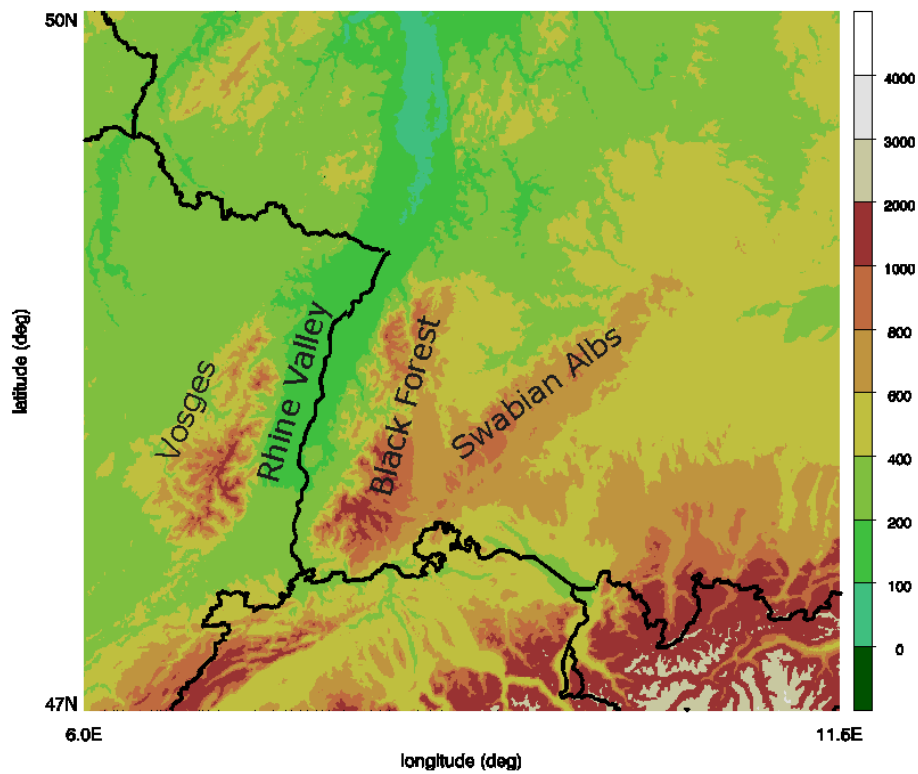


COPS ATLAS

- Die meteorologische Situation vom 1. Juni bis 31. August 2007 -
- The meteorological situation from June 1 till August 31, 2007 -



INTERNAL REPORT No. 1

Institut für Physik der Atmosphäre



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Einleitung - Introduction

Dieser Atlas gibt einen Überblick über die meteorologische Situation an den einzelnen Tagen während der Feldmesskampagne COPS (Convective and Orographically induced Precipitation Study). Zu diesem Zweck werden operationelle Analysen vom ECMWF (European Centre for Medium-Range Weather Forecasts) verwendet. Zudem wird die Qualität der Niederschlagsvorhersagen verschiedener Wettervorhersagemodelle illustriert. Die Modellverifikation erfolgte für den deutschen Abschnitt des COPS Gebiets (COPS-DE, siehe Abb. 1). Dafür wurden auch die Niederschlagsvorhersagen von numerischen Wettermodellen des MAP D-PHASE (Mesoscale Alpine Project Demonstration of Probabilistic Hydrological and Atmospheric Simulation of flood Events in the Alpine region) Projektes verwendet.

This atlas provides an overview over the meteorological situation on all days during the COPS (Convective and Orographically induced Precipitation Study) field experiment, based upon operational ECMWF analyses (European Centre for Medium-Range Weather Forecasts). In addition, the atlas illustrates the quality of precipitation forecasts from various numerical weather prediction models in the German part of the COPS domain (referred to as COPS-DE, see Fig. 1). The models used for this verification exercise were part of the MAP D-PHASE project (Mesoscale Alpine Project Demonstration of Probabilistic Hydrological and Atmospheric Simulation of flood Events in the Alpine region).

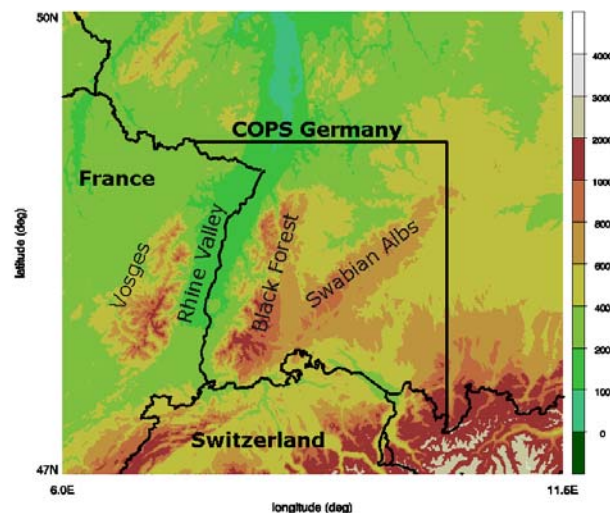


Abbildung 1: Topographische Darstellung der COPS Region. Deutlich ist der Schwarzwald, die schwäbische Alb, die Vogesen und der Oberrheingraben zu erkennen. - *Topography of the COPS region with the Black Forest, the Swabian Alb, the Vosges mountains and the upper Rhine valley.*

Daten und Methodik - Data and methods

- **ECMWF Analysen:** Die Analysen der spektralen Modellversion T799L91 wurden auf ein reguläres Gitter mit einer horizontalen Auflösung von 0,5 Grad interpoliert. Aus den primären Modellvariablen wurden der vertikal integrierte Wasserdampf (TWV), die potentielle Vorticity (PV), sowie die äquivalent-potentielle Temperatur (Θ_e) berechnet.
- **Niederschlagsbeobachtungen:** Die täglichen Stationsdaten wurden mit Hilfe der Methode von *Frei und Schär (1998)* auf ein reguläres Gitter mit einer horizontalen Auflösung von 7 km transformiert. In *Paulat et al. (2008)* ist die Durchführung dieser Methode für Deutschland beschrieben.
- **Niederschlagsvorhersagen:** Es wurden 20 Modelle (siehe Tabelle 1) aus dem Datensatz des MAP D-PHASE Projektes verwendet. Die Tagessummen der Niederschlagsvorhersagen wurden aus den 00-UTC Vorhersagen berechnet, außer für COSMO-DE und COSMOCH2 (Kombination von 00- und 12-UTC Vorhersagen, da die Vorhersagezeit nicht ausreichend ist). Zur Durchführung der Verifikation wurden alle Vorhersagen auf das 7 km Gitter des COSMO-EU transformiert.
- **Verifikation:** Zur Bewertung der Qualität der täglichen Niederschlagsvorhersagen wurden drei Maße verwendet. Zum einen sind dies zwei traditionelle kontinuierliche Maße, der **Root Mean Square Error (RMSE)**

$$RMSE = \sqrt{\frac{1}{N} \sum_{i=1}^N (f_i - o_i)^2},$$

der mittlere Fehler (Bias)

$$Bias = \frac{1}{N} \sum_{i=1}^N (f_i - o_i)$$

zum anderen ein neu entwickeltes objekt-orientiertes Bewertungsmaß "SAL" *Wernli et al. (2008)*.

- **ECMWF analyses:** *The analyses produced with the spectral model version T799L91 have been interpolated onto a regular grid with a horizontal resolution of 0.5°. The vertically integrated water vapour (TWV), potential vorticity (PV), and equivalent potential temperature (Θ_e) have been calculated from the primary model variables.*
- **Precipitation observations:** *Using the method by Frei and Schär (1998), the daily rain gauge measurements have been gridded onto a regular grid with a horizontal resolution of 7 km. The application of this method for Germany is described in Paulat et al. (2008).*
- **Precipitation forecasts:** *20 deterministic models from the MAP D-PHASE data set (see Table 1) have been used to calculate daily precipitation forecasts from the simulations started at 00 UTC (except for COSMO-DE and COSMOCH2 where forecasts starting at 00 and 12 UTC had to be combined). For the verification of the precipitation forecasts, all model fields have been transformed onto the grid of the COSMO-EU model.*

- **Verification:** Three different measures have been used to assess the quality of the daily precipitation forecasts: two traditional continuous measures, the **Root Mean Square Error**,

$$RMSE = \sqrt{\frac{1}{N} \sum_{i=1}^N (f_i - o_i)^2},$$

the mean error

$$Bias = \frac{1}{N} \sum_{i=1}^N (f_i - o_i)$$

and the newly developed object-oriented quality measure SAL (Wernli et al. 2008).

Nr.	Abkürzung	Modell	horizontale Auflösung	Konvektions-parametrisierung	Startzeitpunkt der Vorhersagen (UTC)
1	EU	COSMO-EU	7 km	ja	00,03,06,09,12,15,18,21
2	DE	COSMO-DE	2,8 km	nein	00,03,06,09,12,15,18,21
3	CH7	COSMOCH7	7 km	ja	00,12
4	CH2	COSMOCH2	2,2 km	nein	00,03,06,09,12,15,18,21
5	EURO	LMEURO	7 km	ja	00
6	ITA	LMITA	2,8 km	nein	00
7	AT	ALADAT	9,6 km	ja	00,12
8	I7	LAMI7	7 km	ja	00,12
9	FR	ALADFR	9,5 km	ja	00
10	AROME	AROME	2,5 km	nein	00
11	NH8	MESONH8	8 km	ja	00
12	NH2	MESONH2	2 km	nein	00
13	33	QBOLAM33	33 km	ja	12
14	11	QBOLAM11	11 km	ja	00
15	60	MM5_60	60 km	ja	00,12
16	15	MM5_15	15 km	ja	00,12
17	CT	MM5_CT	2 km	nein	00
18	4D	MM5_4D	2 km	nein	00
19	IS2	ISACMOL2	2 km	nein	00
20	EC	ECMWF	~30 km	ja	00

Tabelle 1: Liste der betrachteten Modelle, ihre Nummer bzw. Abkürzung bei der Darstellung der Verifikationsergebnisse, die horizontale Auflösung, Information zur Konvektionsparametrisierung sowie die Startzeitpunkte der Modellvorhersagen. - *List of models, their labels used below for the presentation of the verification results, their horizontal resolution, information about the parameterization of deep convection, and the start times of the model forecasts.*

Zeitlicher Verlauf der täglichen Niederschlagssummen - Time series of daily precipitation

Abbildung 2 zeigt den zeitlichen Verlauf des mittleren Tagesniederschlags im Zeitraum Juni bis August 2007 für den deutschen Bereich des COPS Gebiets.

The time series of daily averaged precipitation in the German part of the COPS domain is shown in Fig. 2 for the time period June till August 2007.

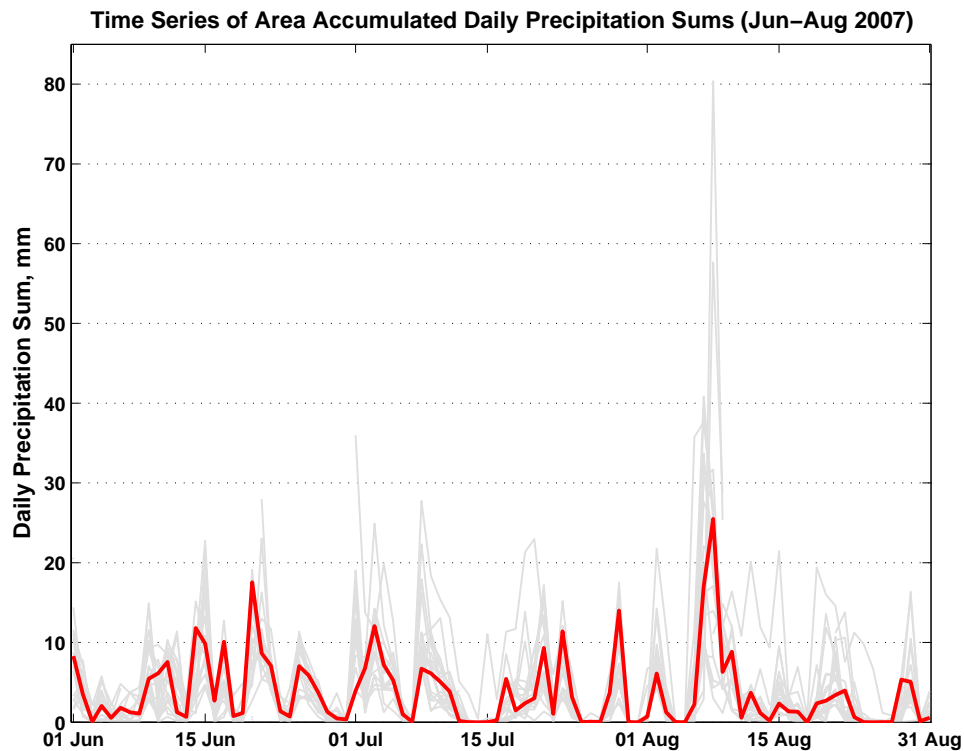


Abbildung 2: Zeitreihe der täglichen Niederschlagssumme für den deutschen Abschnitt des COPS Gebiets im Zeitraum von Juni-August 2007. In rot ist der Verlauf der gegitterten Stationsbeobachtungen dargestellt. Die grauen Linien geben die einzelnen Modellvorhersagen an. - *Time series of averaged daily precipitation in the German part of the COPS domain during June-August 2007. The red line represents gridded observations and the grey lines the time series from the individual forecast models.*

Tägliche Zusammenfassung der meteorologischen Situation - Daily summary of the meteorological situation

Auf den folgenden Seiten werden für jeden Tag der COPS Messkampagne, 1. Juni bis 31. August 2007, jeweils sechs verschiedene Abbildungen gezeigt. Diese sind folgendermaßen angeordnet:

- **links oben:** PV (Farbe) in pvu auf der 320 K Isentropen und Bodendruck (Konturen, alle 5 hPa) um 12 UTC.
- **rechts oben:** Vertikal integrierter Wasserdampf (Farbe) in g/m^2 , Windvektoren in 10 m (Pfeile) und Bodendruck in hPa um 12 UTC.
- **links mitte:** Gegitterte Niederschlagssumme aus Beobachtungen in mm für Deutschland.
- **rechts mitte:** Θ_e (Farbe) in K auf 925 hPa und Bodendruck (Konturen) in hPa um 12 UTC.
- **links unten:** SAL Diagramm der täglichen Niederschlagsvorhersagen der verschiedenen Modelle (Nummerierung siehe Tabelle 1). Für Details zum SAL Diagramm, siehe Wernli et al. (2008).
- **rechts unten:** Traditionelle Bewertungsmaße, oben der RMSE und unten der Bias (beide in mm), für die täglichen Niederschlagsvorhersagen der verschiedenen Modelle.

In the following, for each day of the COPS field experiment from 1 June 1 till 31 August 2007, six figures will be shown representing the following information:

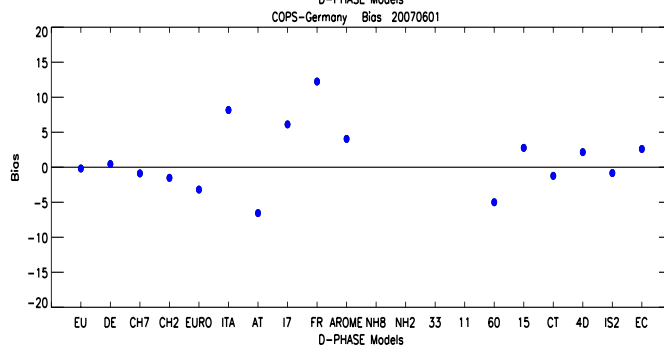
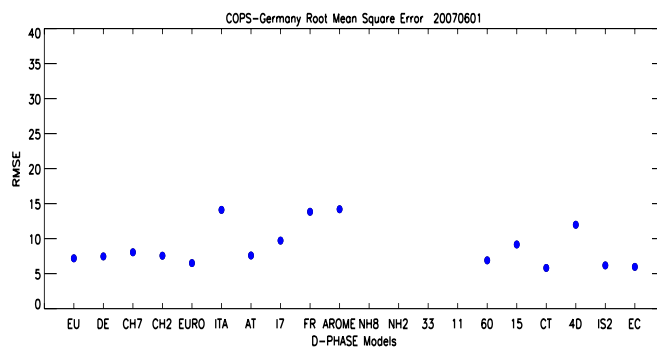
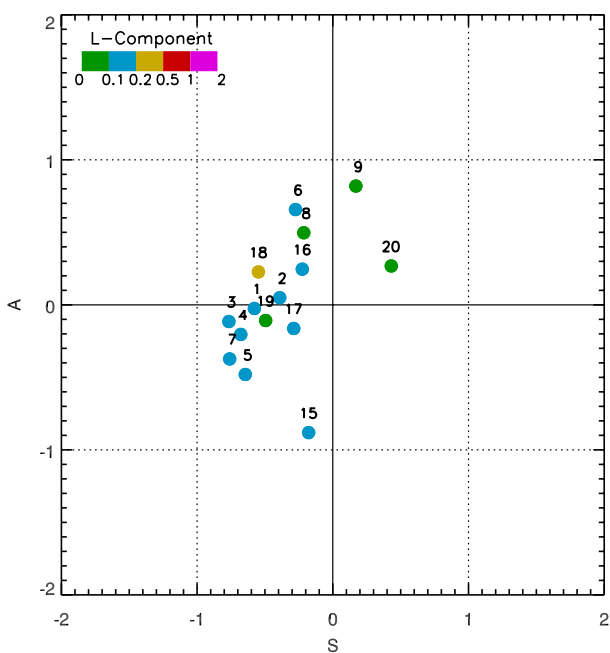
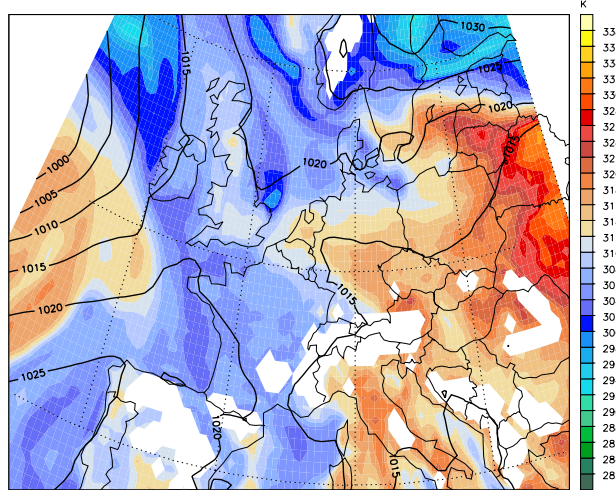
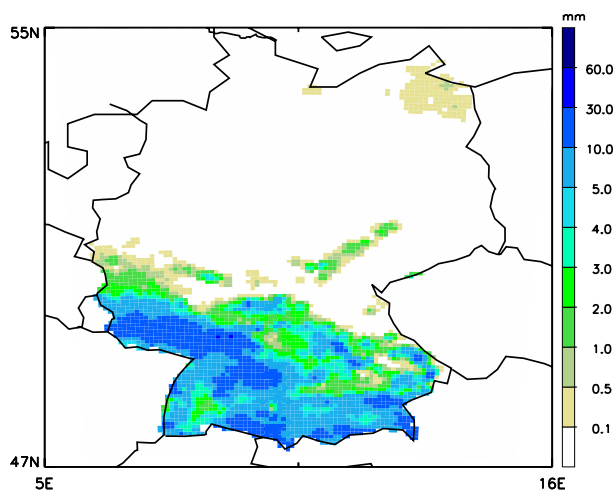
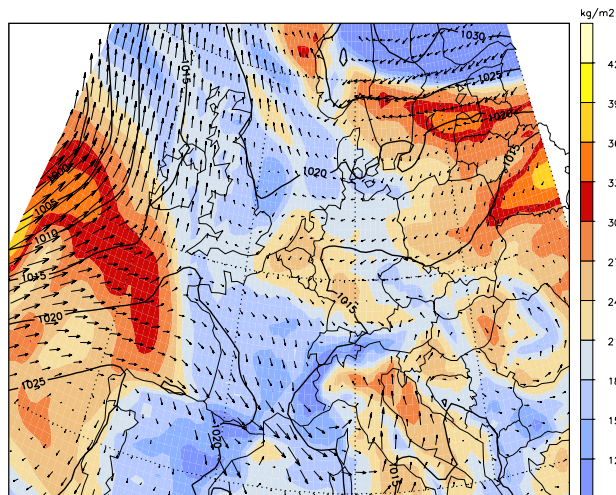
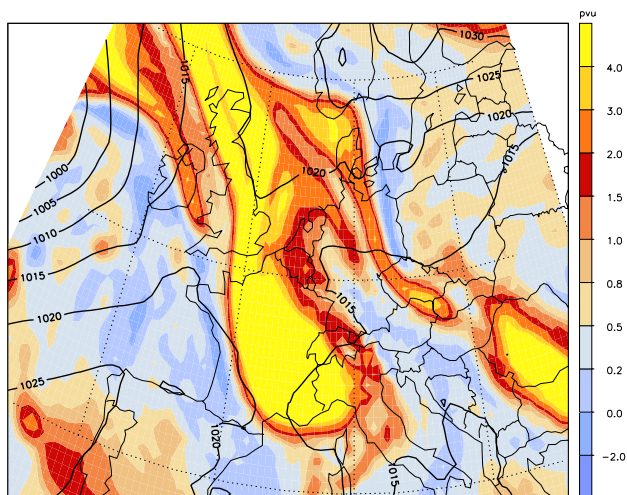
- **top left:** *PV (colors, in pvu) on the 320-K isentrope and sea level pressure (contours, every 5 hPa) at 12 UTC.*
- **top right:** *Vertically integrated water vapour TWV (colors, in g/m^2), 10-m wind vectors (arrows) and sea level pressure (contours, every 5 hPa) at 12 UTC.*
- **middle left:** *Observed daily precipitation in Germany (in mm/day).*
- **middle right:** *Θ_e (colors, in K) on 925 hPa and sea level pressure (contours, every 5 hPa) at 12 UTC.*
- **bottom left:** *SAL diagram for the daily precipitation forecasts from the models listed in Table 1. Every dot represents one model. For details of the diagram see Wernli et al. (2008).*
- **bottom right:** *Traditional error measures (top: RMSE, bottom: BIAS, both in mm) for the models' daily precipitation forecasts.*

Danksagung - Acknowledgements

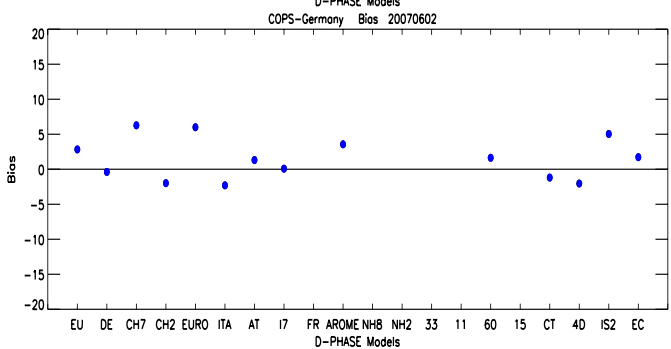
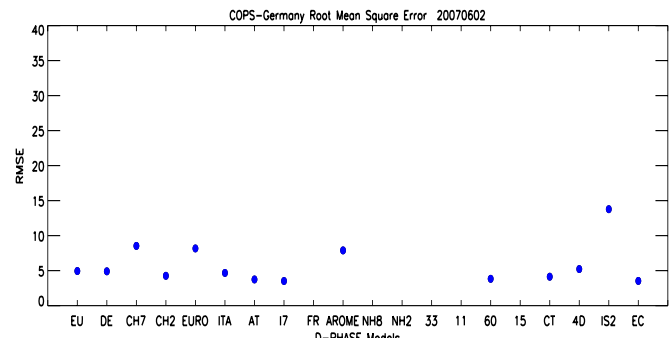
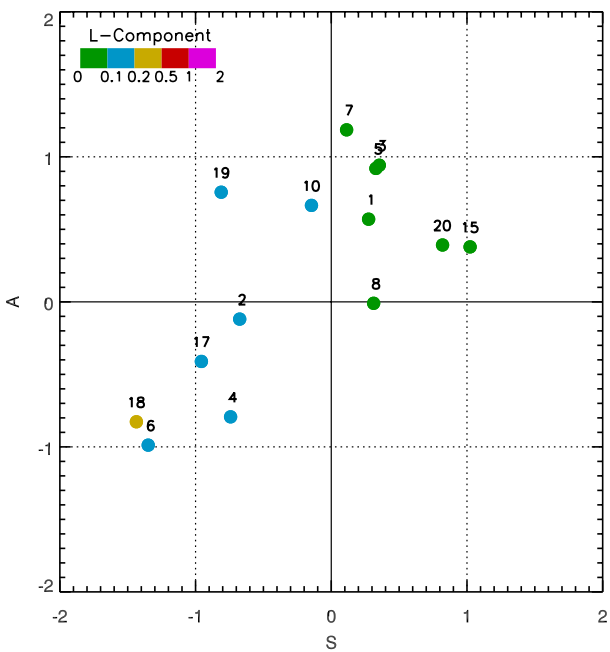
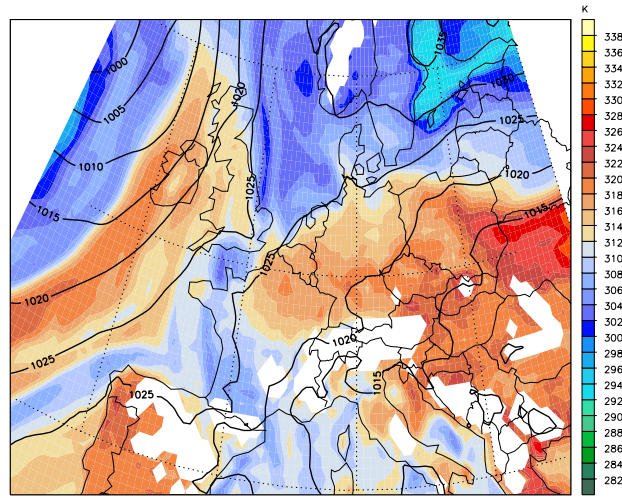
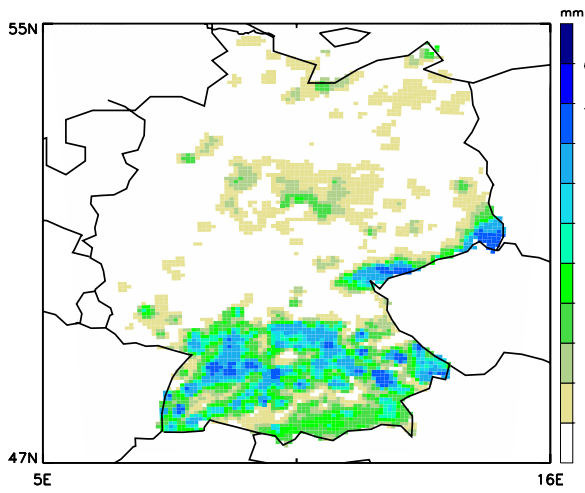
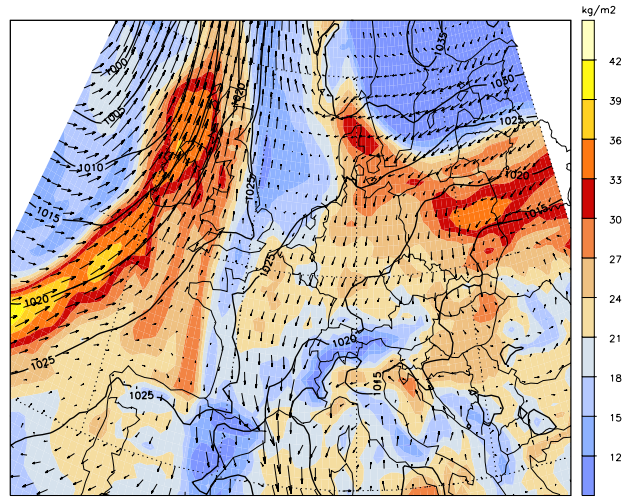
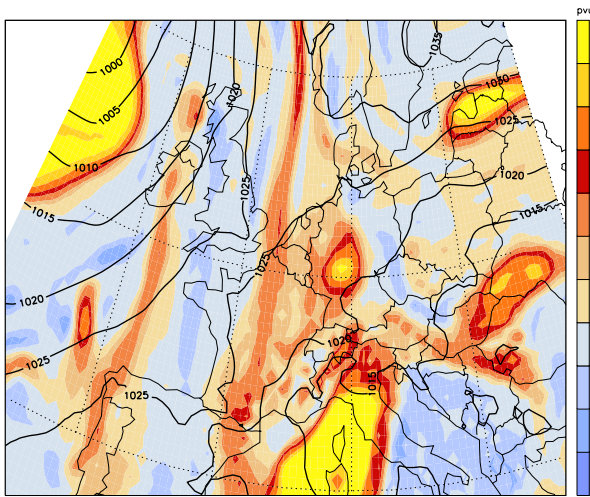
Diese Arbeit wurde gefördert durch das DFG Schwerpunktprogramm SPP-1167 “Quantitative Niederschlagsvorhersage”. Wir danken dem Deutschen Wetterdienst (DWD) für die Bereitstellung der Niederschlagsmessungen und für den Zugang zu den ECMWF Analysen. Zudem danken wir dem MAP D-PHASE Projekt für den Zugang zu den Niederschlagsvorhersagen.

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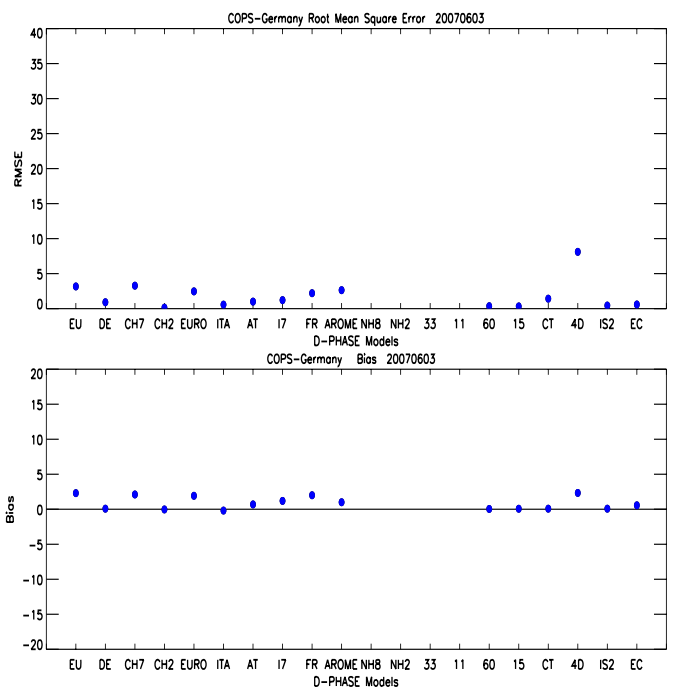
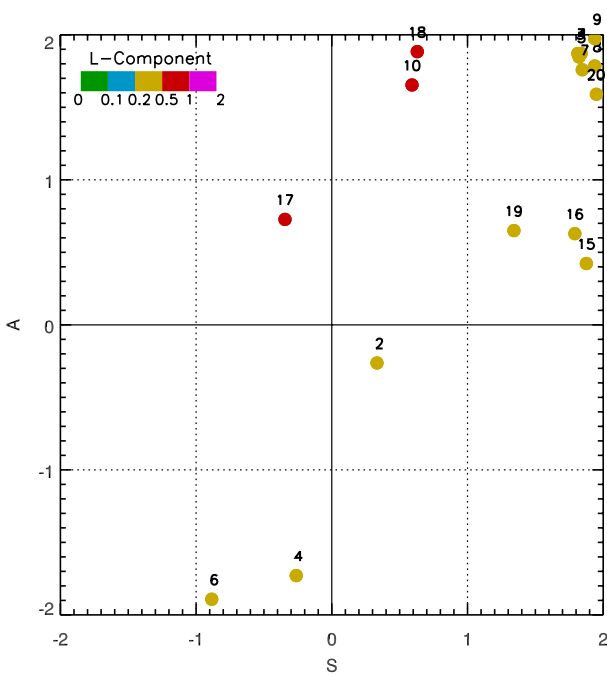
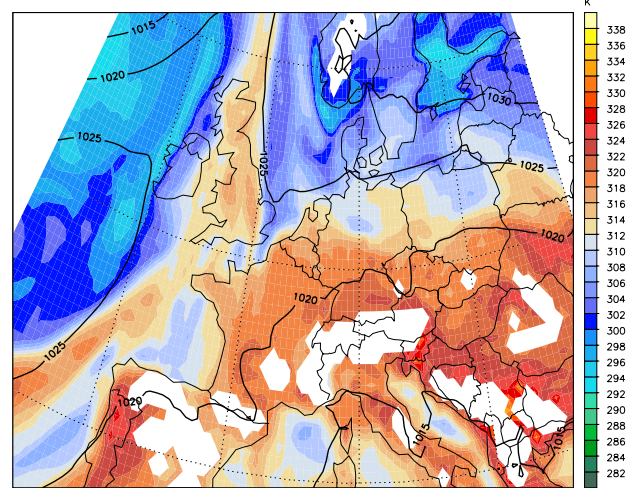
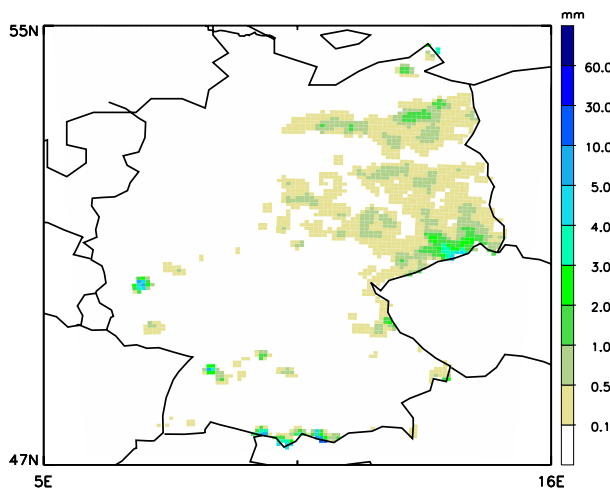
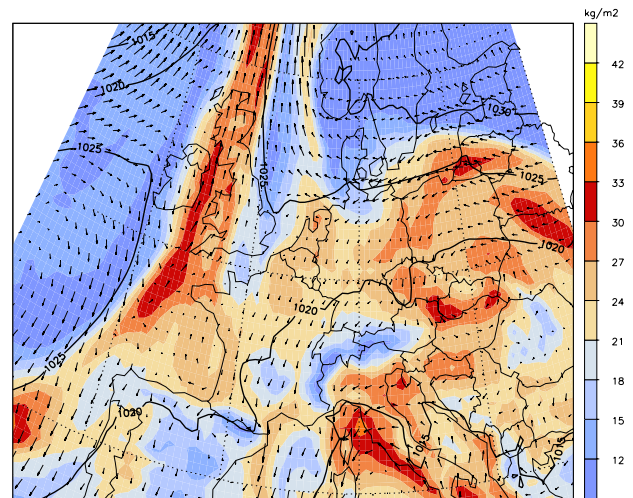
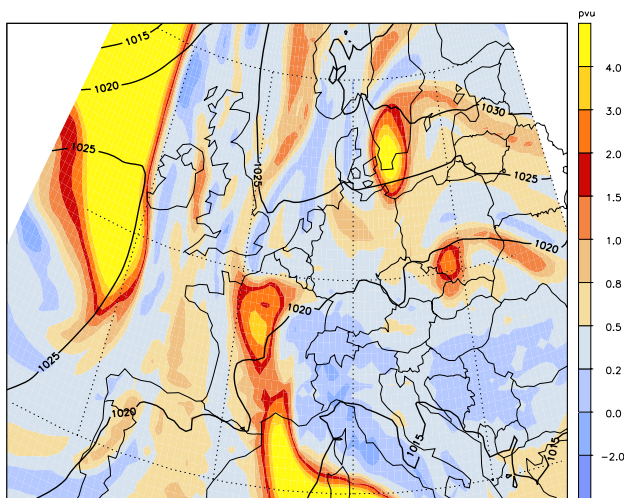
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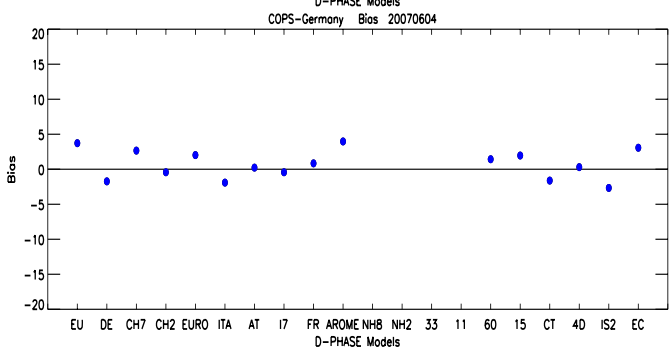
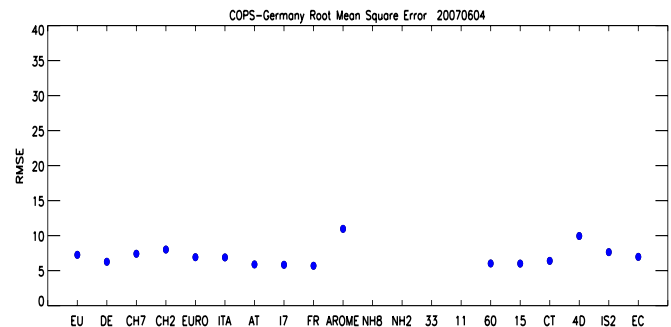
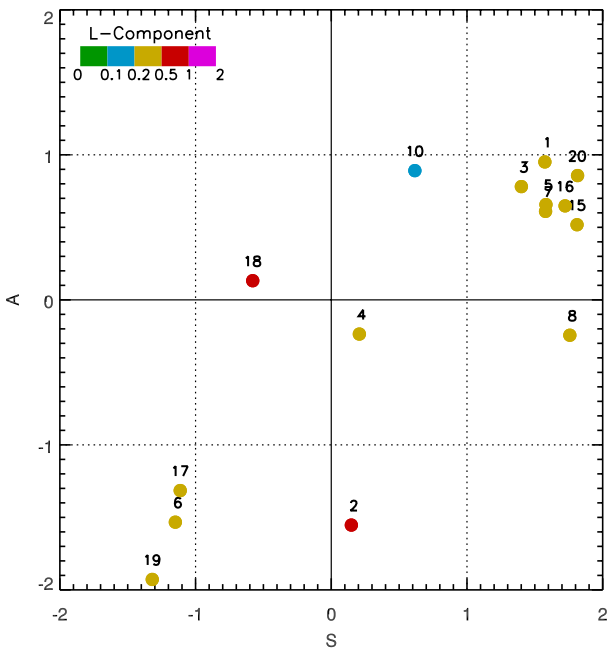
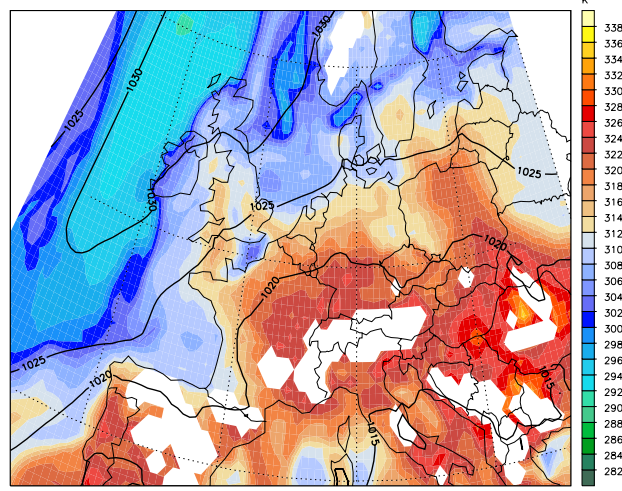
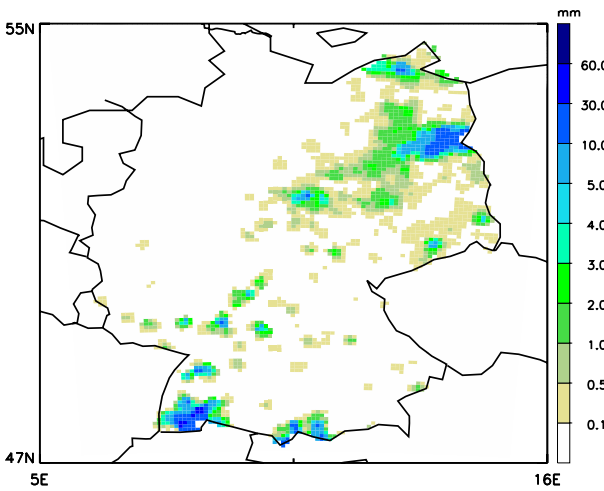
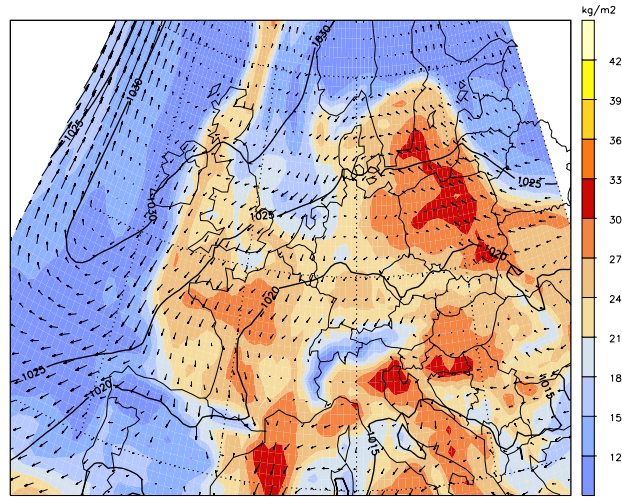
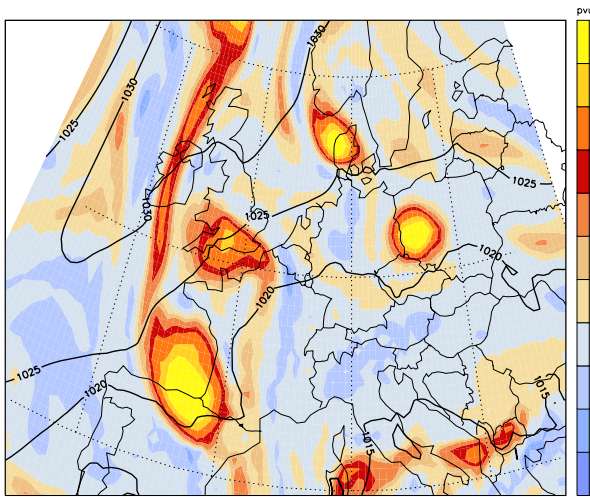
Meteorologische Situation und Qualität der Niederschlagsvorhersage für COPS-DE am 1. Juni 2007.



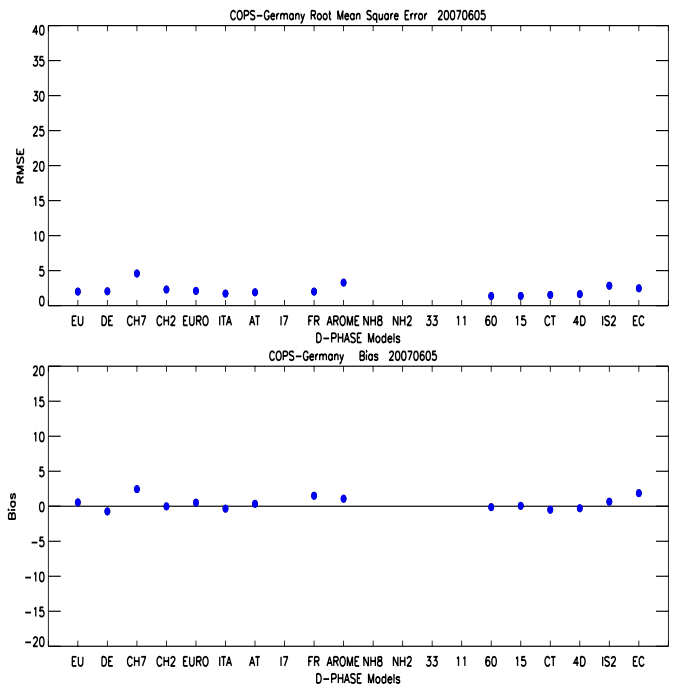
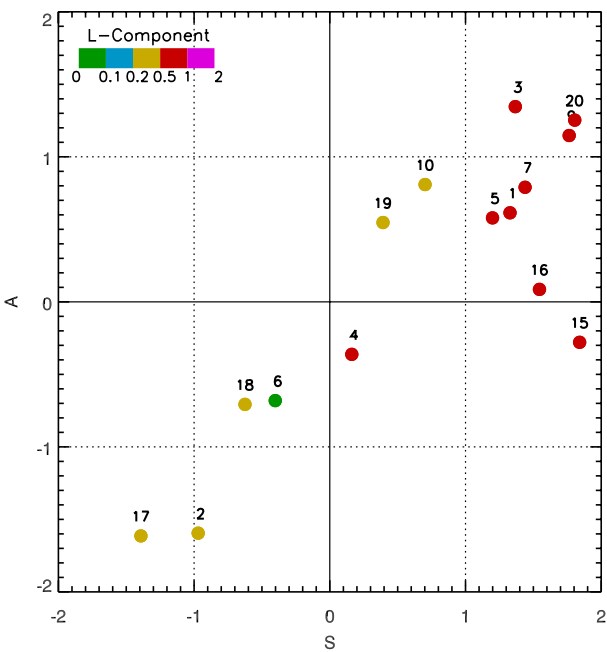
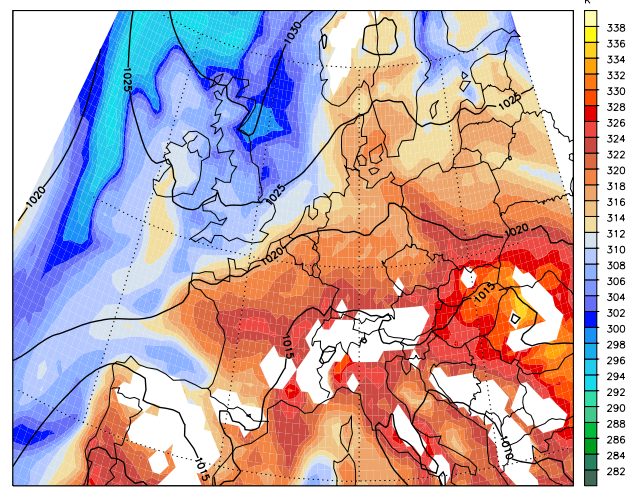
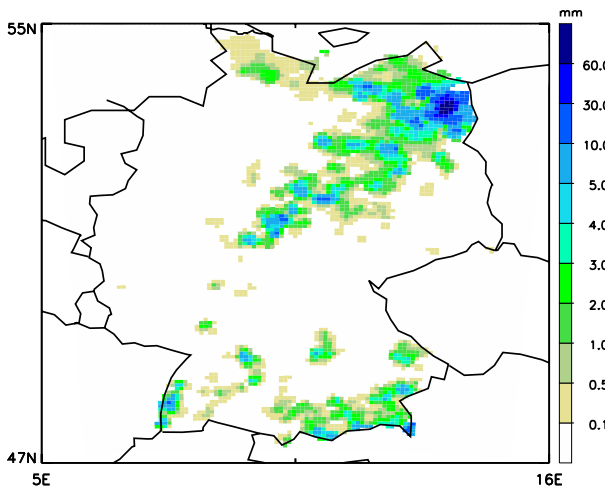
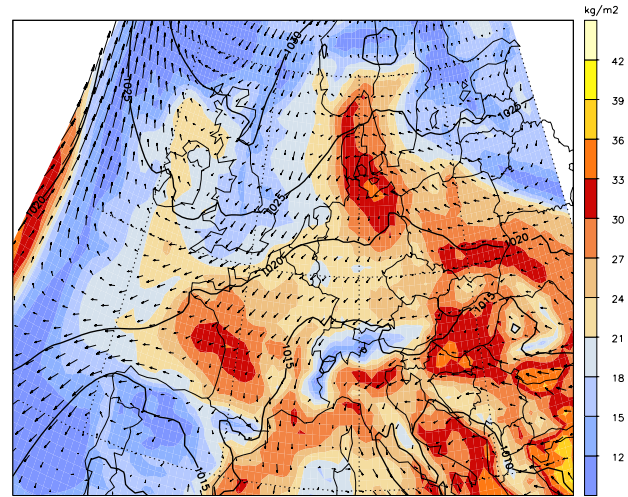
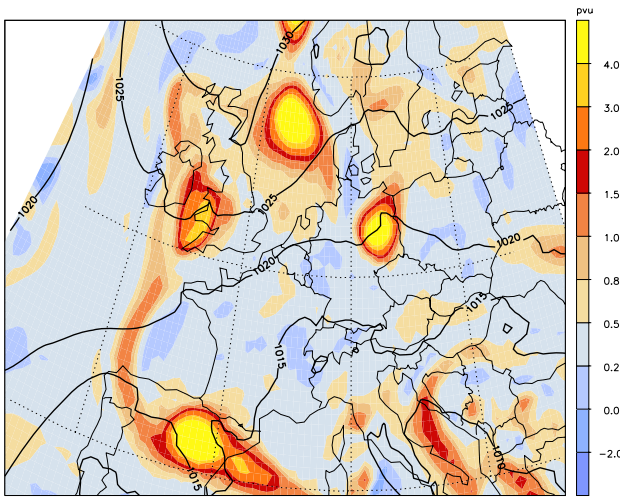
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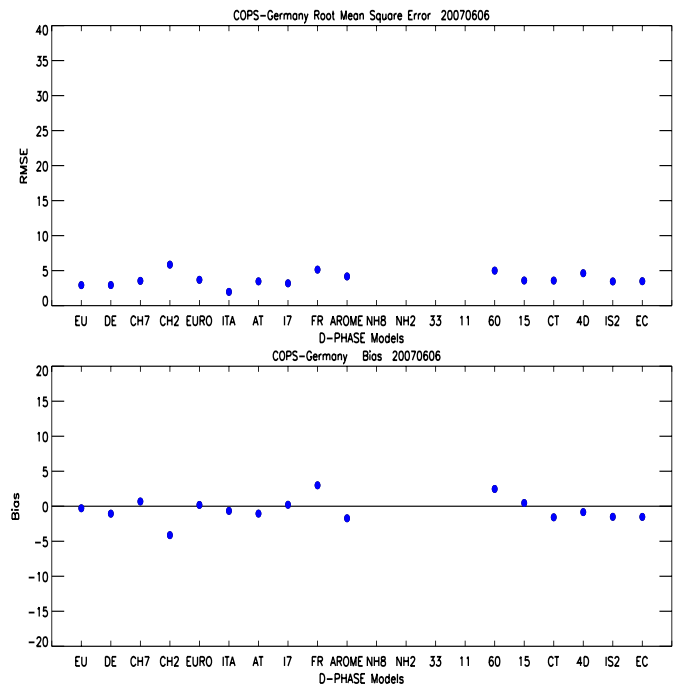
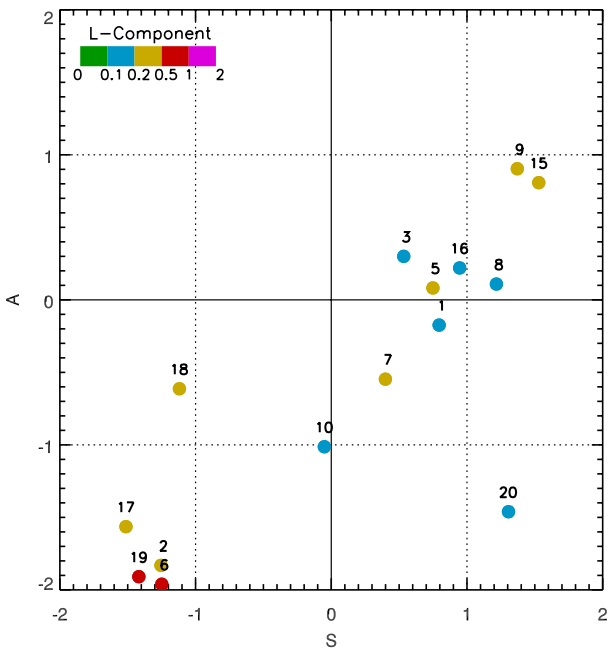
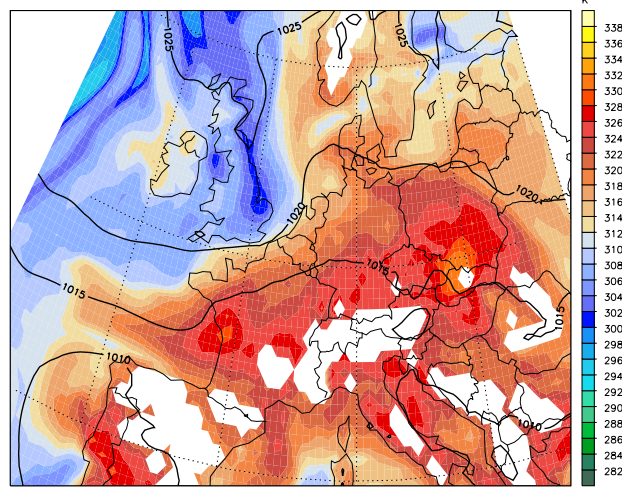
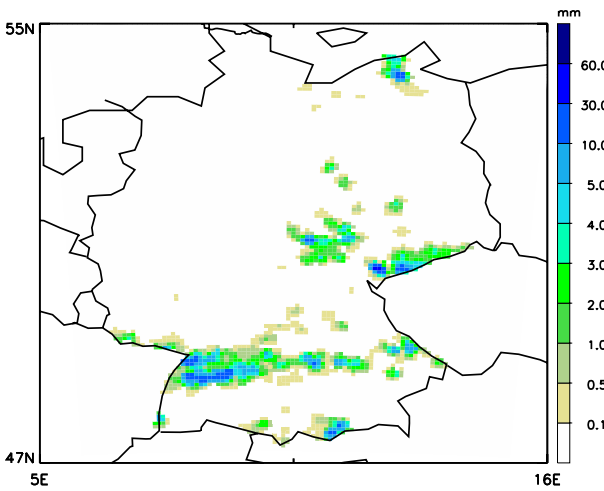
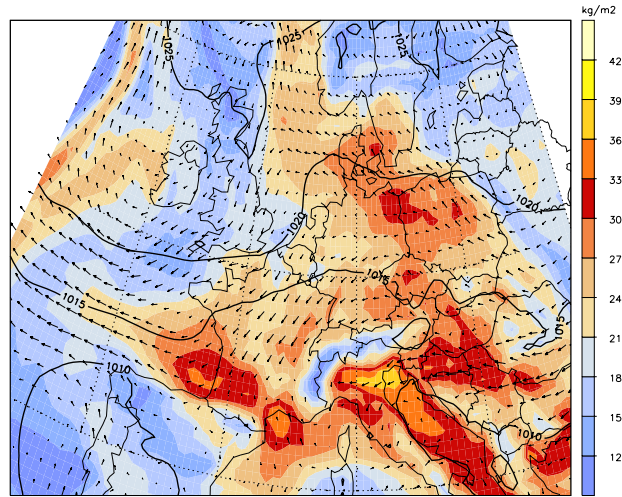
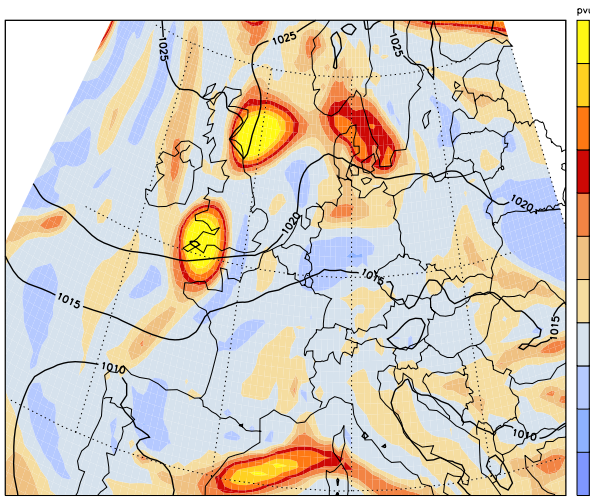
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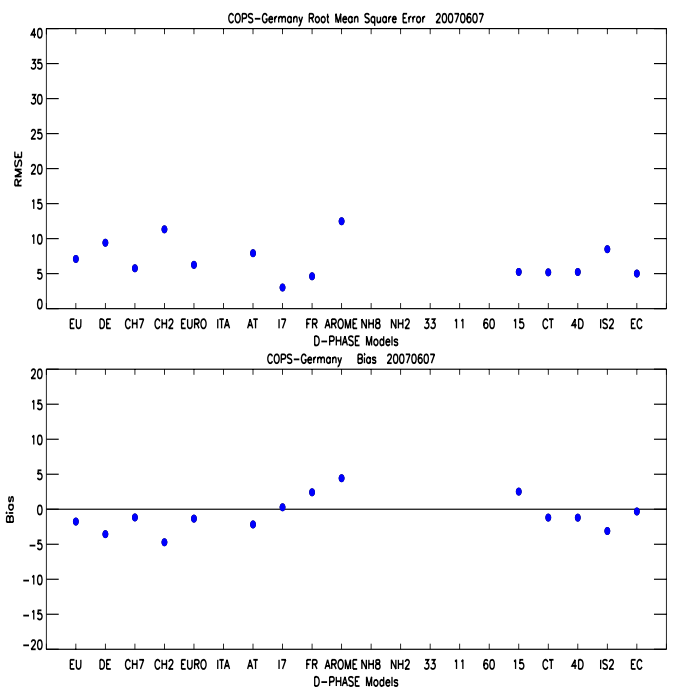
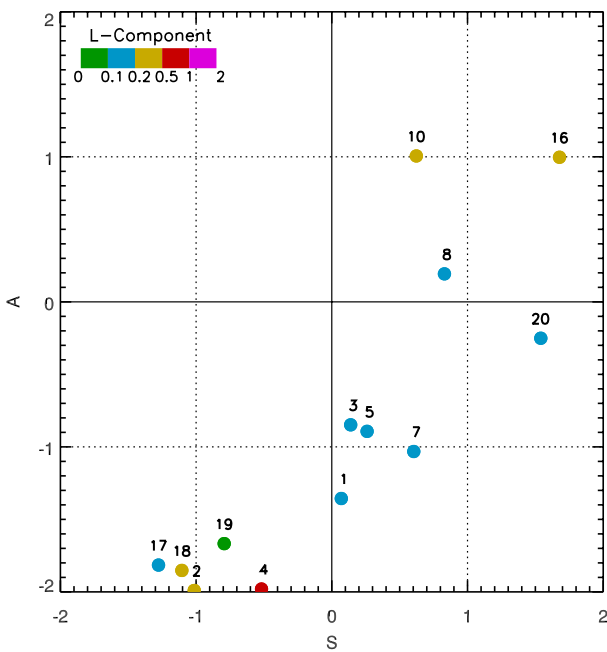
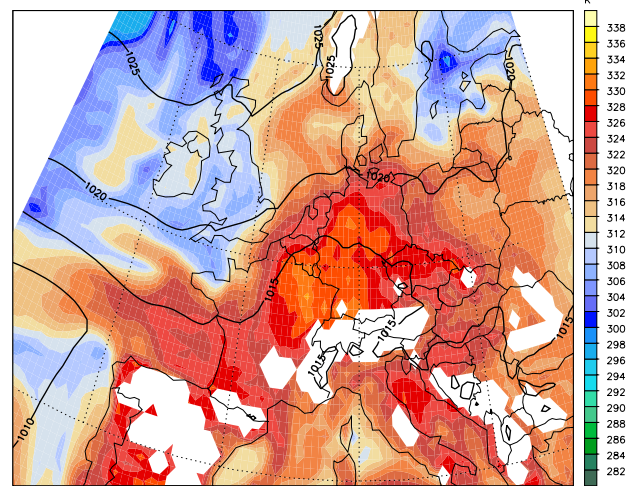
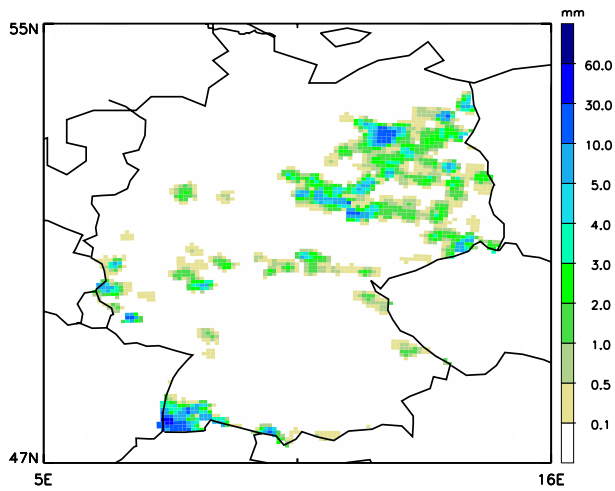
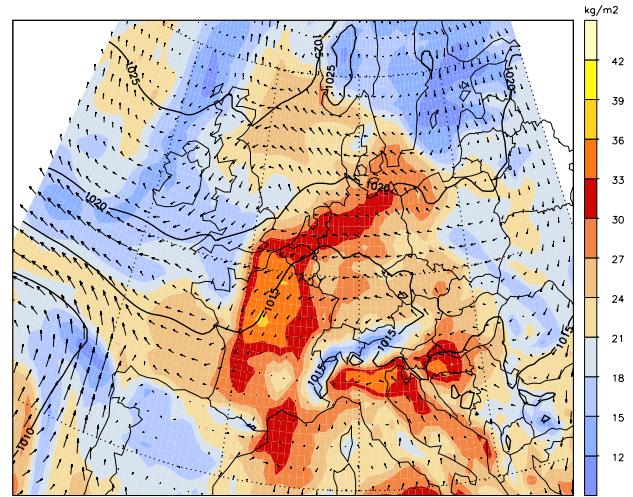
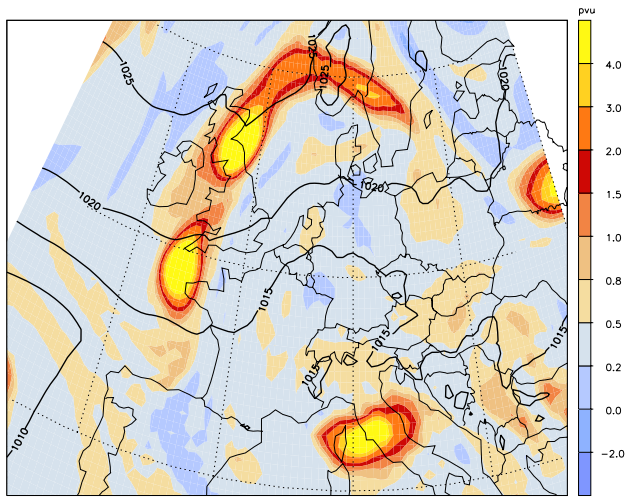
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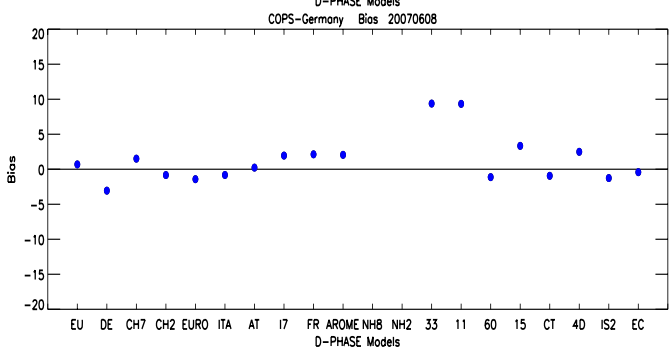
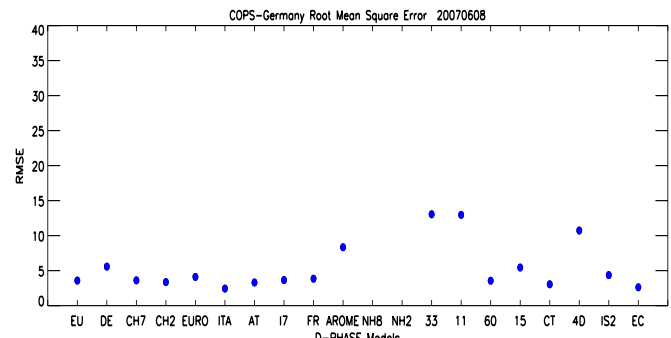
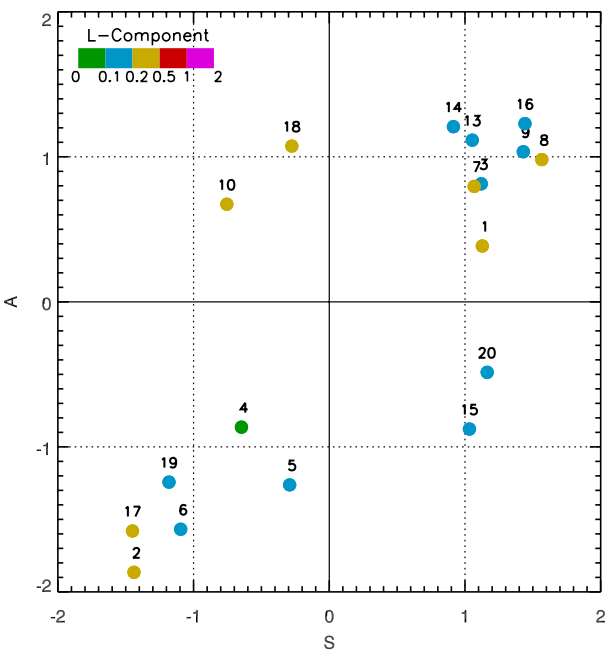
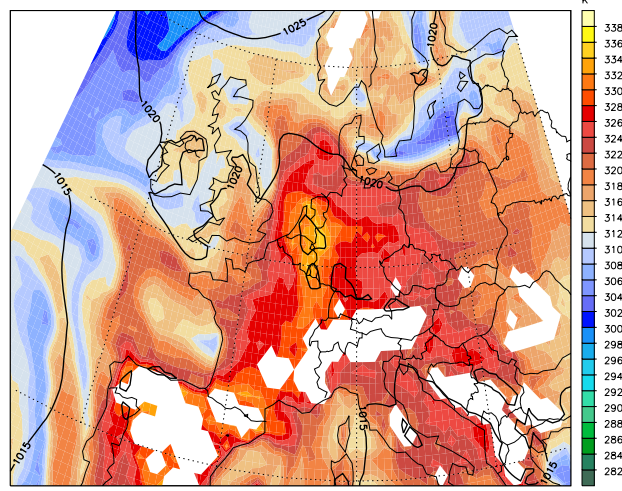
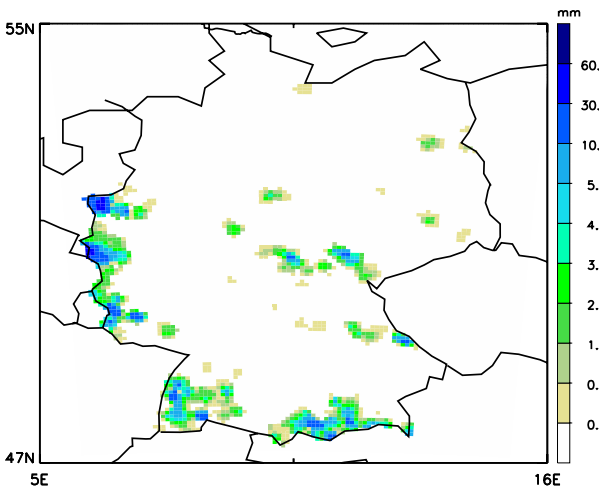
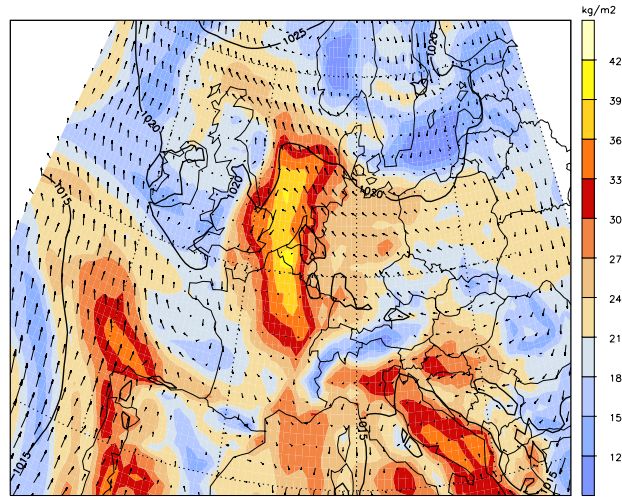
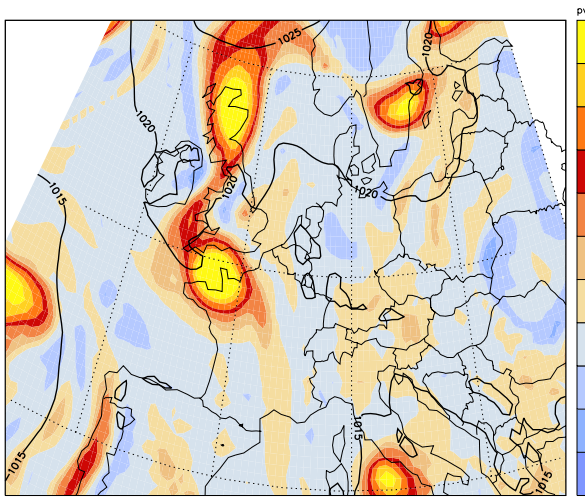
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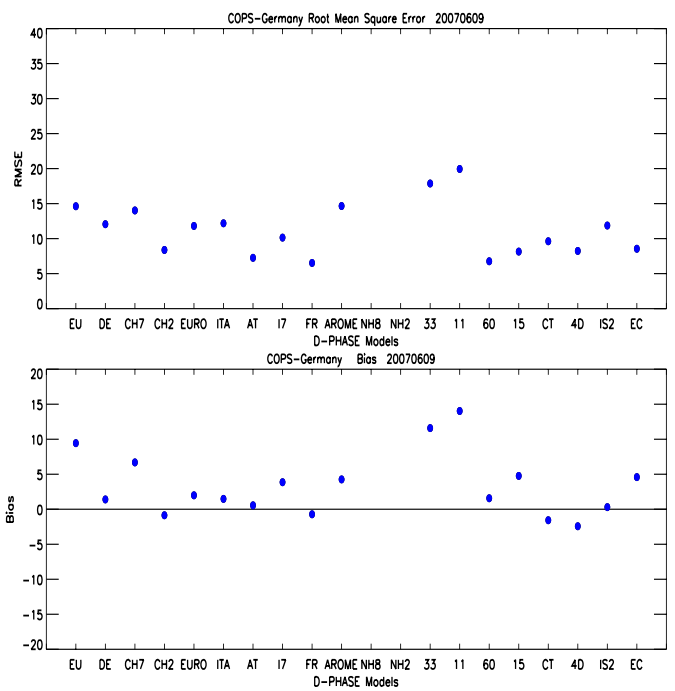
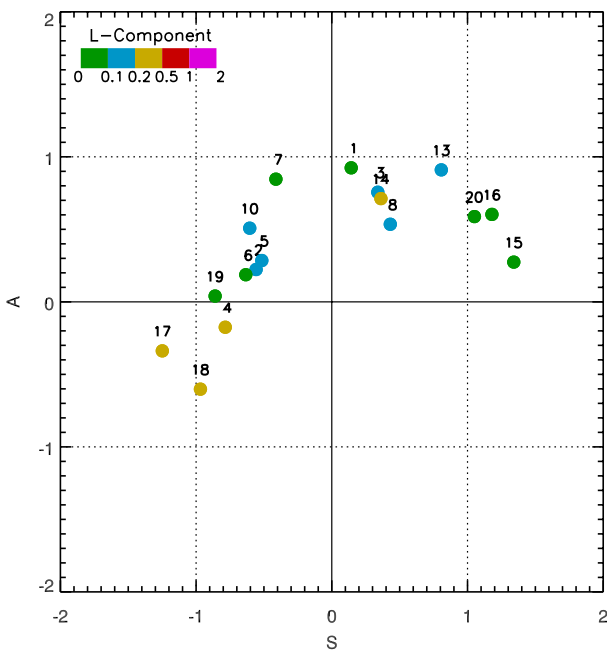
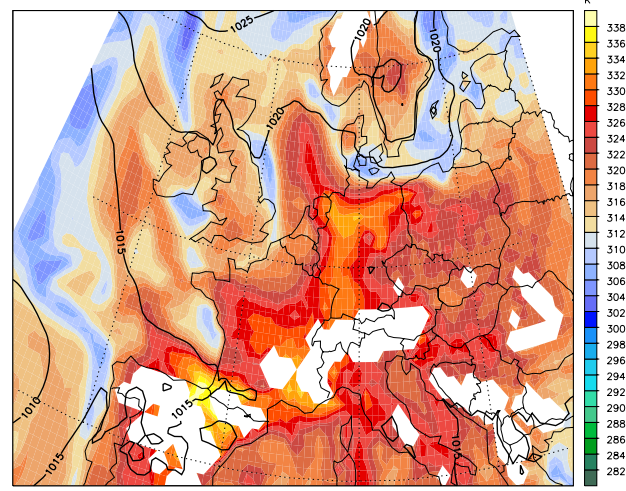
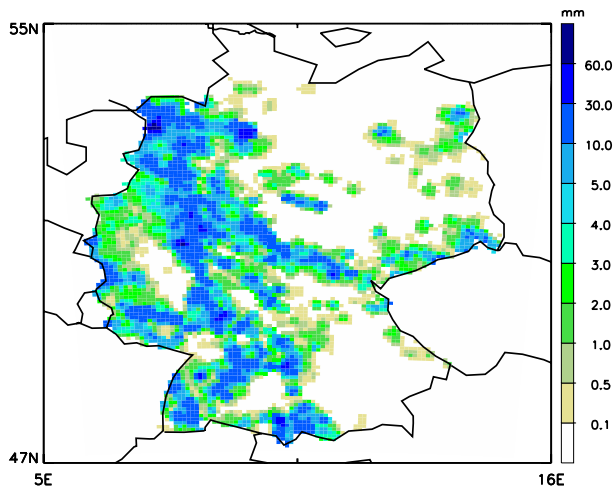
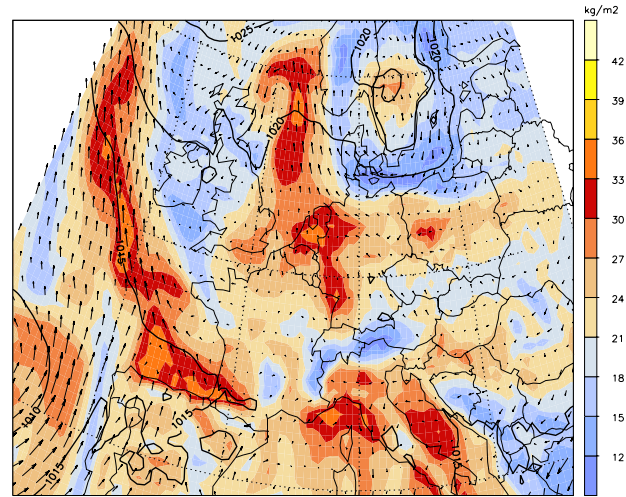
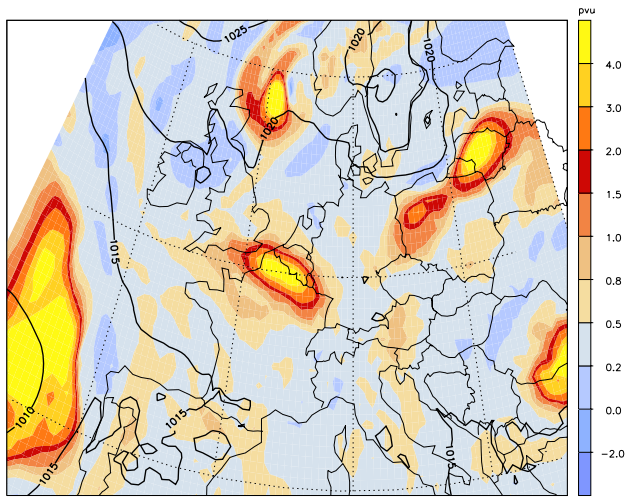
Meteorologische Situation und Qualität der Niederschlagsvorhersage für COPS-DE am 6. Juni 2007.



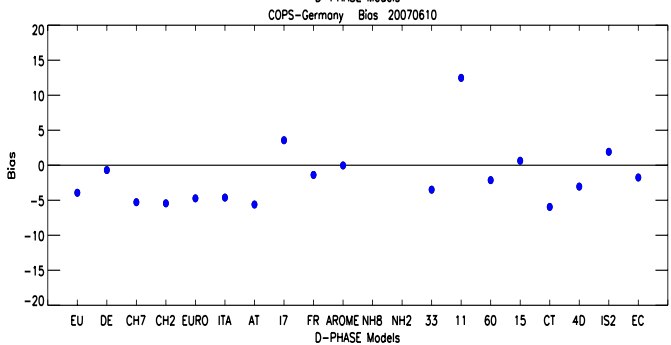
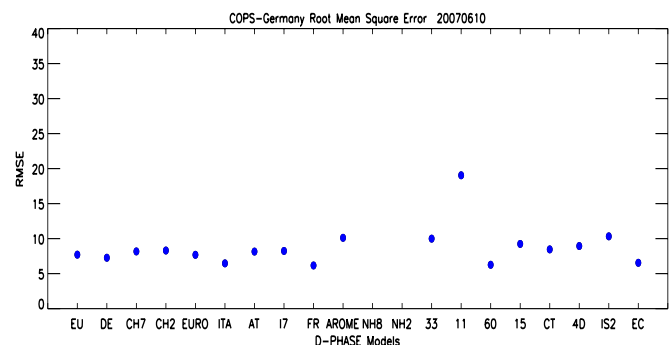
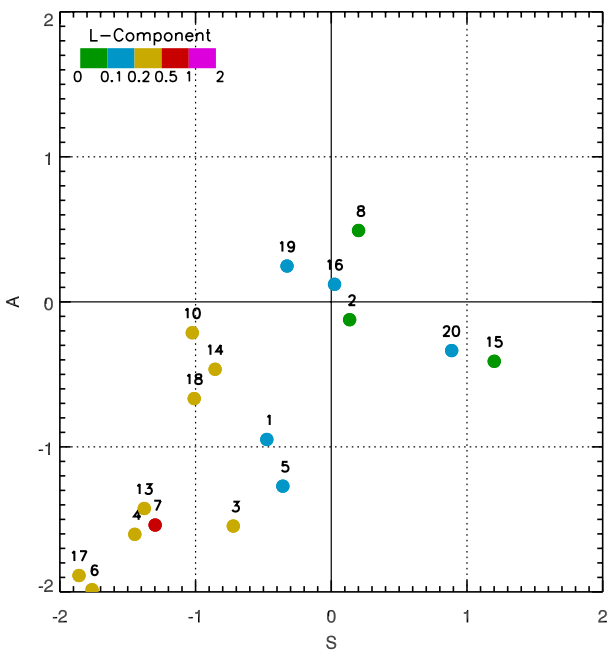
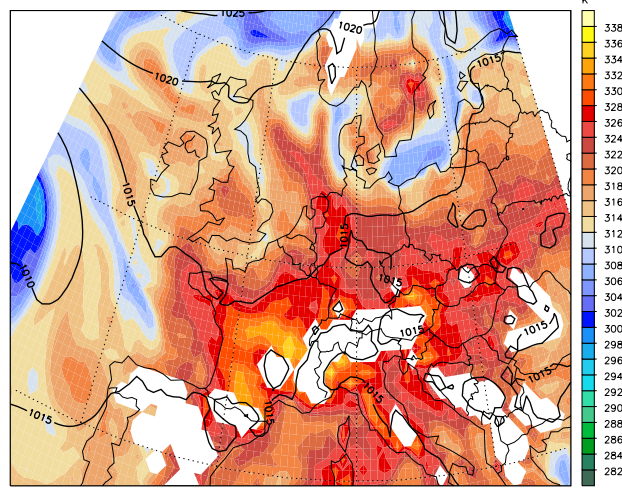
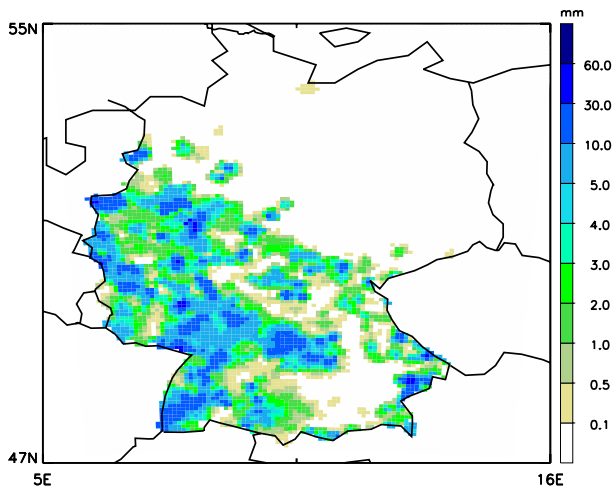
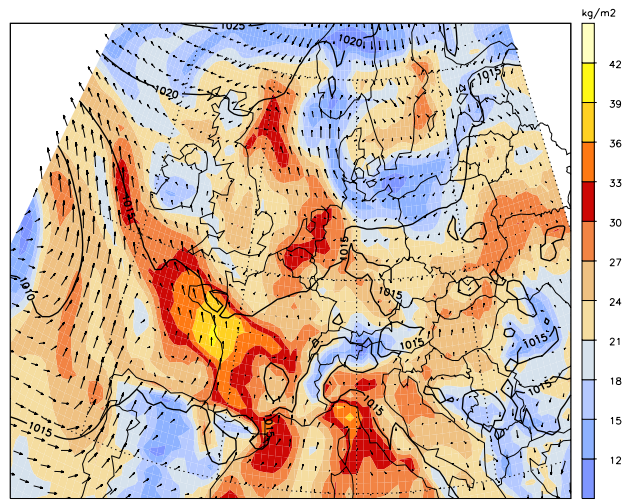
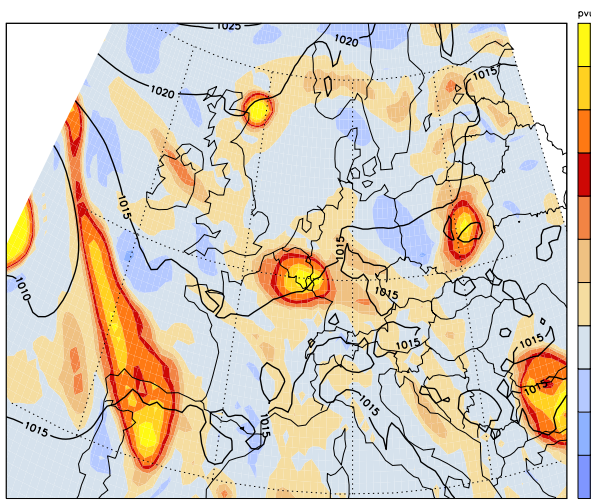
Meteorologische Situation und Qualität der Niederschlagsvorhersage für COPS-DE am 7. Juni 2007.



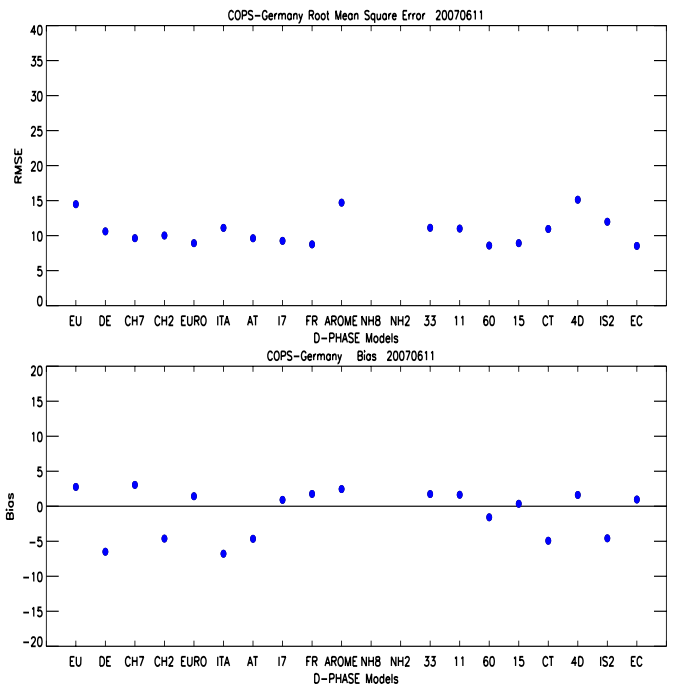
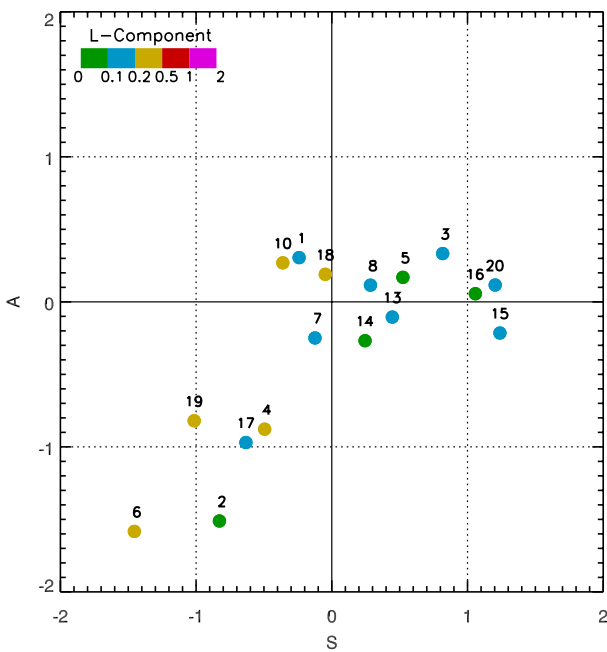
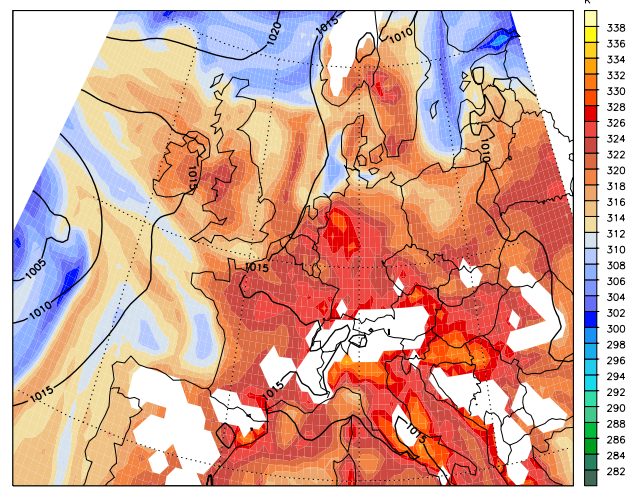
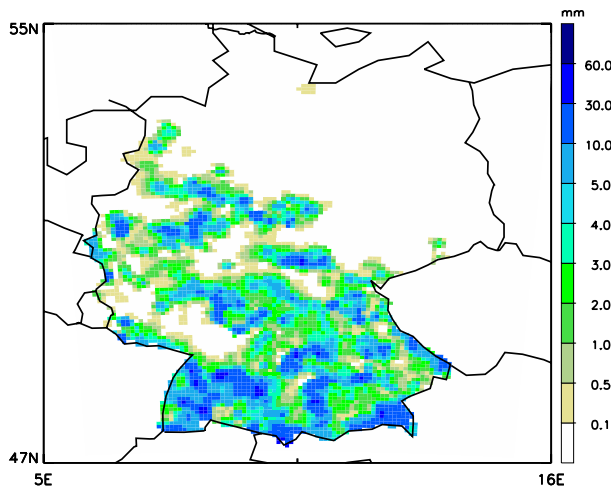
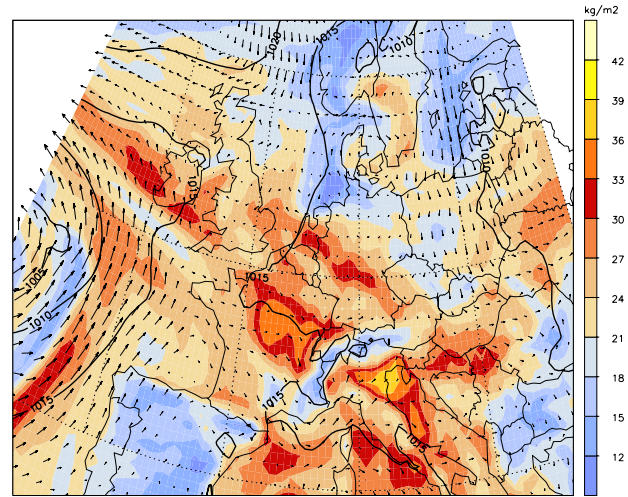
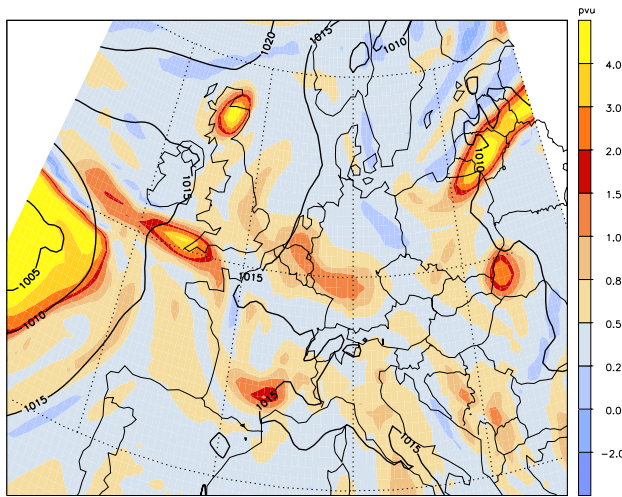
Meteorologische Situation und Qualität der Niederschlagsvorhersage für COPS-DE am 8. Juni 2007.



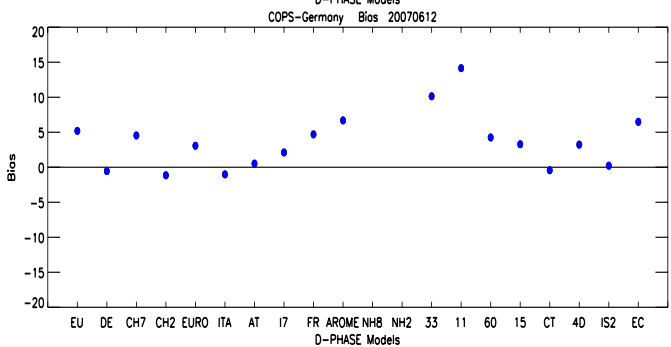
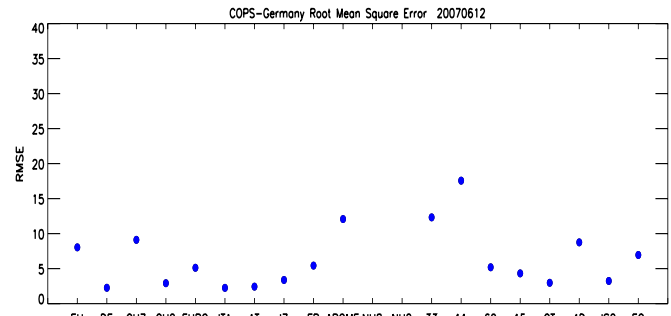
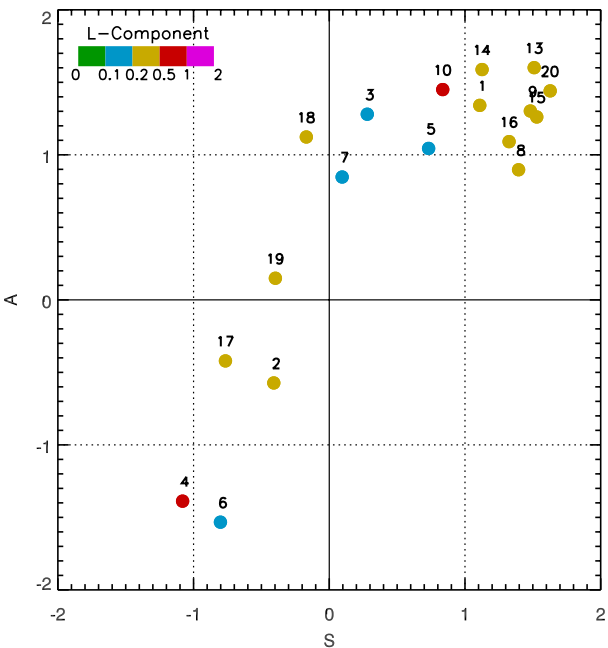
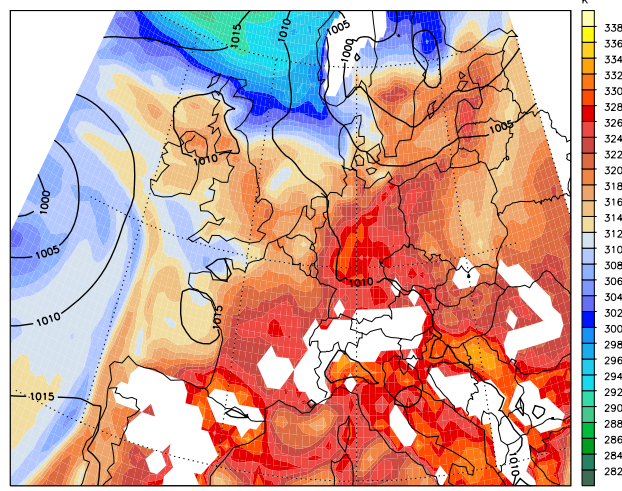
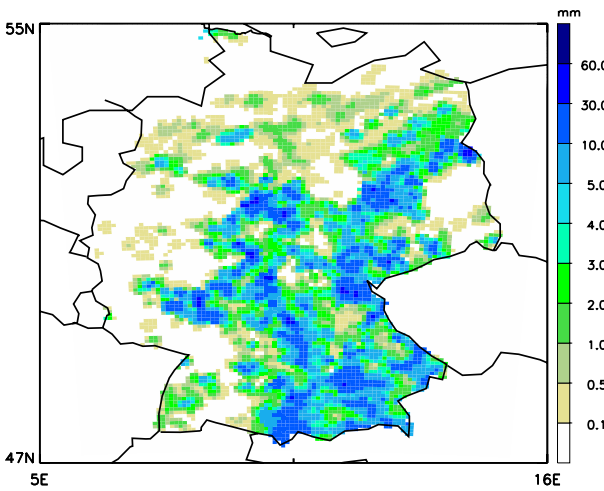
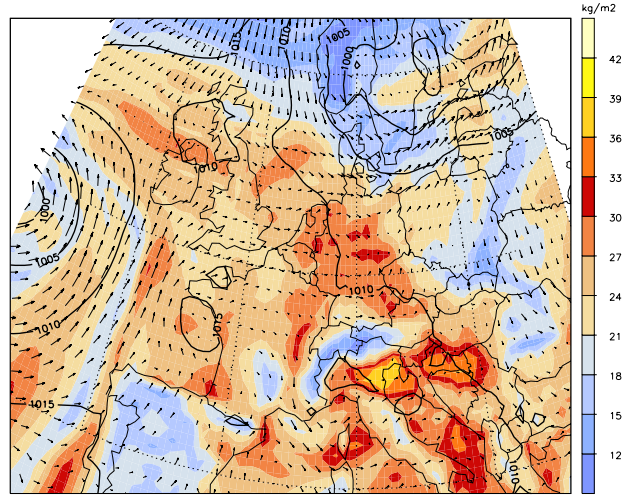
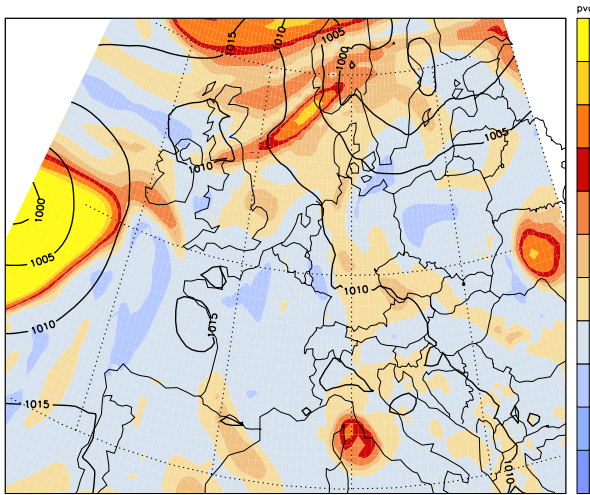
Meteorologische Situation und Qualität der Niederschlagsvorhersage für COPS-DE am 9. Juni 2007.



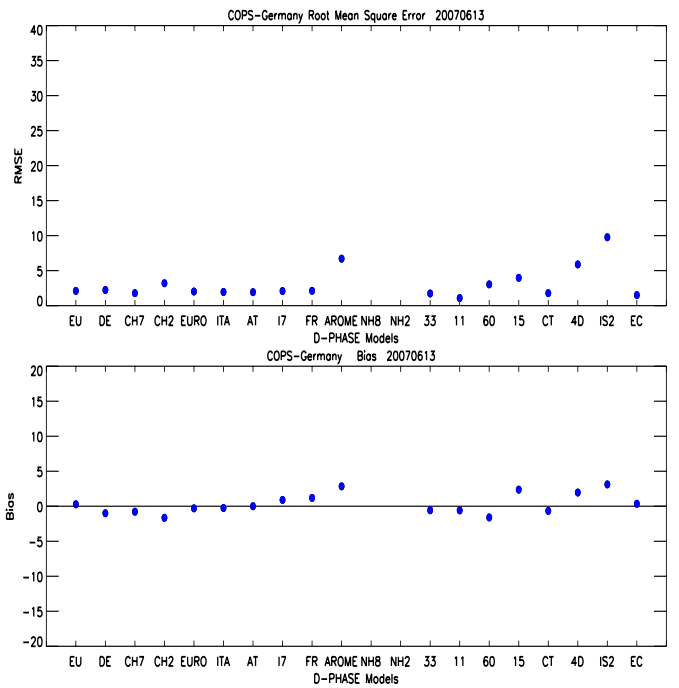
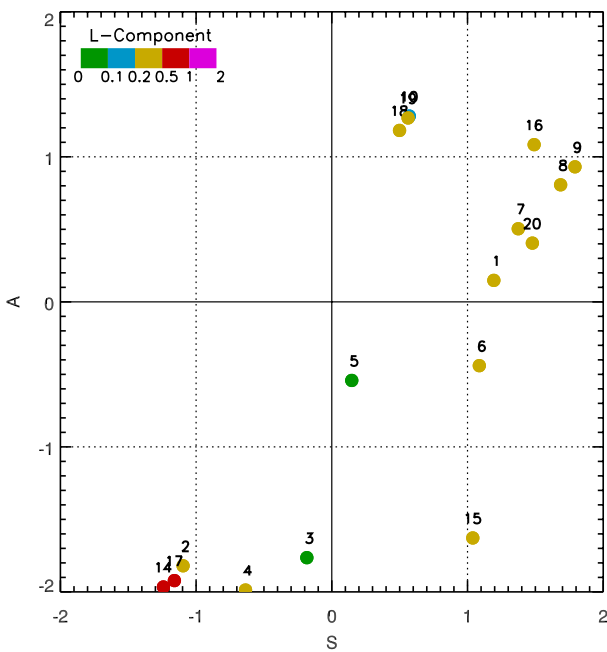
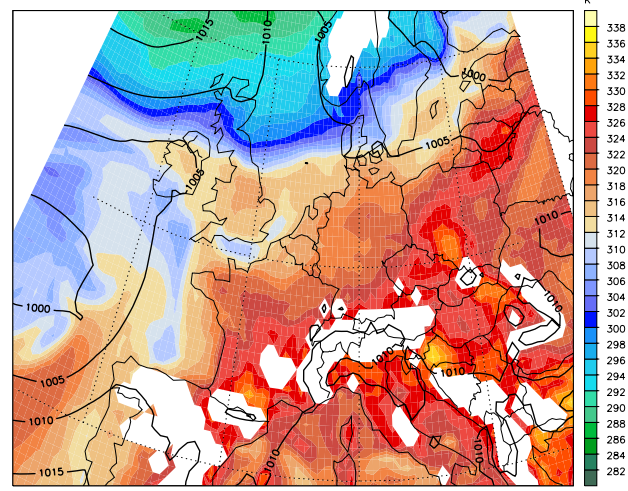
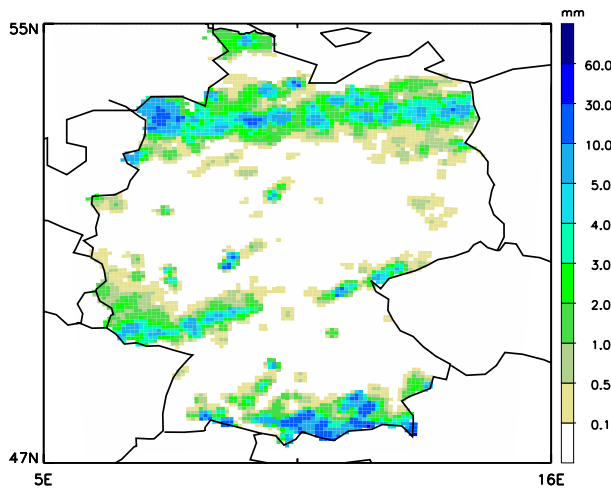
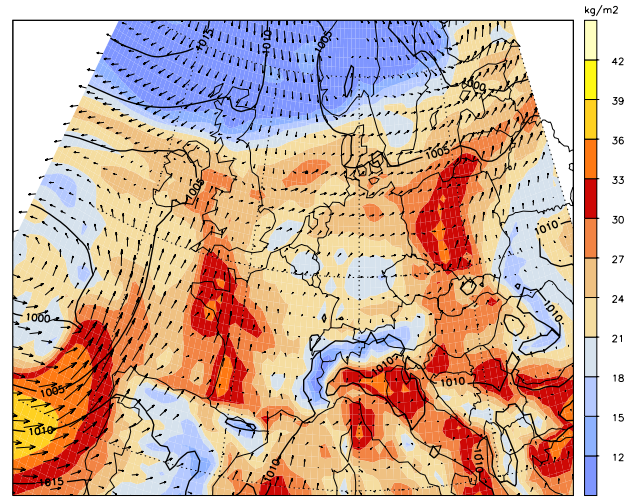
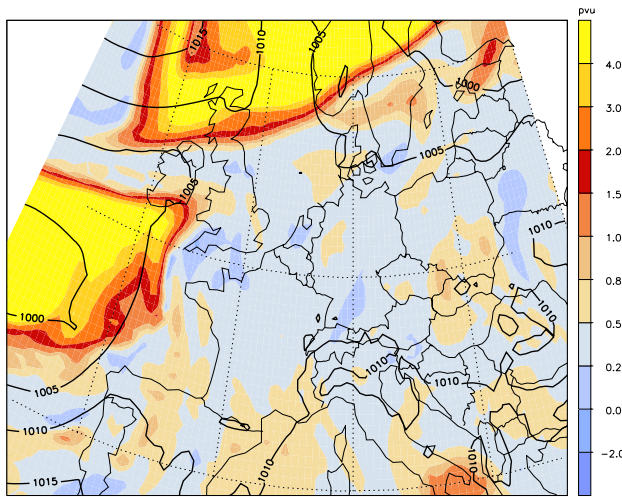
Meteorologische Situation und Qualität der Niederschlagsvorhersage für COPS-DE am 10. Juni 2007.



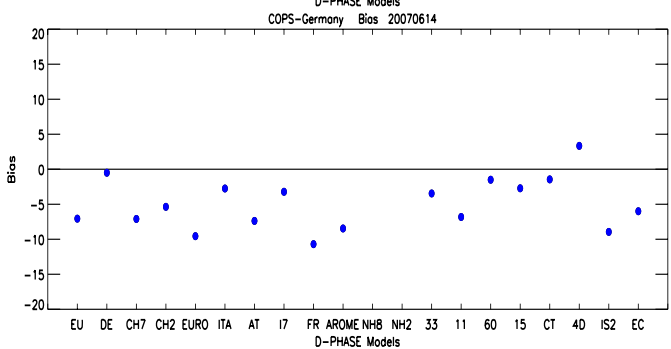
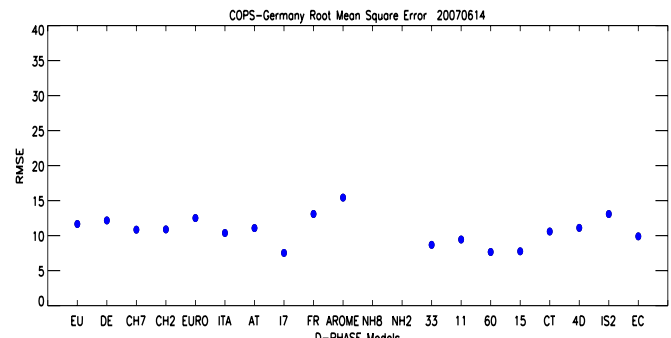
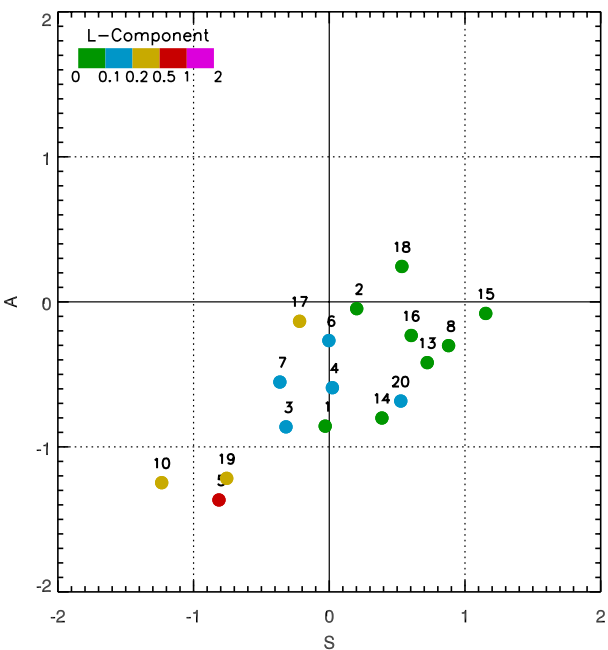
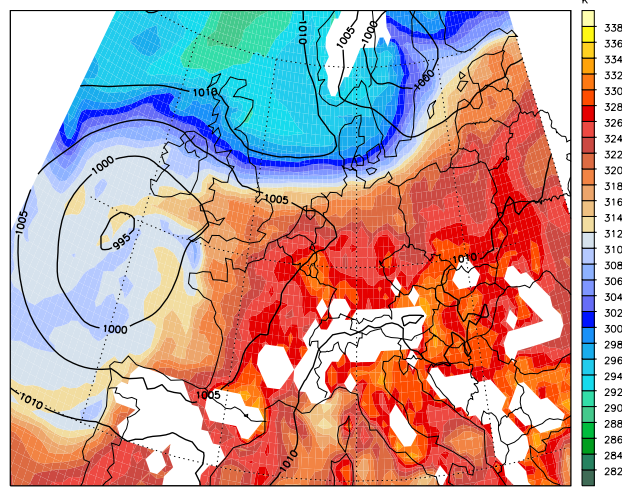
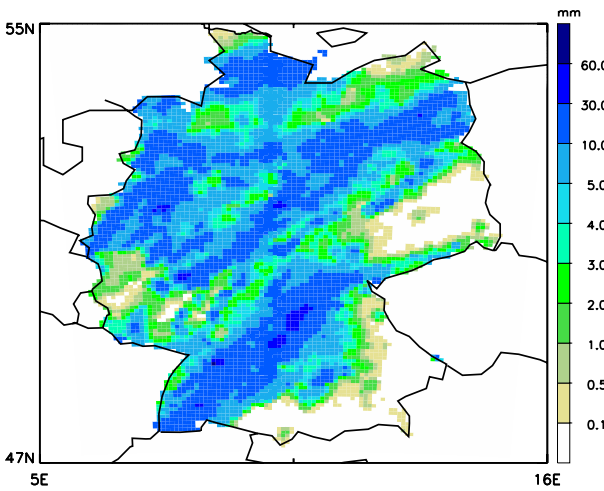
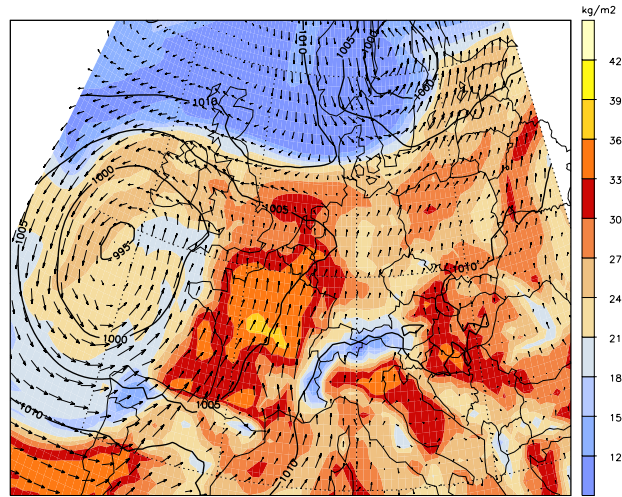
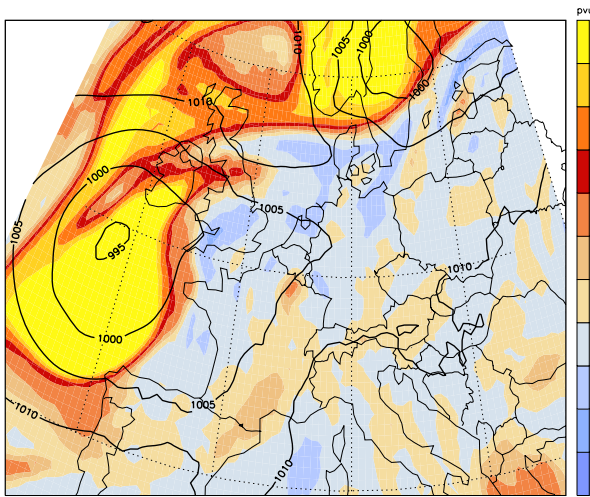
Meteorologische Situation und Qualität der Niederschlagsvorhersage für COPS-DE am 11. Juni 2007.



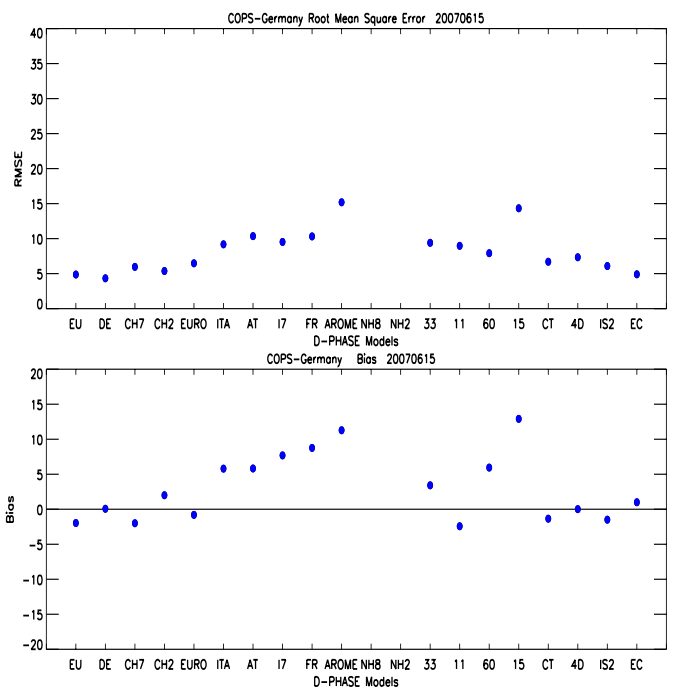
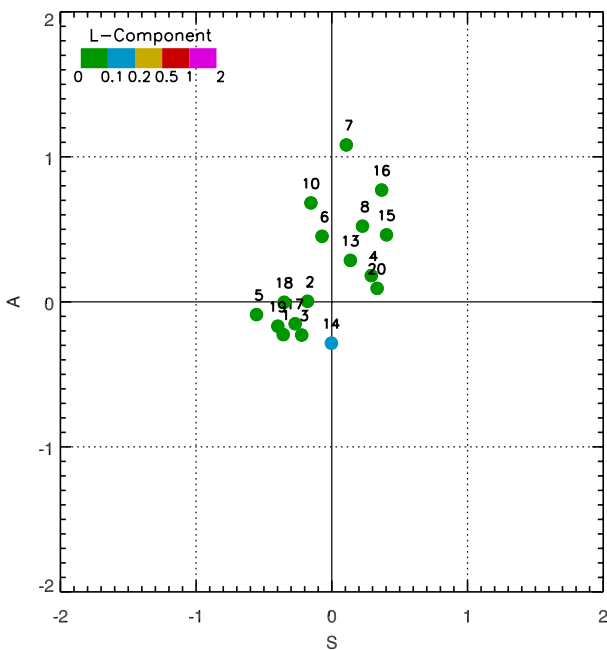
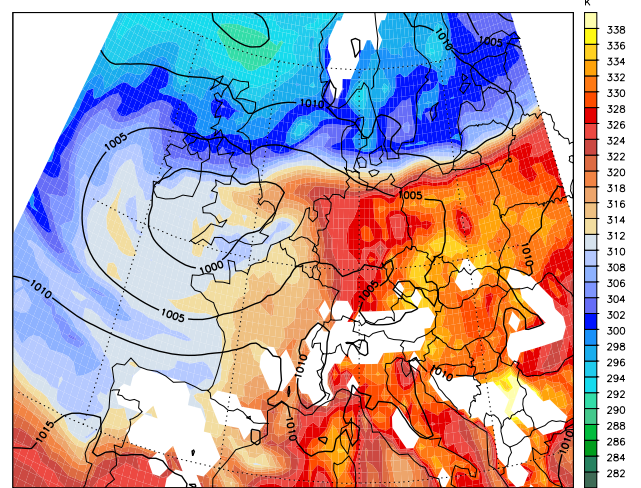
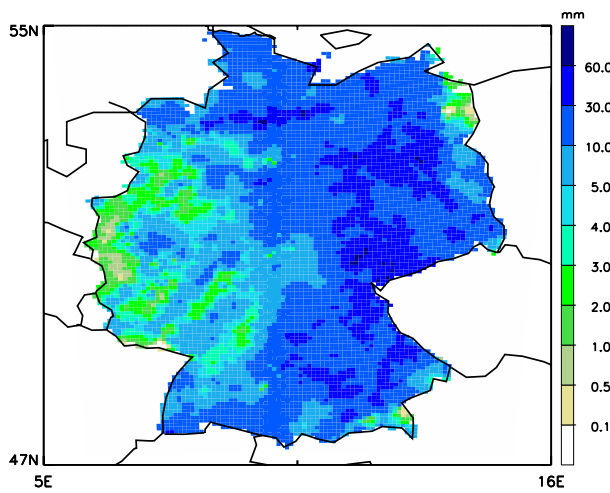
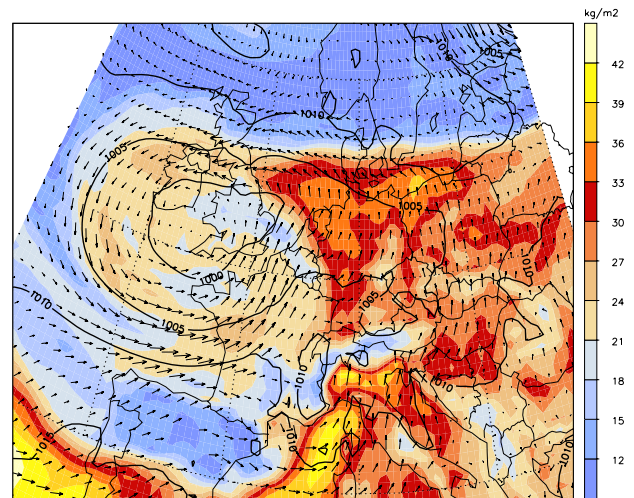
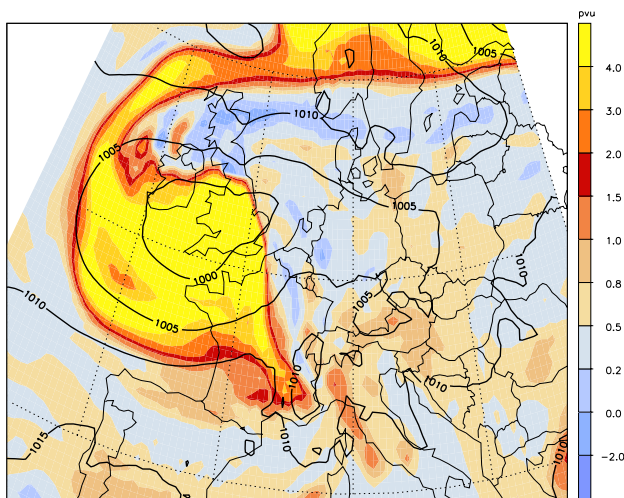
Meteorologische Situation und Qualität der Niederschlagsvorhersage für COPS-DE am 12. Juni 2007.



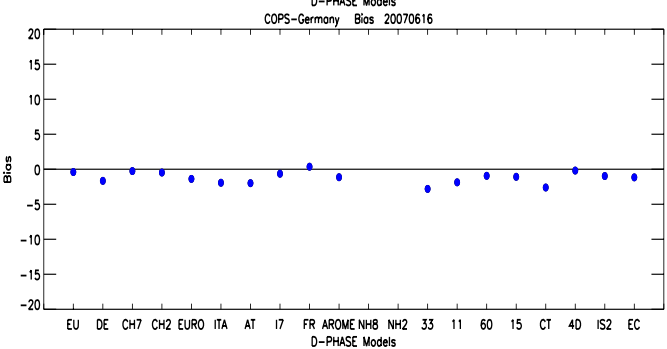
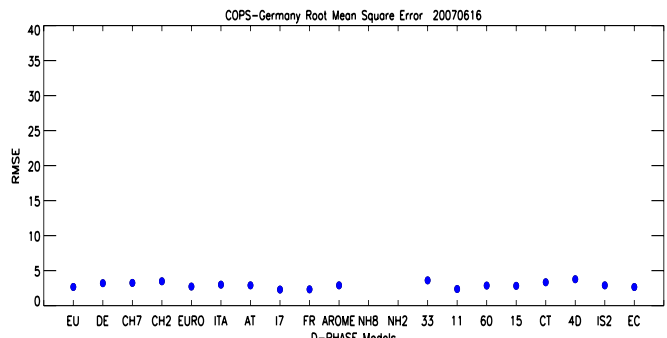
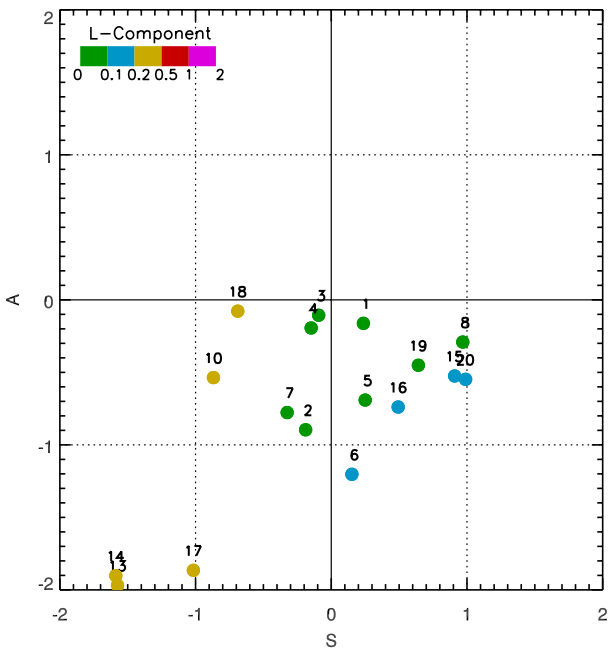
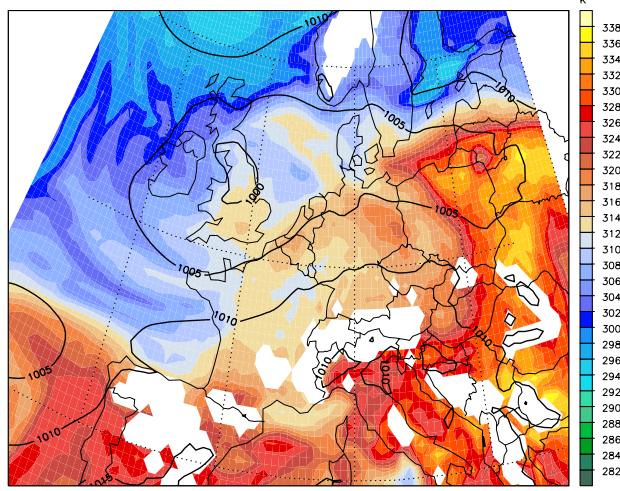
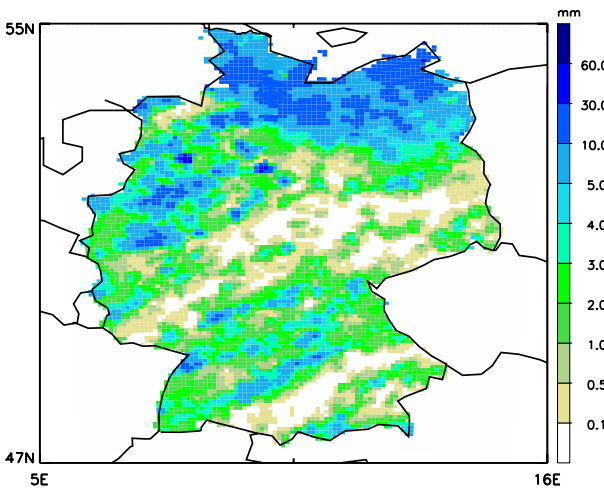
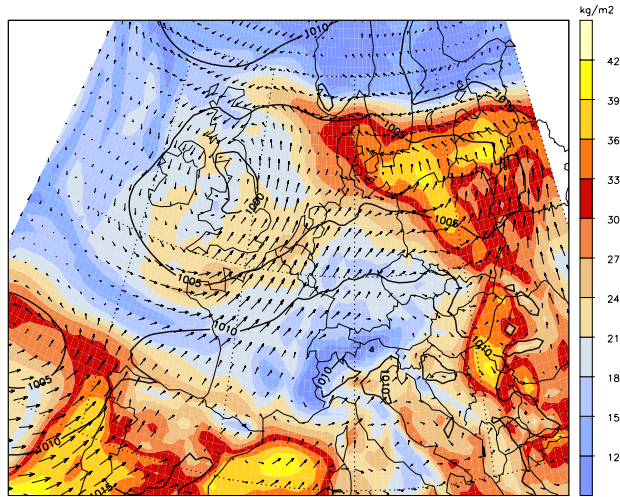
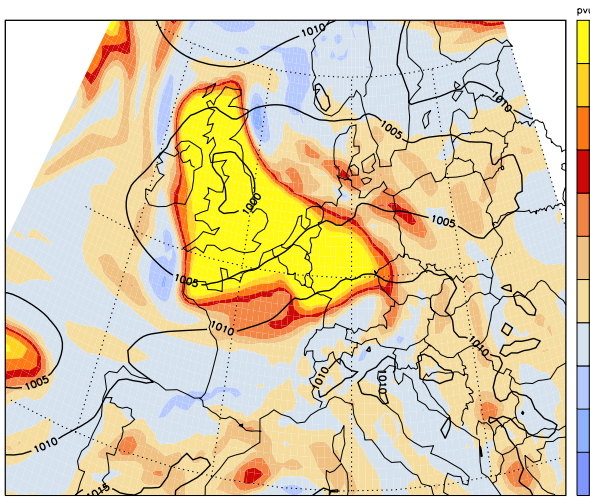
Meteorologische Situation und Qualität der Niederschlagsvorhersage für COPS-DE am 13. Juni 2007.



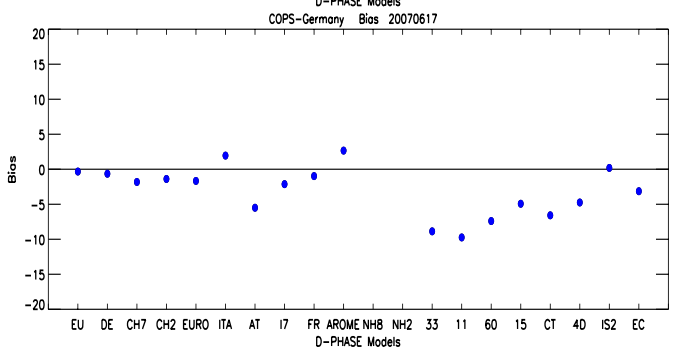
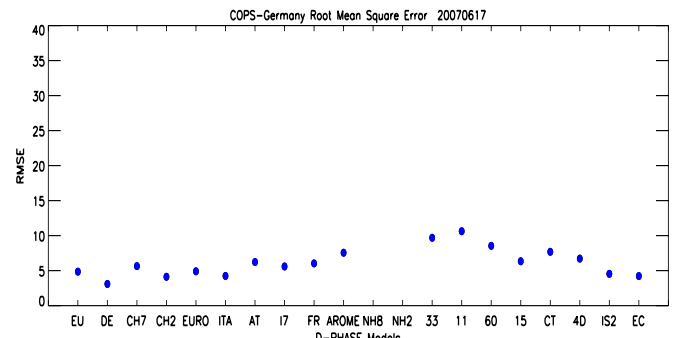
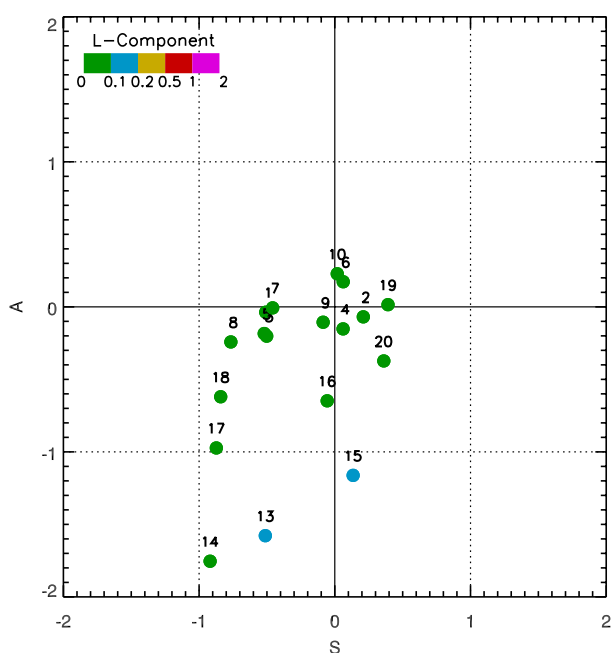
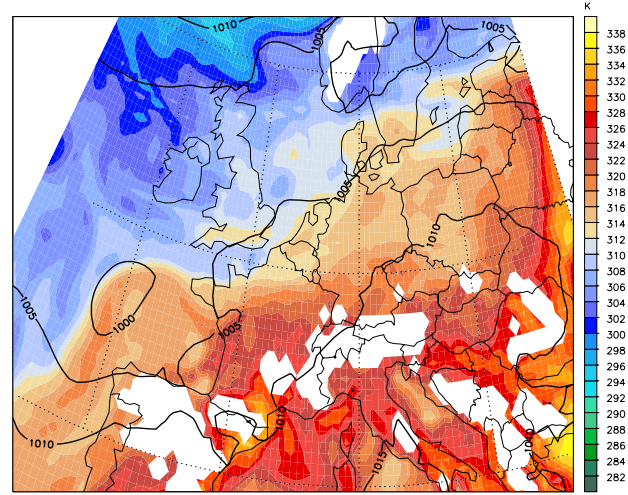
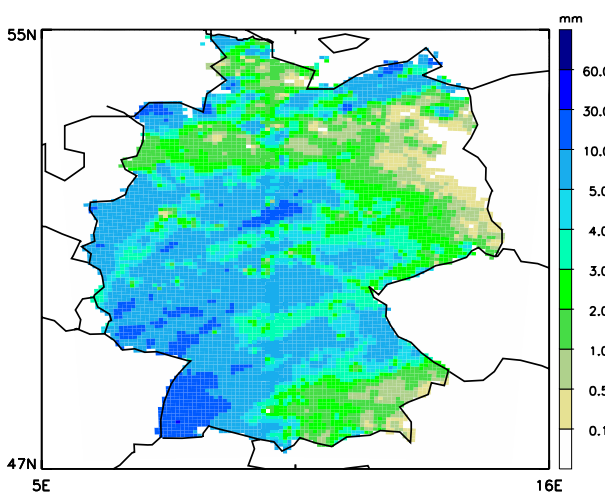
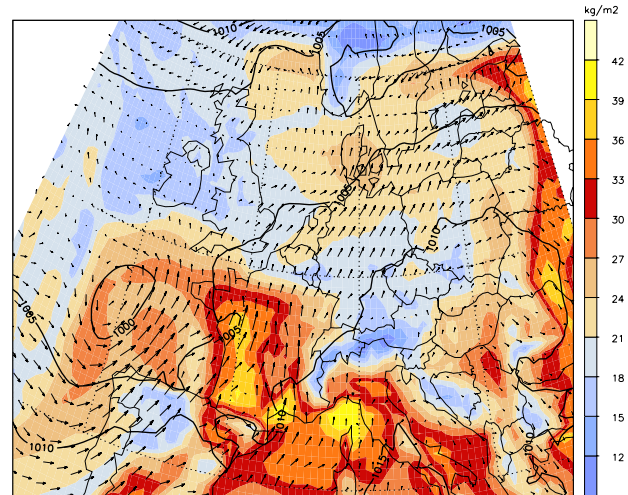
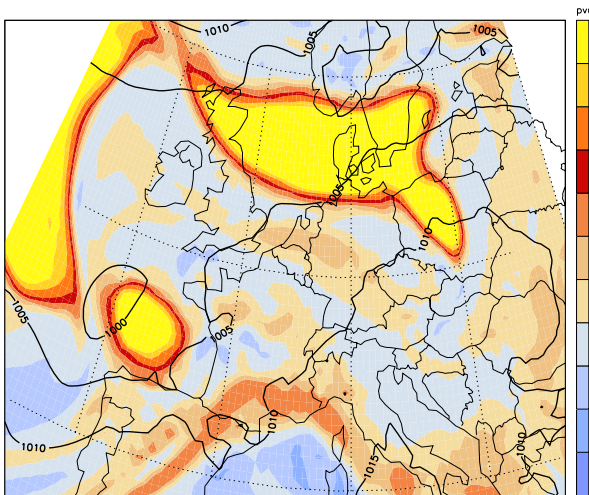
Meteorologische Situation und Qualität der Niederschlagsvorhersage für COPS-DE am 14. Juni 2007.



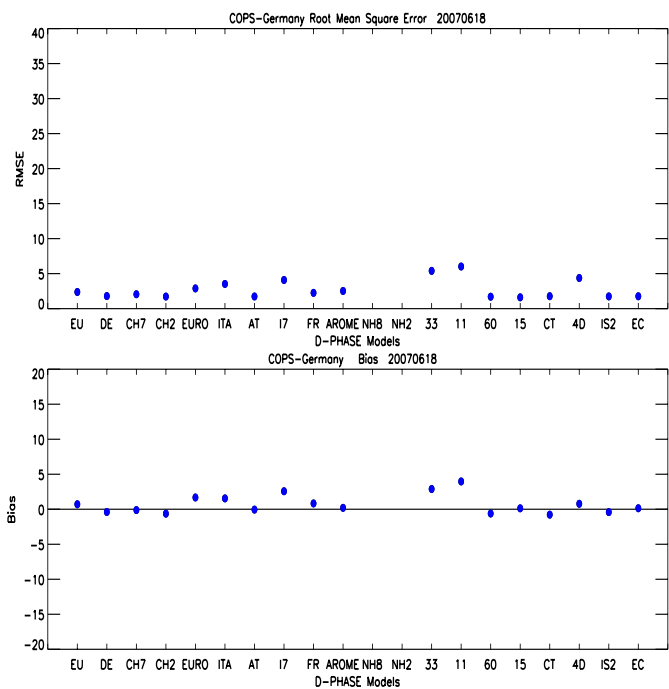
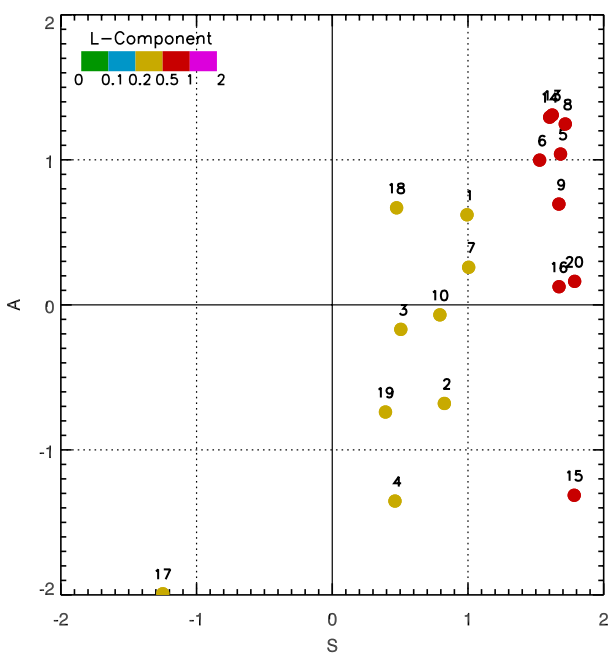
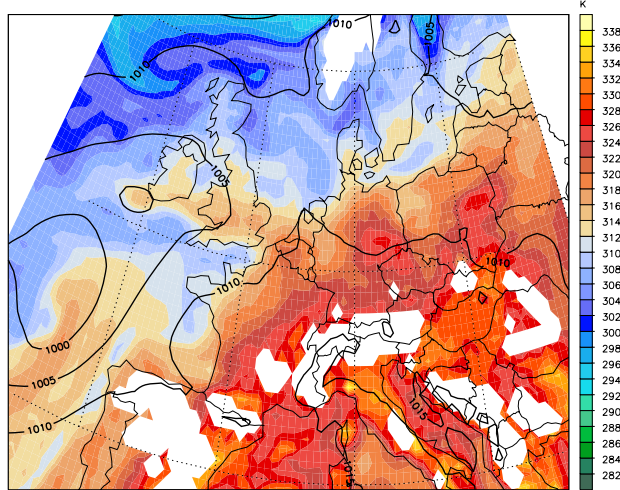
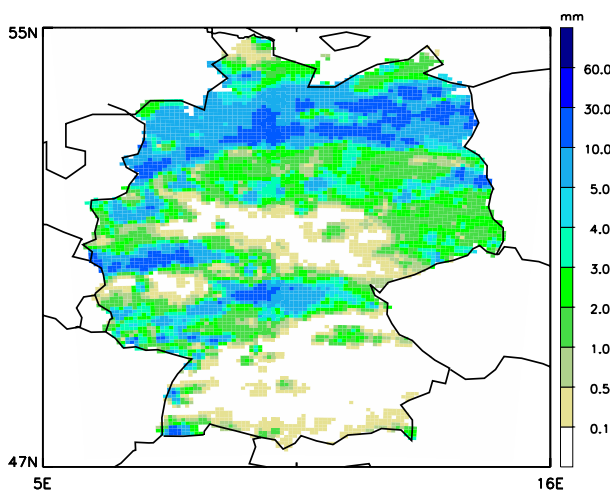
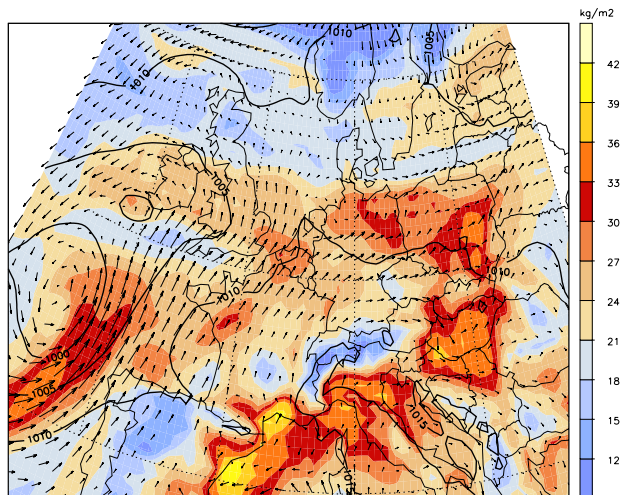
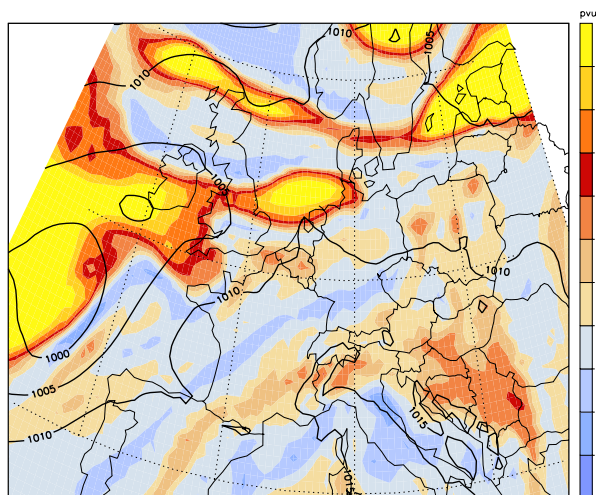
Meteorologische Situation und Qualität der Niederschlagsvorhersage für COPS-DE am 15. Juni 2007.



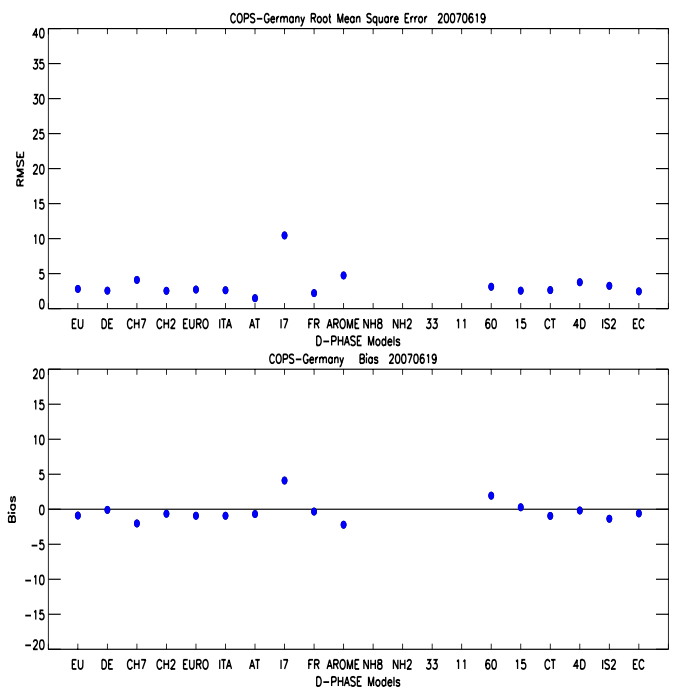
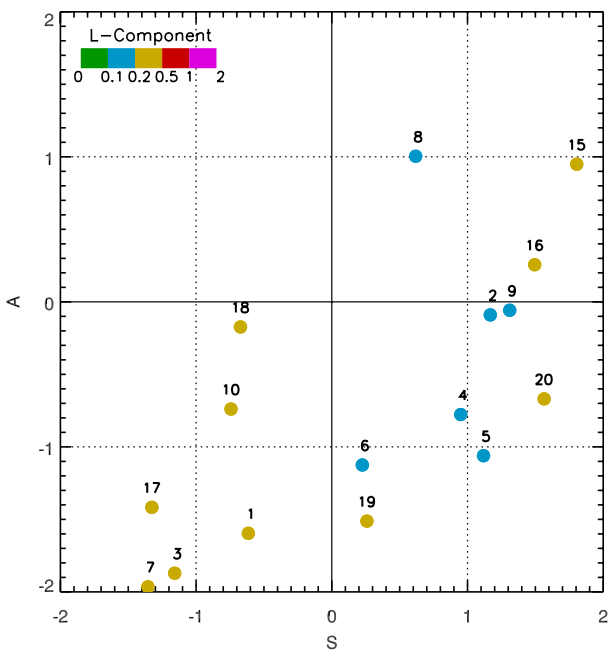
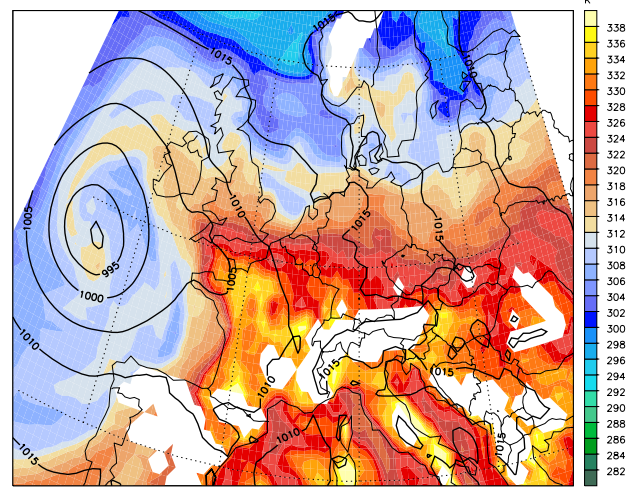
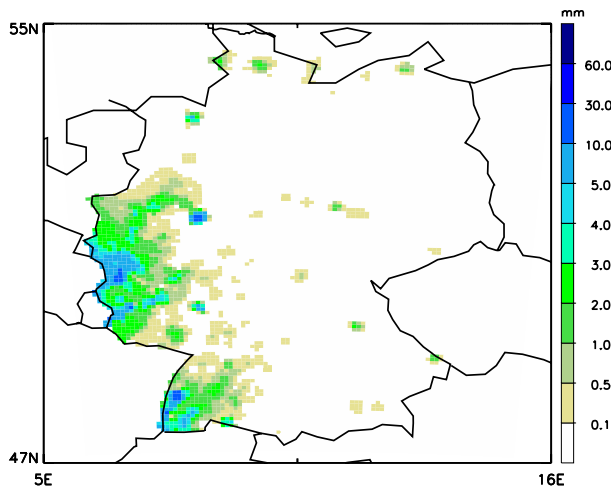
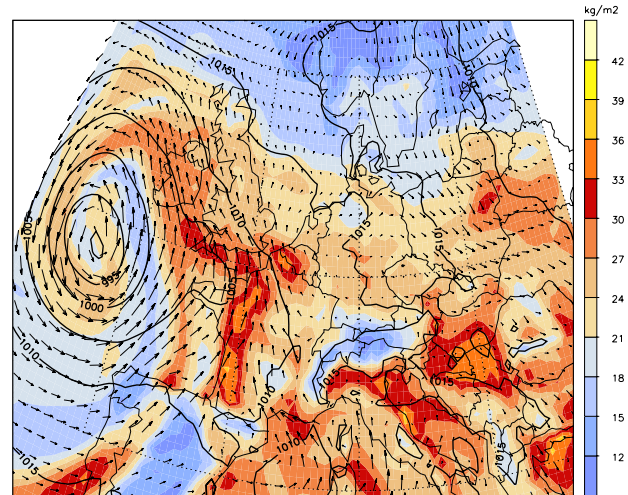
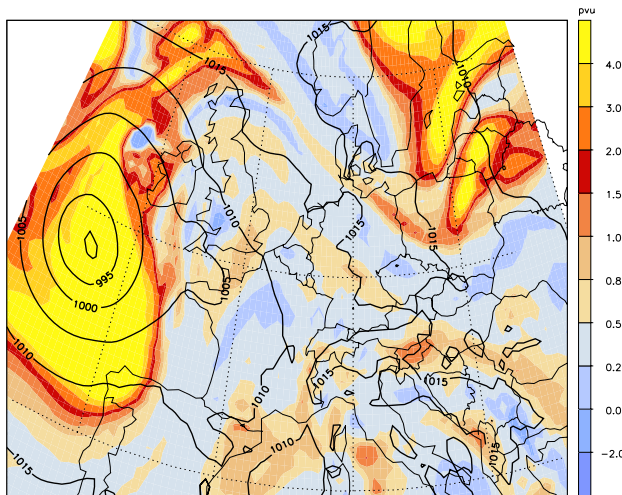
Meteorologische Situation und Qualität der Niederschlagsvorhersage für COPS-DE am 16. Juni 2007.



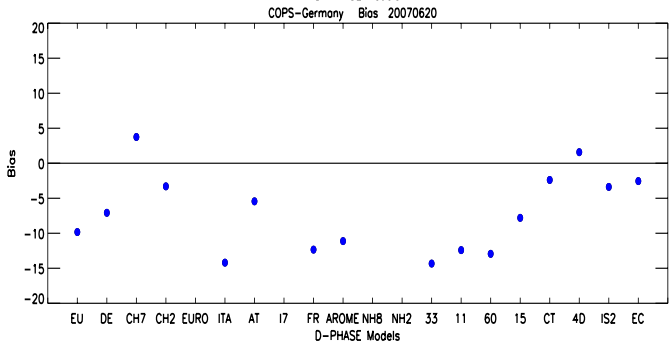
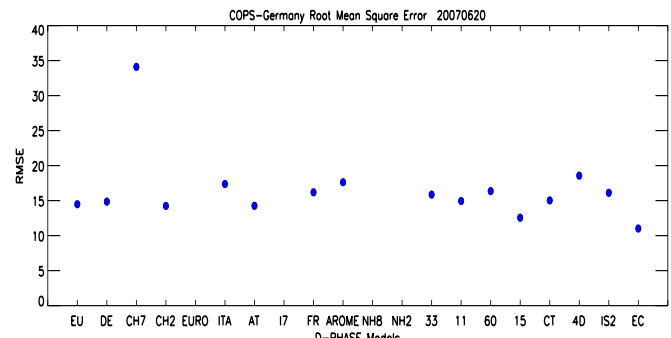
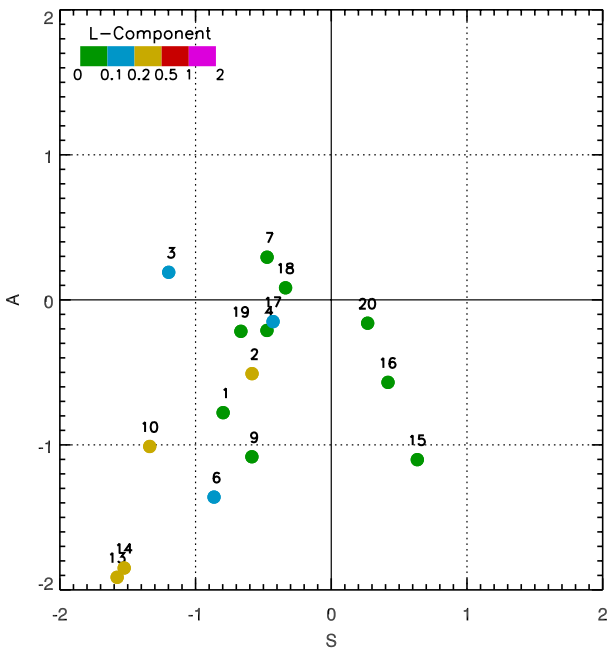
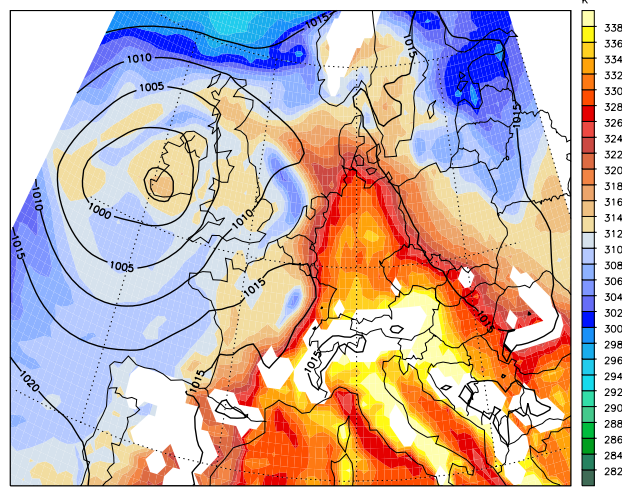
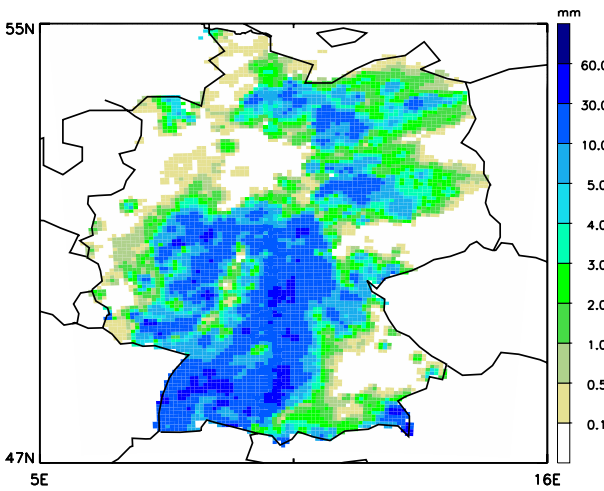
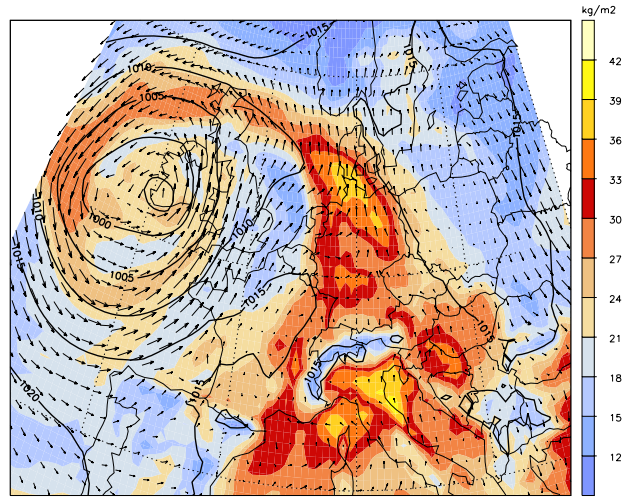
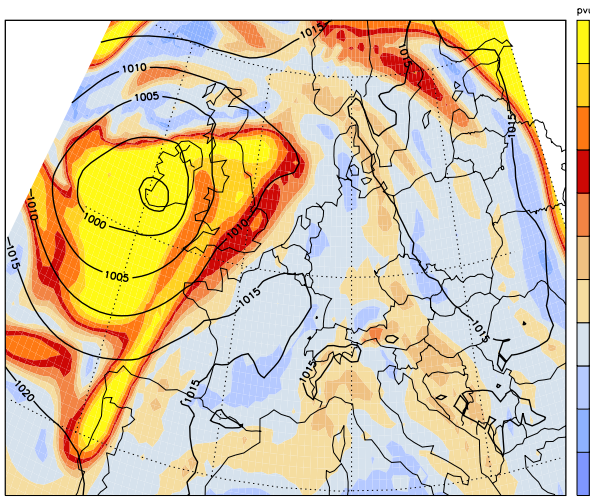
Meteorologische Situation und Qualität der Niederschlagsvorhersage für COPS-DE am 17. Juni 2007.



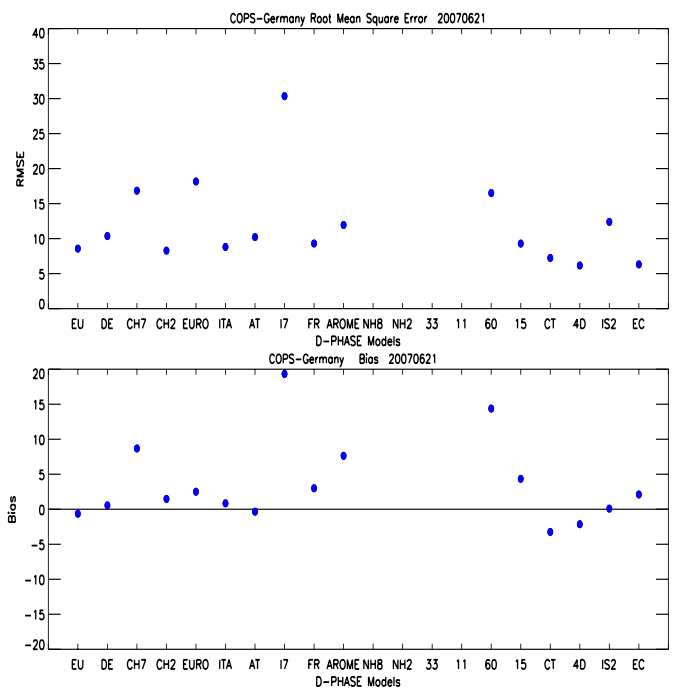
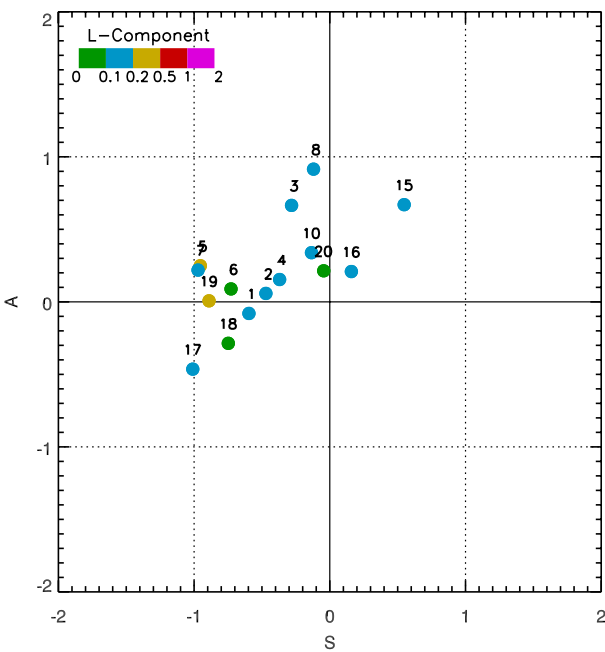
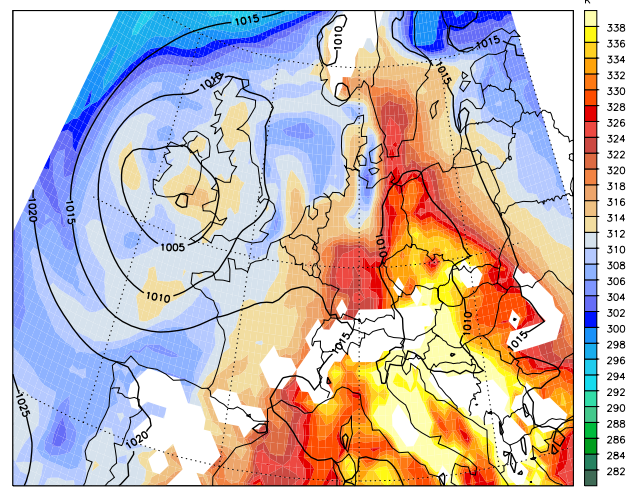
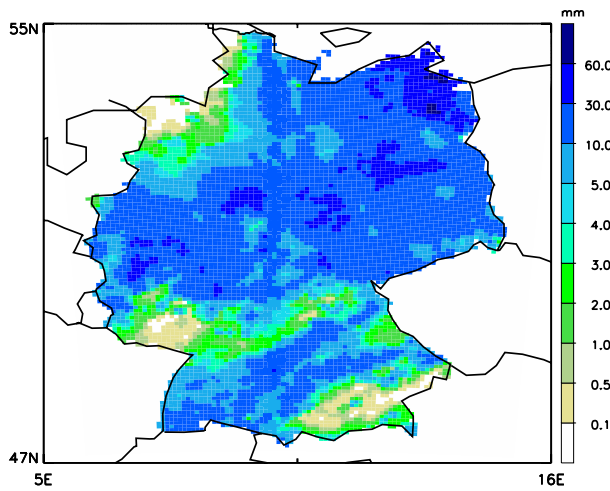
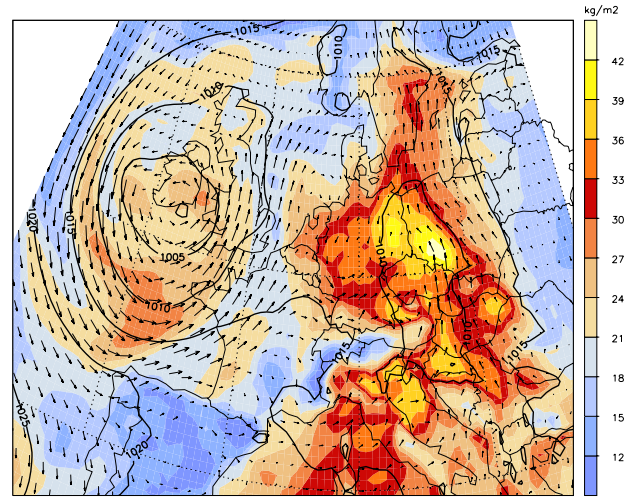
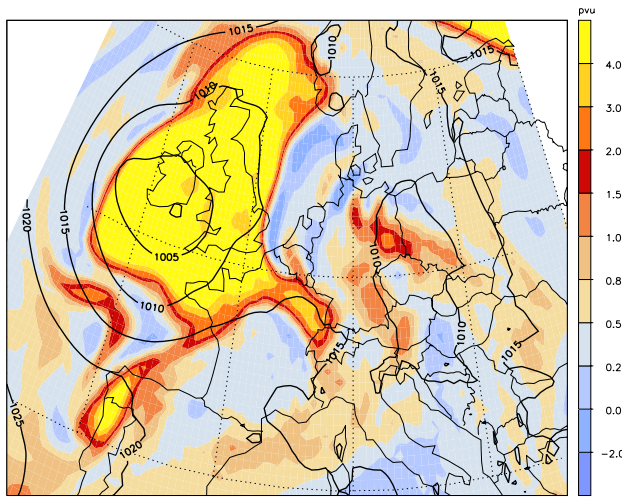
Meteorologische Situation und Qualität der Niederschlagsvorhersage für COPS-DE am 18. Juni 2007.



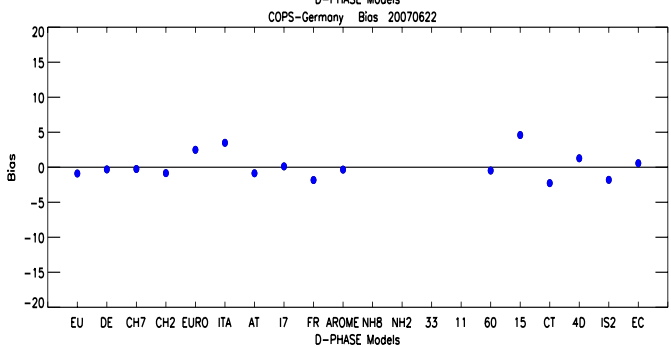
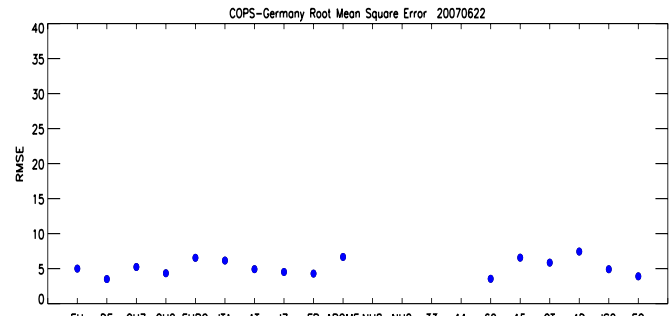
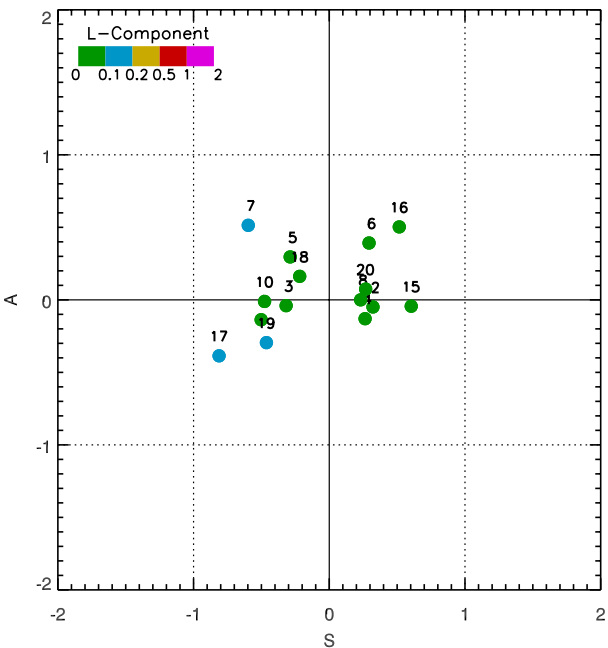
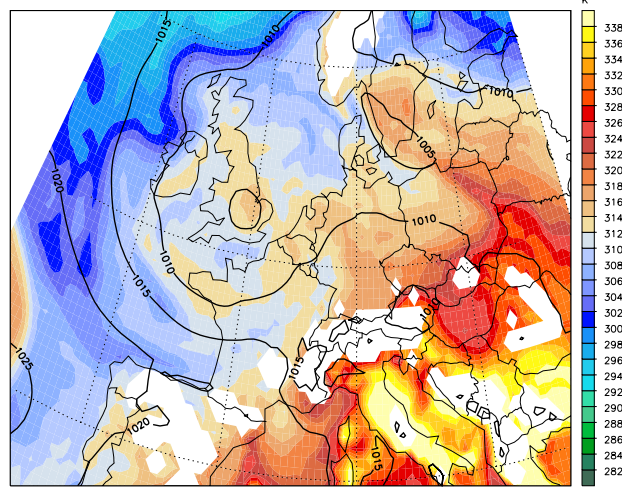
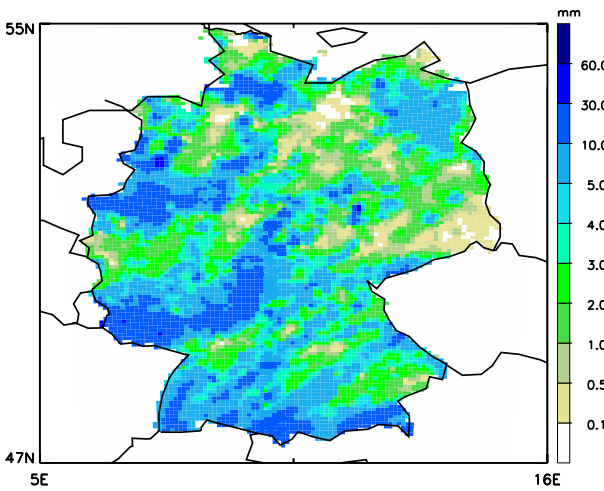
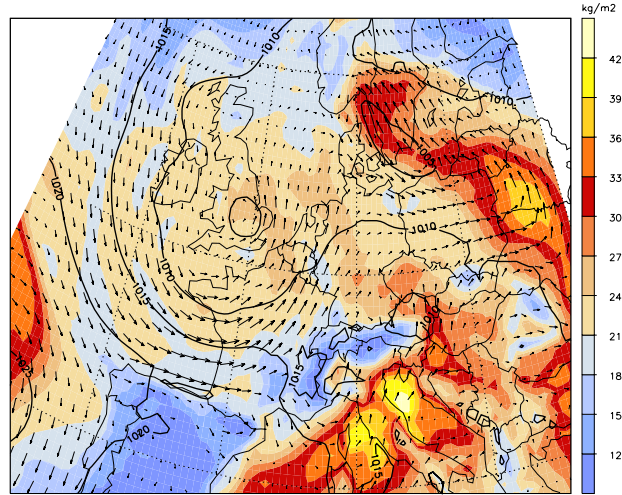
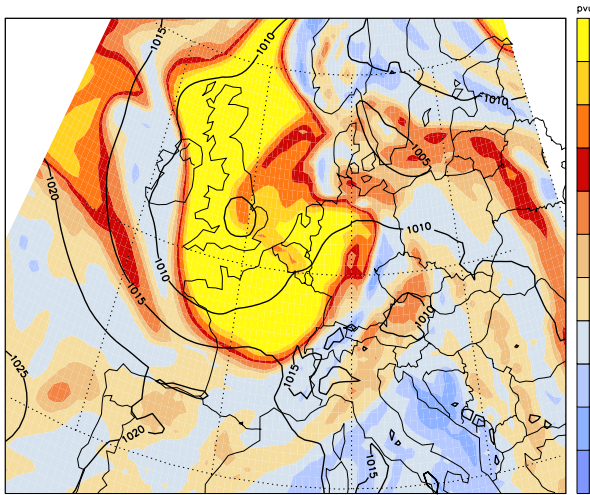
Meteorologische Situation und Qualität der Niederschlagsvorhersage für COPS-DE am 19. Juni 2007.



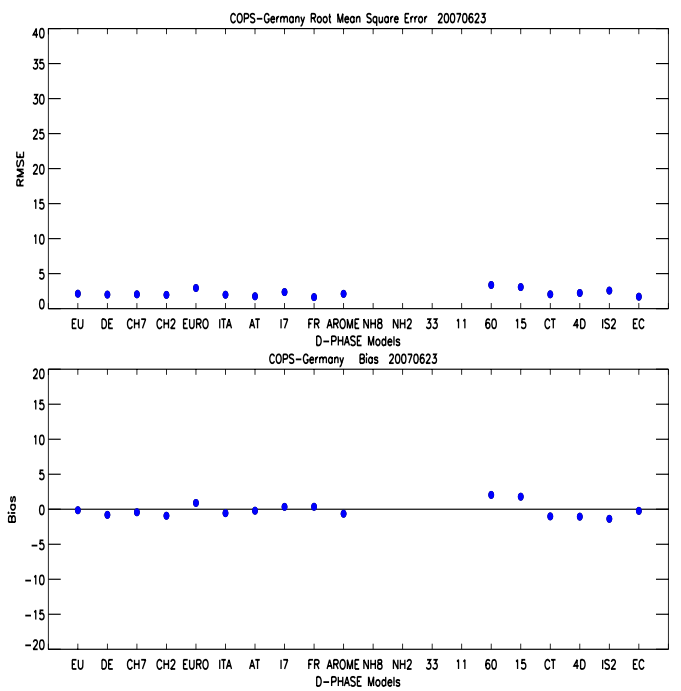
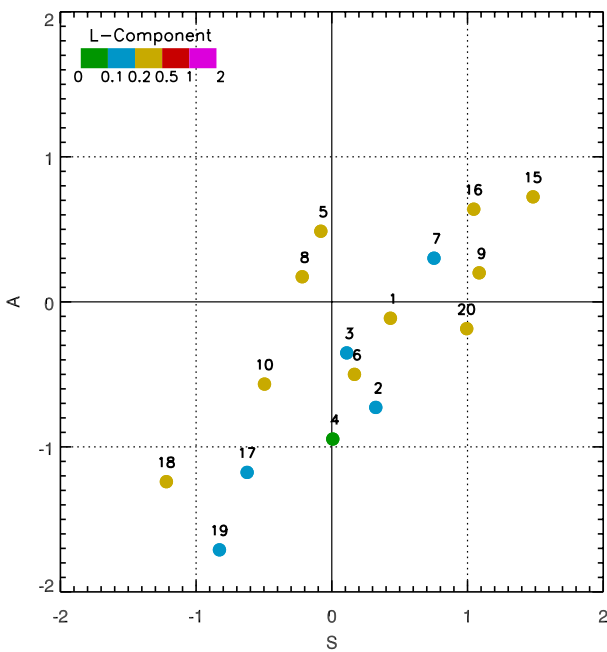
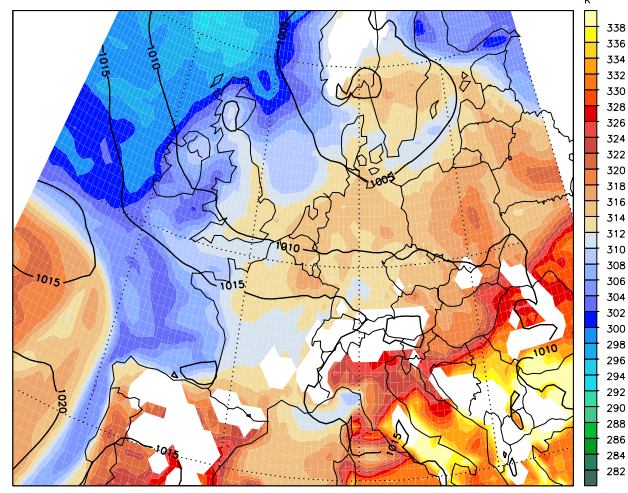
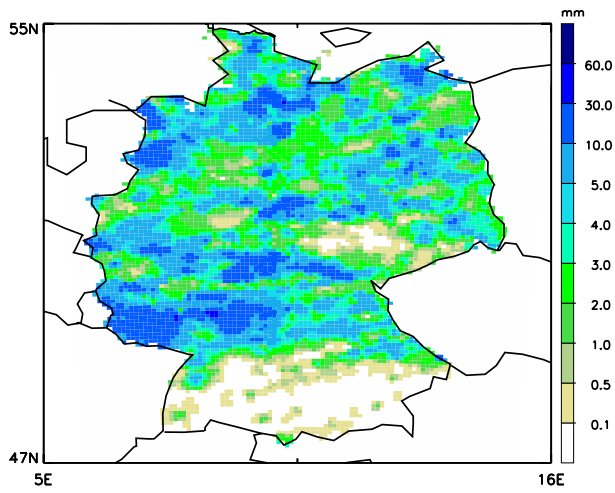
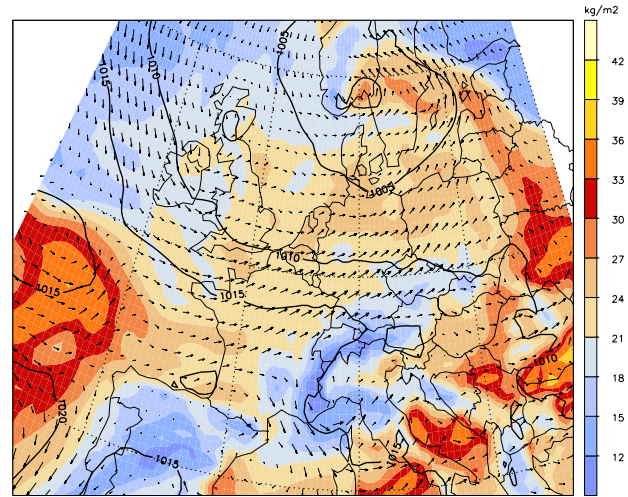
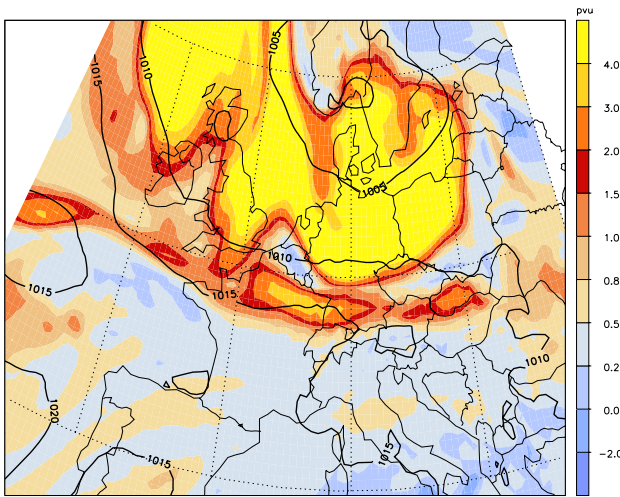
Meteorologische Situation und Qualität der Niederschlagsvorhersage für COPS-DE am 20. Juni 2007.



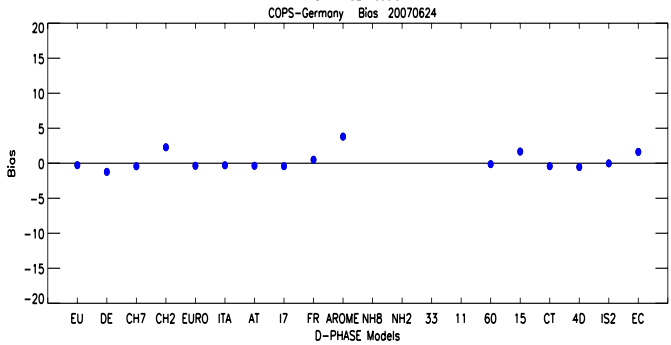
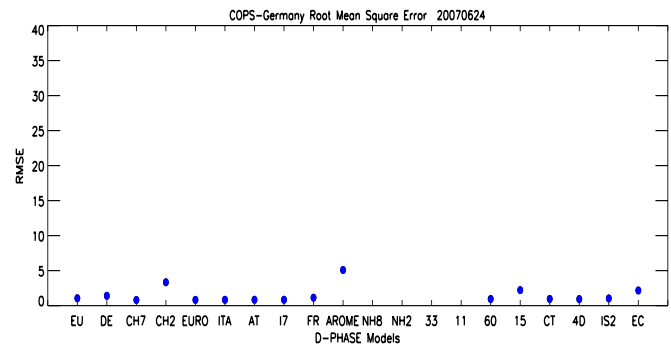
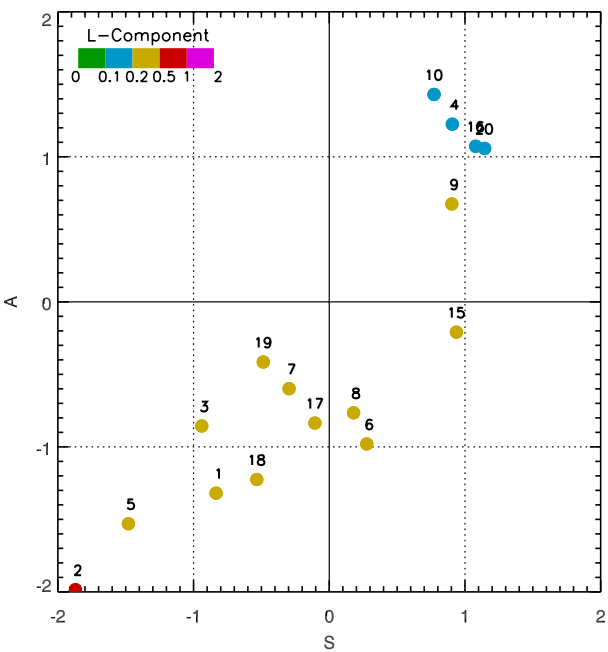
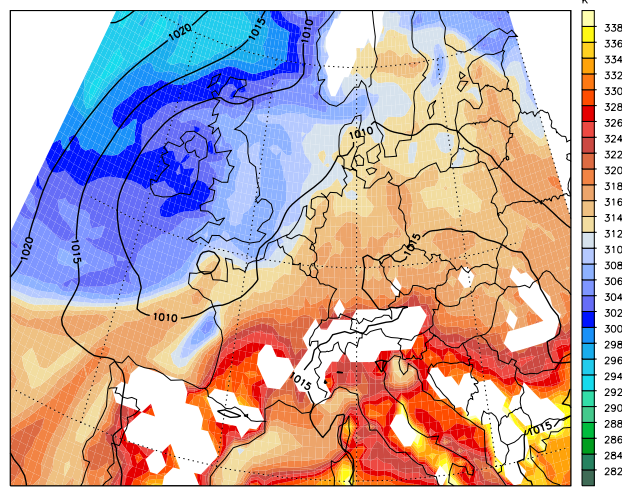
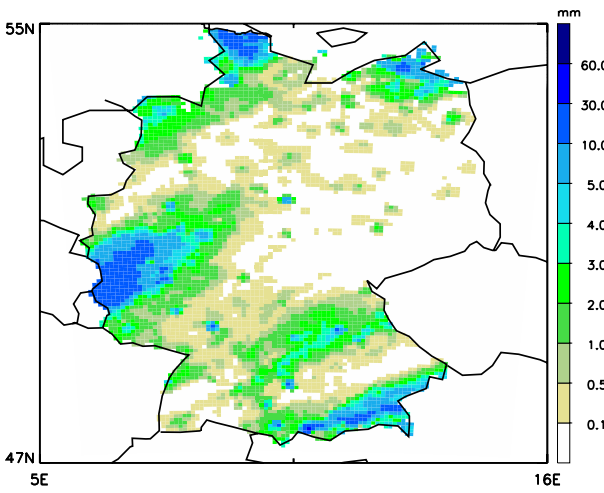
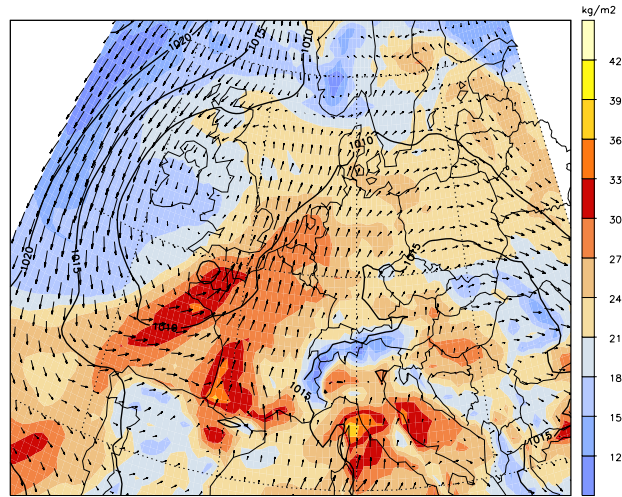
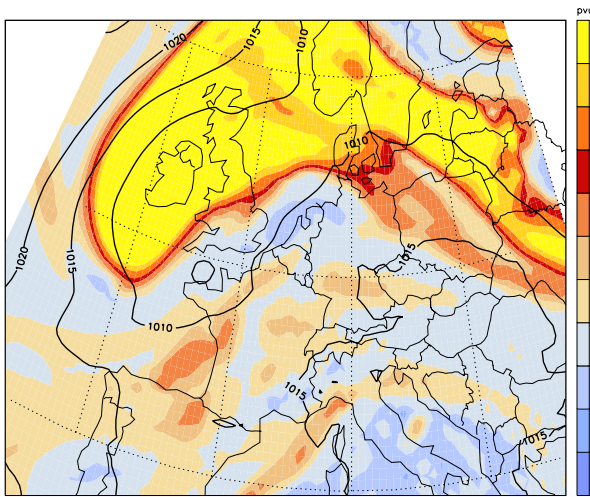
Meteorologische Situation und Qualität der Niederschlagsvorhersage für COPS-DE am 21. Juni 2007.



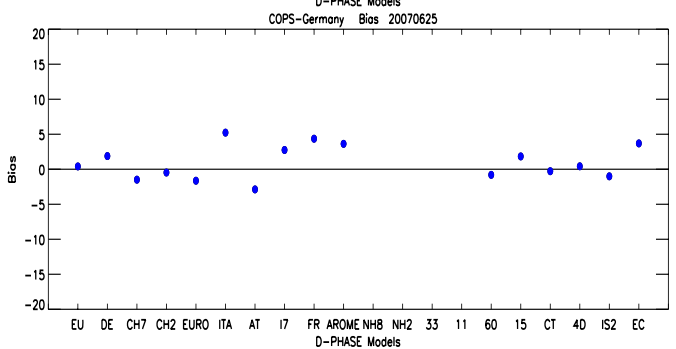
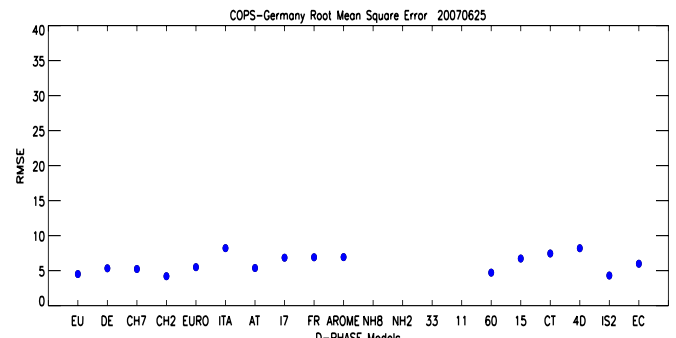
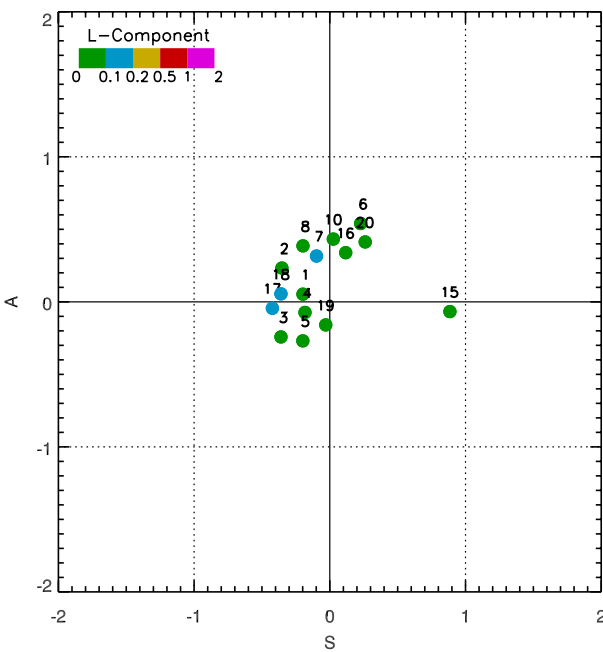
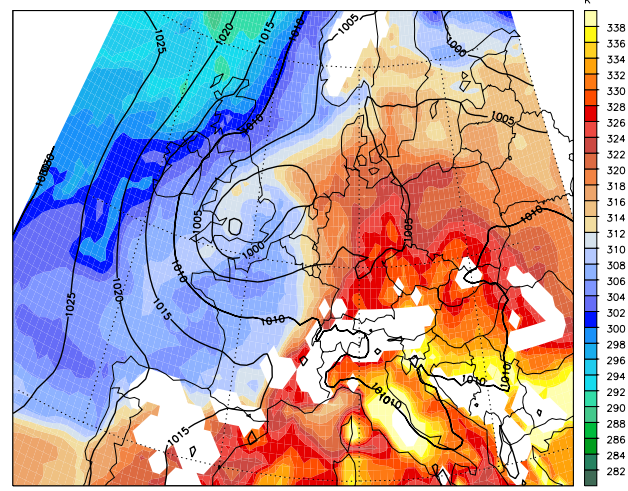
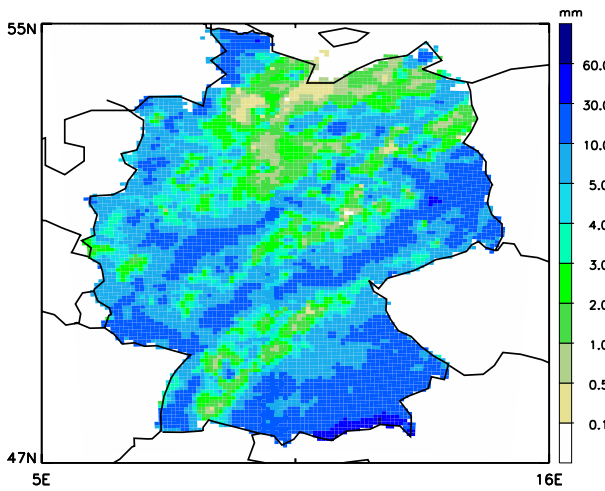
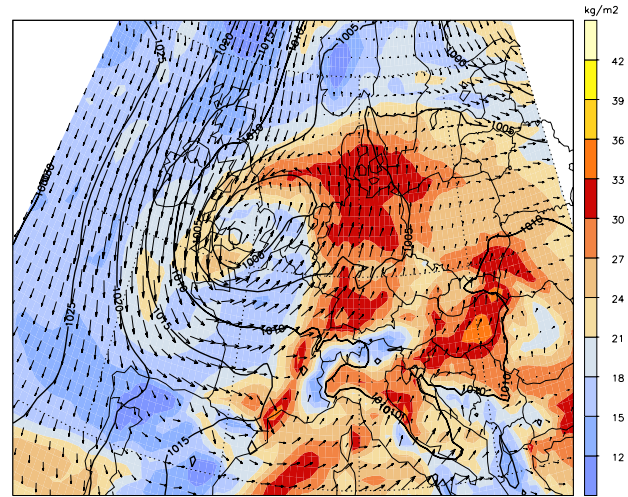
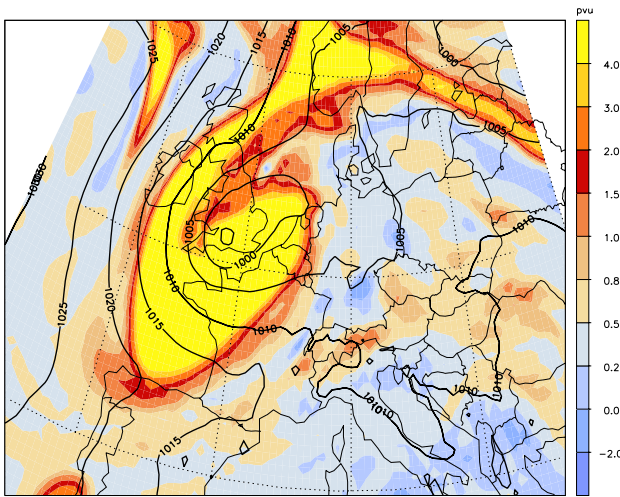
Meteorologische Situation und Qualität der Niederschlagsvorhersage für COPS-DE am 22. Juni 2007.



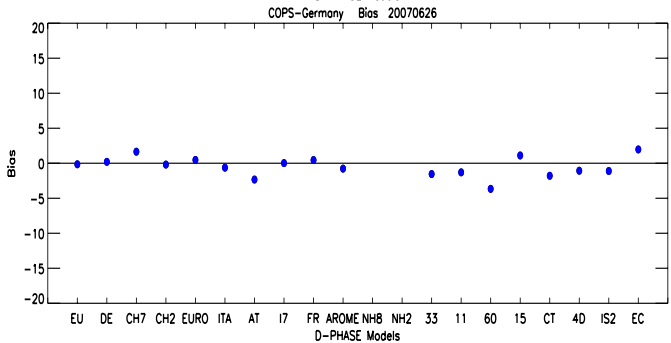
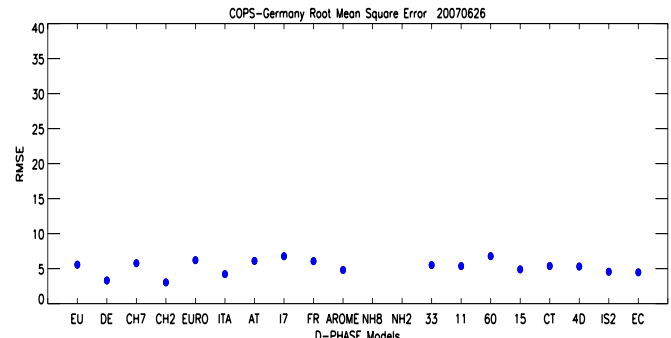
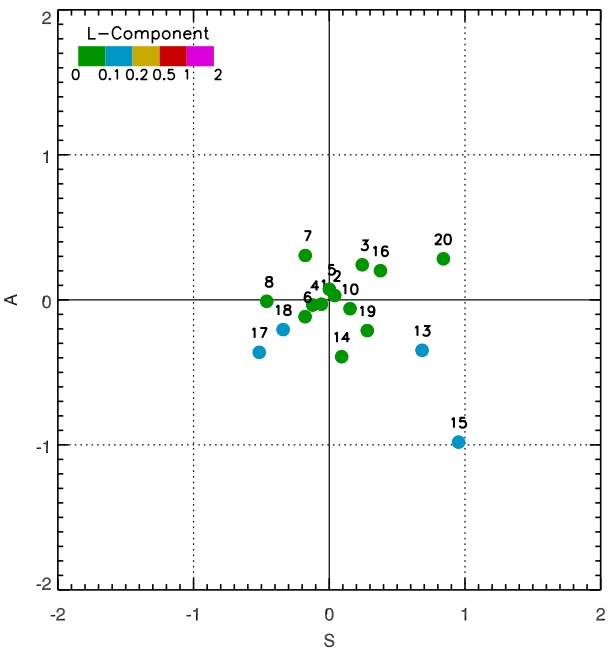
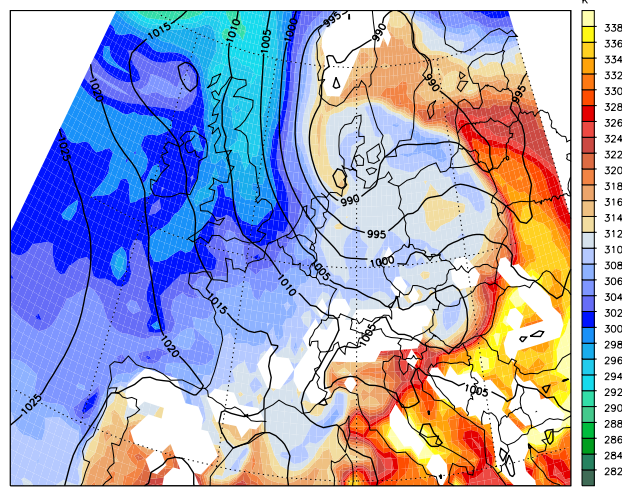
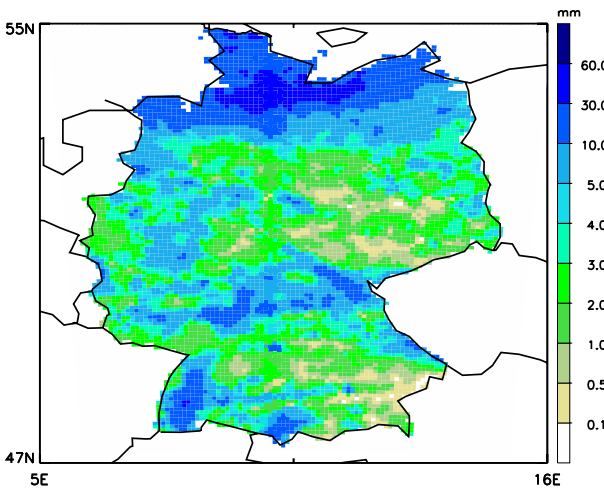
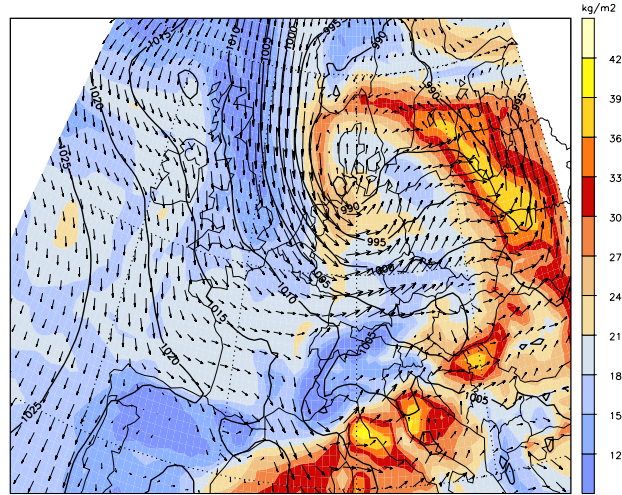
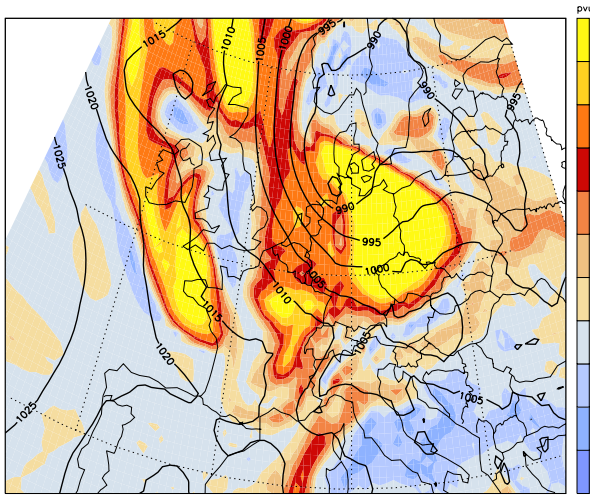
Meteorologische Situation und Qualität der Niederschlagsvorhersage für COPS-DE am 23. Juni 2007.



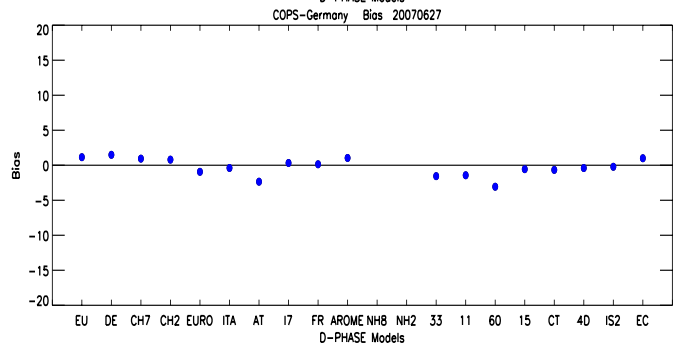
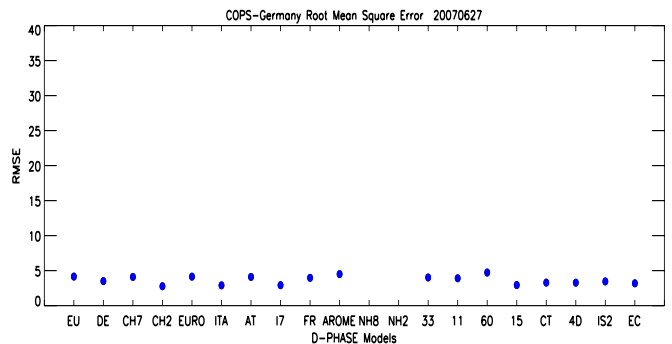
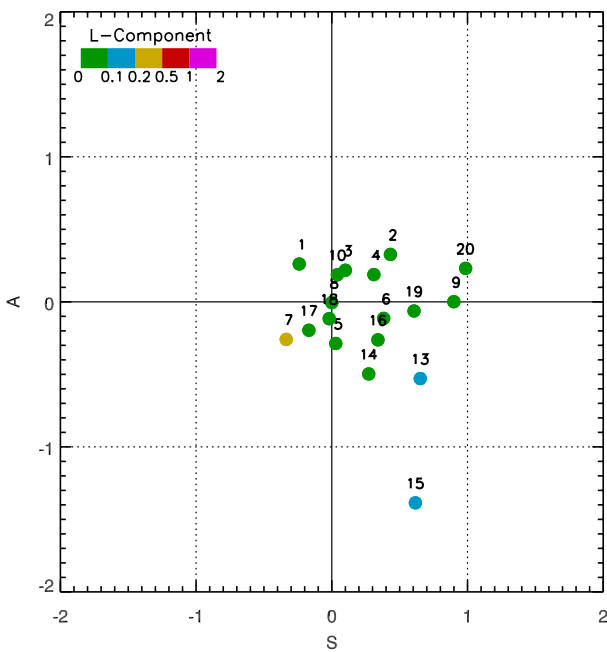
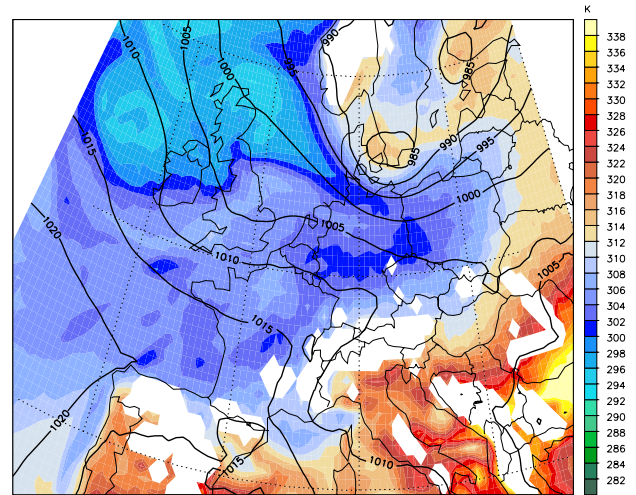
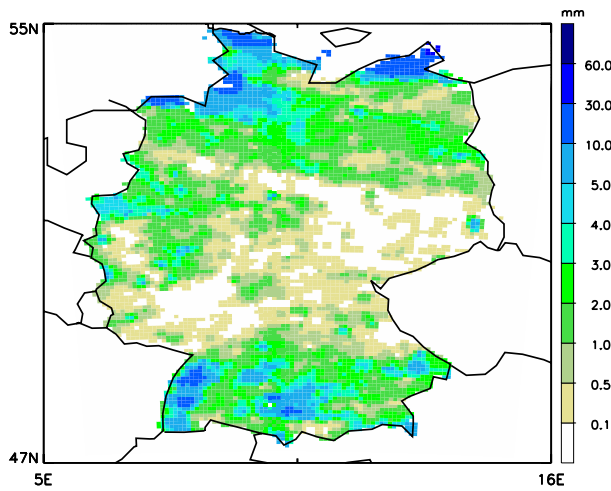
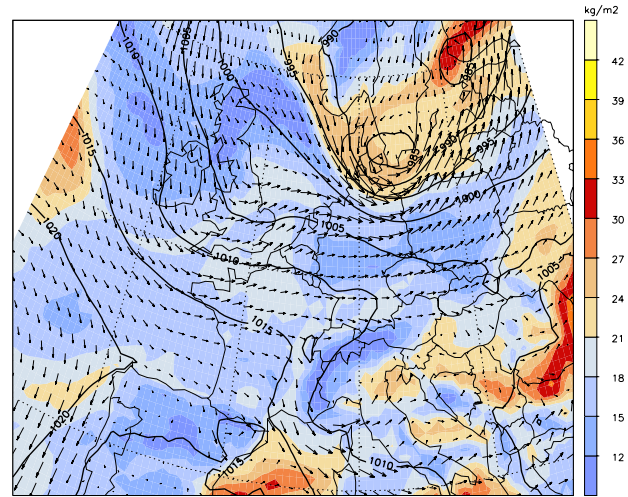
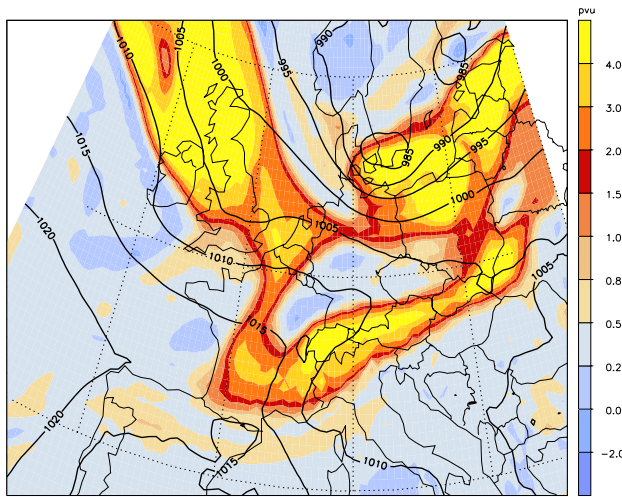
Meteorologische Situation und Qualität der Niederschlagsvorhersage für COPS-DE am 24. Juni 2007.



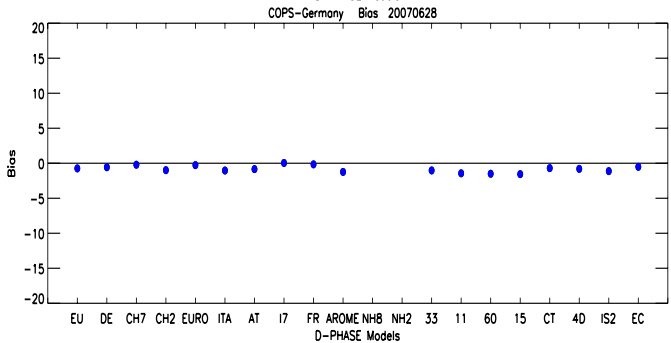
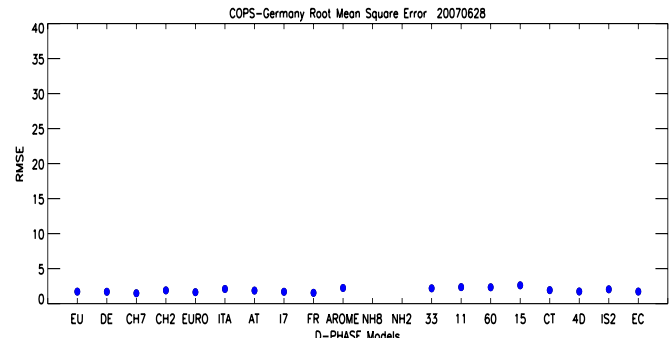
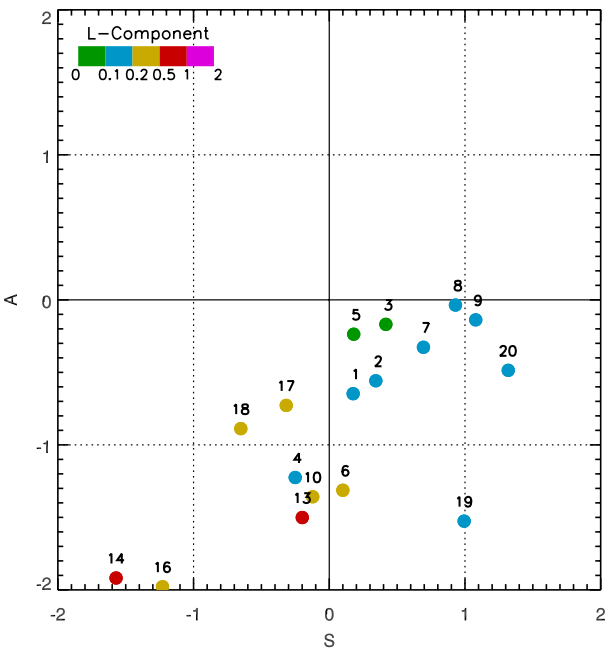
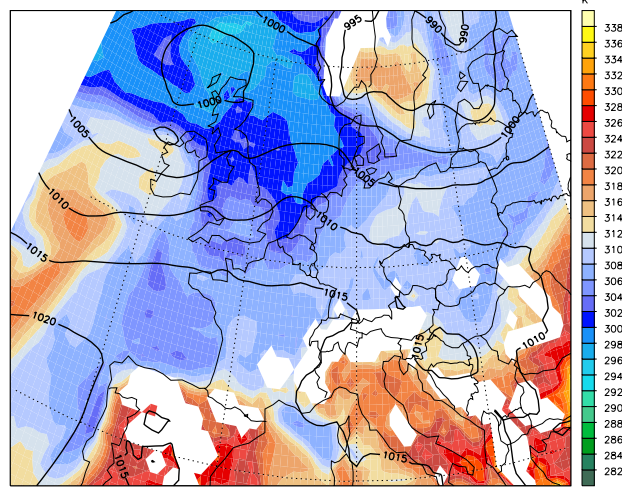
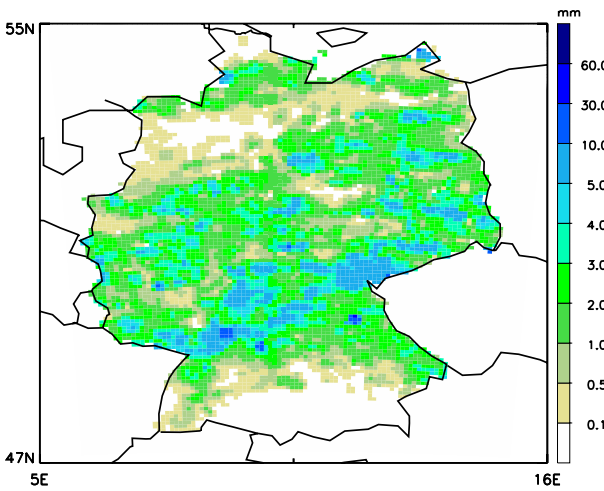
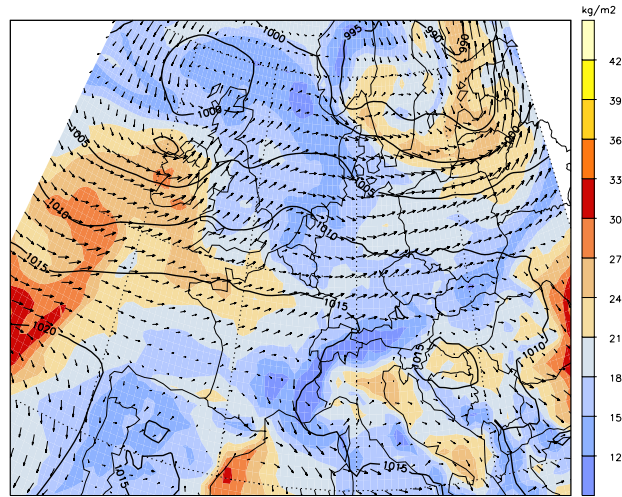
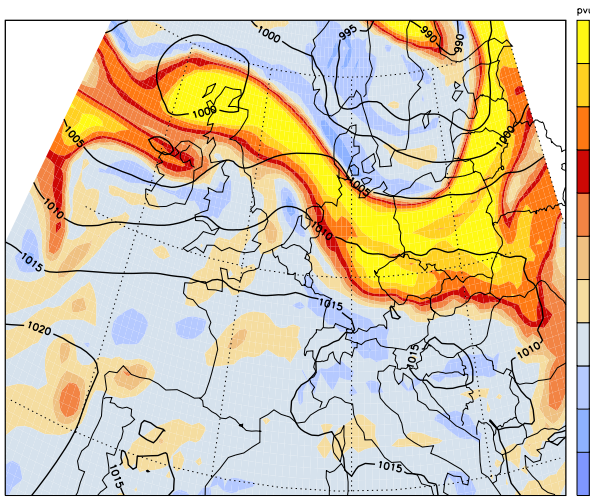
Meteorologische Situation und Qualität der Niederschlagsvorhersage für COPS-DE am 25. Juni 2007.



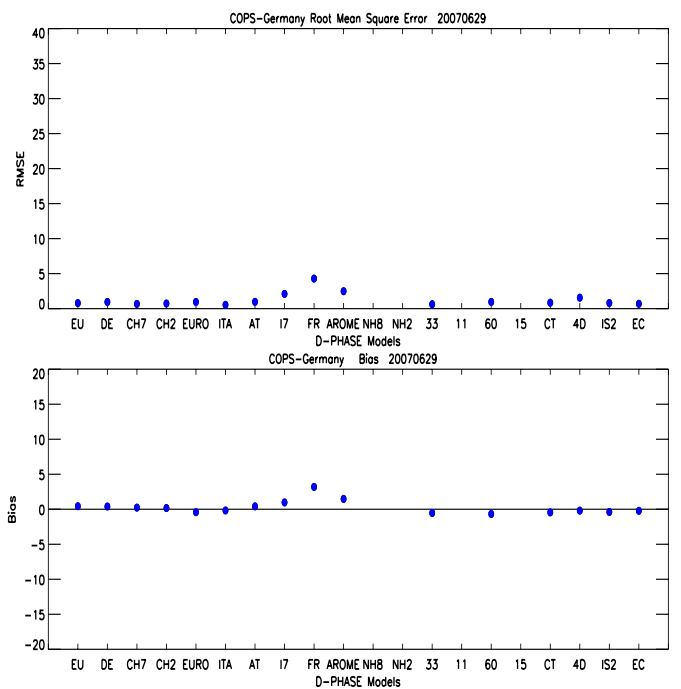
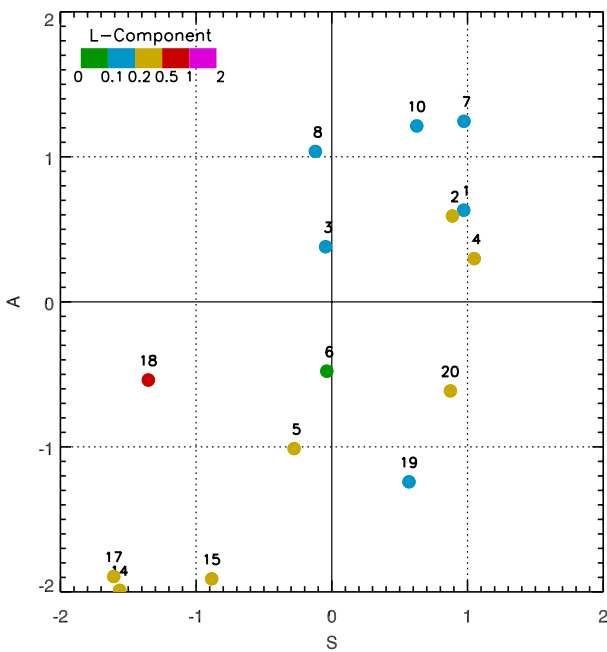
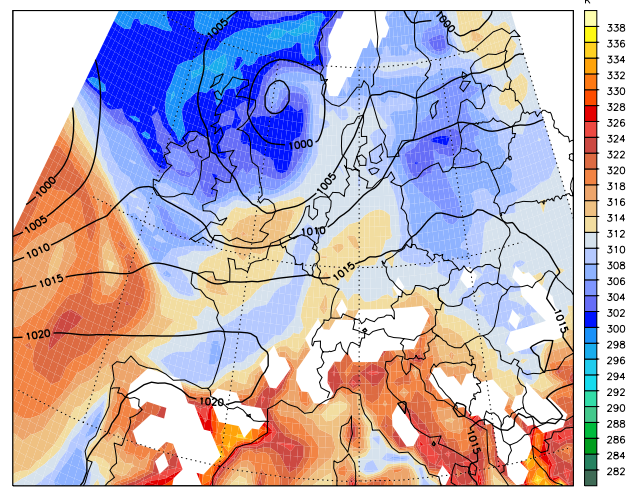
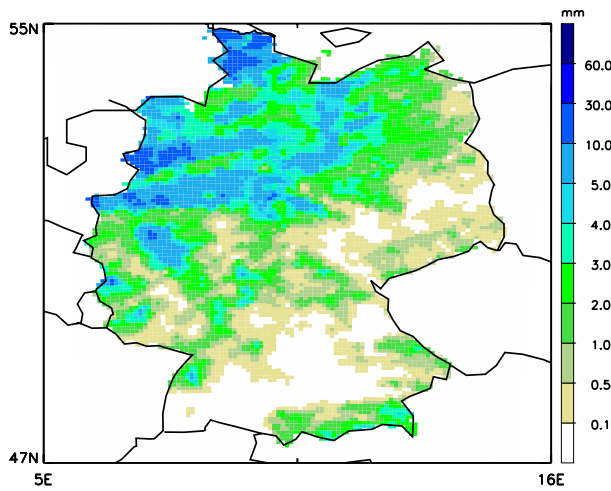
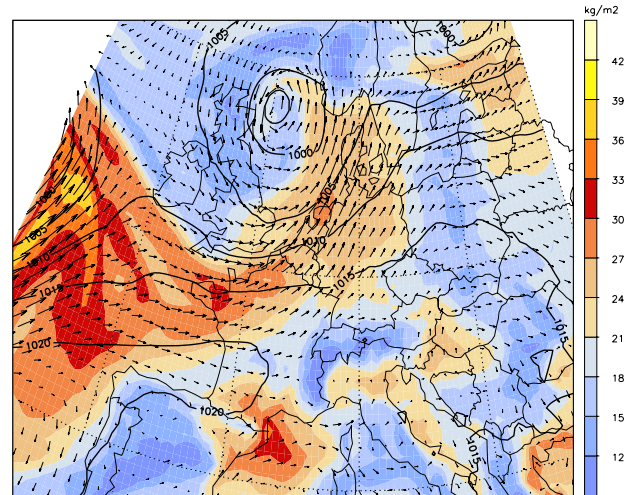
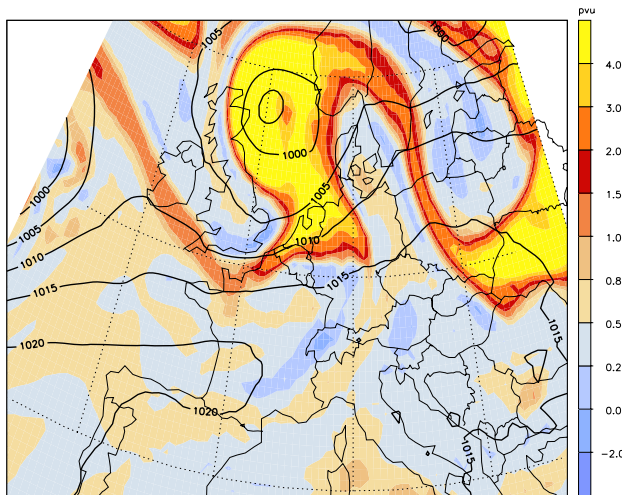
Meteorologische Situation und Qualität der Niederschlagsvorhersage für COPS-DE am 26. Juni 2007.



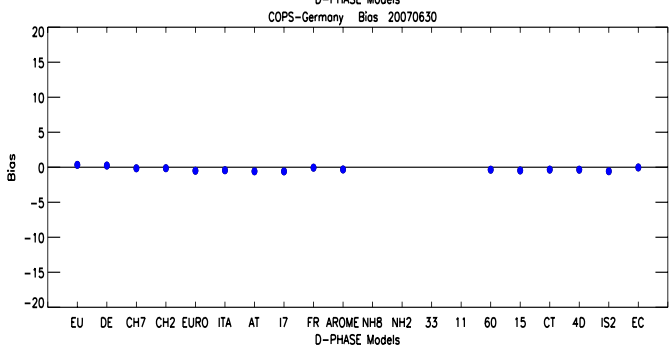
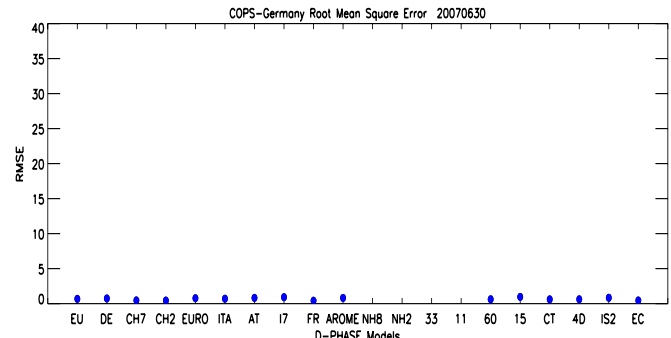
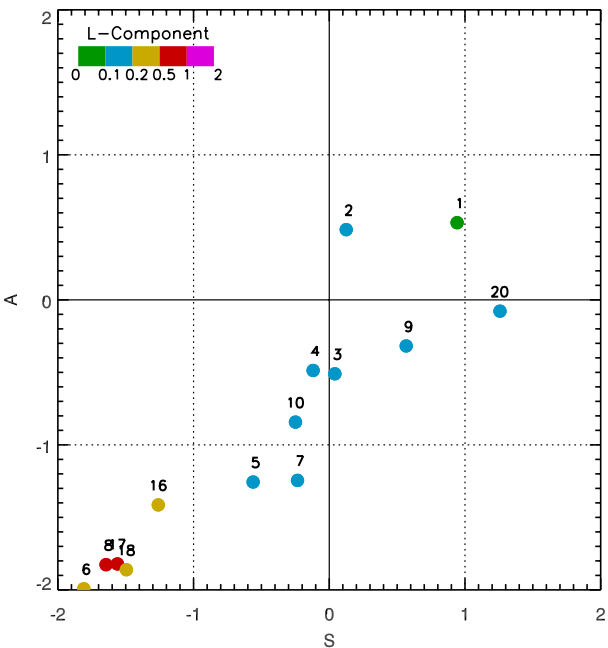
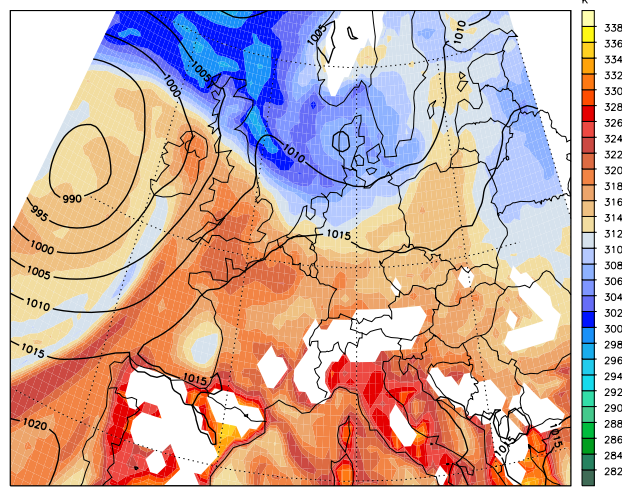
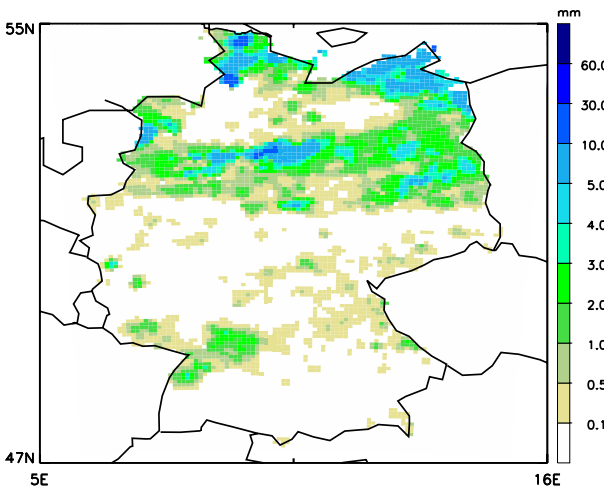
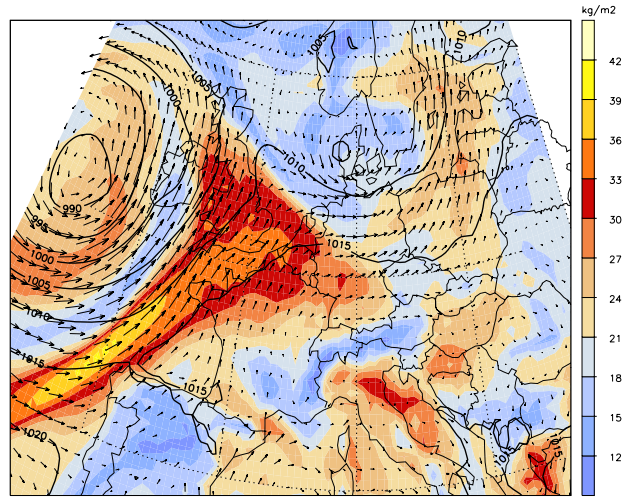
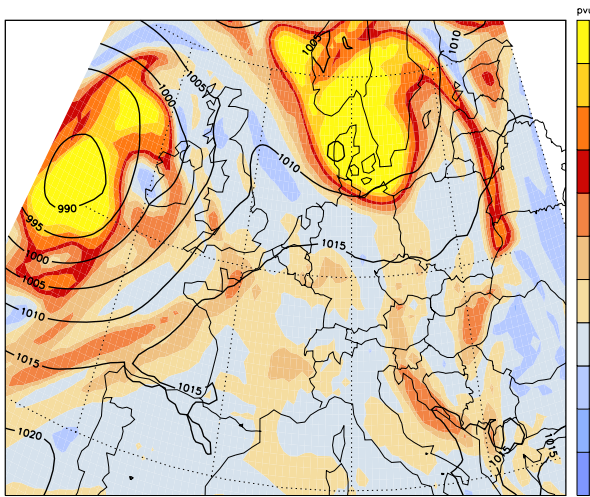
Meteorologische Situation und Qualität der Niederschlagsvorhersage für COPS-DE am 27. Juni 2007.



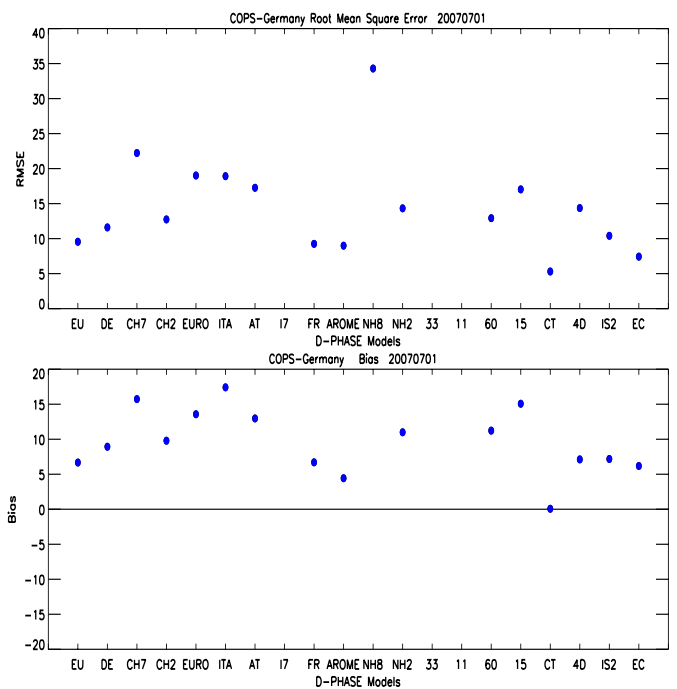
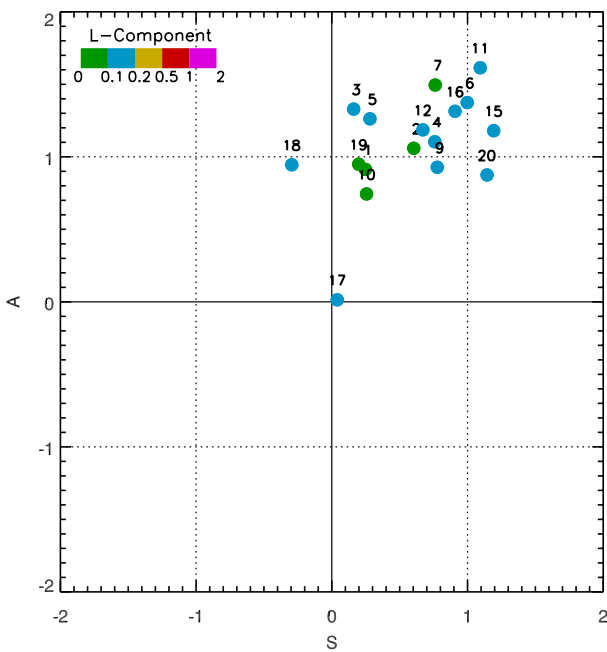
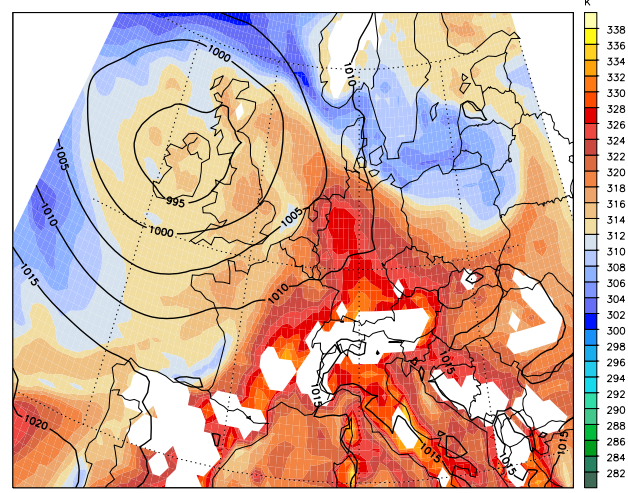
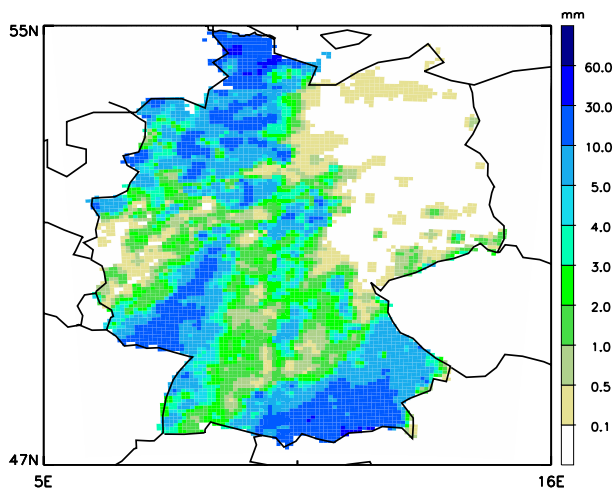
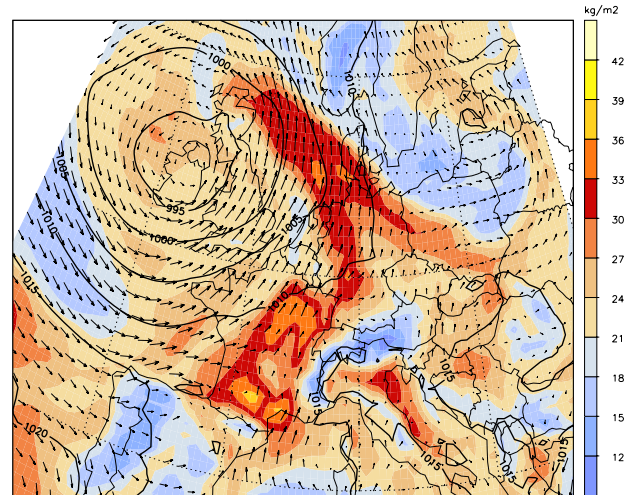
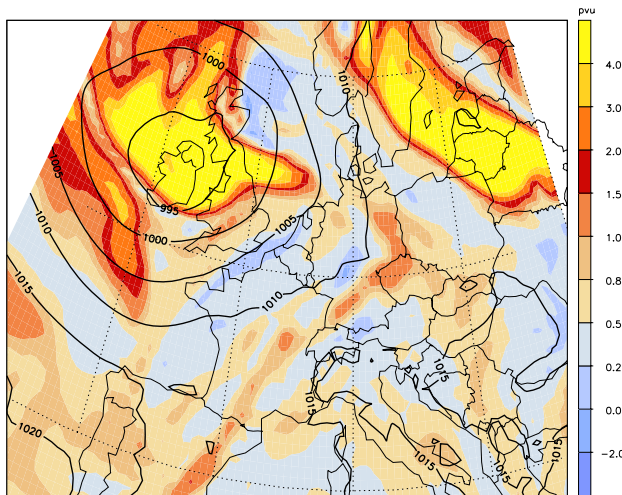
Meteorologische Situation und Qualität der Niederschlagsvorhersage für COPS-DE am 28. Juni 2007.



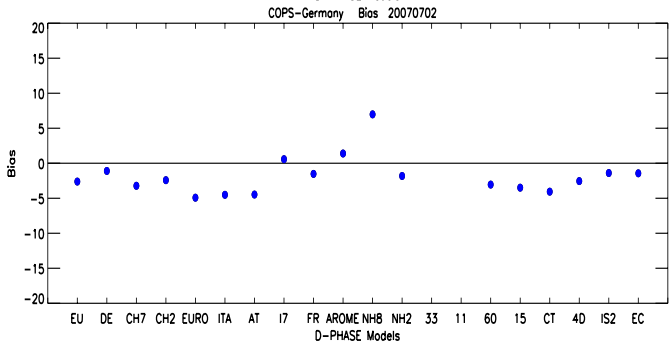
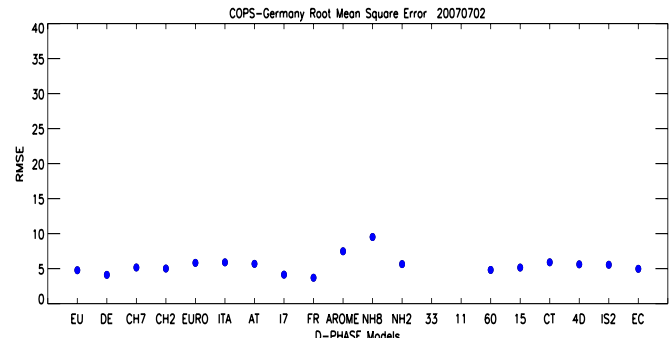
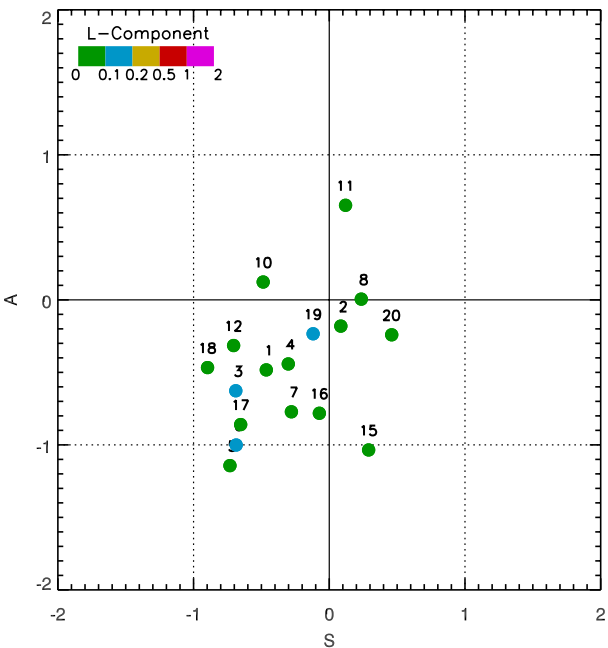
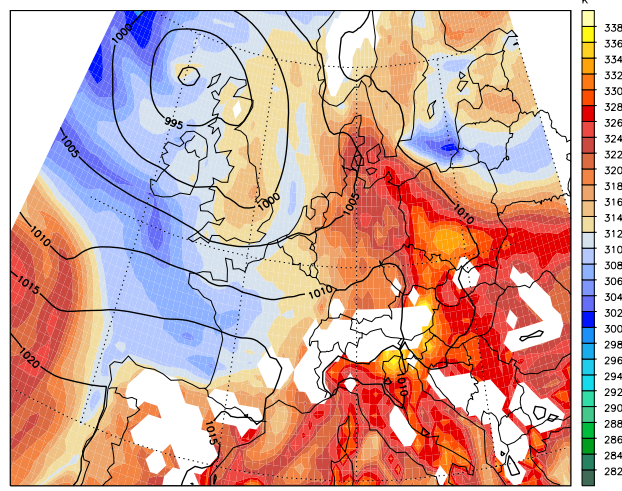
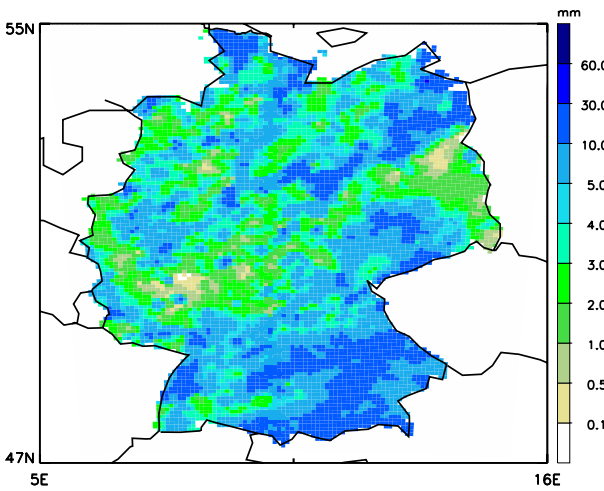
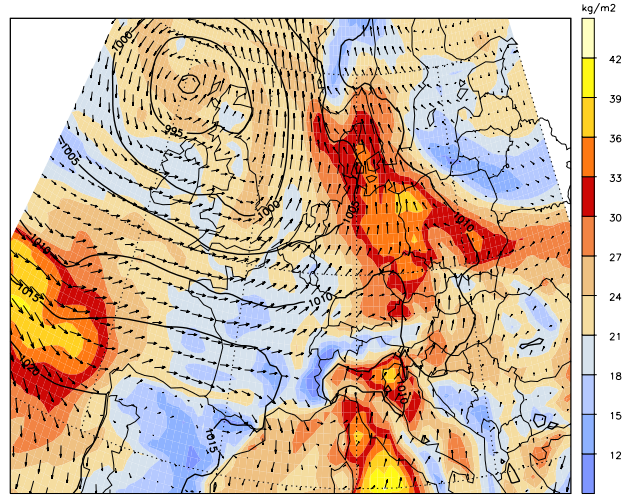
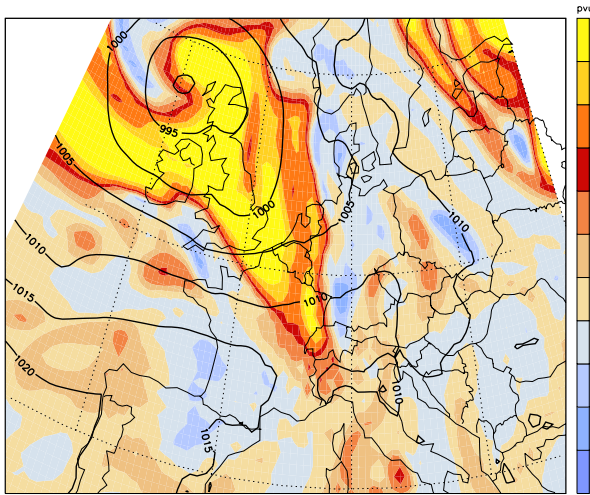
Meteorologische Situation und Qualität der Niederschlagsvorhersage für COPS-DE am 29. Juni 2007.



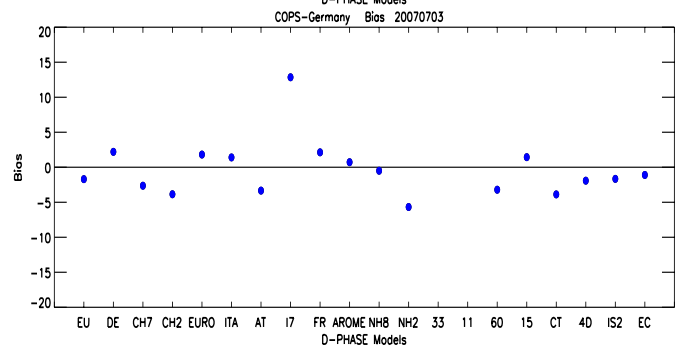
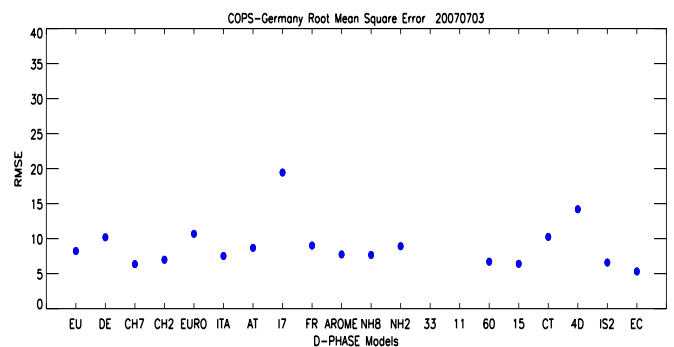
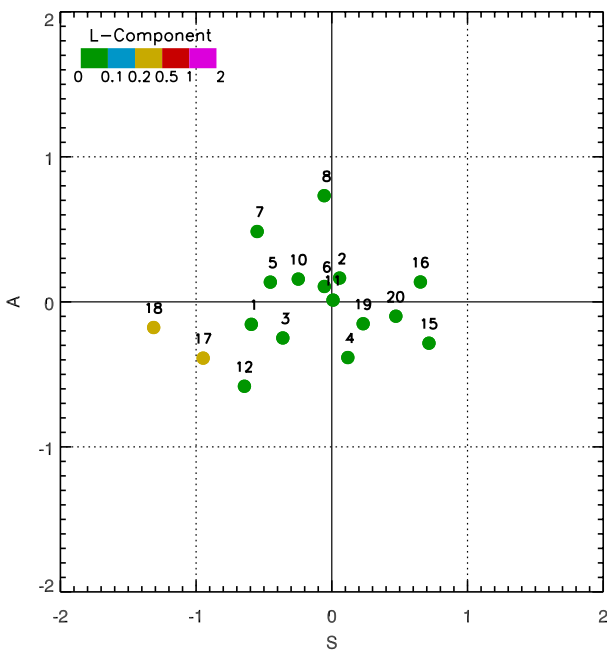
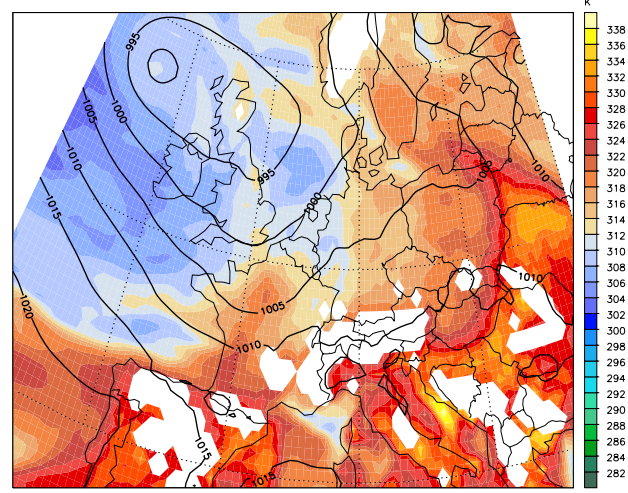
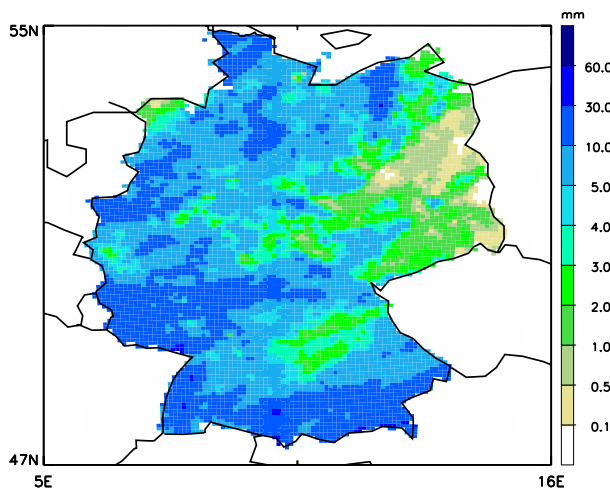
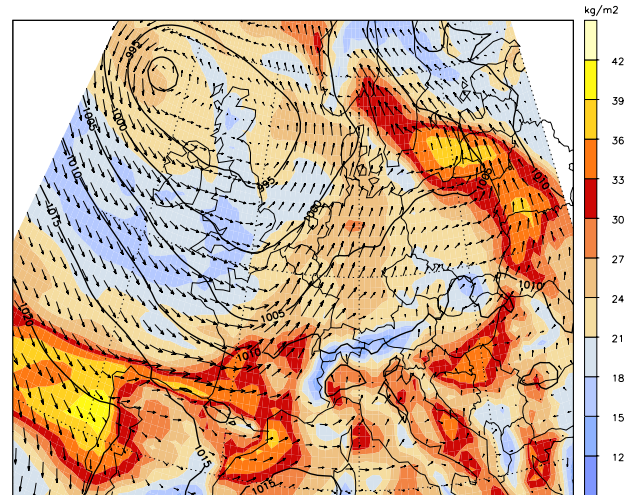
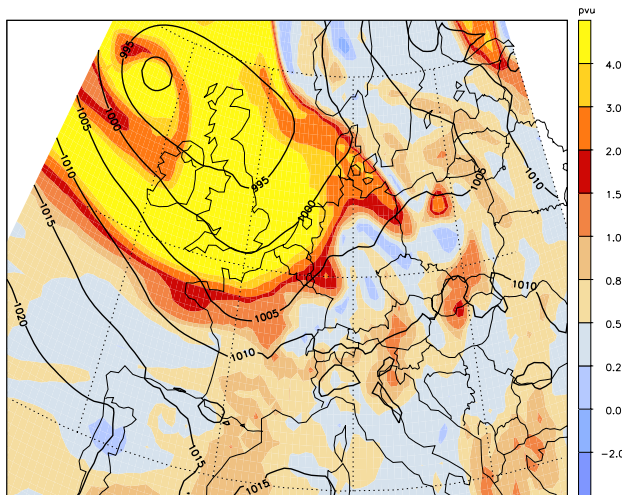
Meteorologische Situation und Qualität der Niederschlagsvorhersage für COPS-DE am 30. Juni 2007.



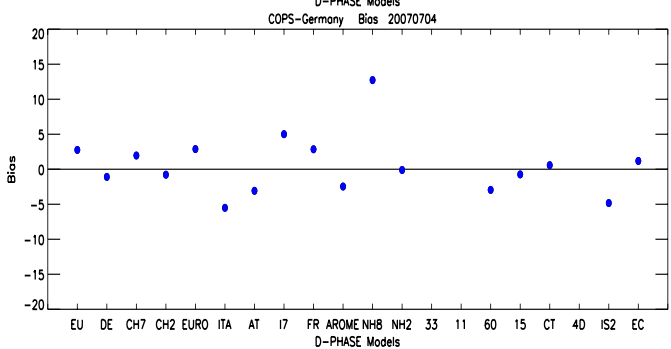
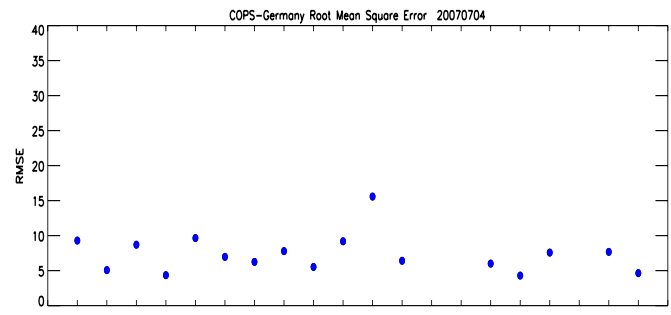
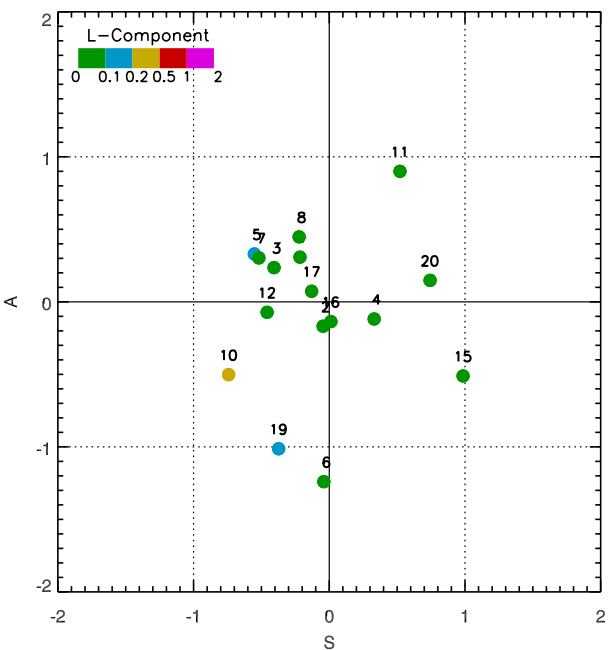
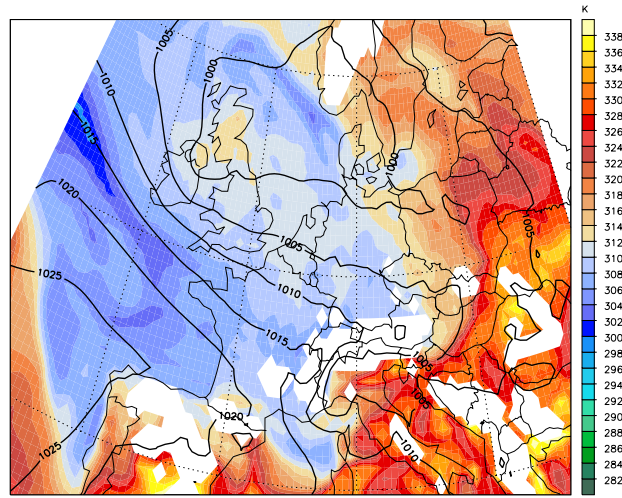
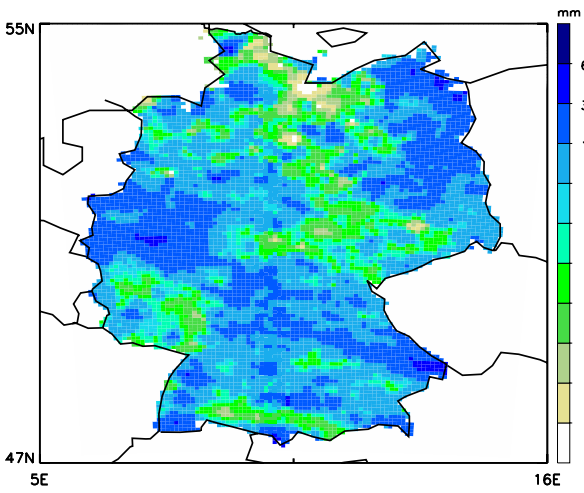
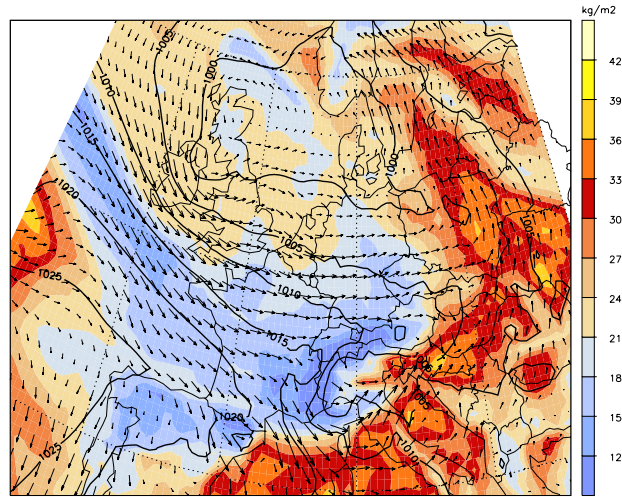
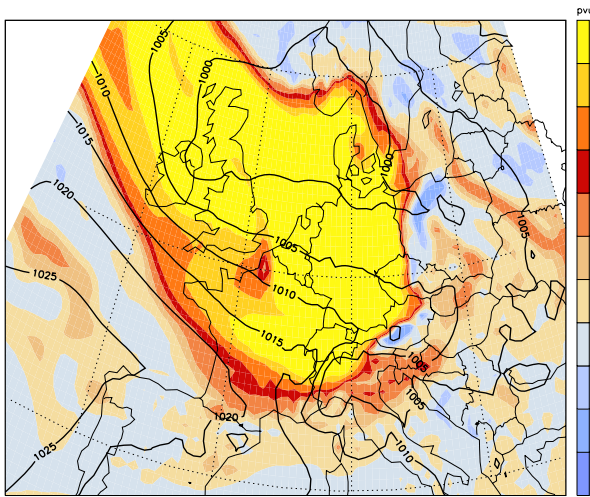
Meteorologische Situation und Qualität der Niederschlagsvorhersage für COPS-DE am 1. Juli 2007.



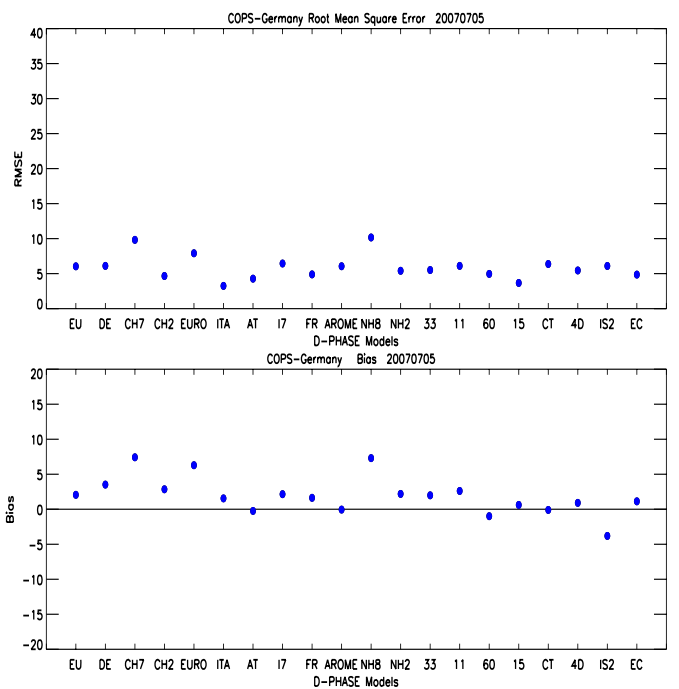
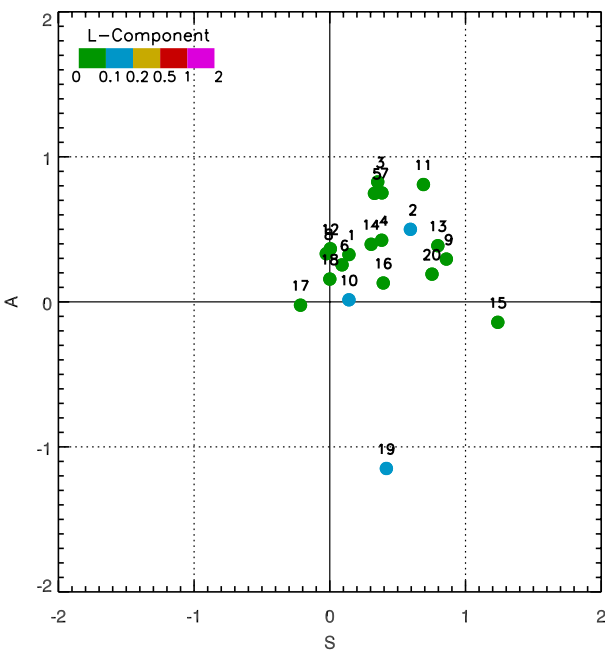
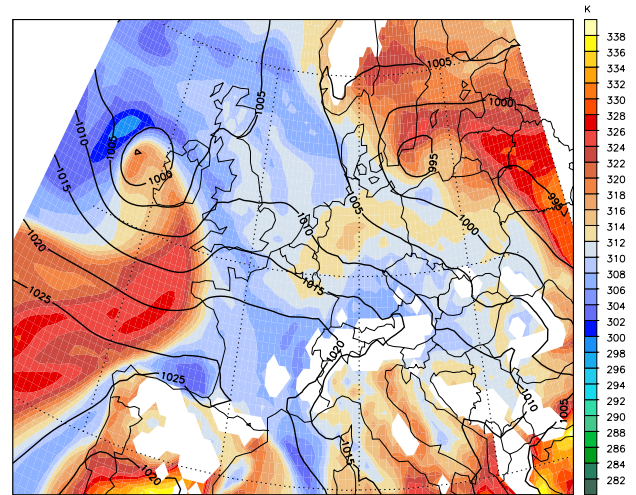
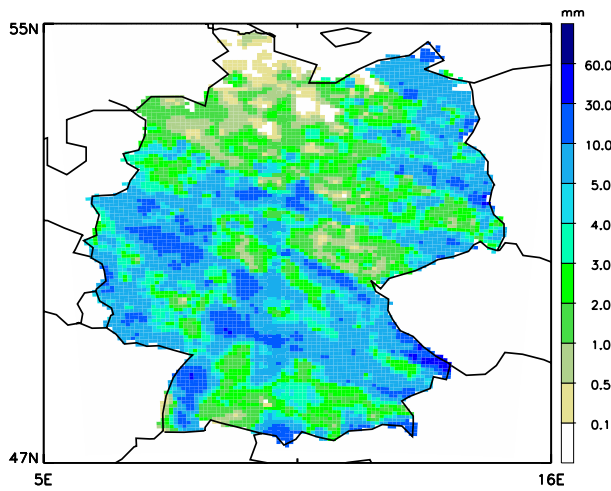
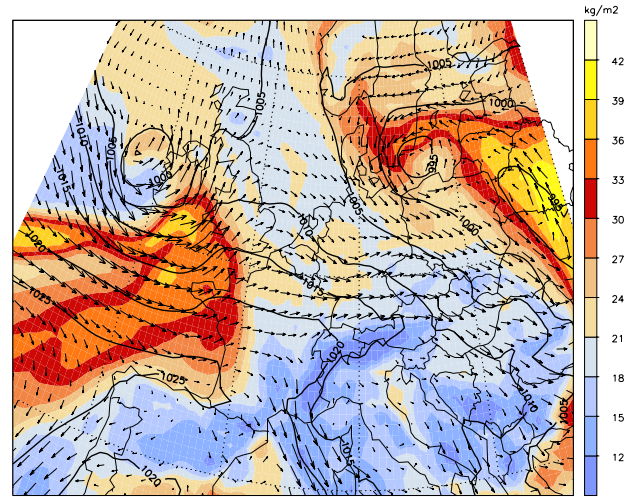
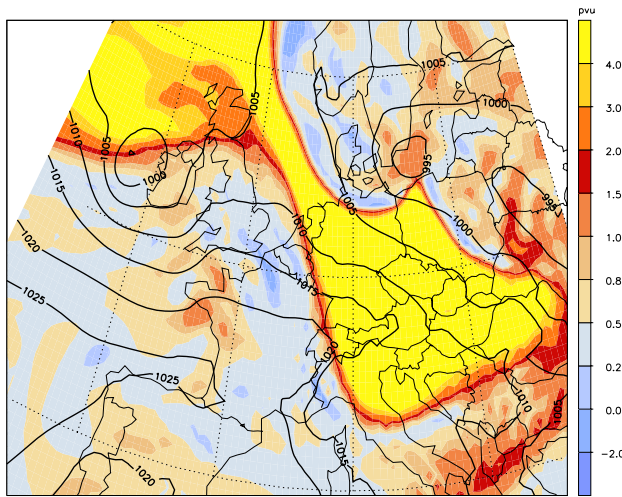
Meteorologische Situation und Qualität der Niederschlagsvorhersage für COPS-DE am 2. Juli 2007.



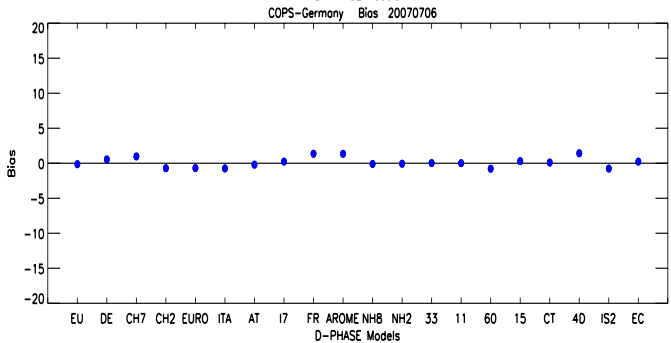
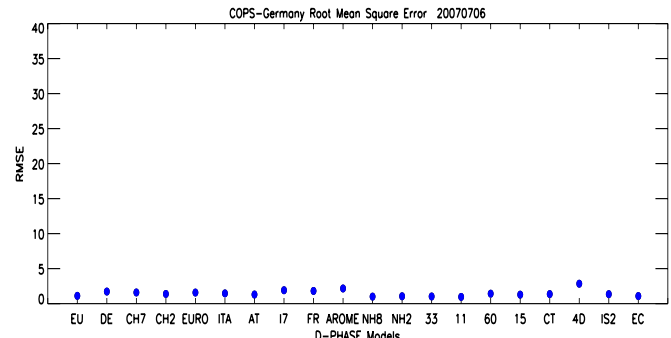
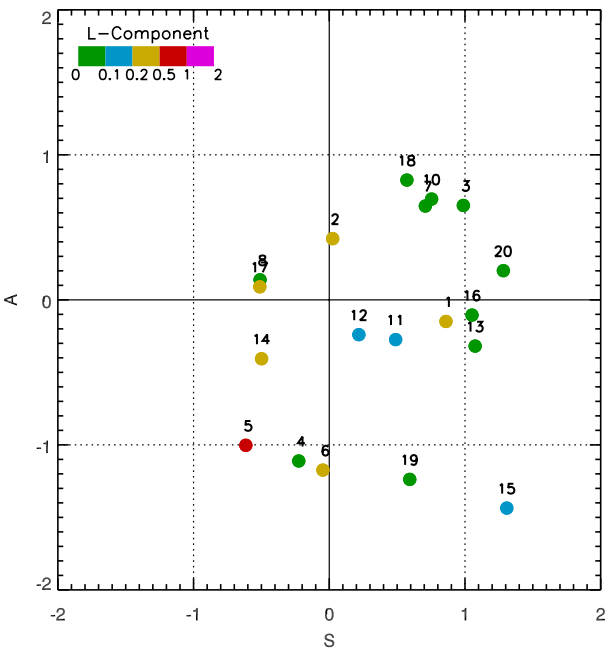
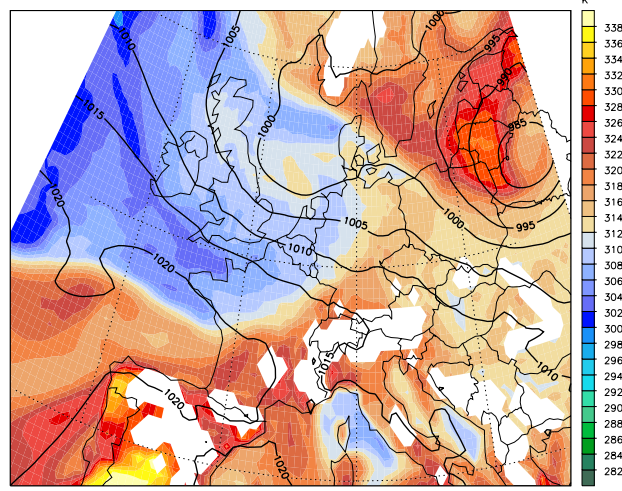
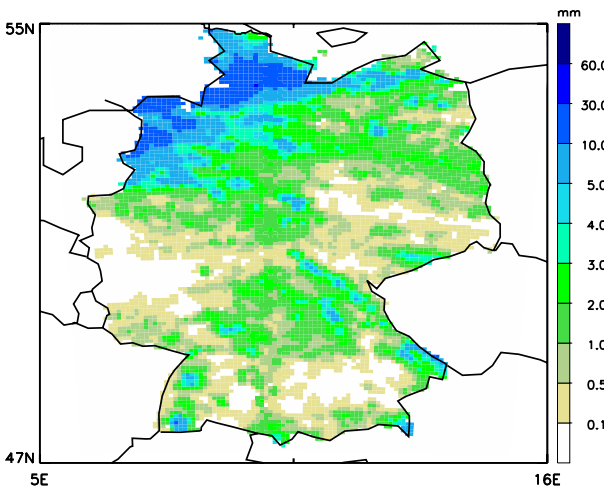
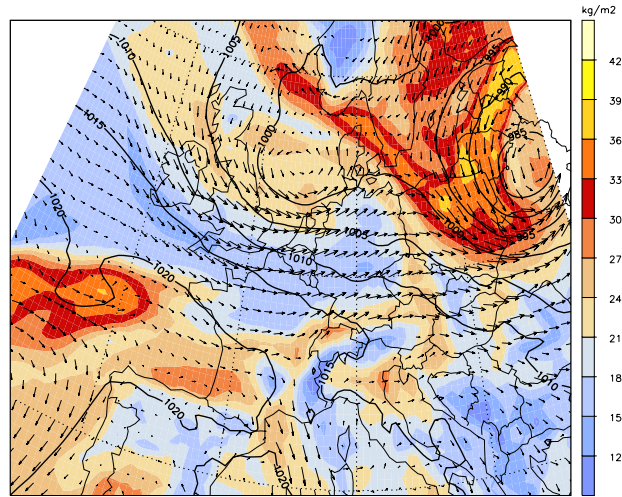
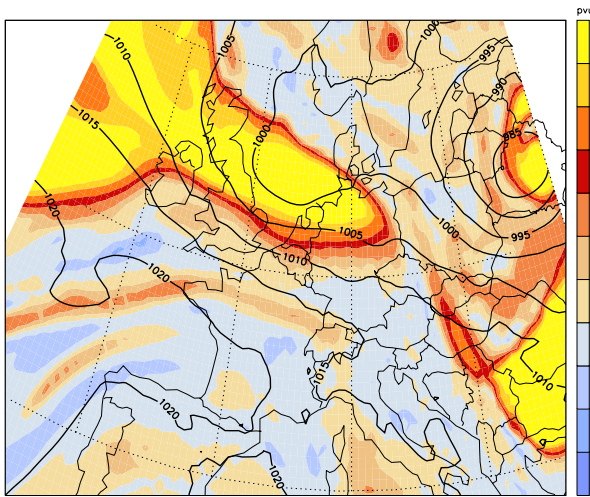
Meteorologische Situation und Qualität der Niederschlagsvorhersage für COPS-DE am 3. Juli 2007.



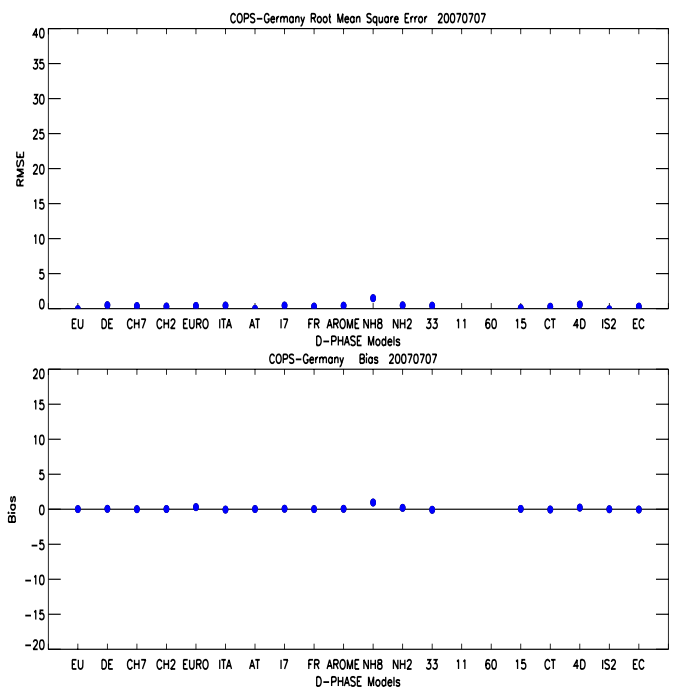
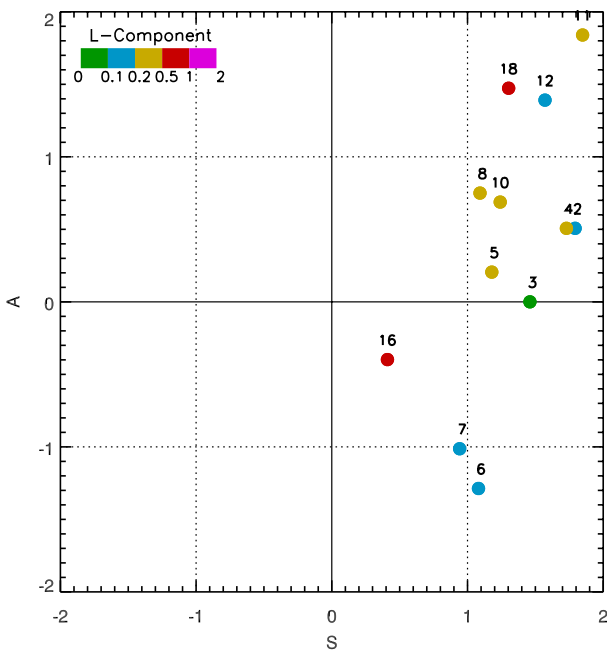
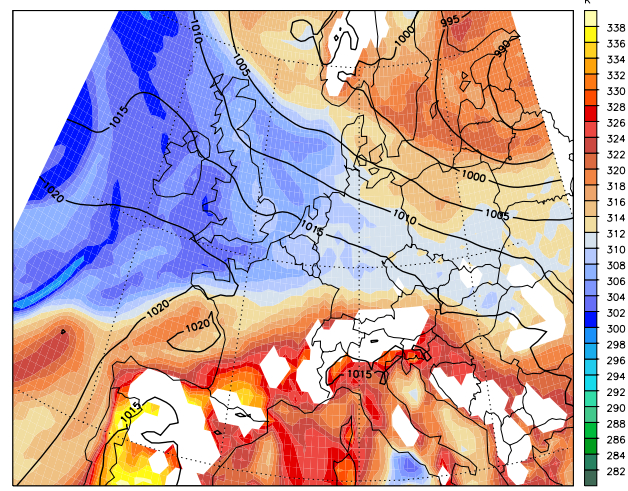
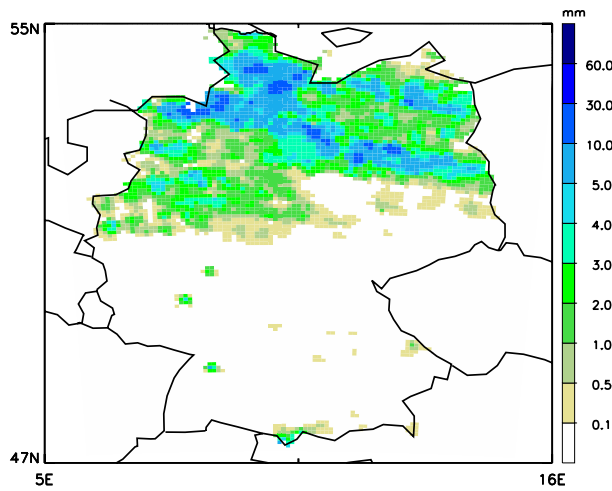
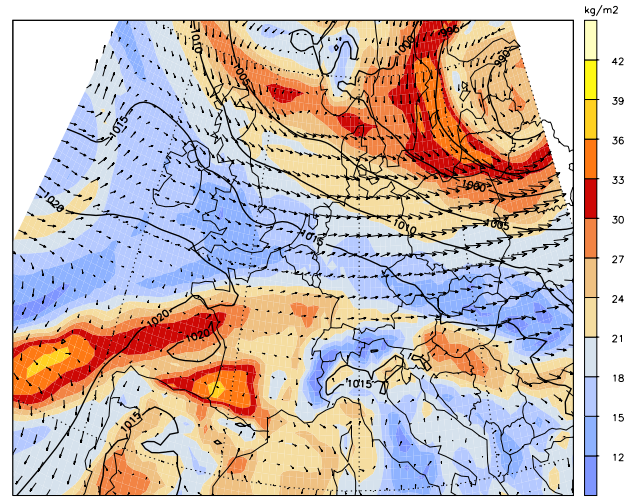
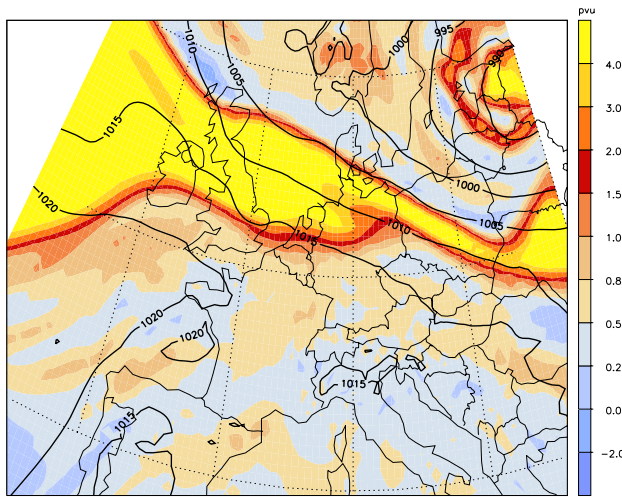
Meteorologische Situation und Qualität der Niederschlagsvorhersage für COPS-DE am 4. Juli 2007.



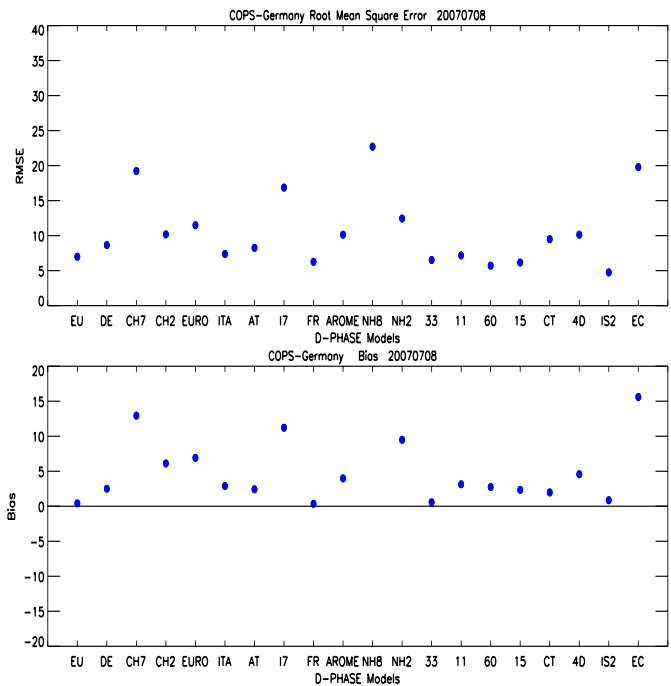
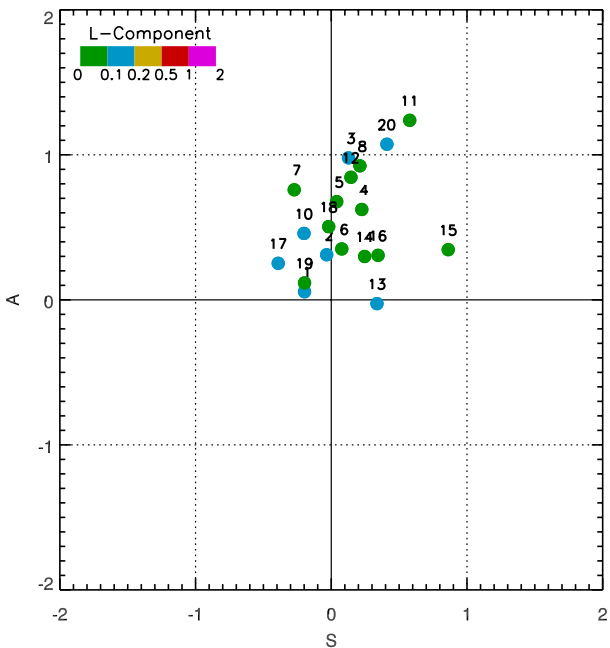
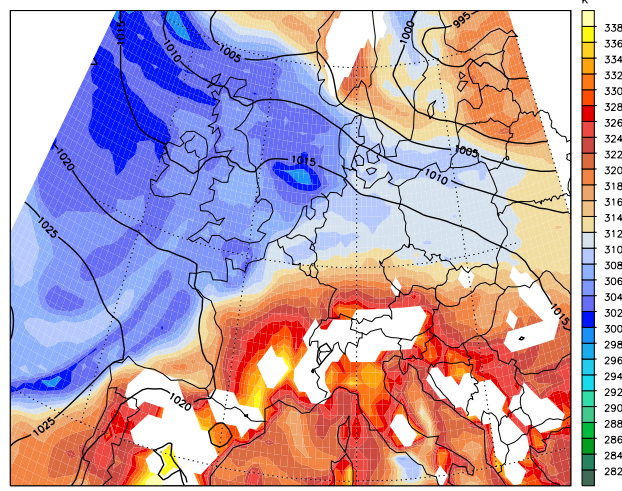
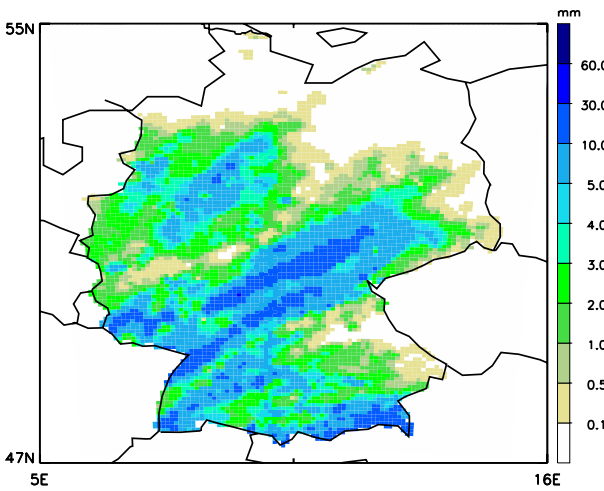
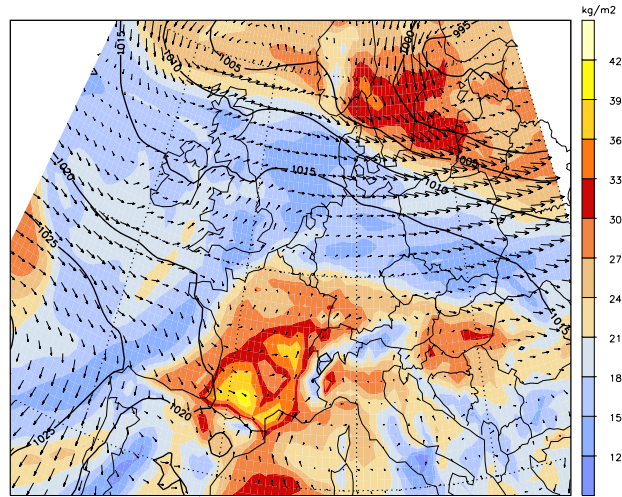
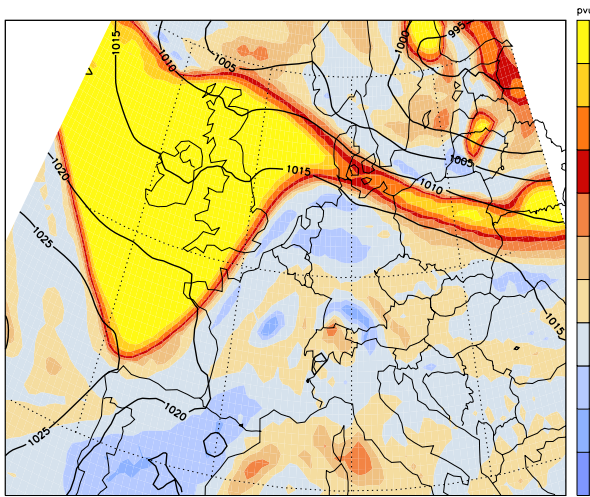
Meteorologische Situation und Qualität der Niederschlagsvorhersage für COPS-DE am 5. Juli 2007.



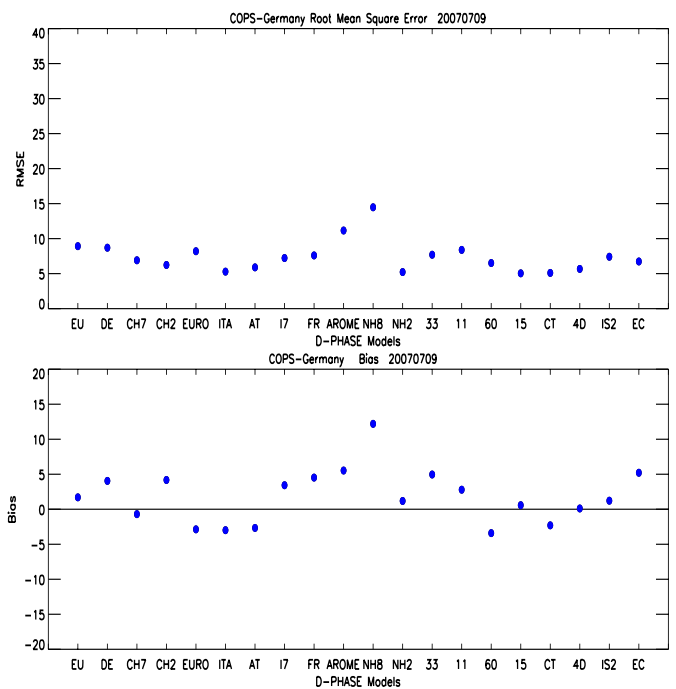
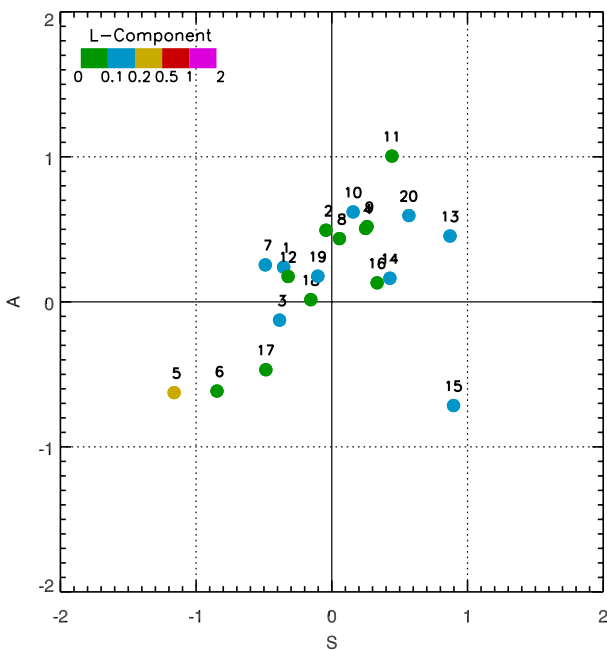
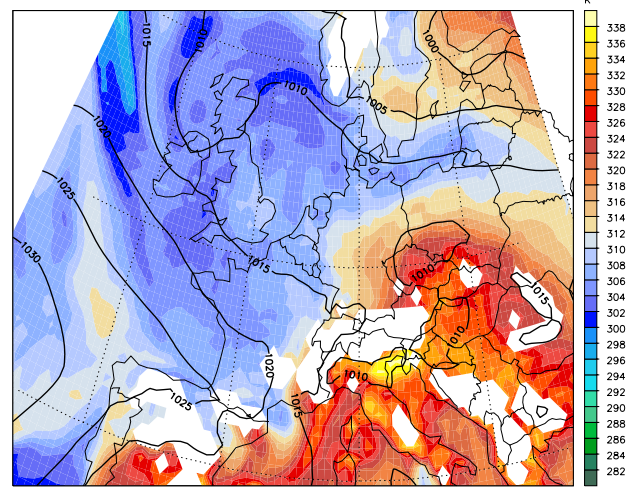
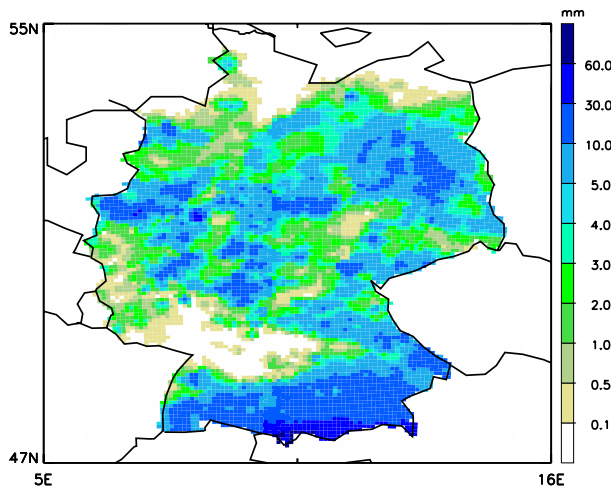
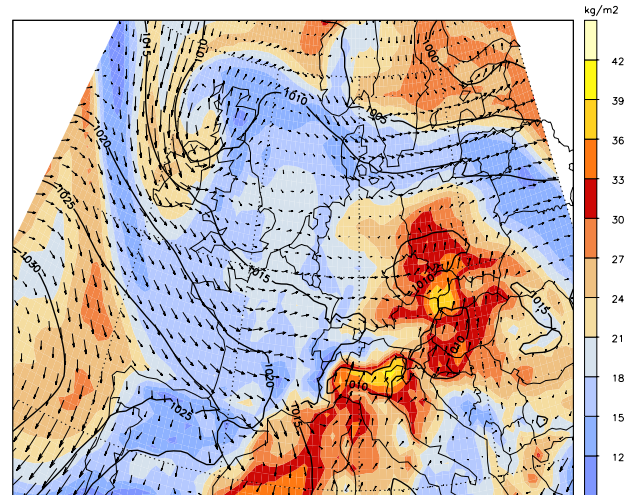
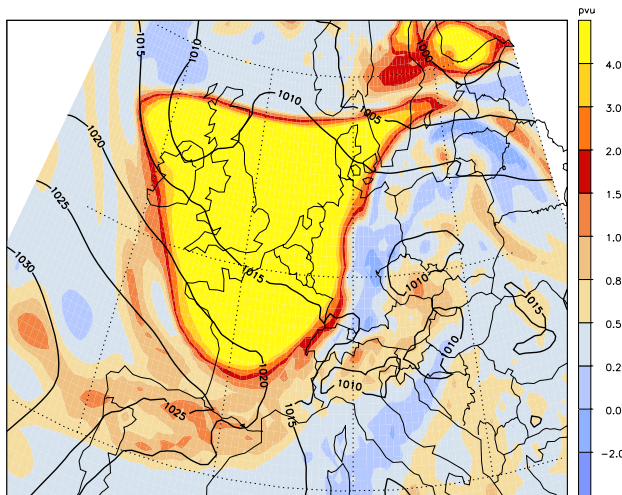
Meteorologische Situation und Qualität der Niederschlagsvorhersage für COPS-DE am 6. Juli 2007.



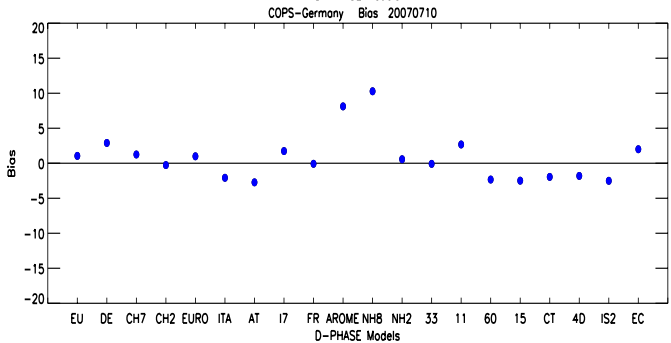
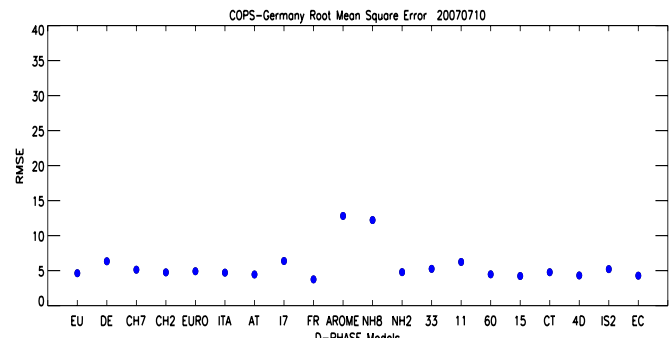
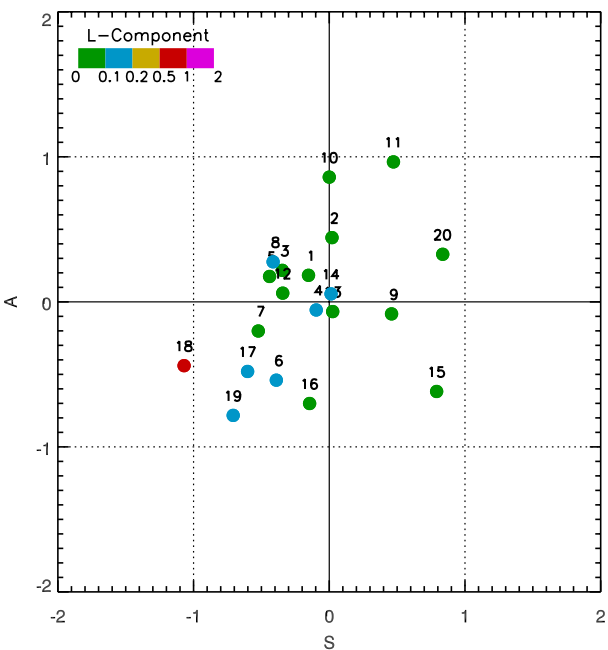
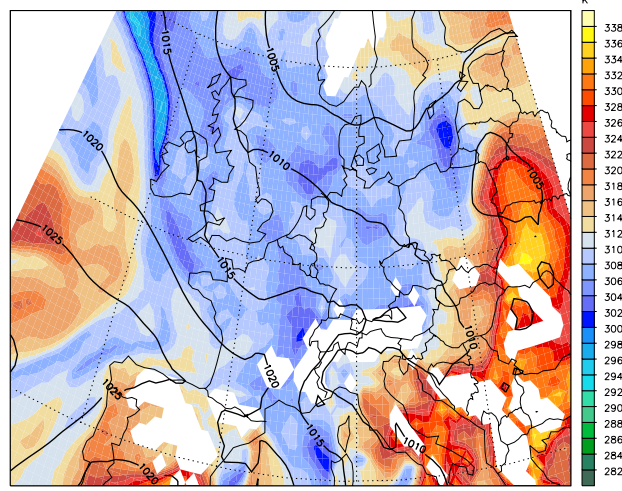
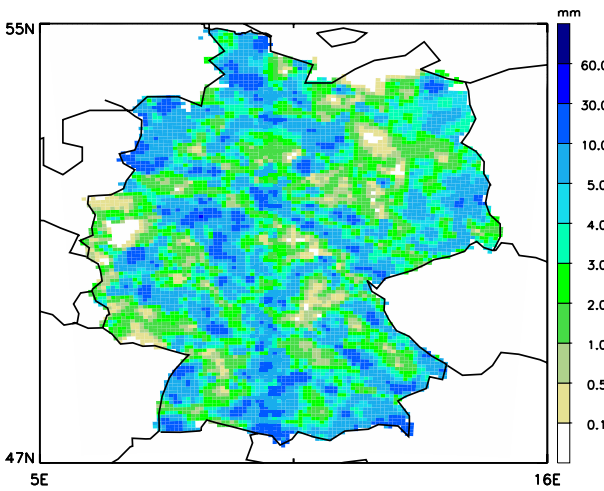
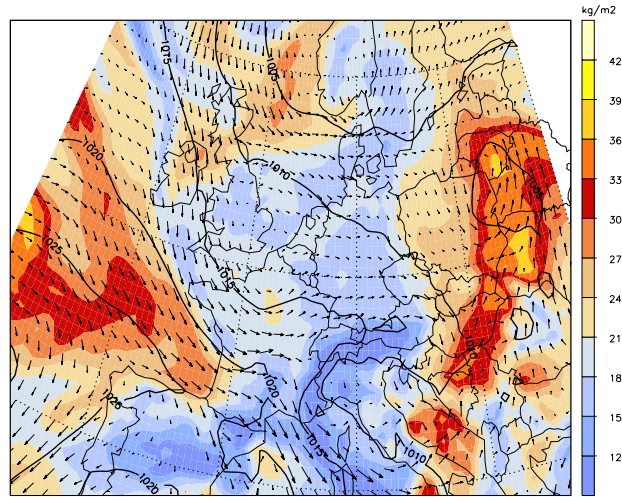
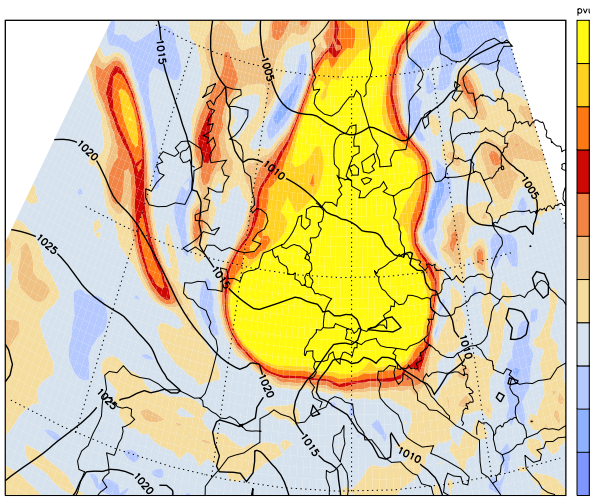
Meteorologische Situation und Qualität der Niederschlagsvorhersage für COPS-DE am 7. Juli 2007.



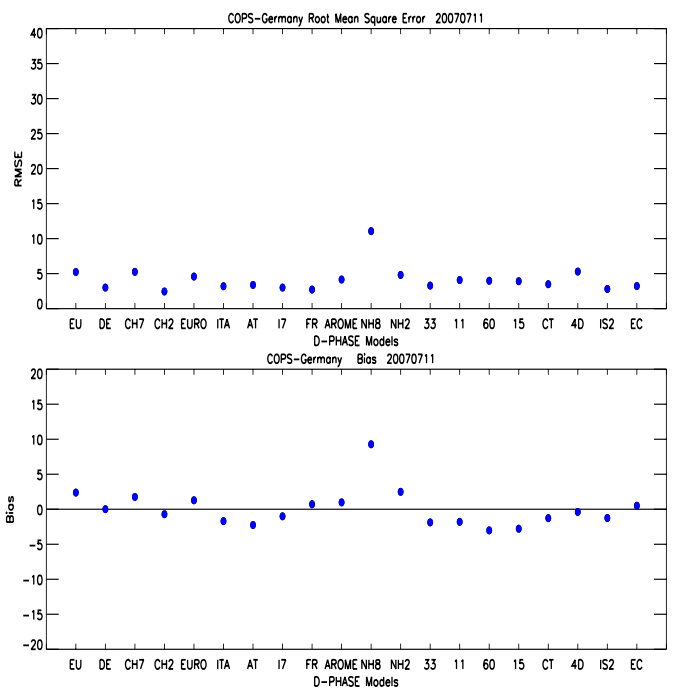
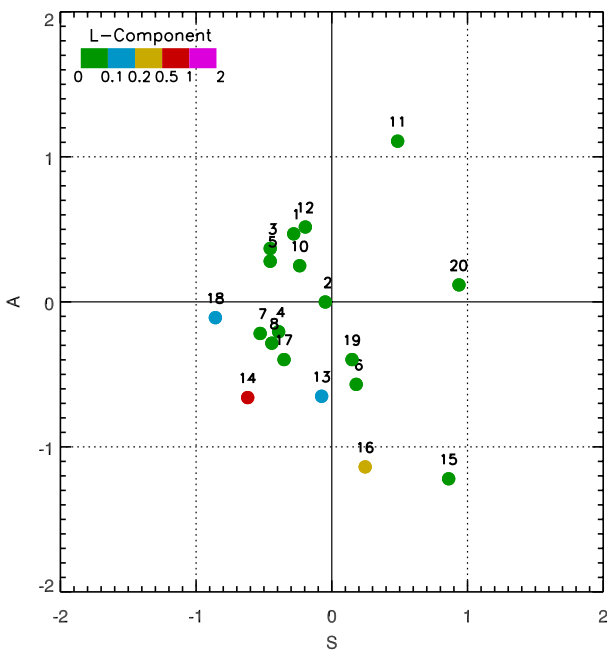
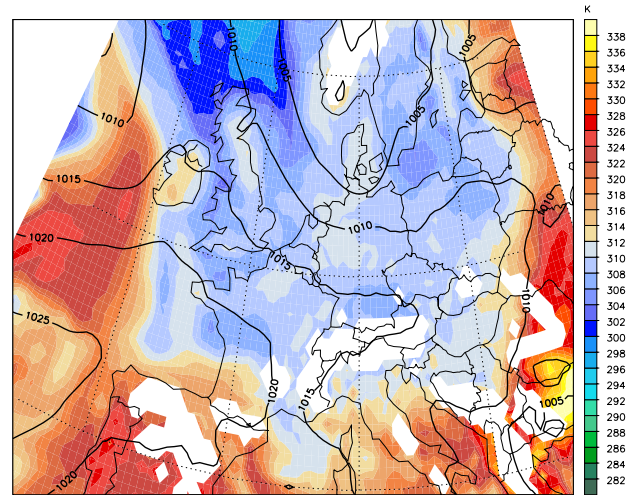
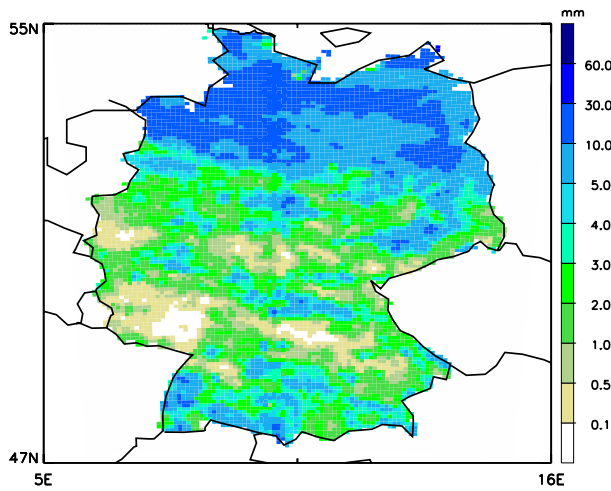
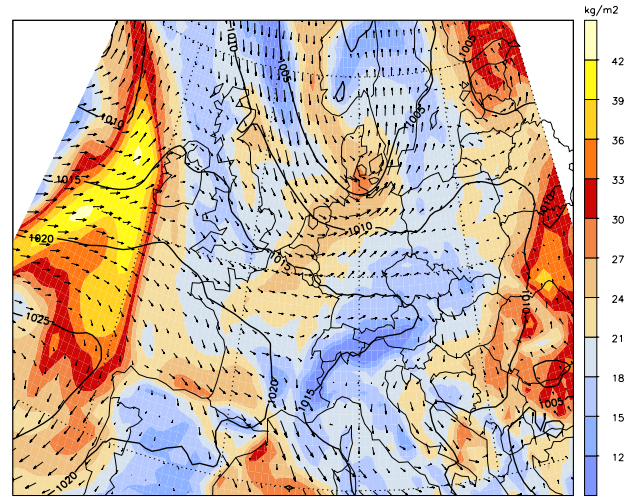
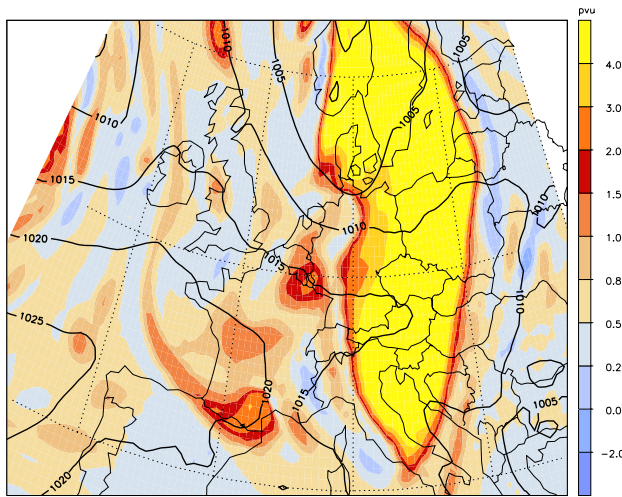
Meteorologische Situation und Qualität der Niederschlagsvorhersage für COPS-DE am 8. Juli 2007.



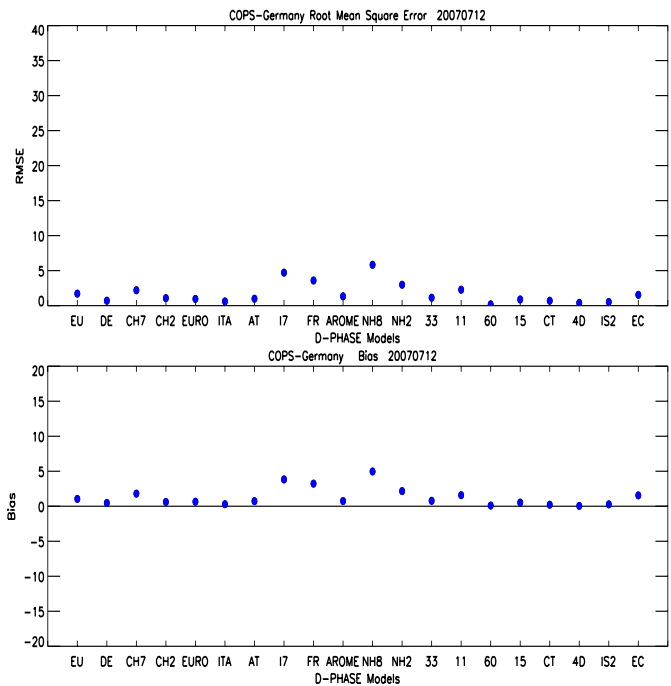
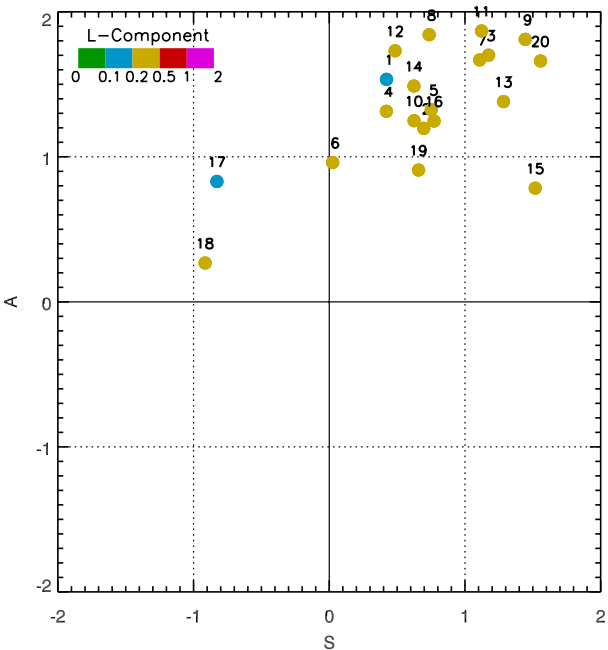
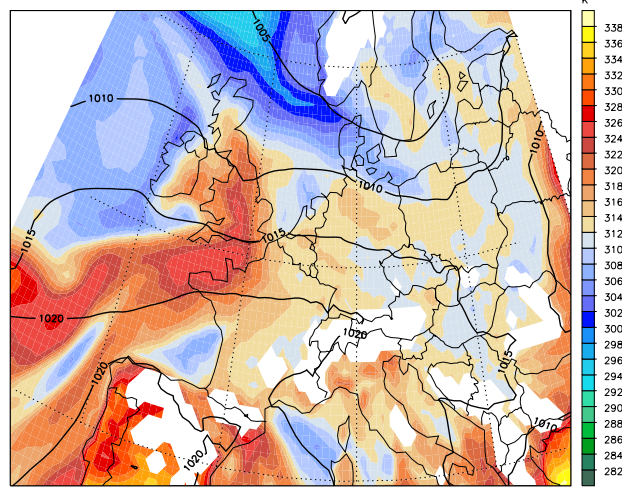
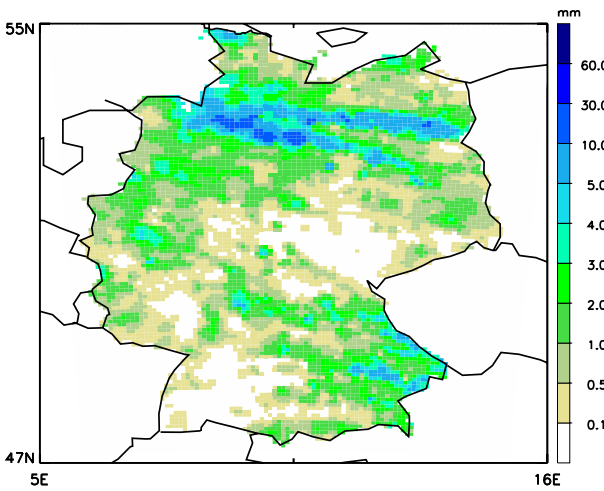
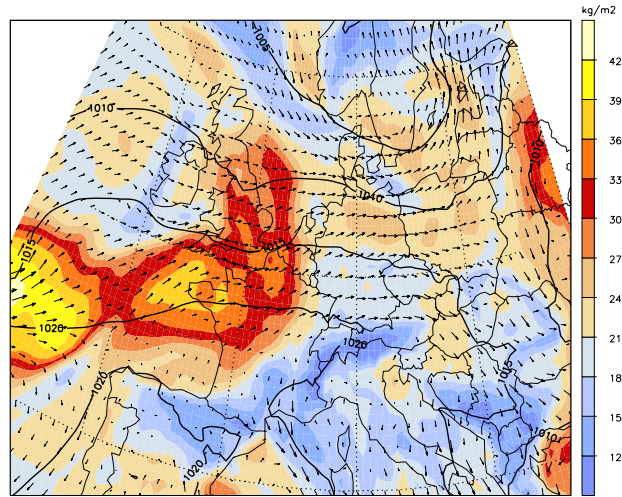
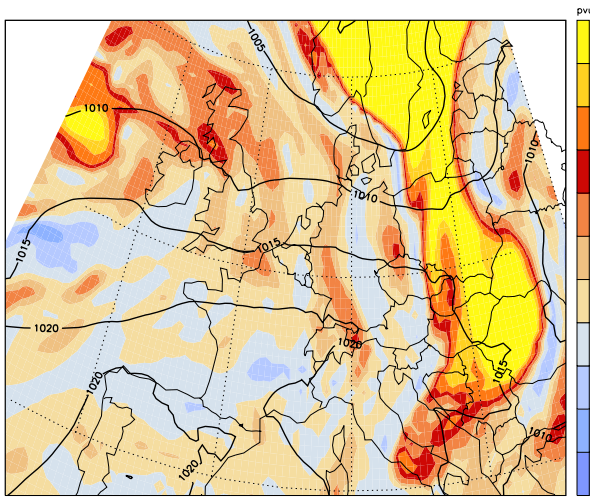
Meteorologische Situation und Qualität der Niederschlagsvorhersage für COPS-DE am 9. Juli 2007.



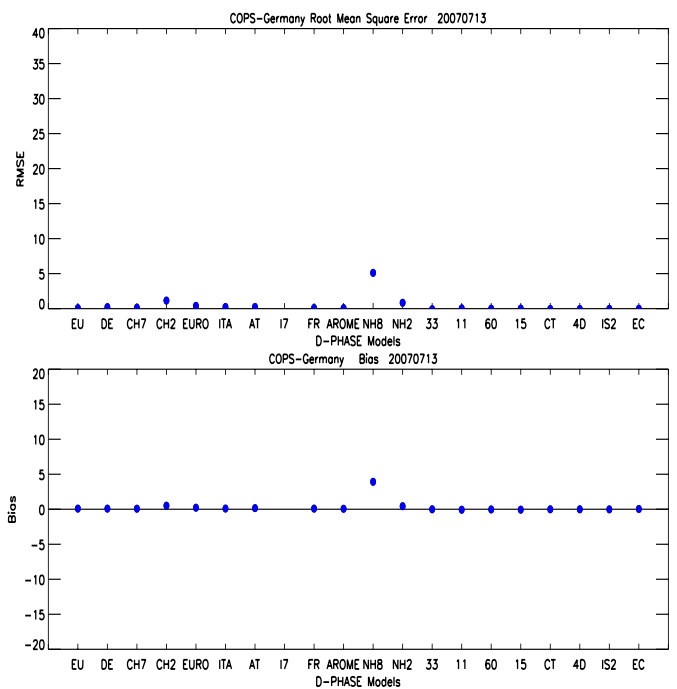
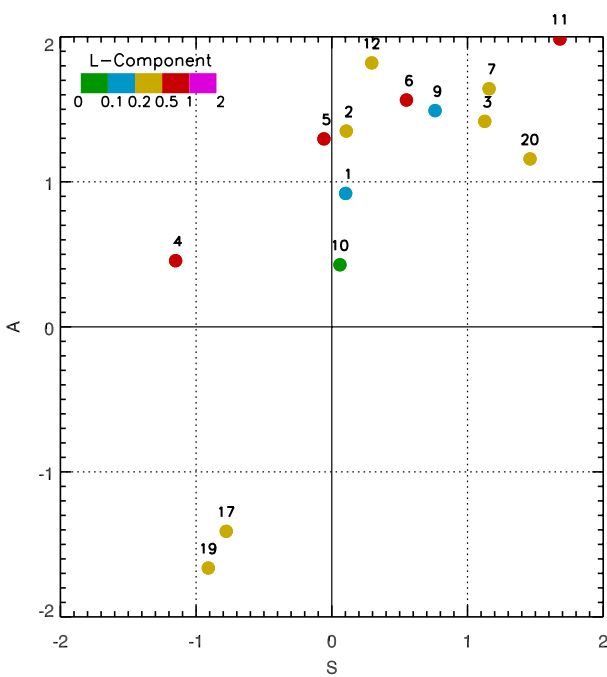
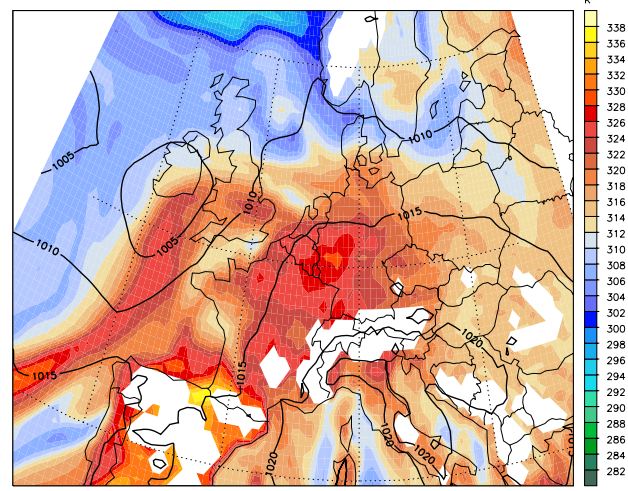
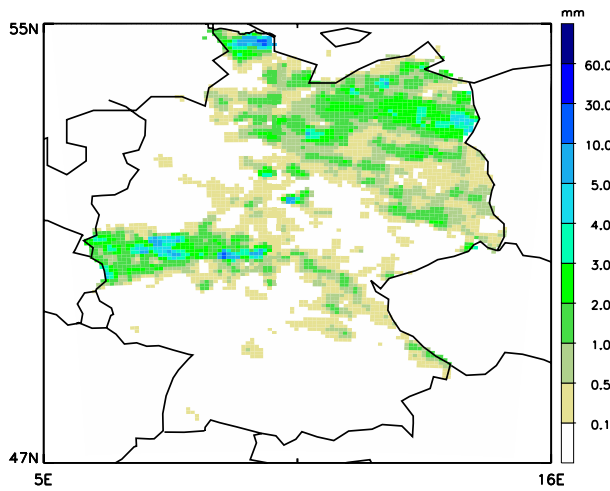
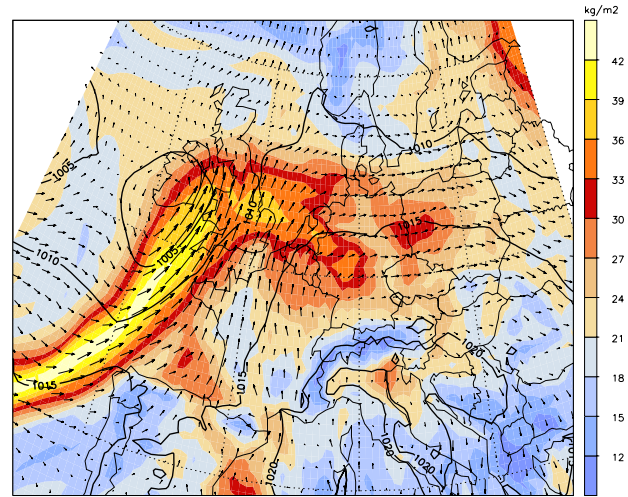
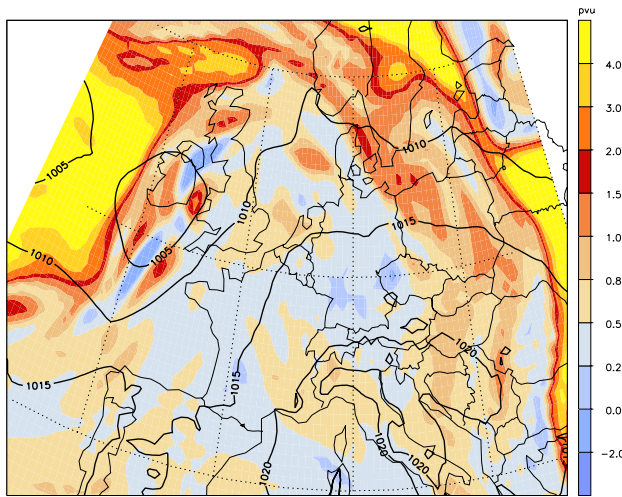
Meteorologische Situation und Qualität der Niederschlagsvorhersage für COPS-DE am 10. Juli 2007.



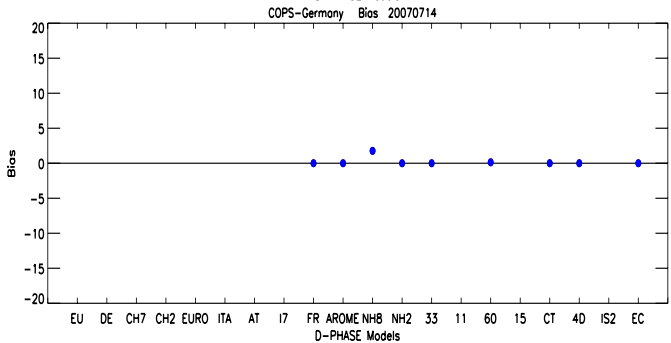
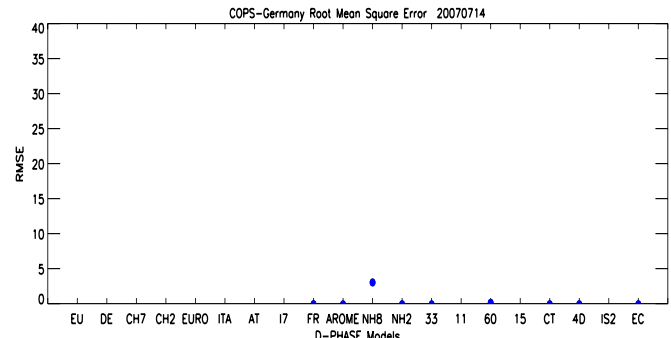
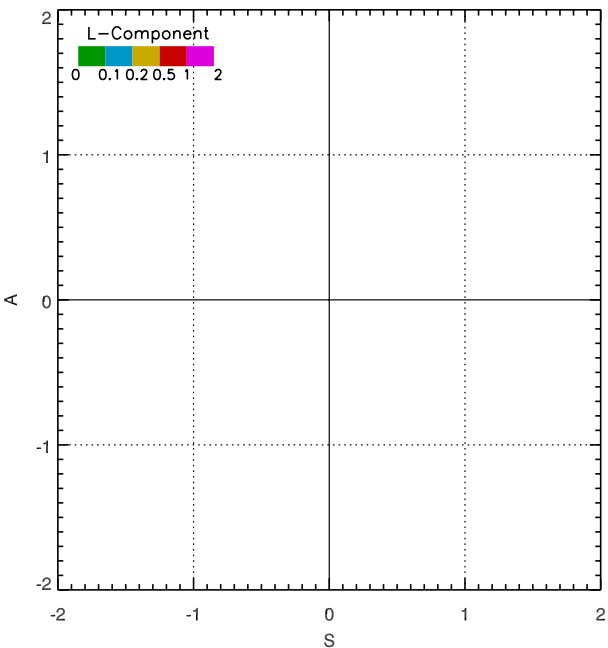
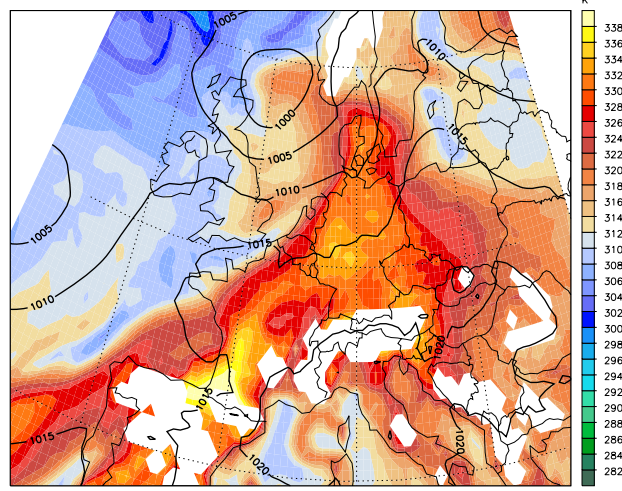
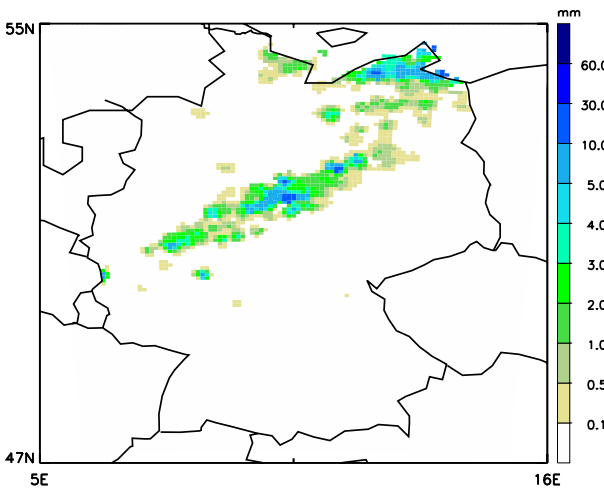
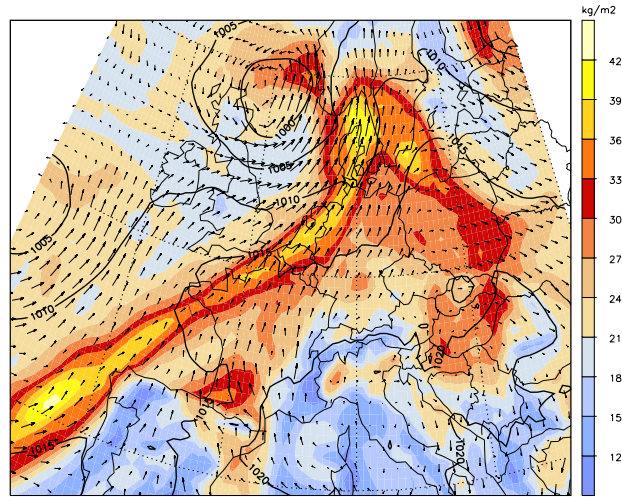
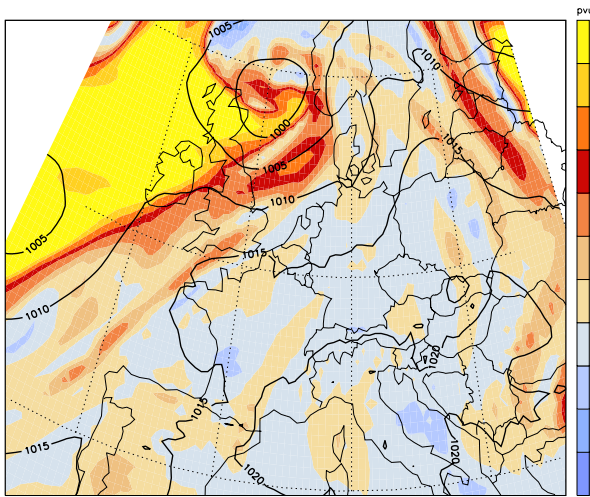
Meteorologische Situation und Qualität der Niederschlagsvorhersage für COPS-DE am 11. Juli 2007.



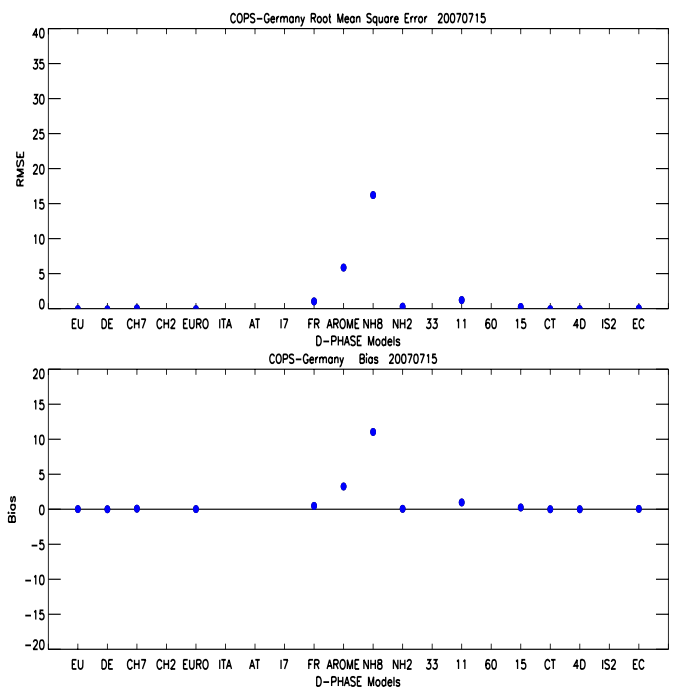
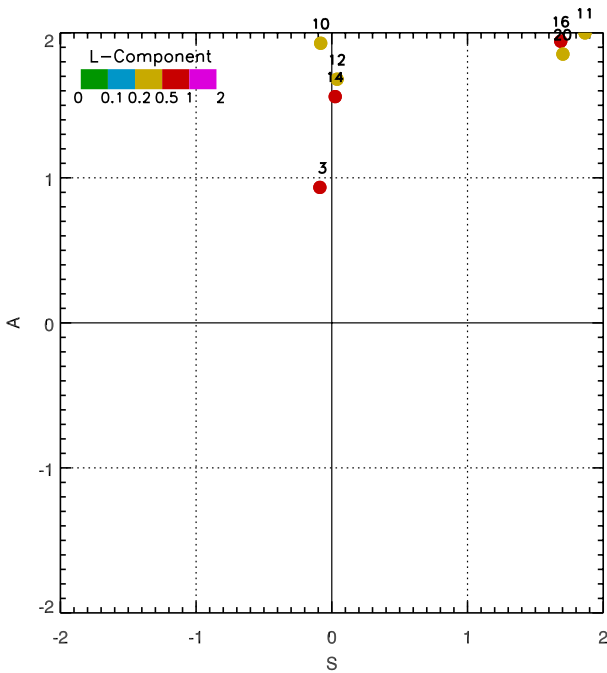
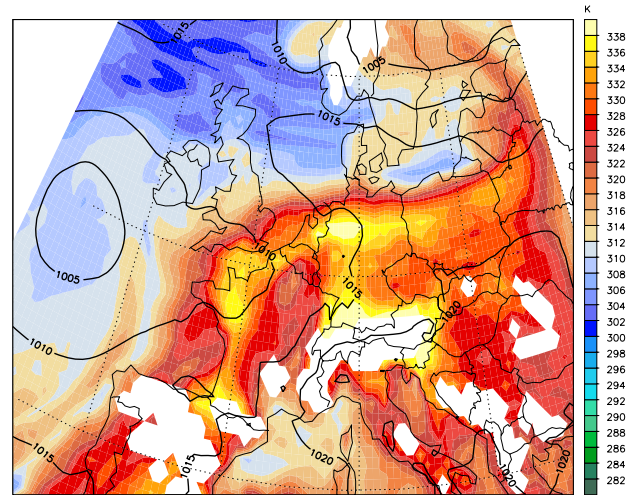
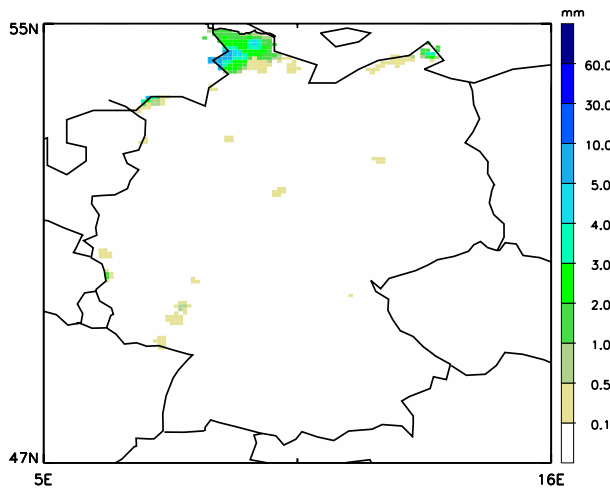
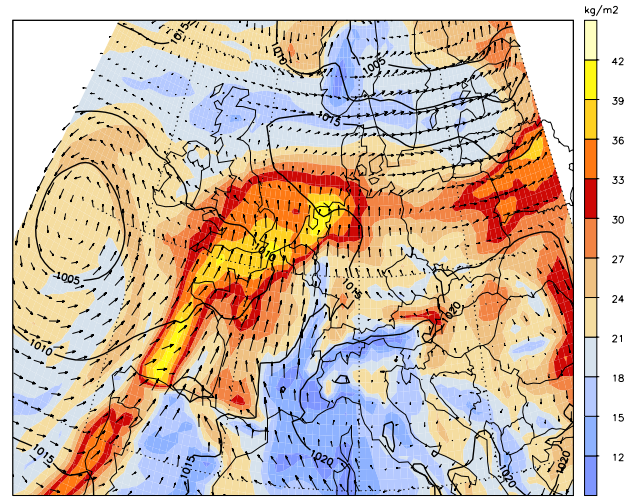
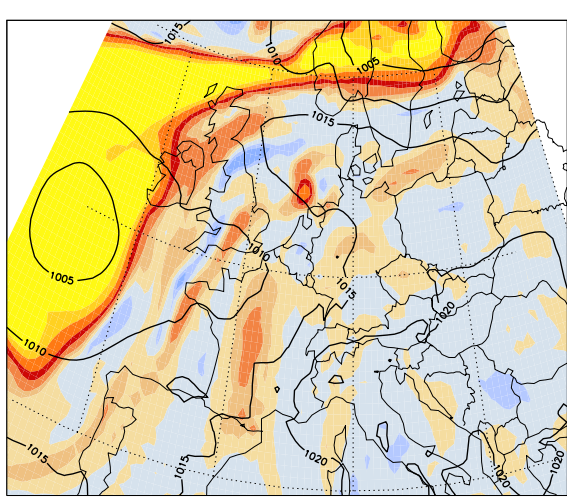
Meteorologische Situation und Qualität der Niederschlagsvorhersage für COPS-DE am 12. Juli 2007.



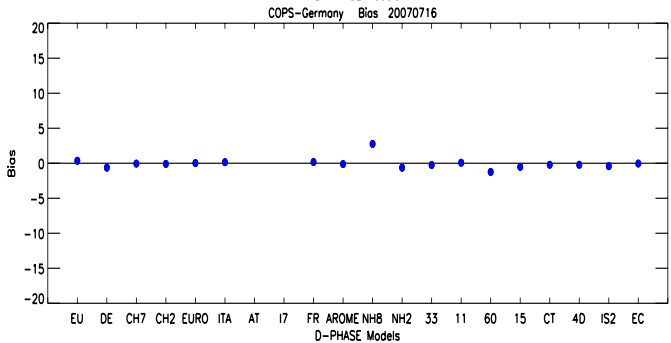
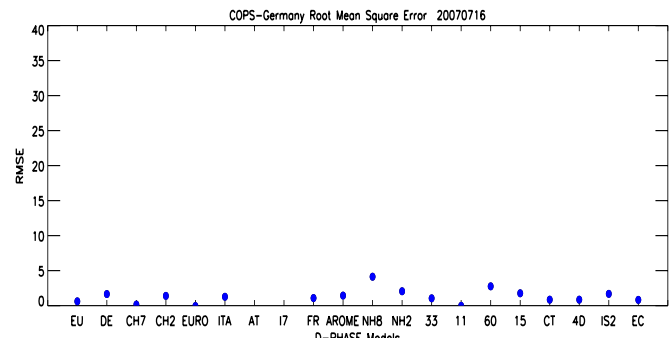
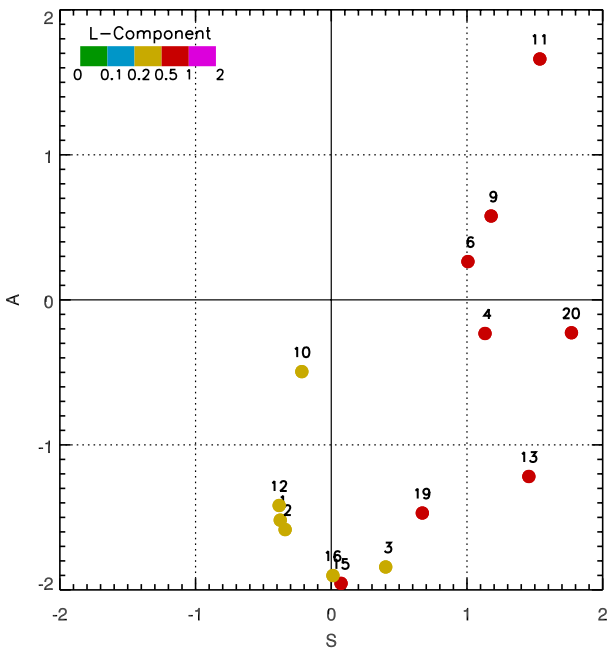
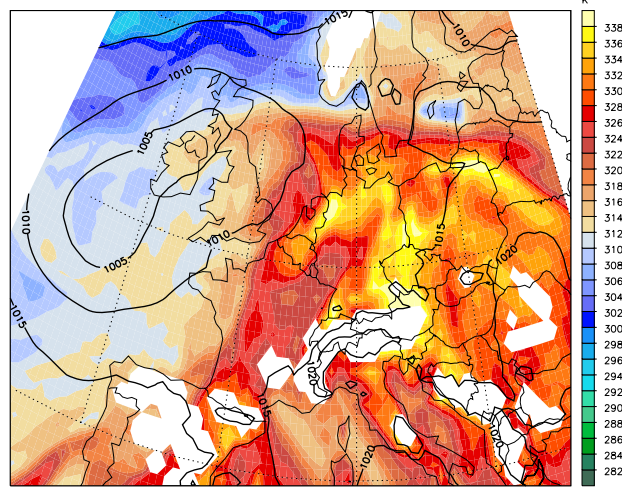
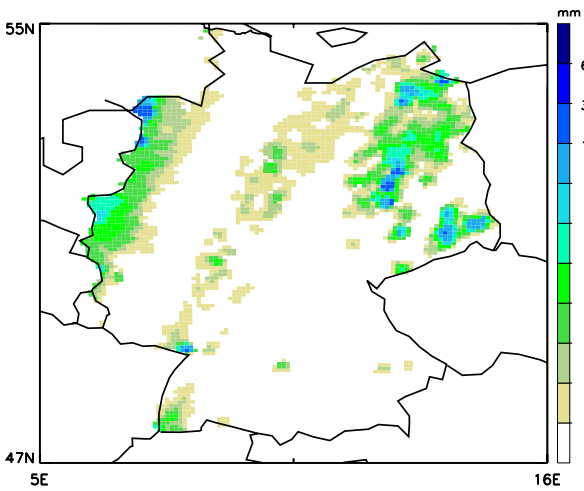
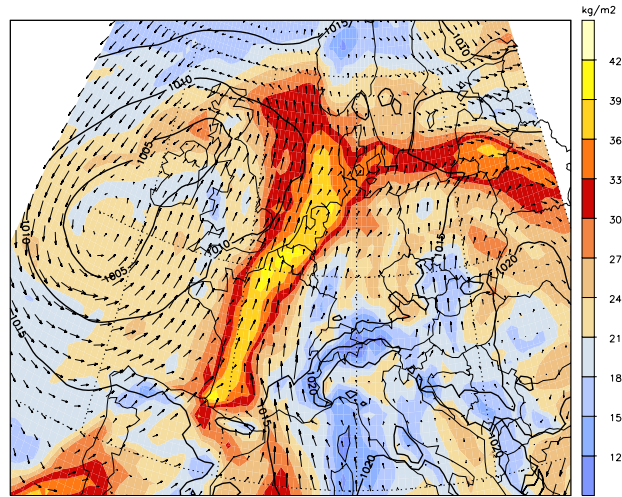
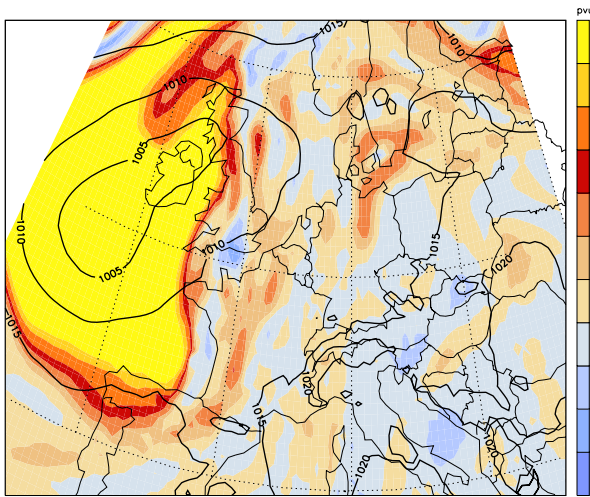
Meteorologische Situation und Qualität der Niederschlagsvorhersage für COPS-DE am 13. Juli 2007.



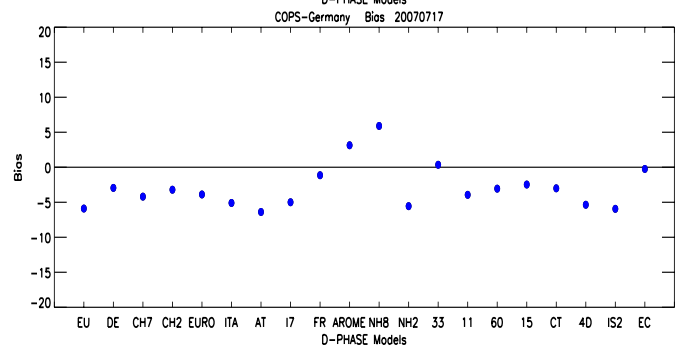
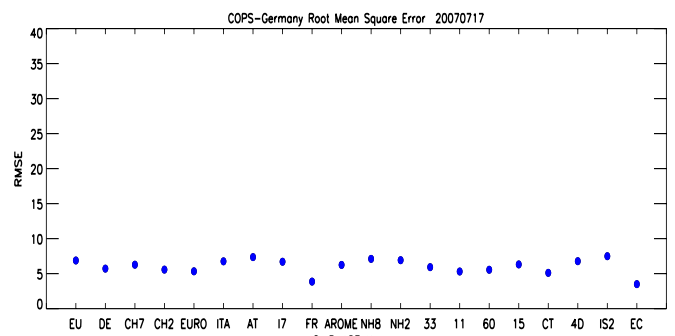
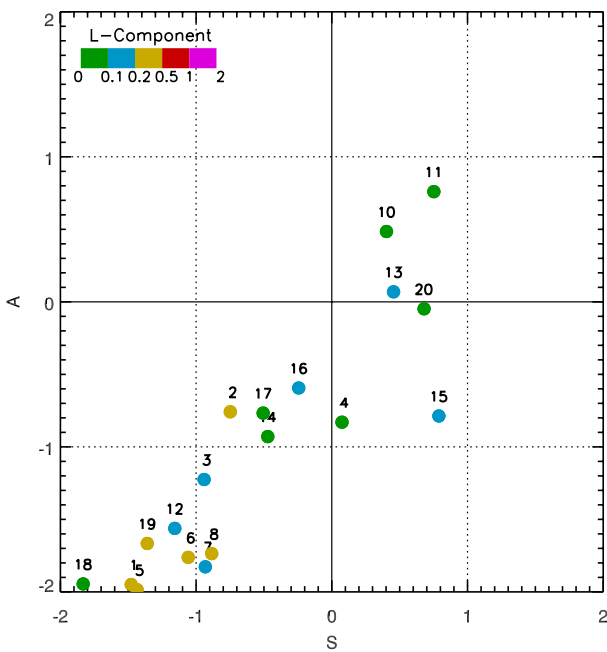
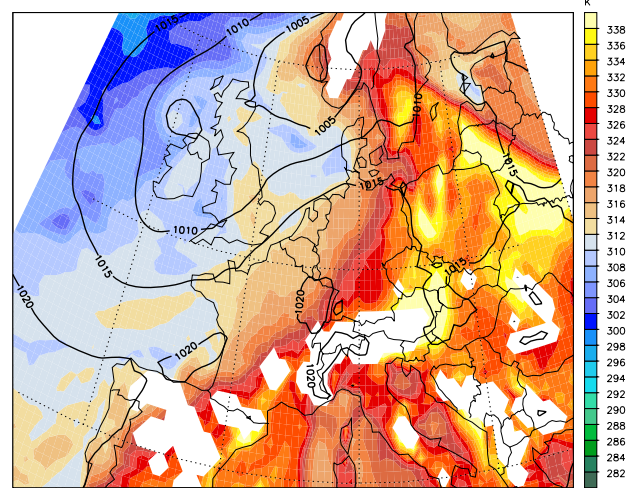
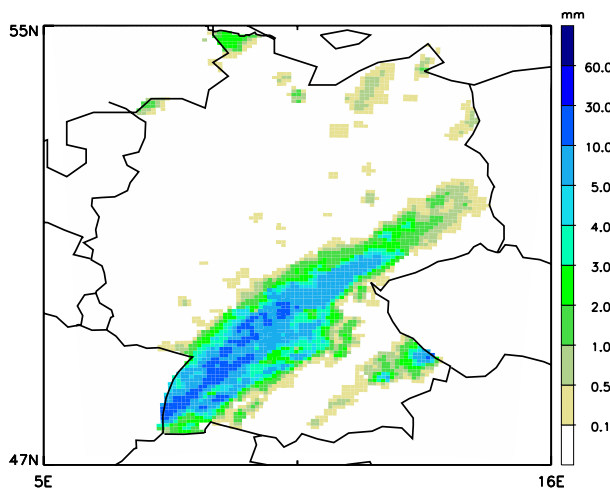
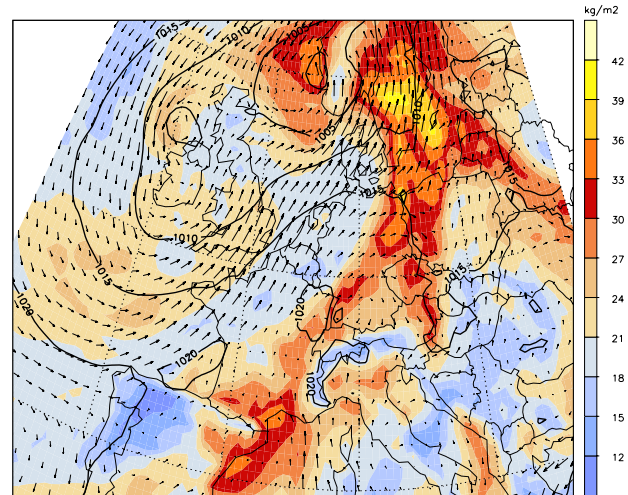
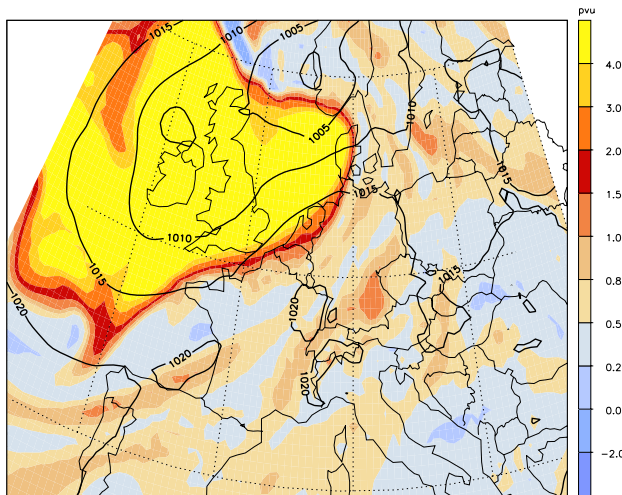
Meteorologische Situation und Qualität der Niederschlagsvorhersage für COPS-DE am 14. Juli 2007.



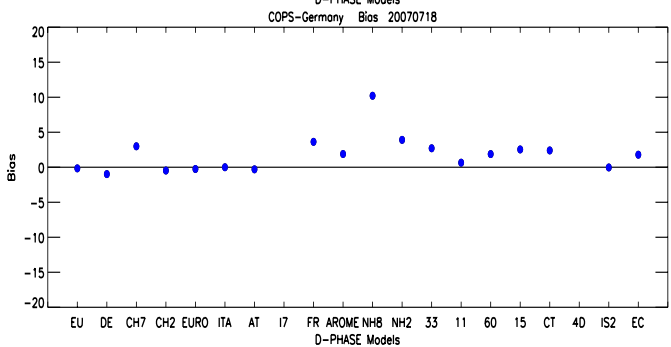
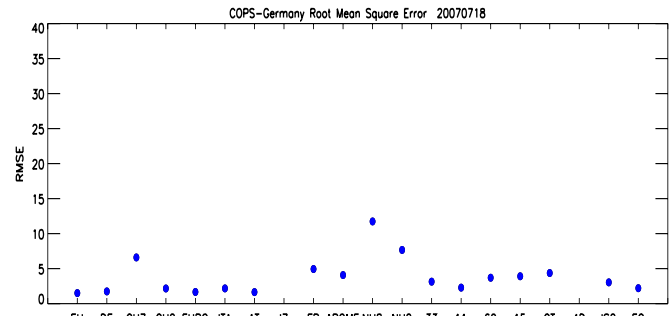
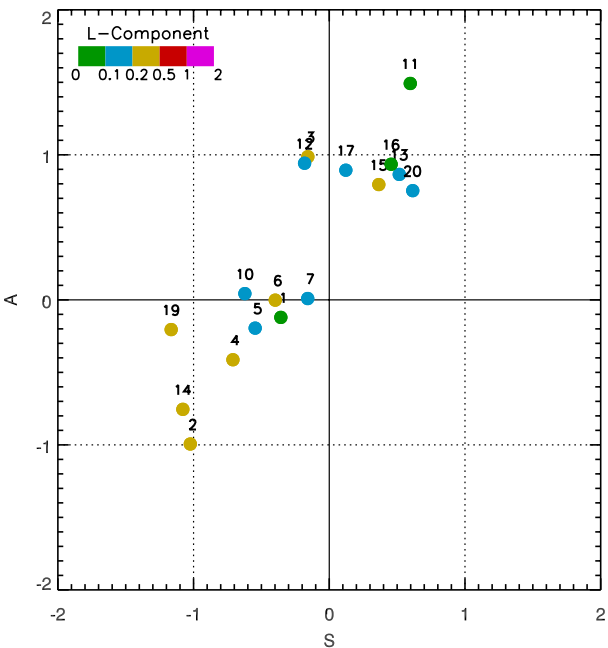
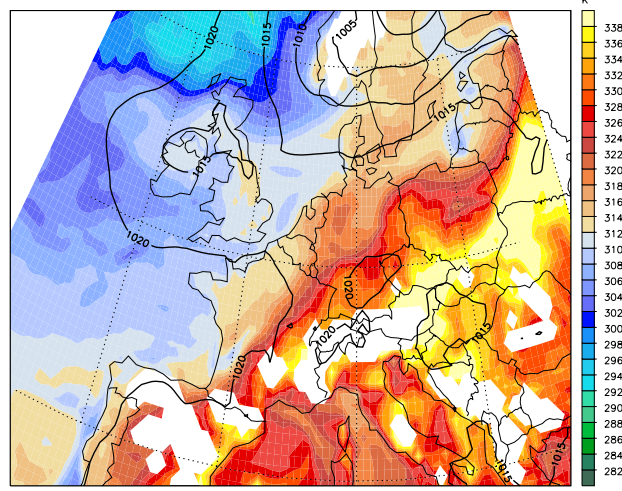
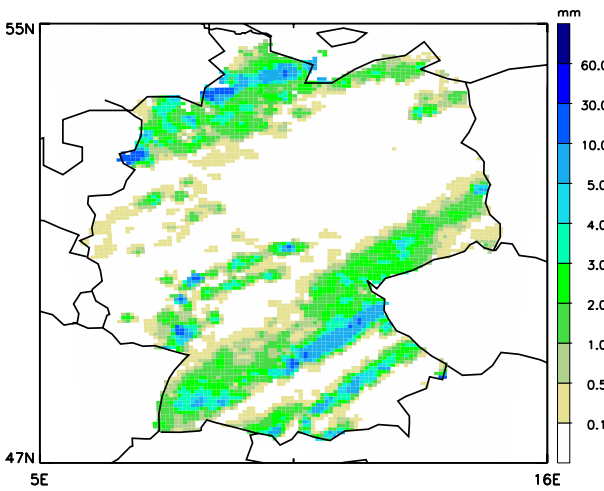
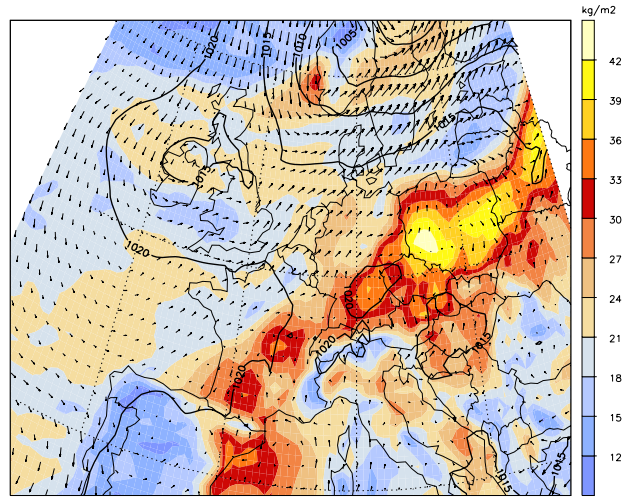
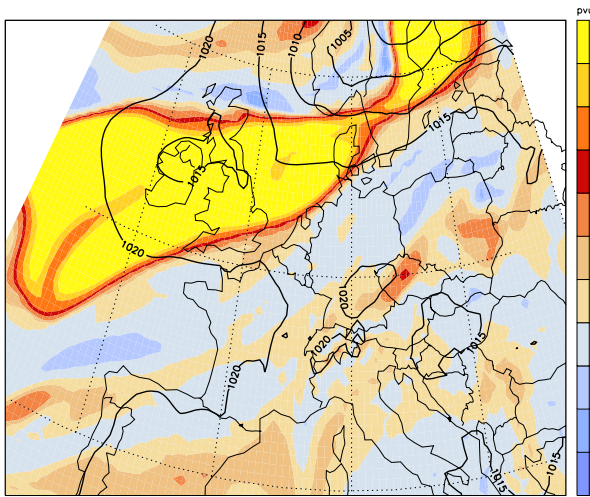
Meteorologische Situation und Qualität der Niederschlagsvorhersage für COPS-DE am 15. Juli 2007.



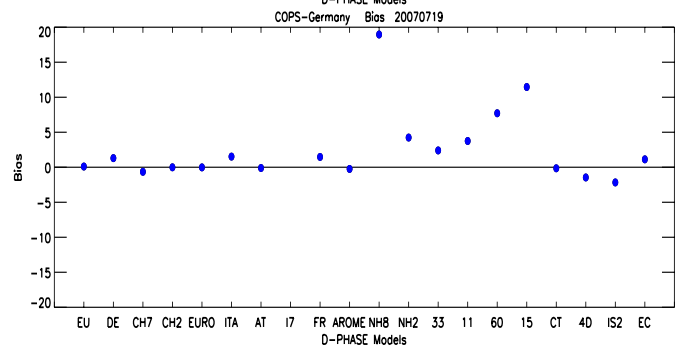
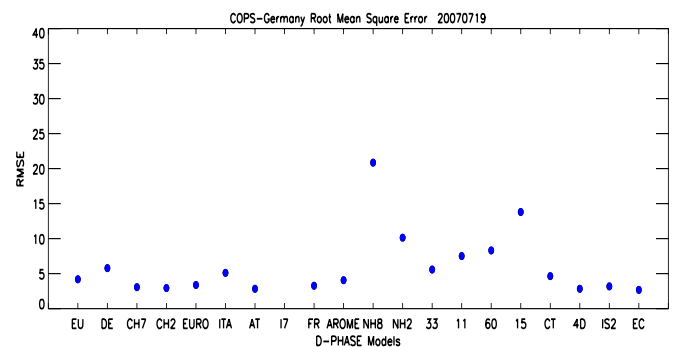
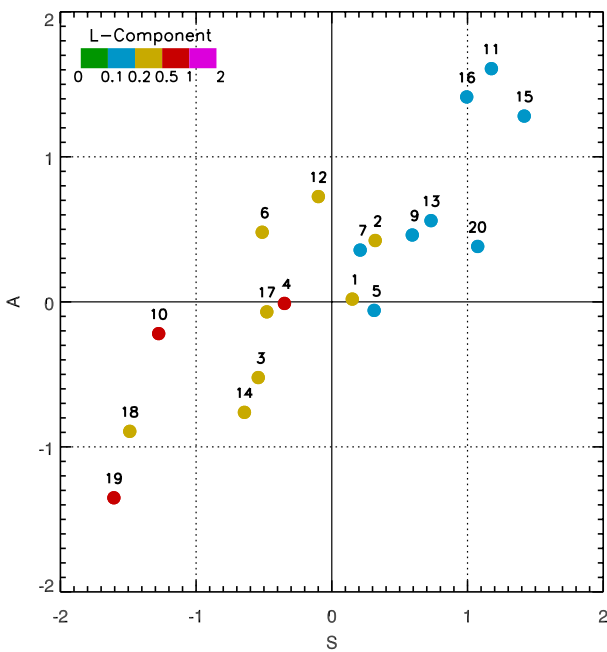
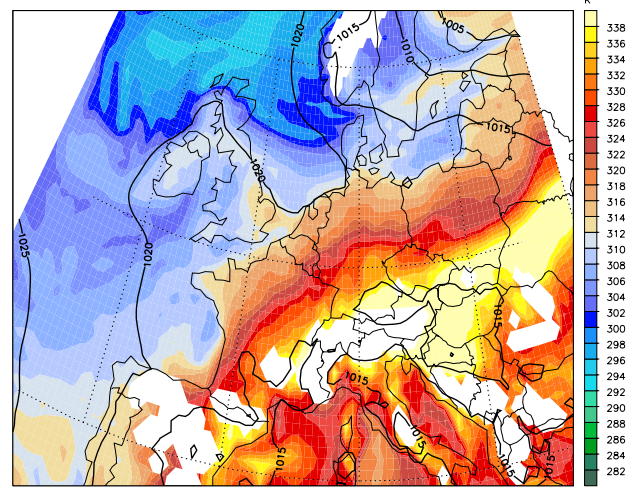
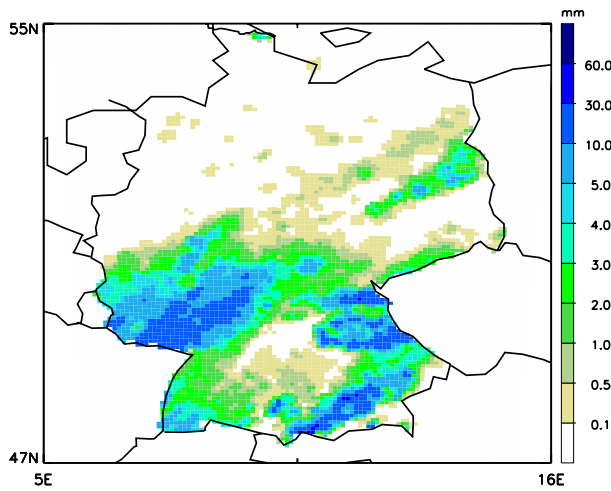
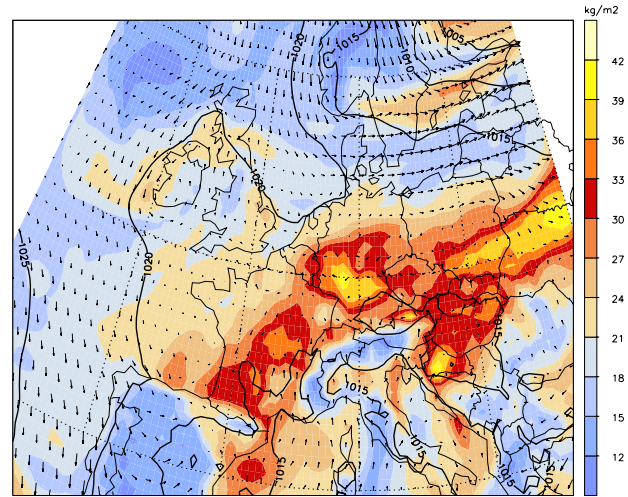
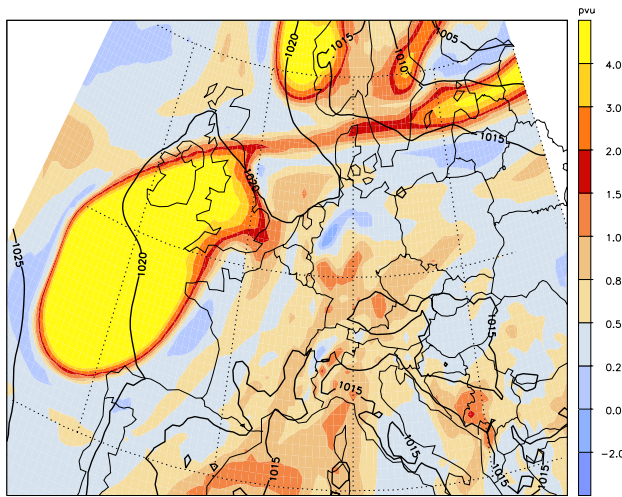
Meteorologische Situation und Qualität der Niederschlagsvorhersage für COPS-DE am 16. Juli 2007.



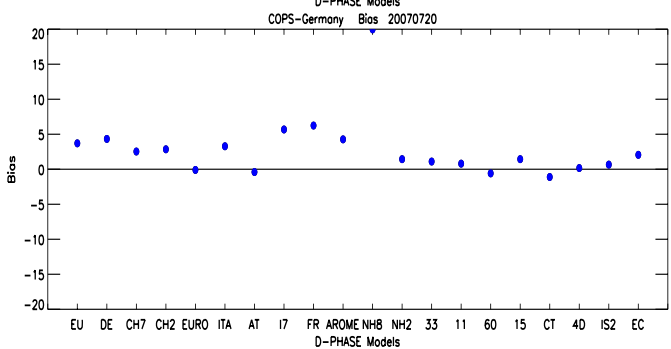
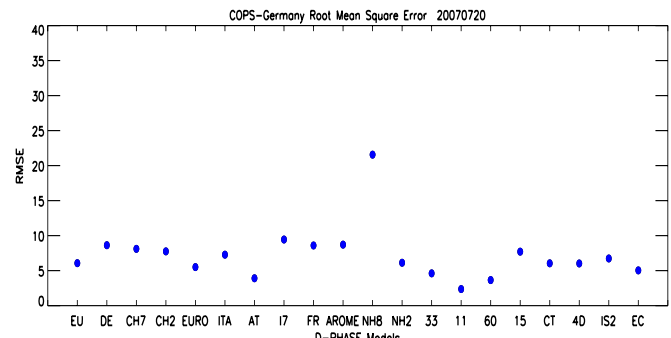
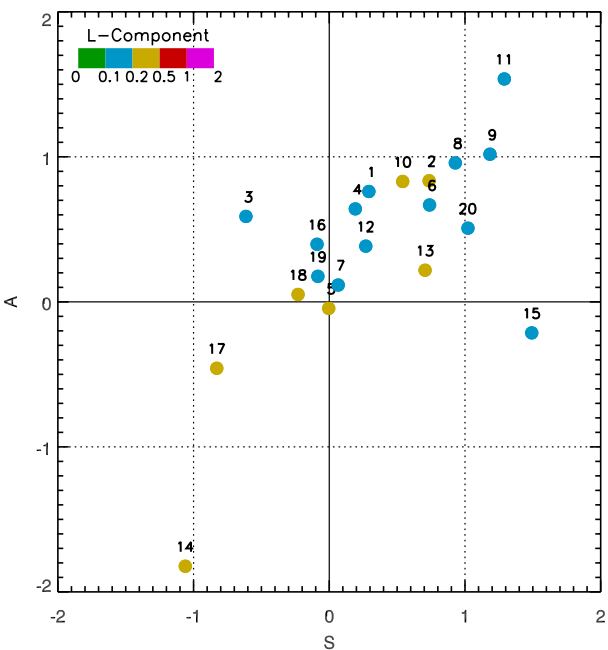
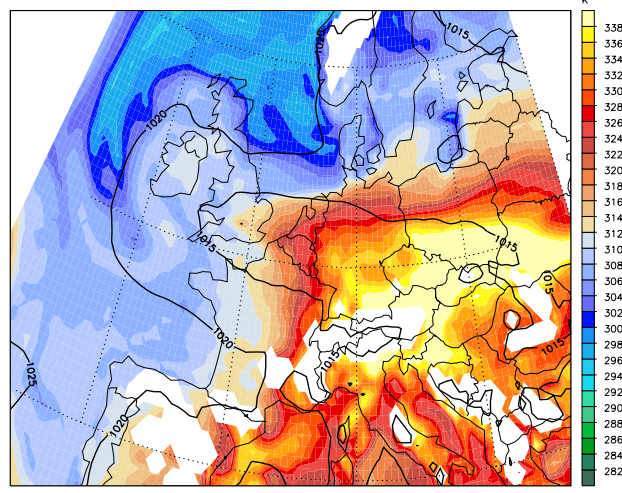
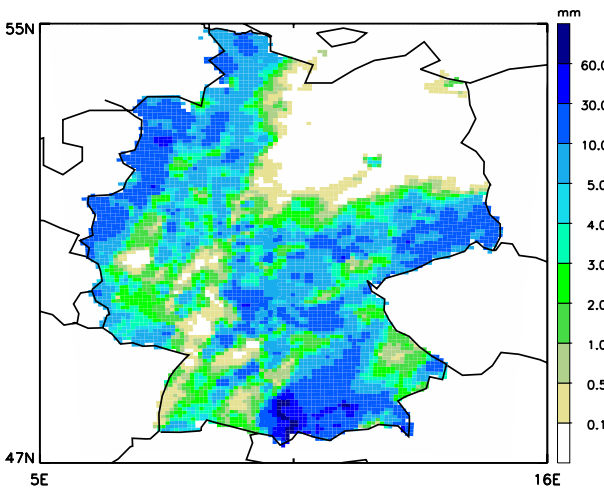
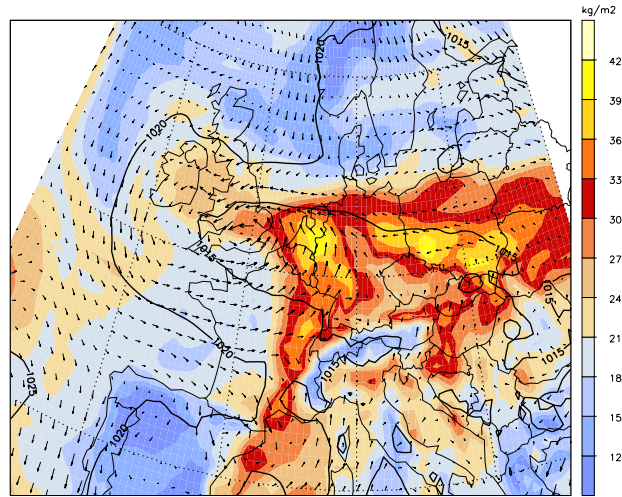
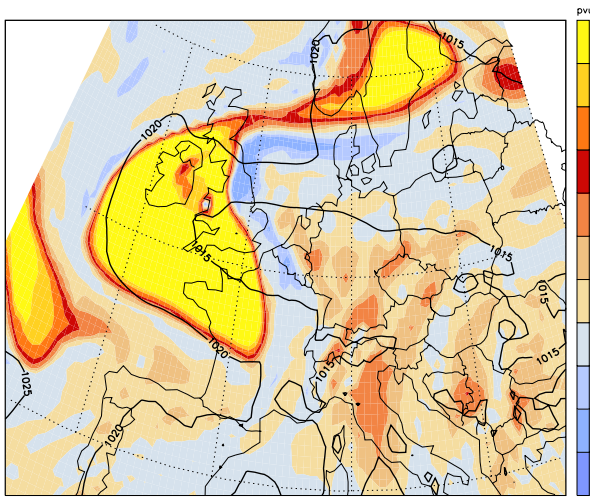
Meteorologische Situation und Qualität der Niederschlagsvorhersage für COPS-DE am 17. Juli 2007.



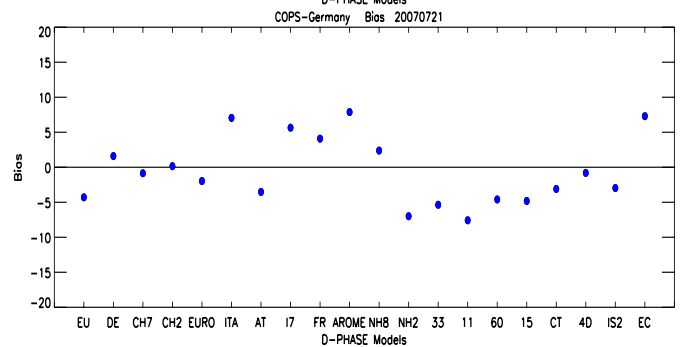
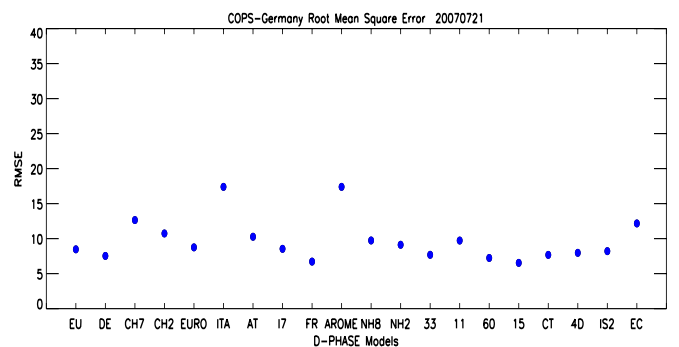
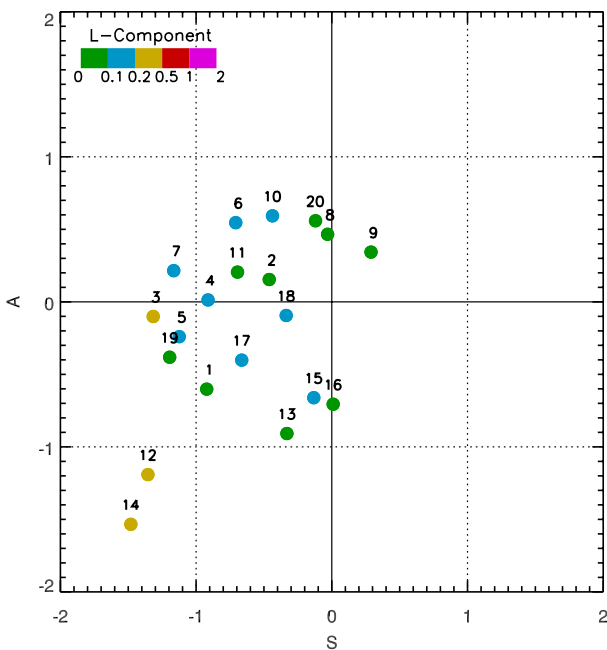
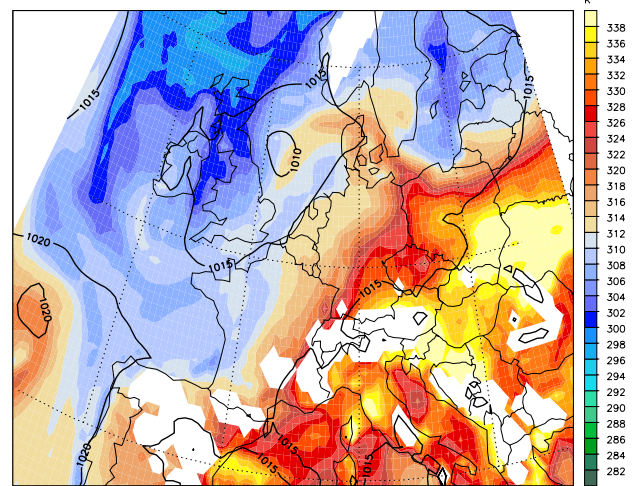
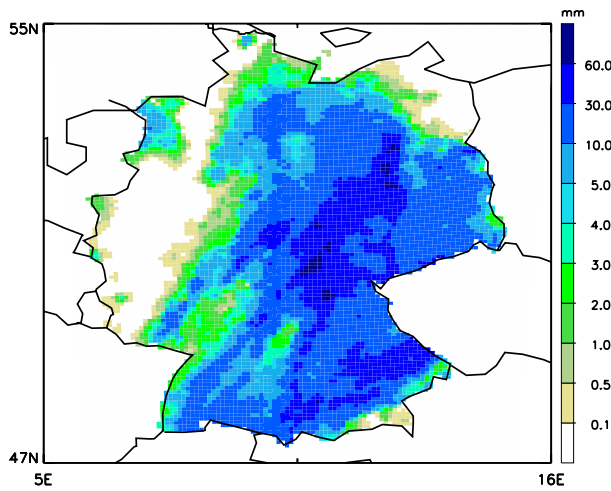
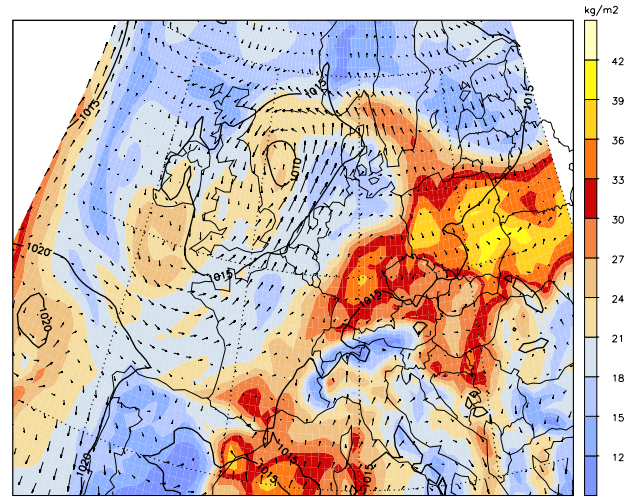
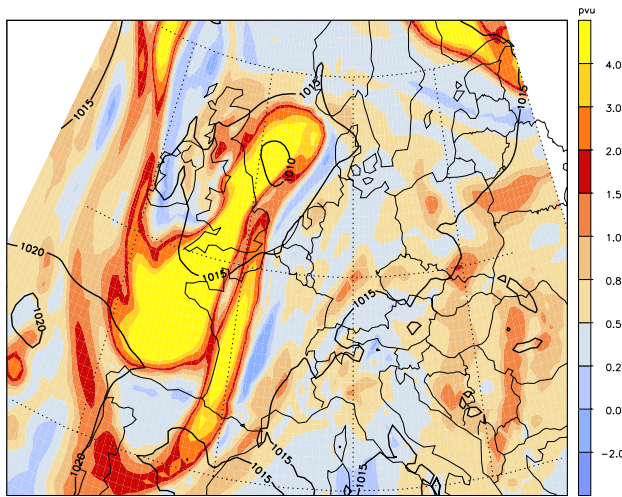
Meteorologische Situation und Qualität der Niederschlagsvorhersage für COPS-DE am 18. Juli 2007.



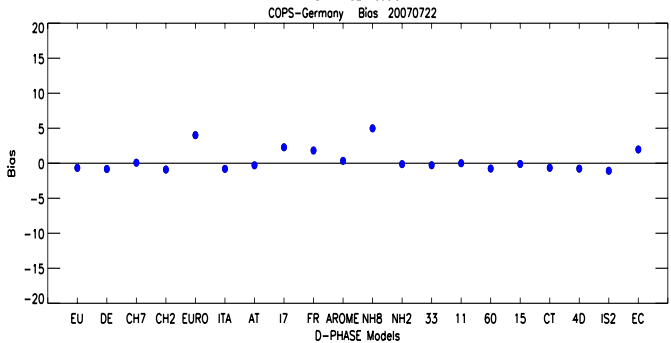
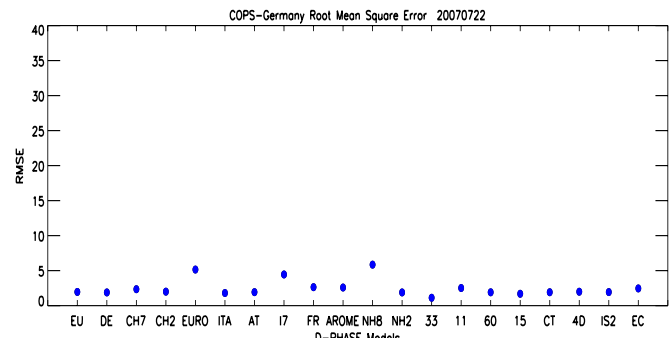
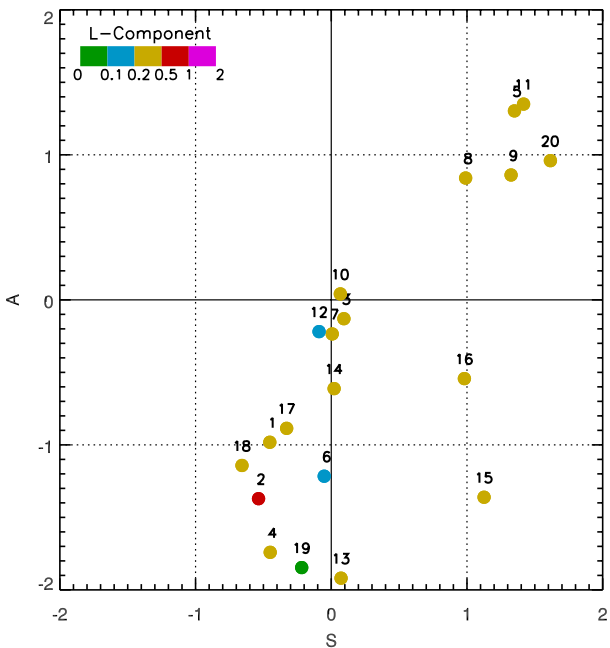
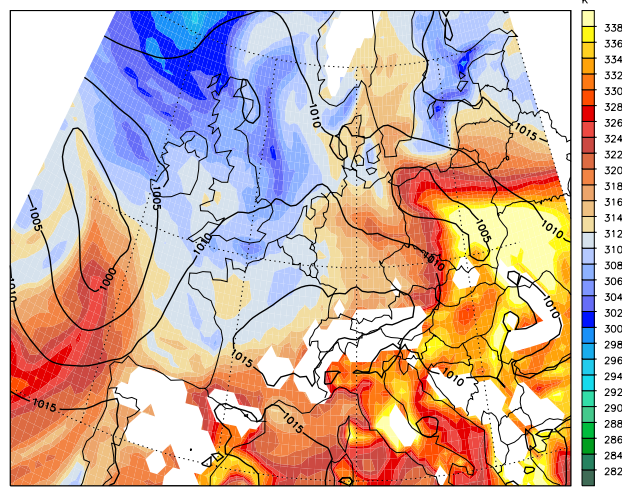
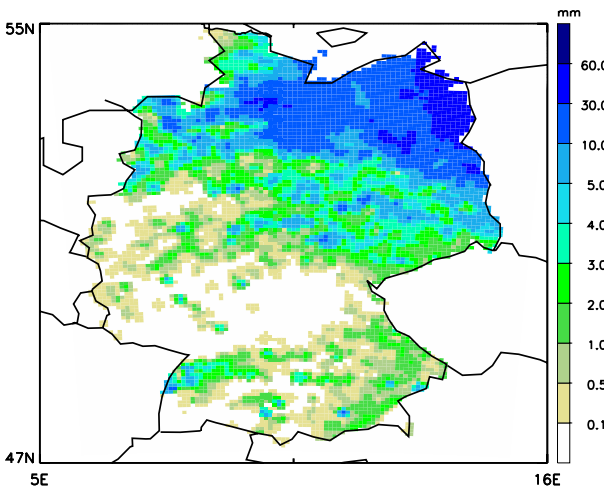
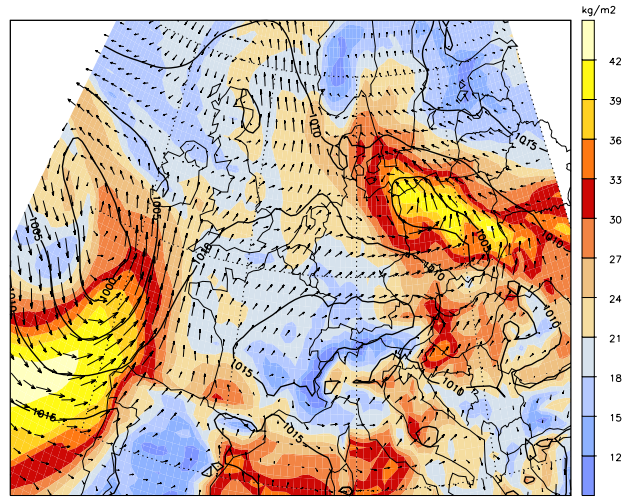
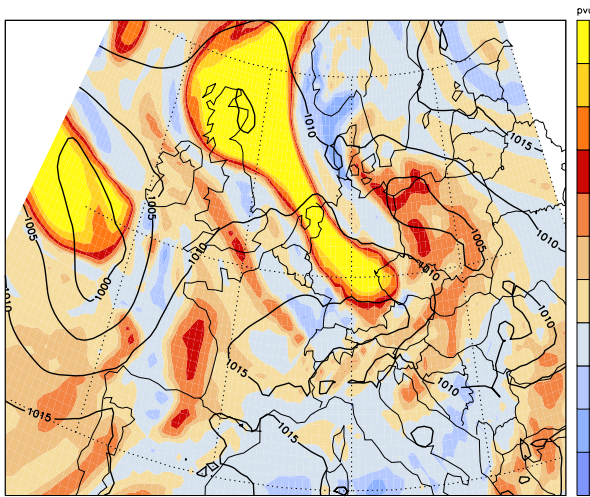
Meteorologische Situation und Qualität der Niederschlagsvorhersage für COPS-DE am 19. Juli 2007.



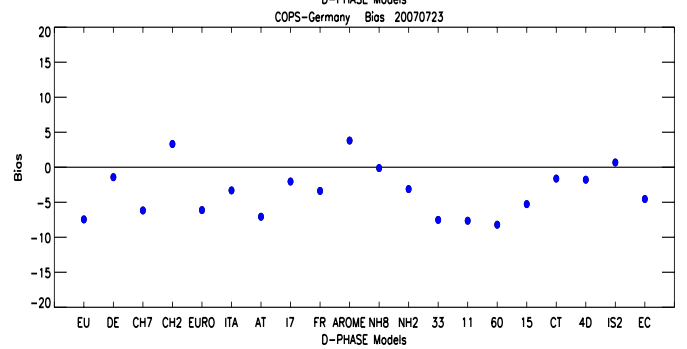
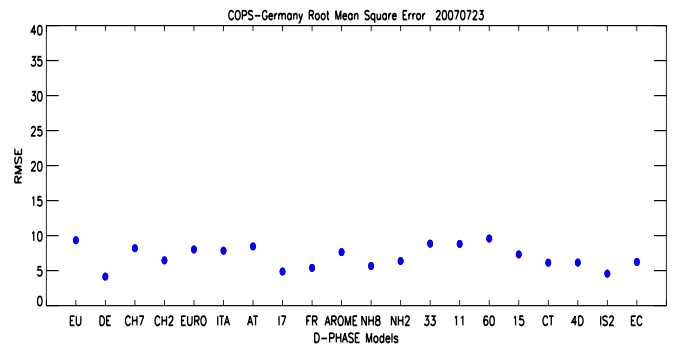
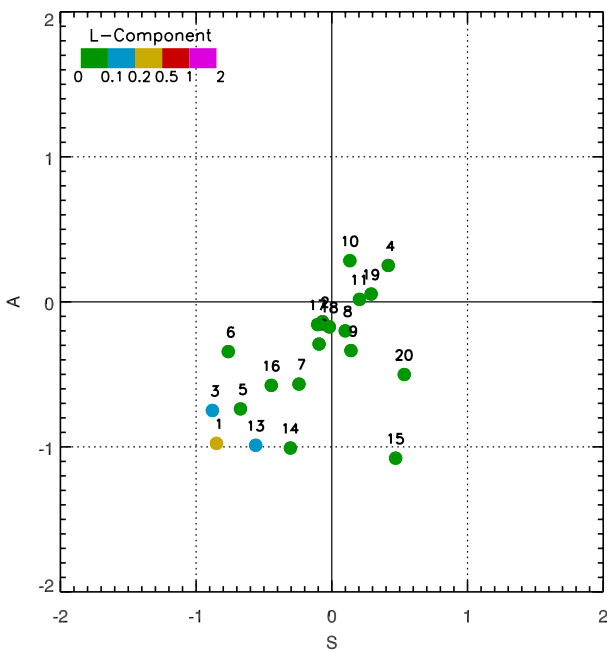
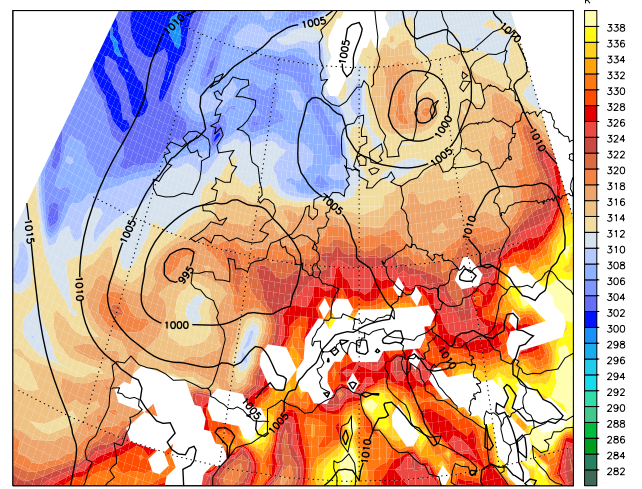
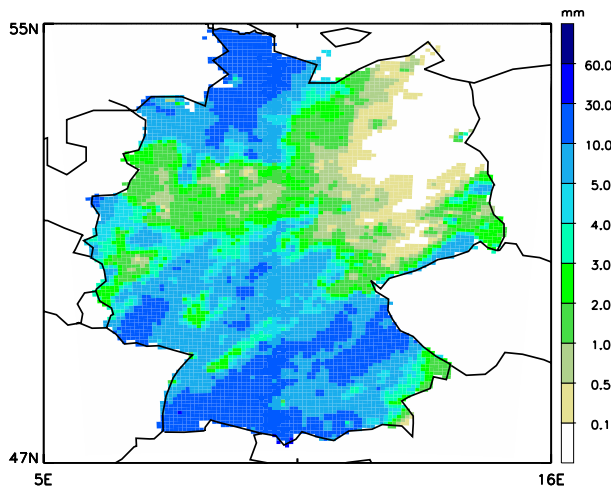
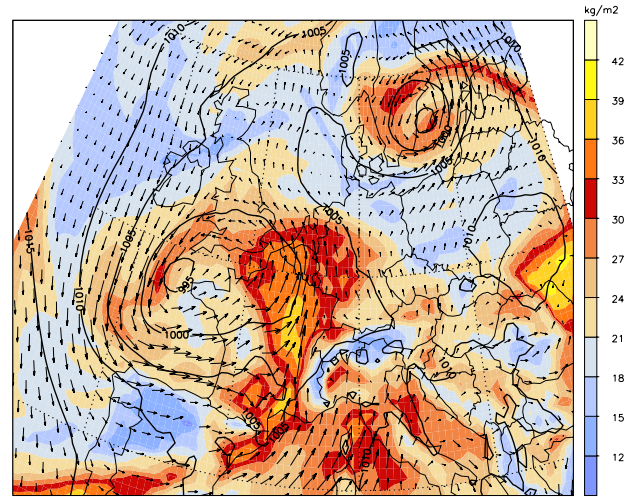
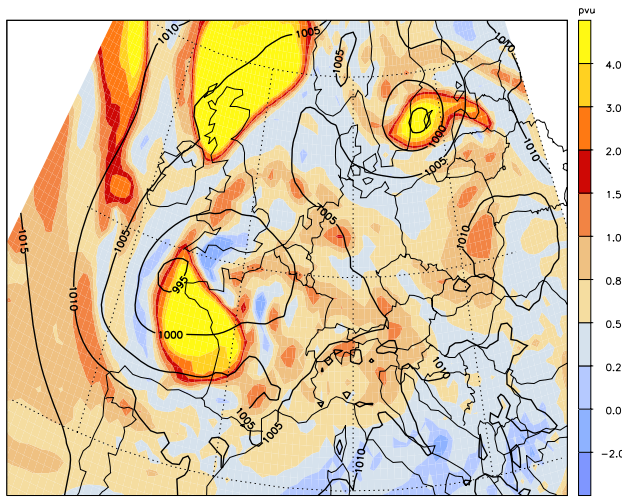
Meteorologische Situation und Qualität der Niederschlagsvorhersage für COPS-DE am 20. Juli 2007.



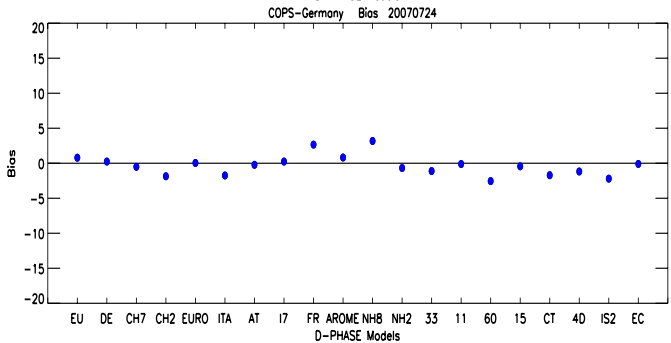
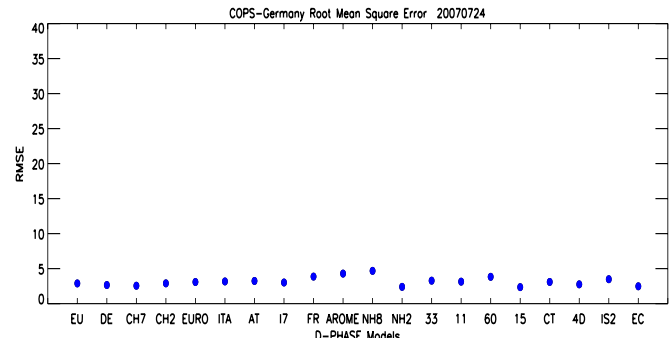
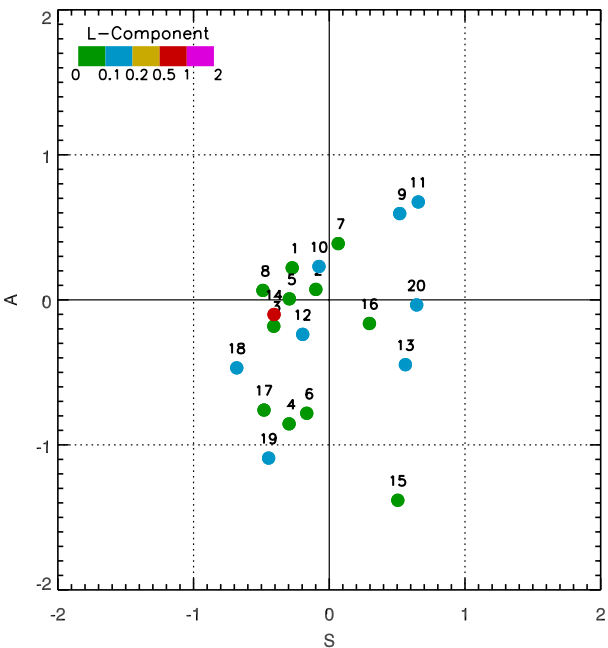
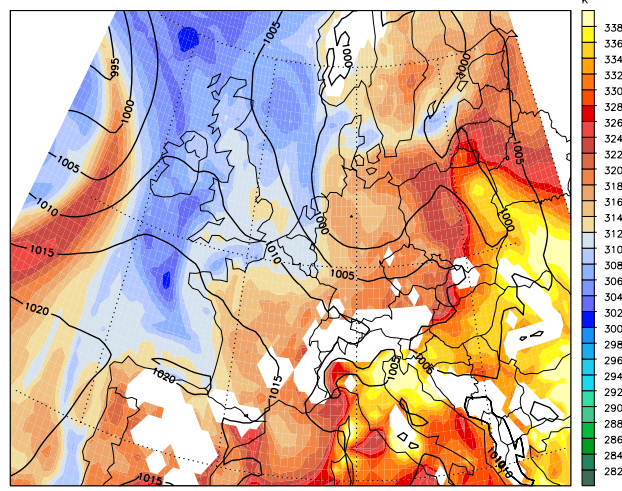
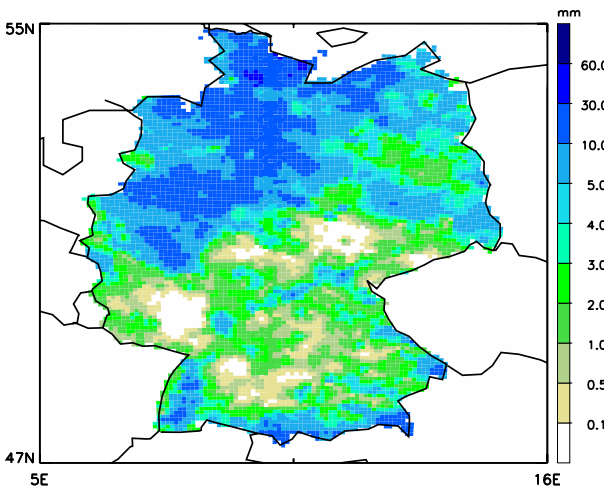
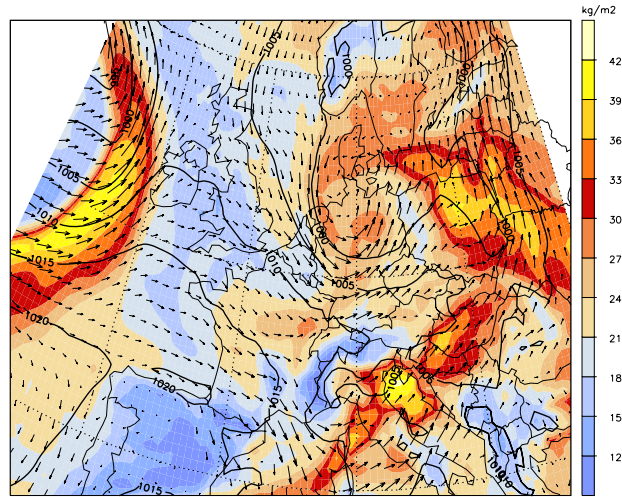
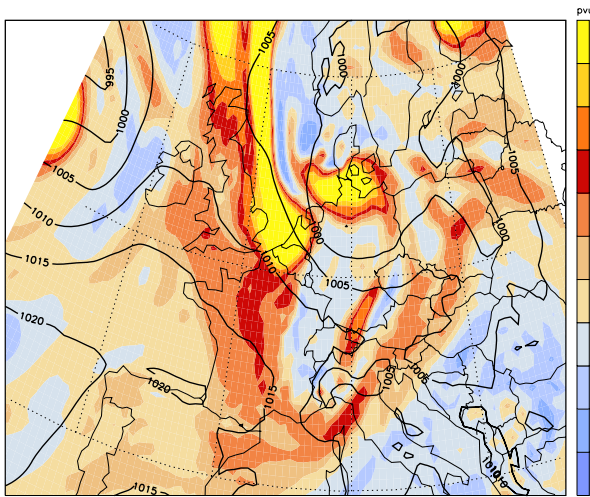
Meteorologische Situation und Qualität der Niederschlagsvorhersage für COPS-DE am 21. Juli 2007.



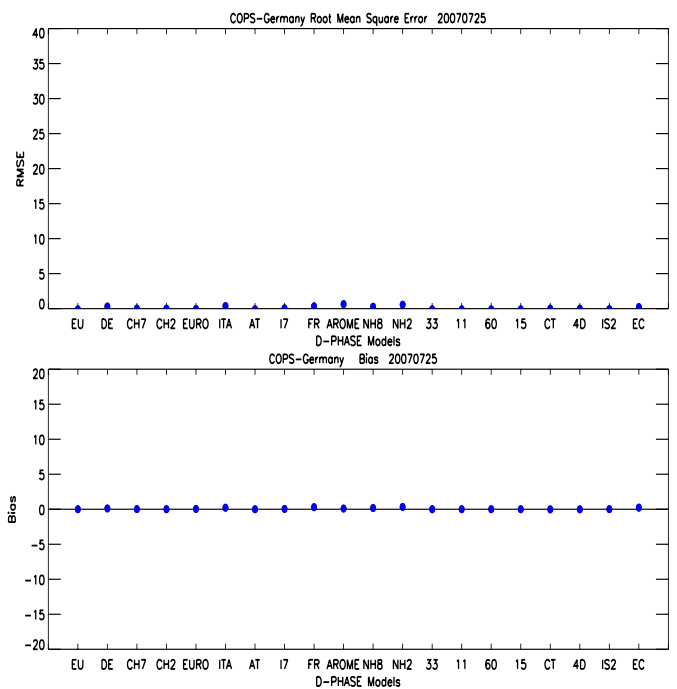
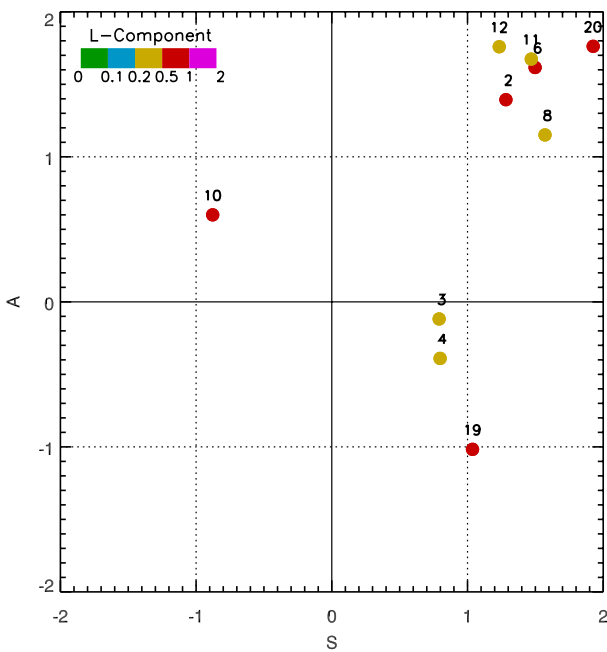
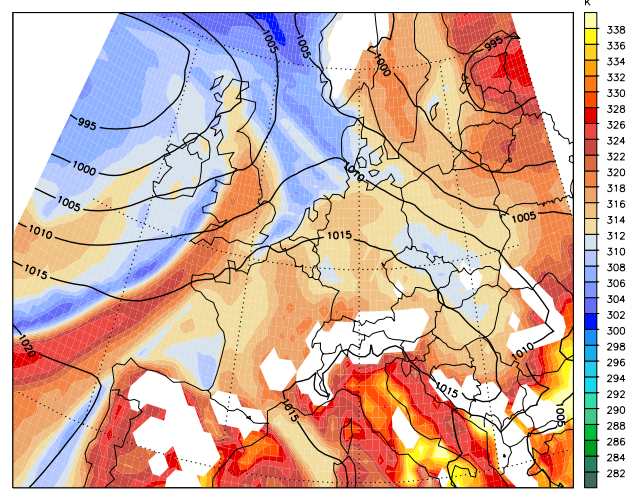
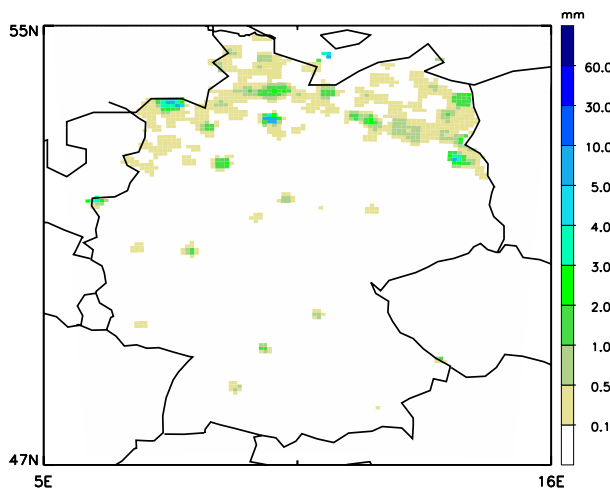
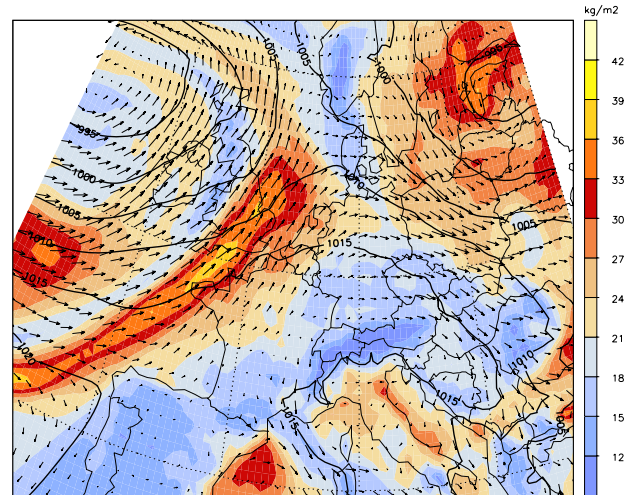
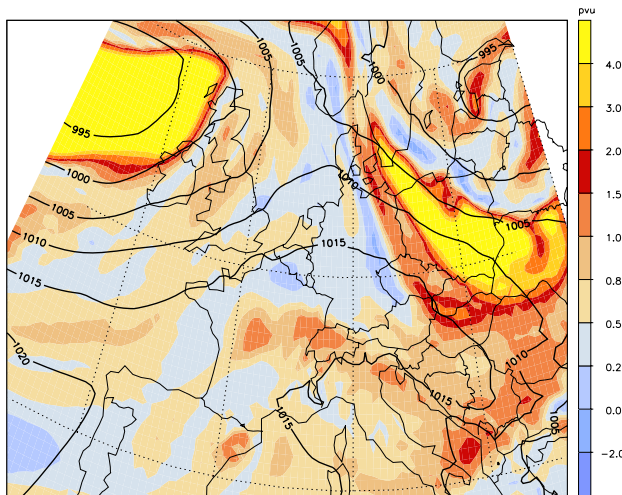
Meteorologische Situation und Qualität der Niederschlagsvorhersage für COPS-DE am 22. Juli 2007.



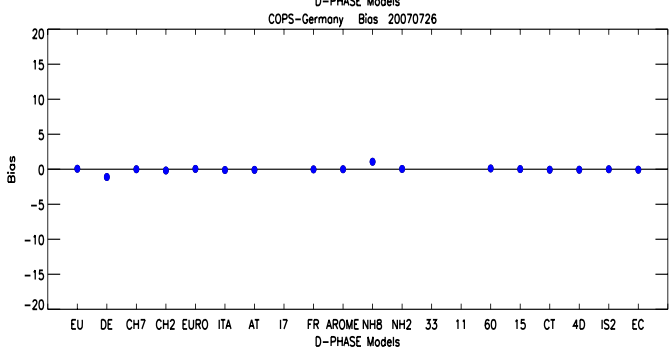
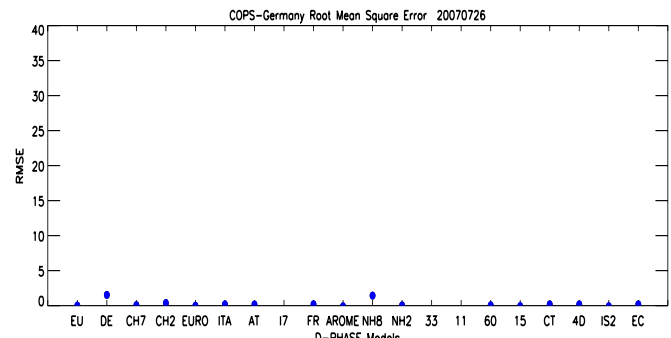
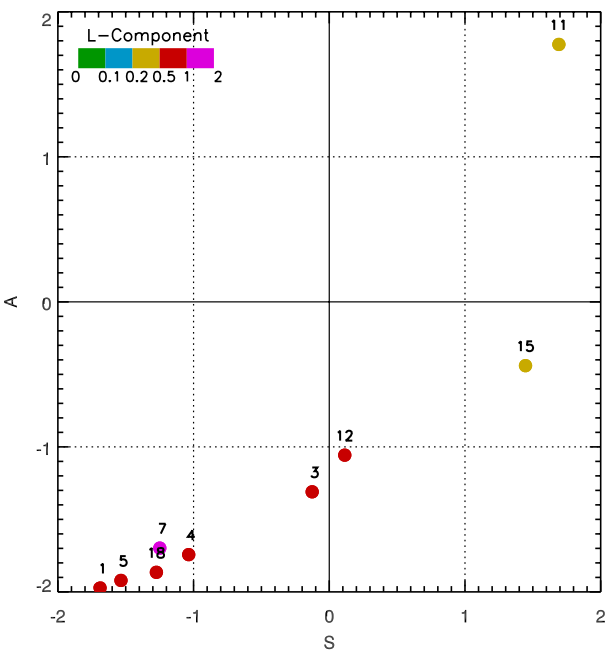
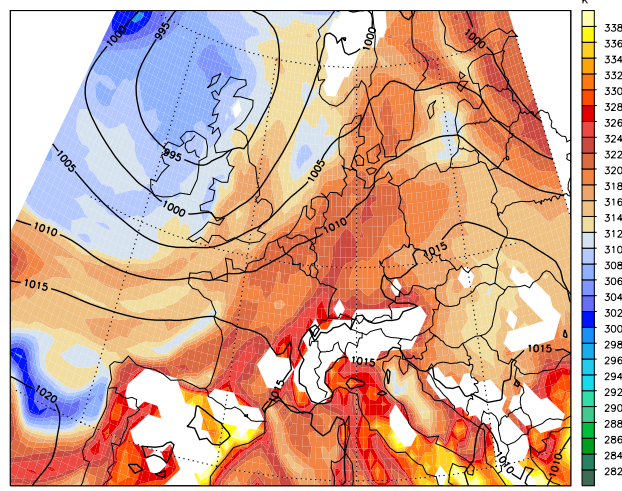
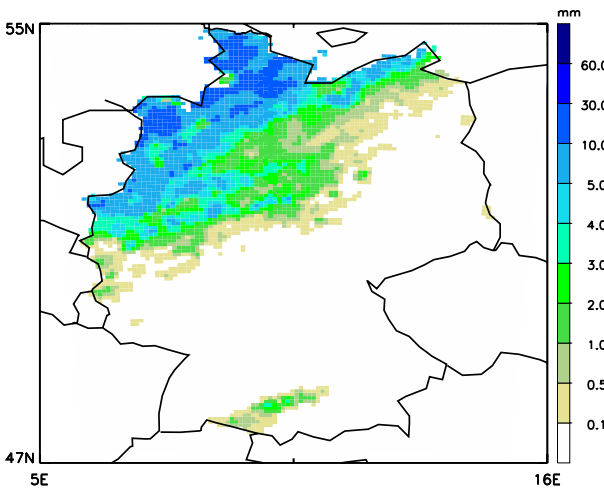
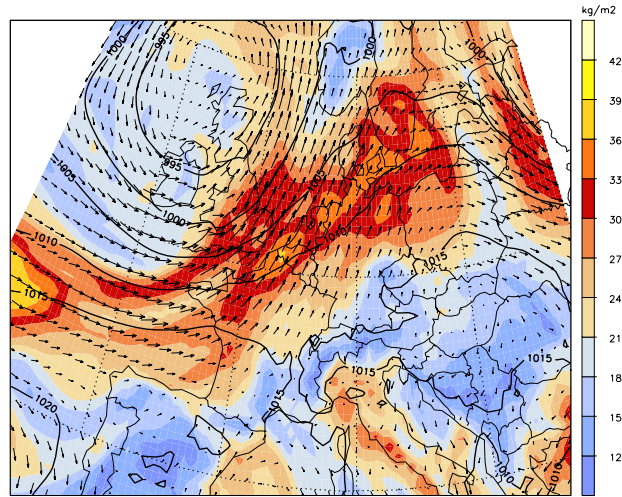
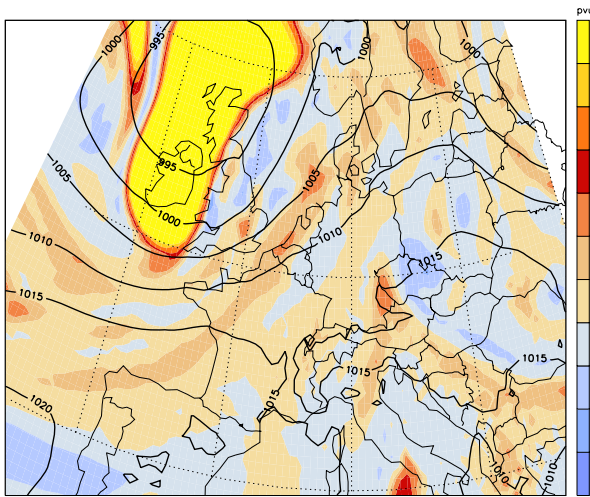
Meteorologische Situation und Qualität der Niederschlagsvorhersage für COPS-DE am 23. Juli 2007.



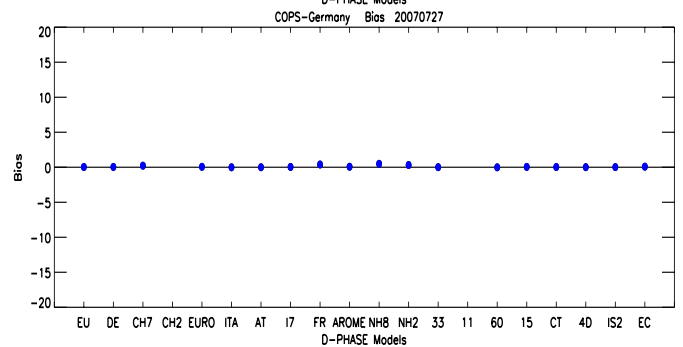
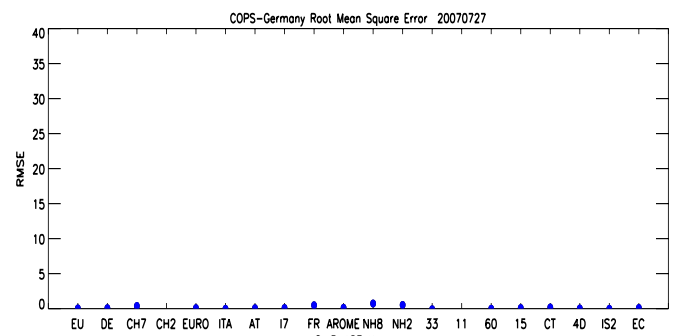
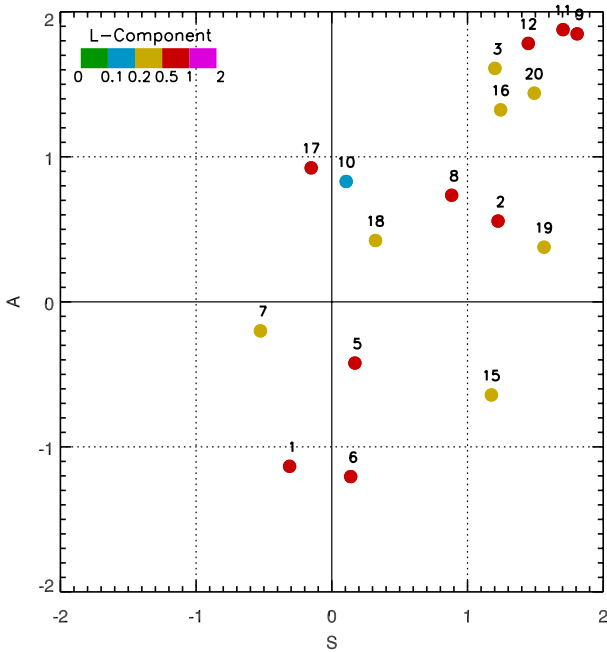
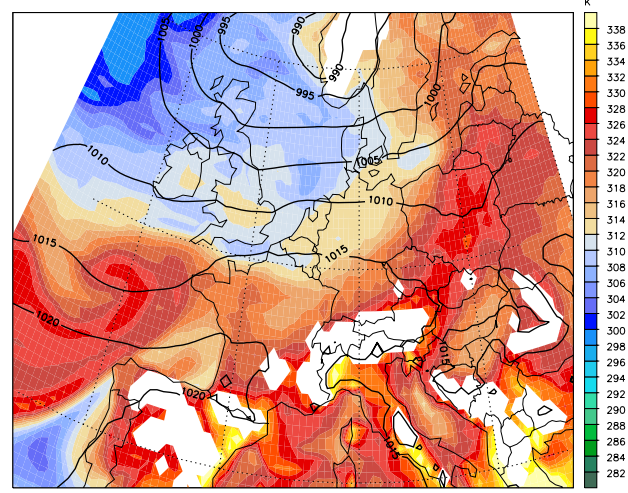
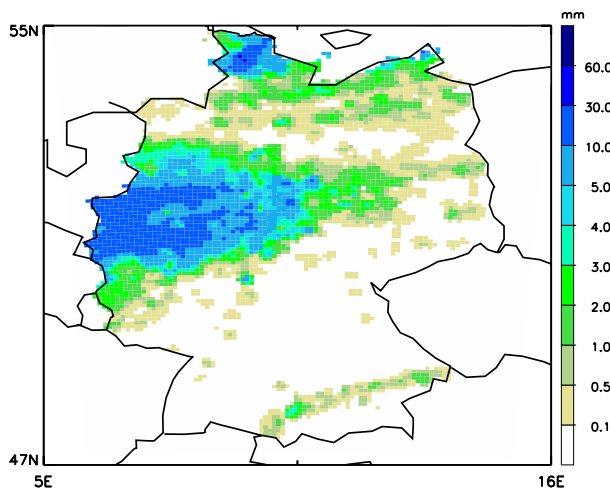
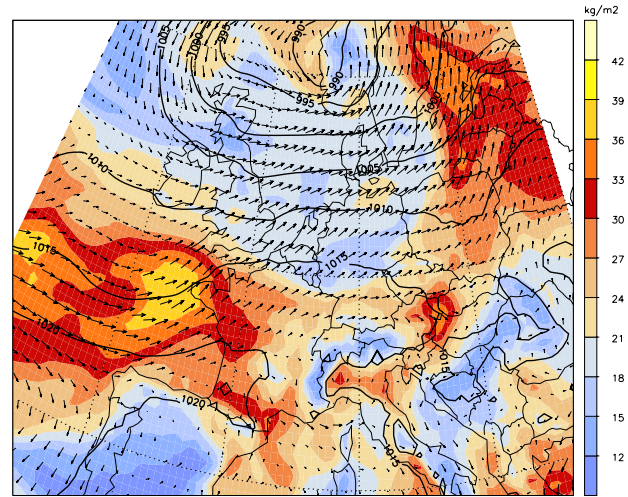
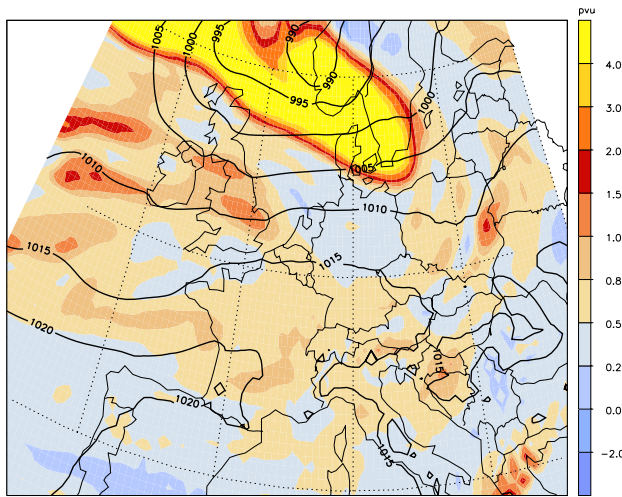
Meteorologische Situation und Qualität der Niederschlagsvorhersage für COPS-DE am 24. Juli 2007.



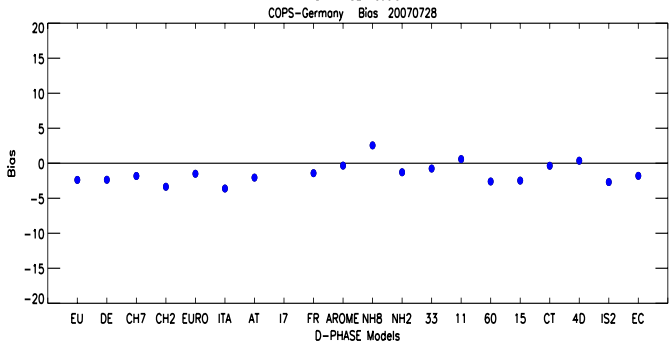
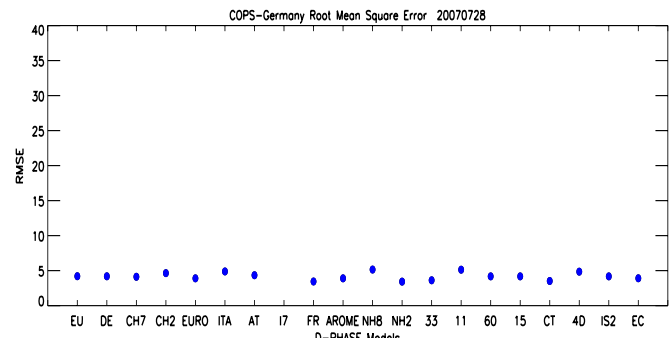
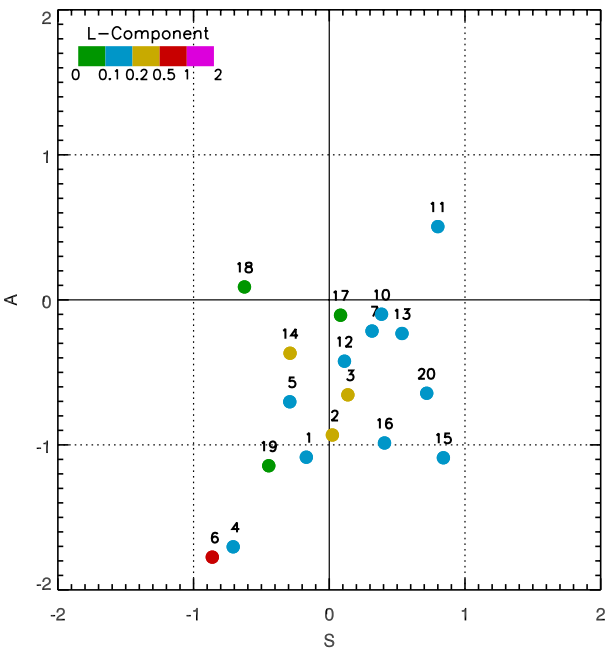
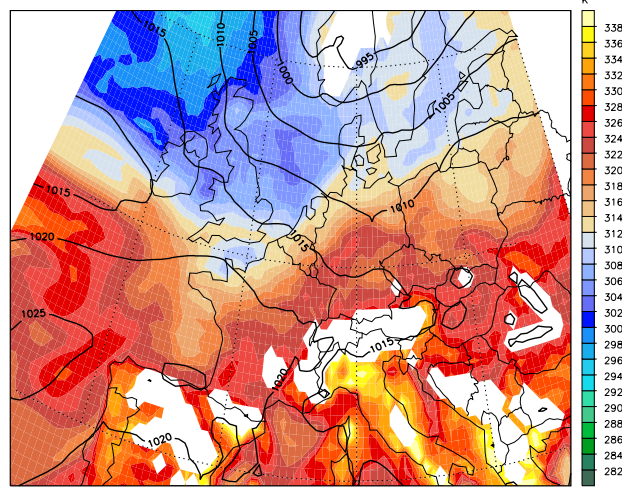
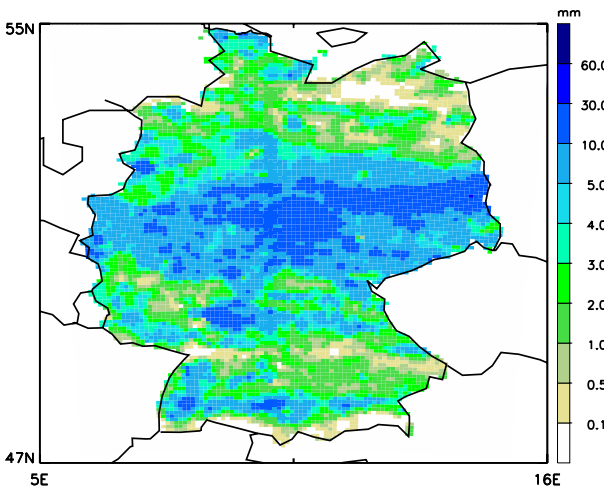
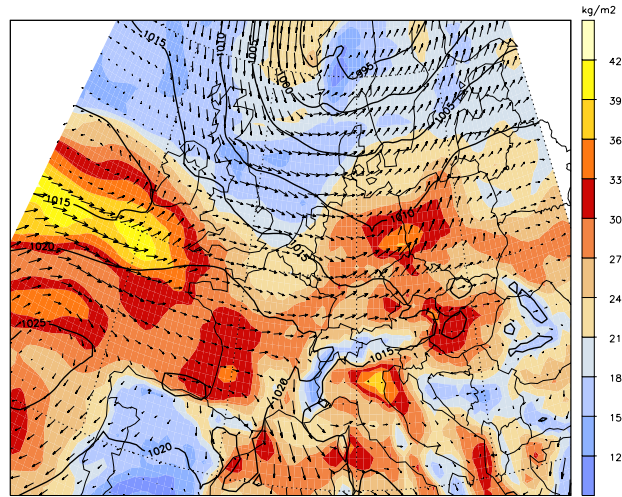
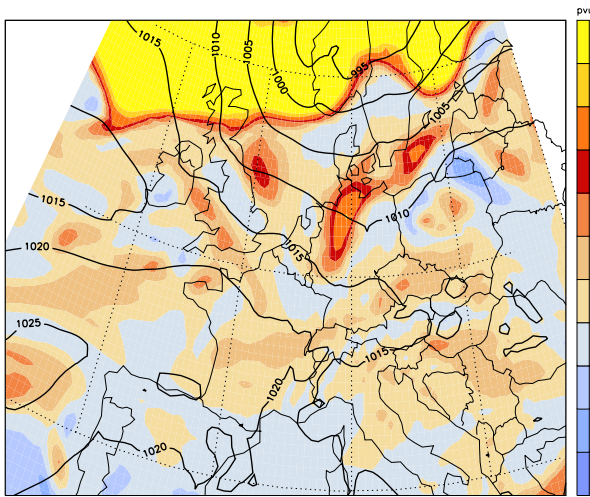
Meteorologische Situation und Qualität der Niederschlagsvorhersage für COPS-DE am 25. Juli 2007.



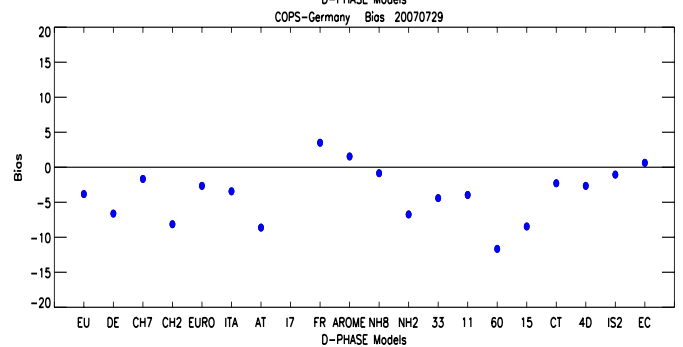
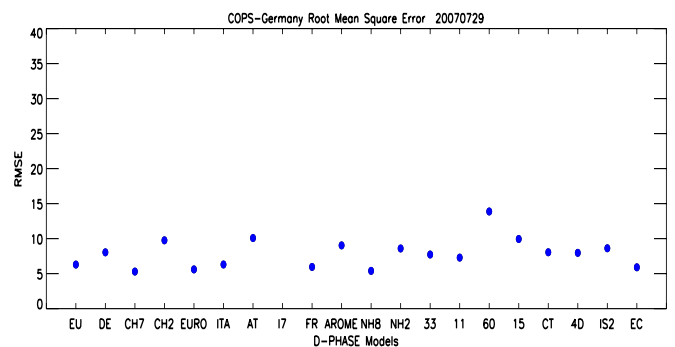
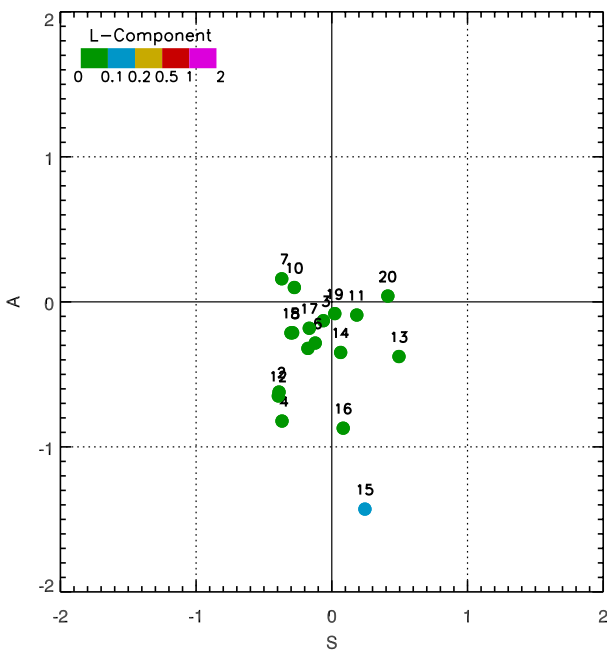
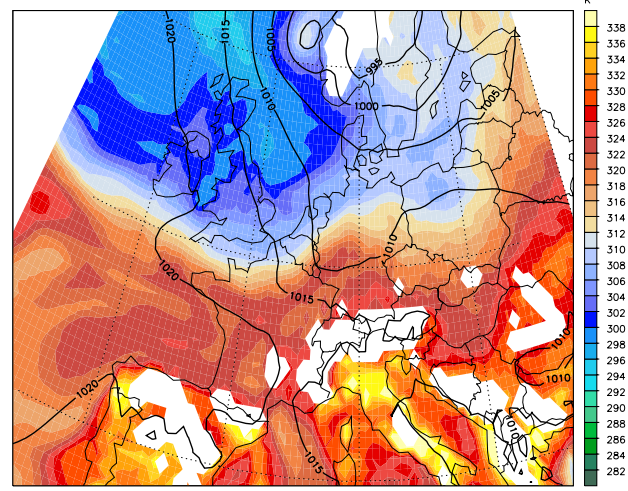
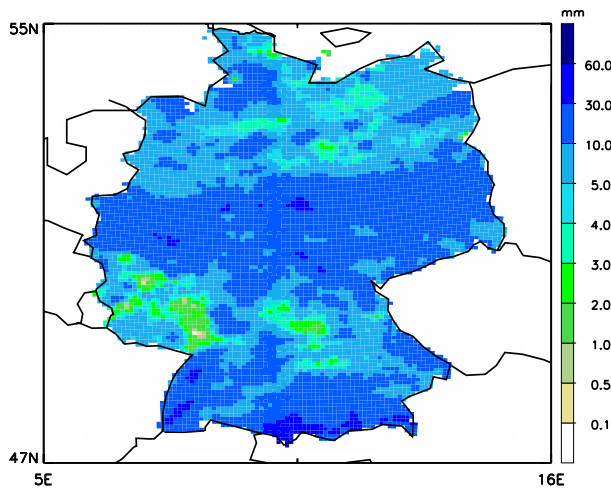
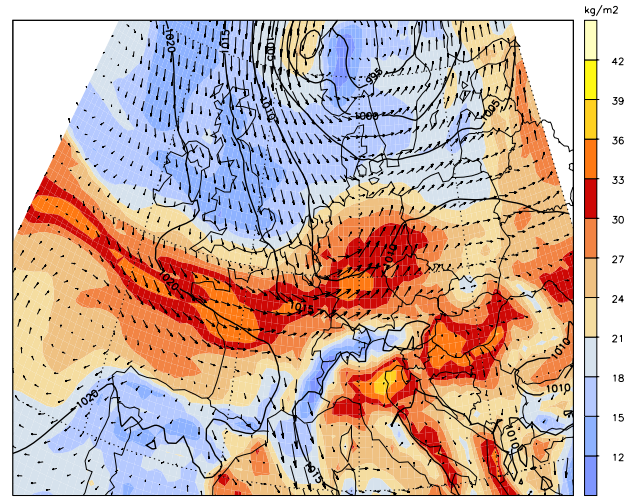
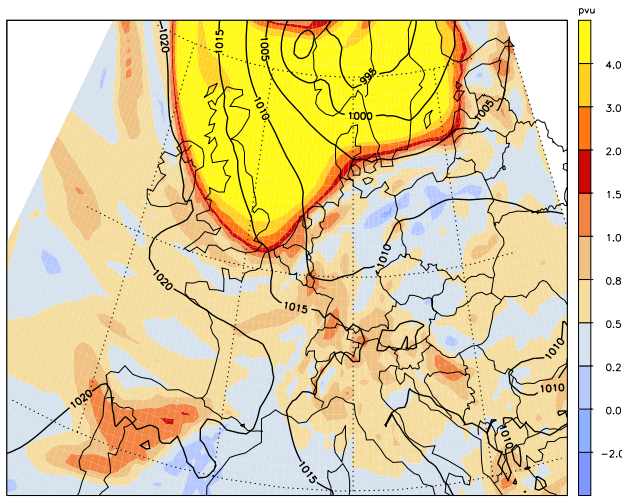
Meteorologische Situation und Qualität der Niederschlagsvorhersage für COPS-DE am 26. Juli 2007.



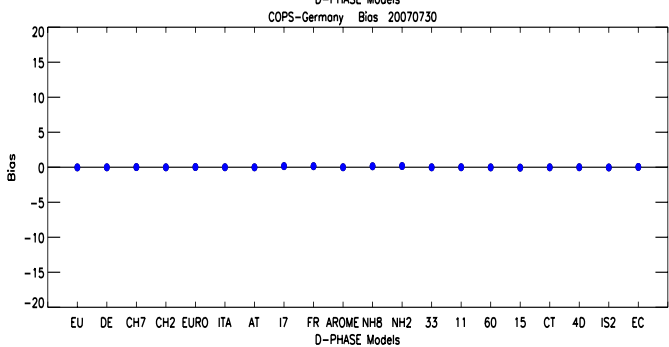
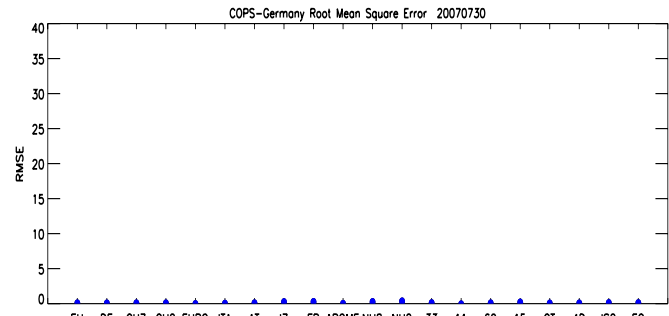
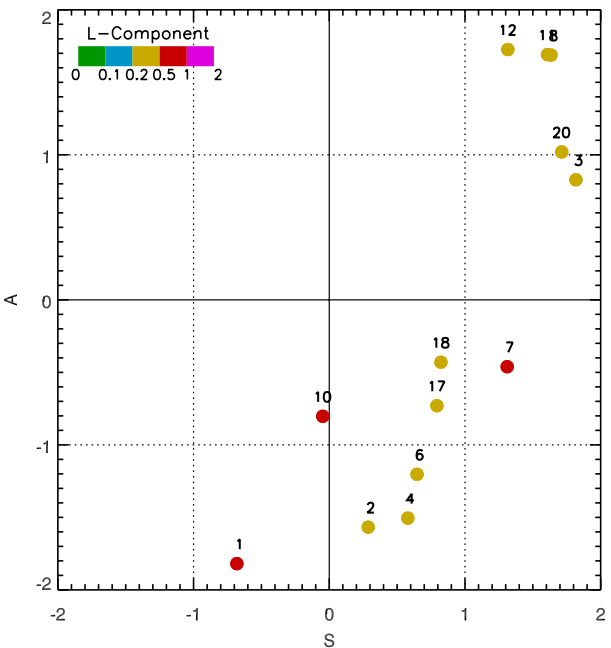
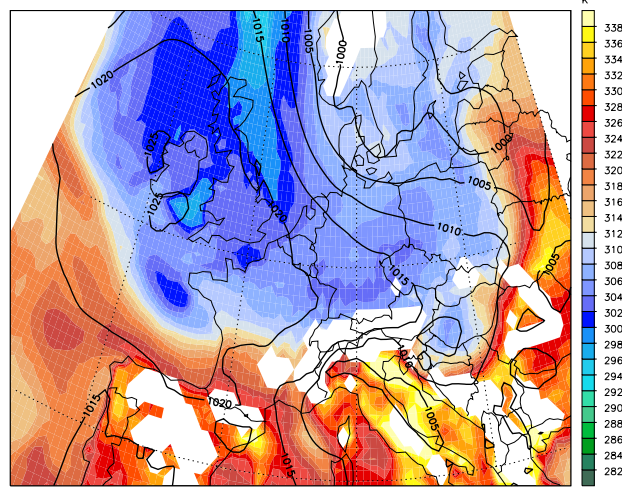
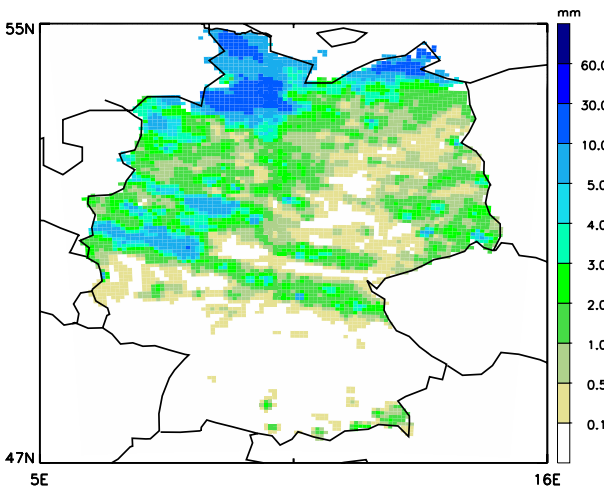
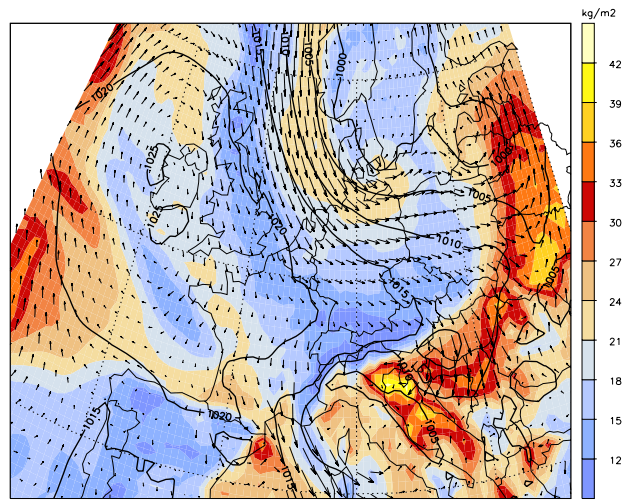
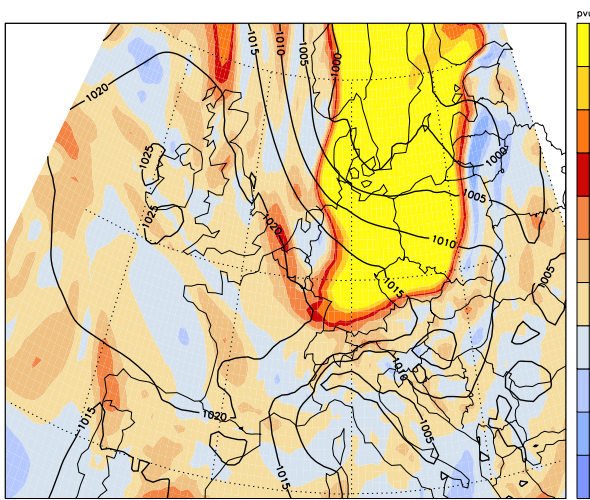
Meteorologische Situation und Qualität der Niederschlagsvorhersage für COPS-DE am 27. Juli 2007.



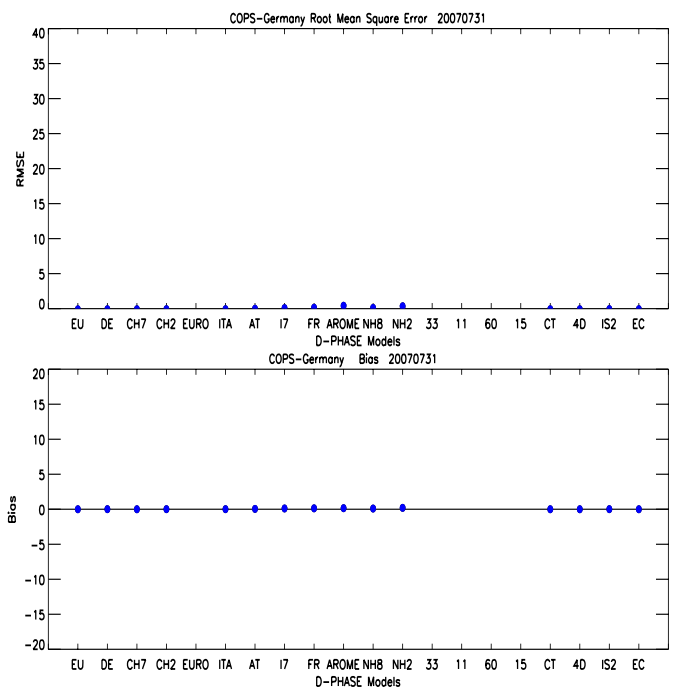
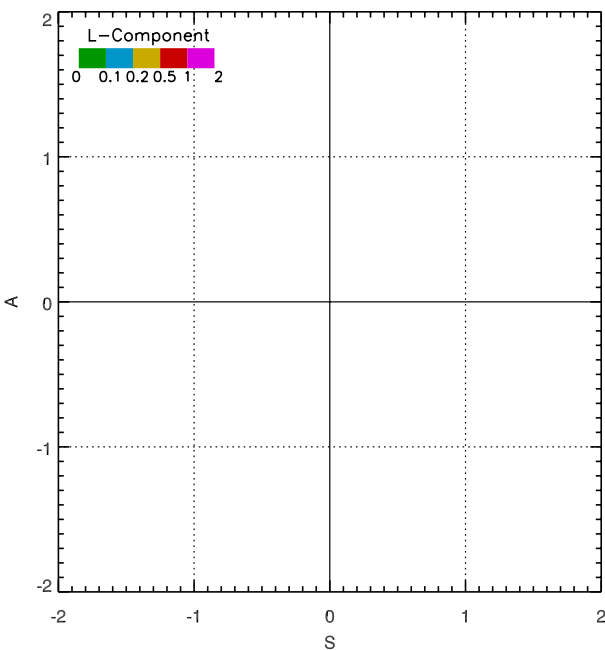
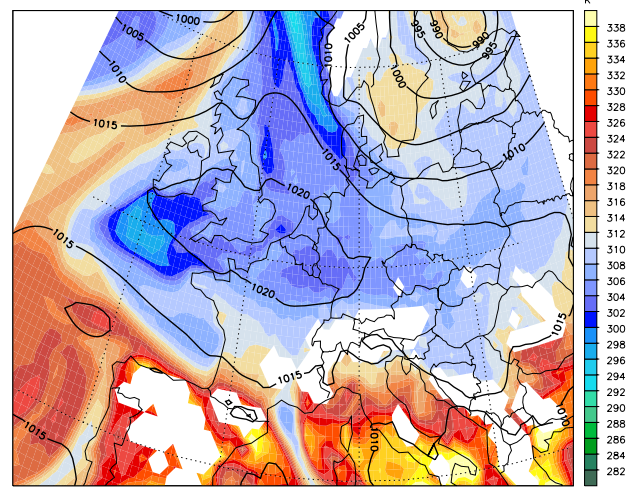
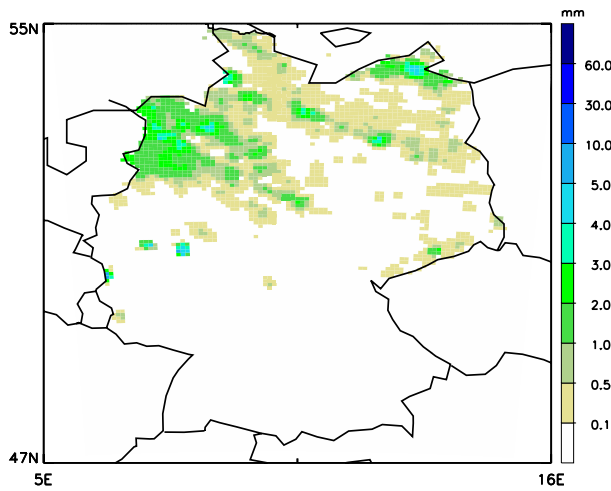
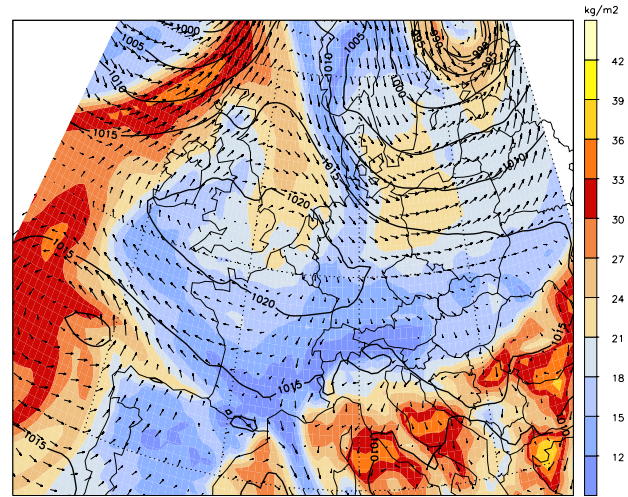
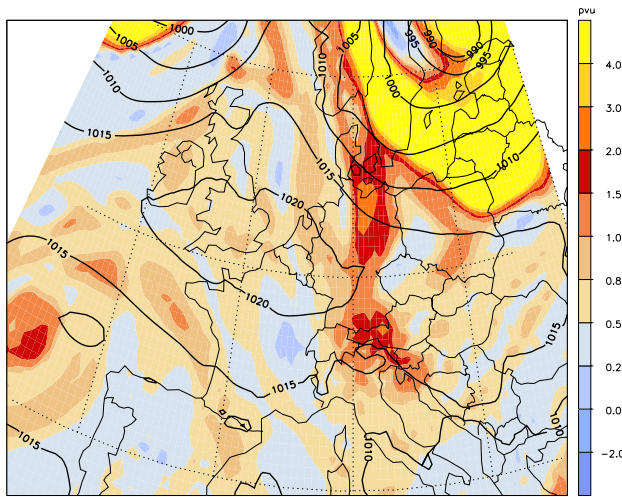
Meteorologische Situation und Qualität der Niederschlagsvorhersage für COPS-DE am 28. Juli 2007.



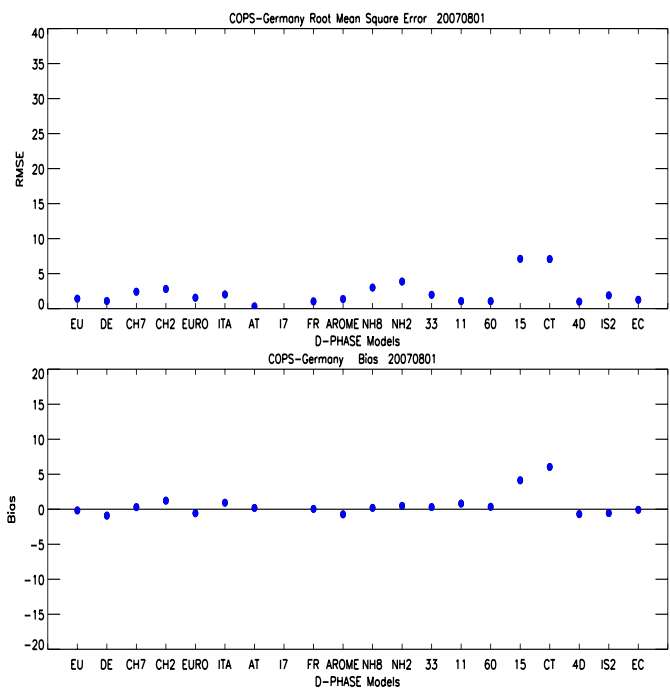
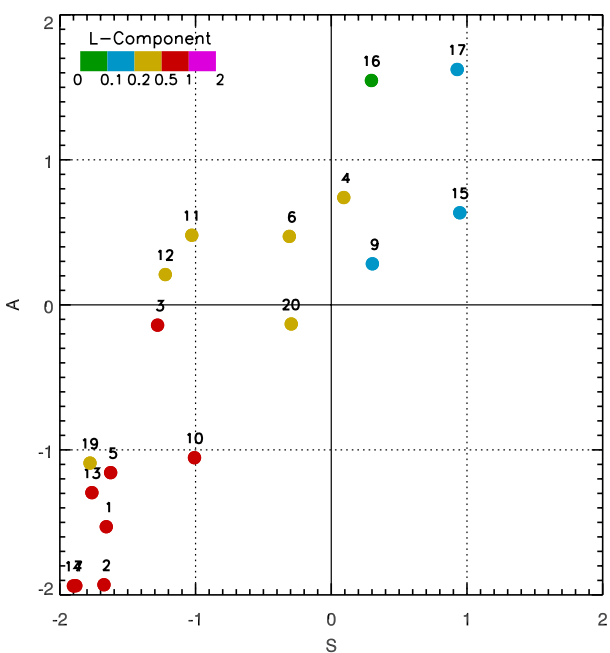
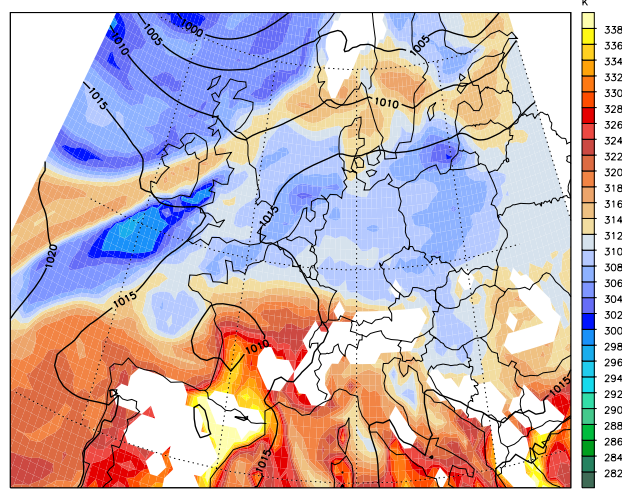
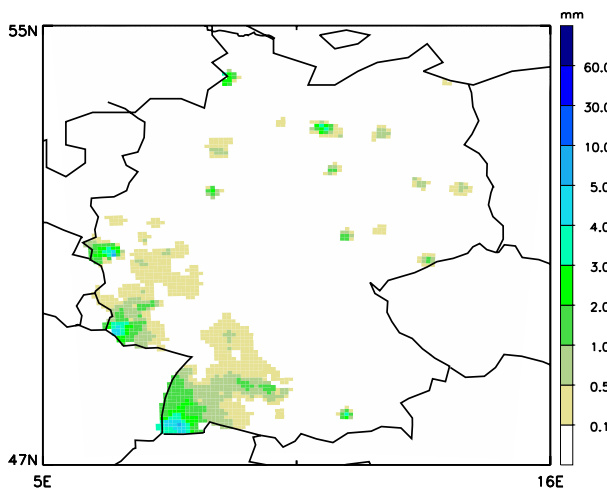
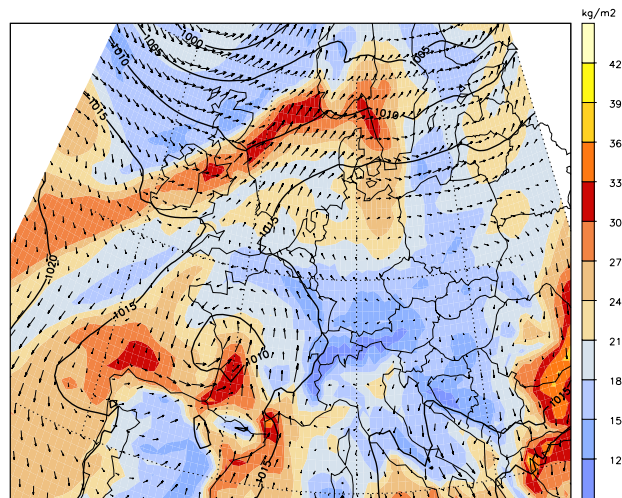
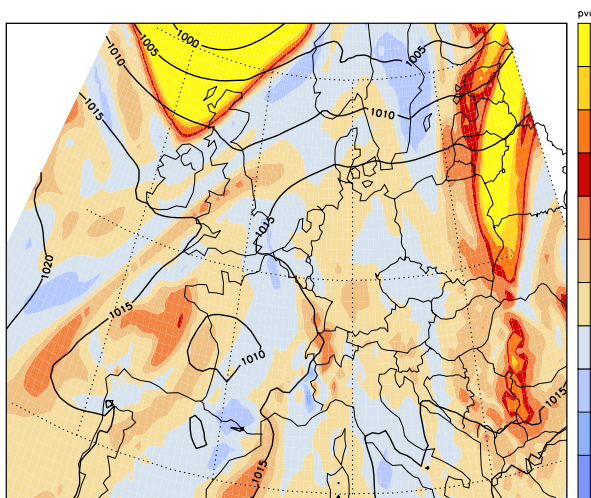
Meteorologische Situation und Qualität der Niederschlagsvorhersage für COPS-DE am 29. Juli 2007.



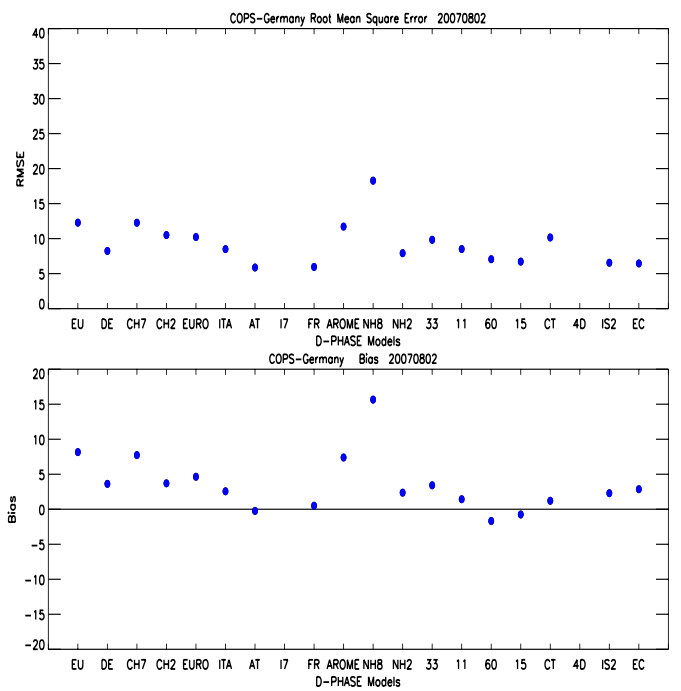
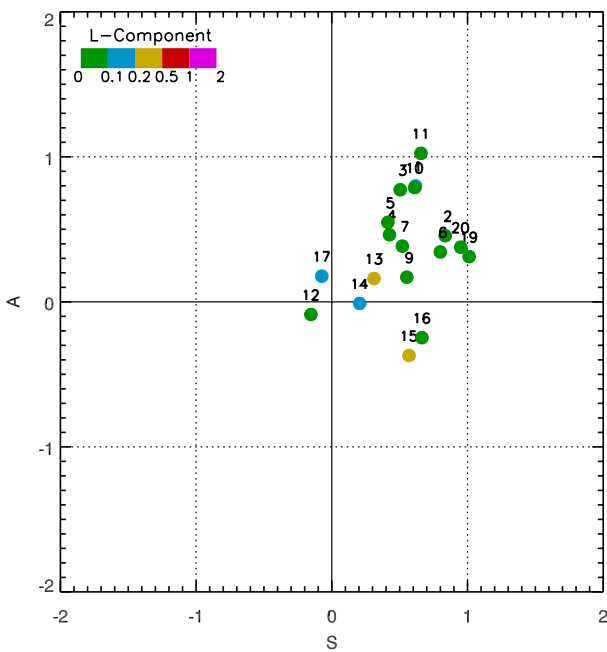
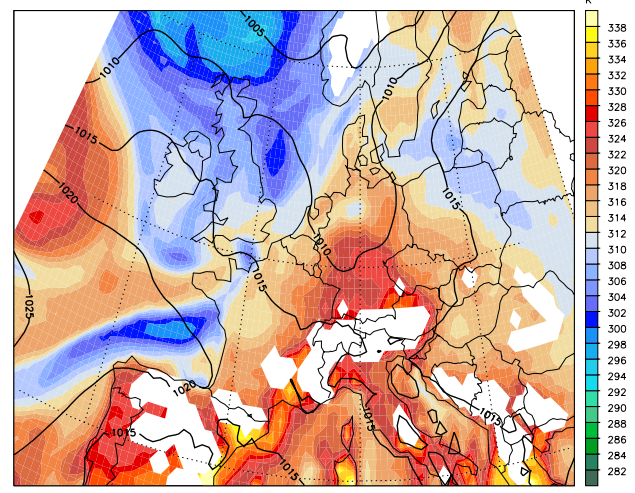
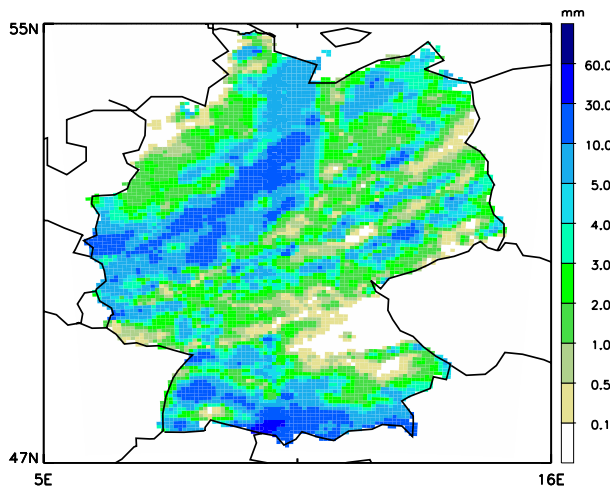
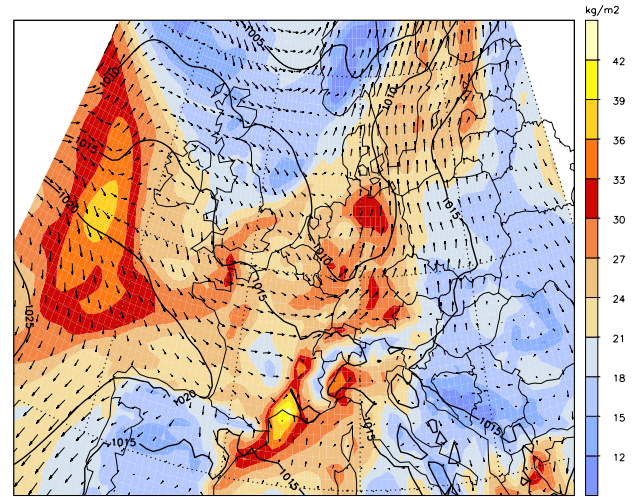
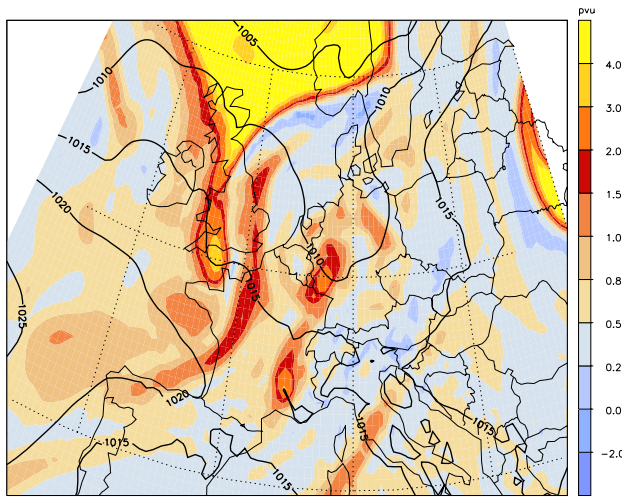
Meteorologische Situation und Qualität der Niederschlagsvorhersage für COPS-DE am 30. Juli 2007.



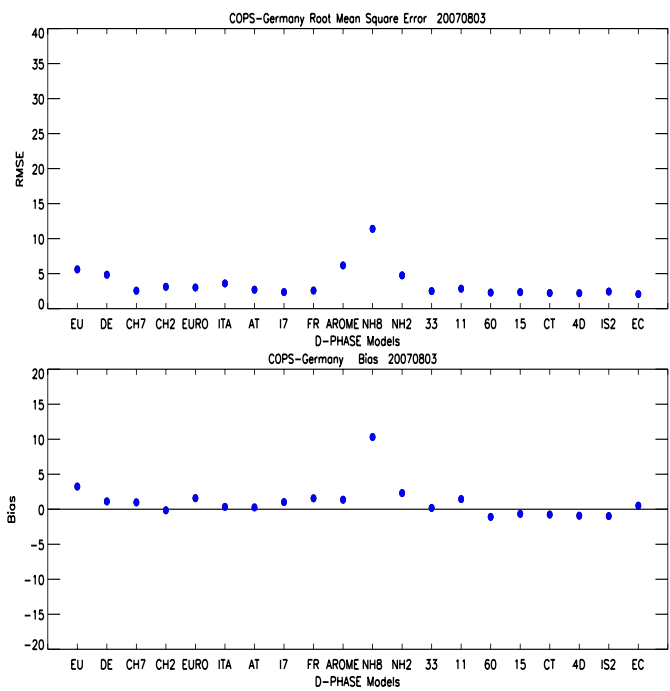
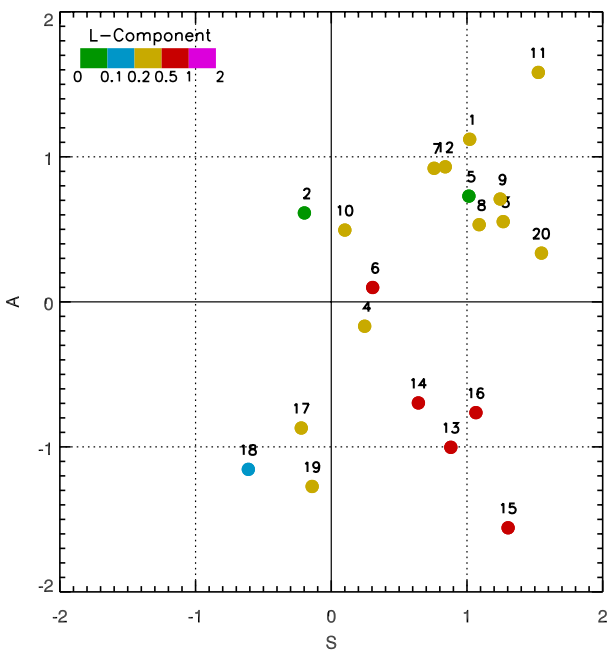
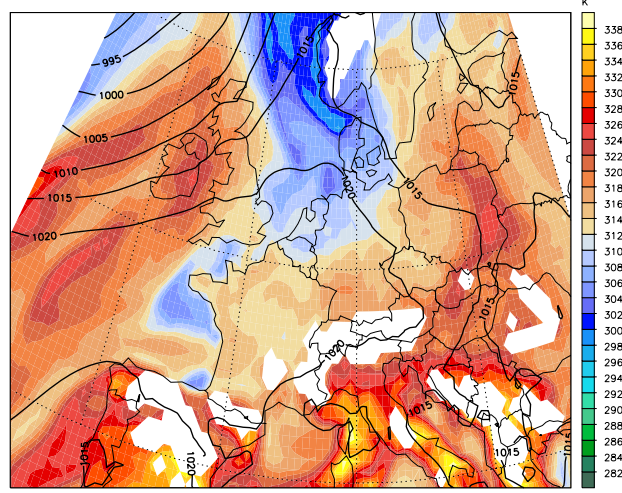
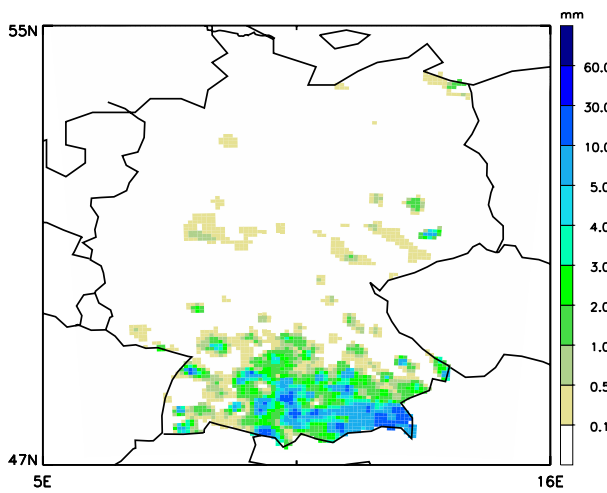
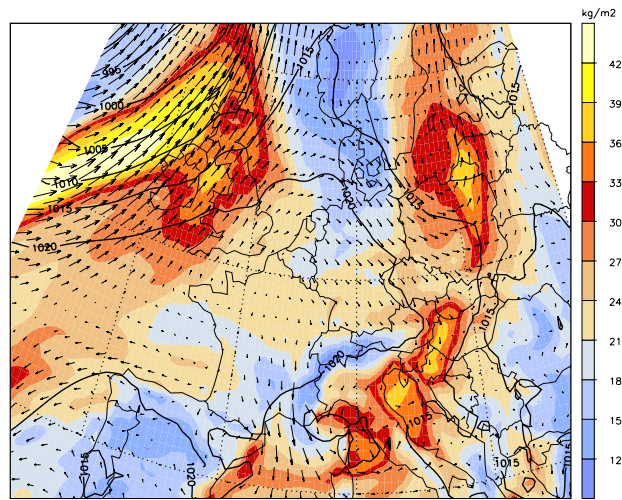
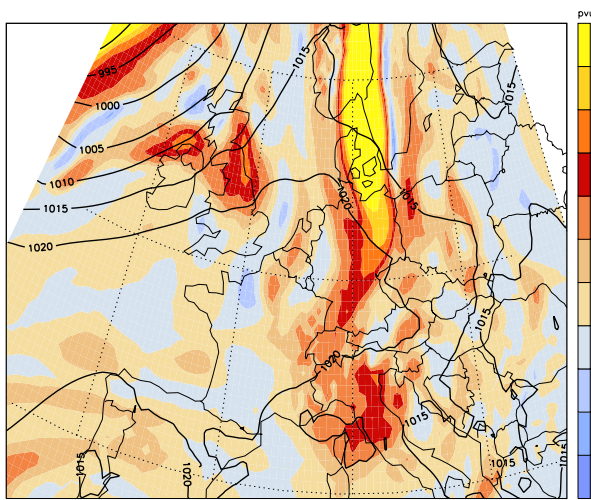
Meteorologische Situation und Qualität der Niederschlagsvorhersage für COPS-DE am 31. Juli 2007.



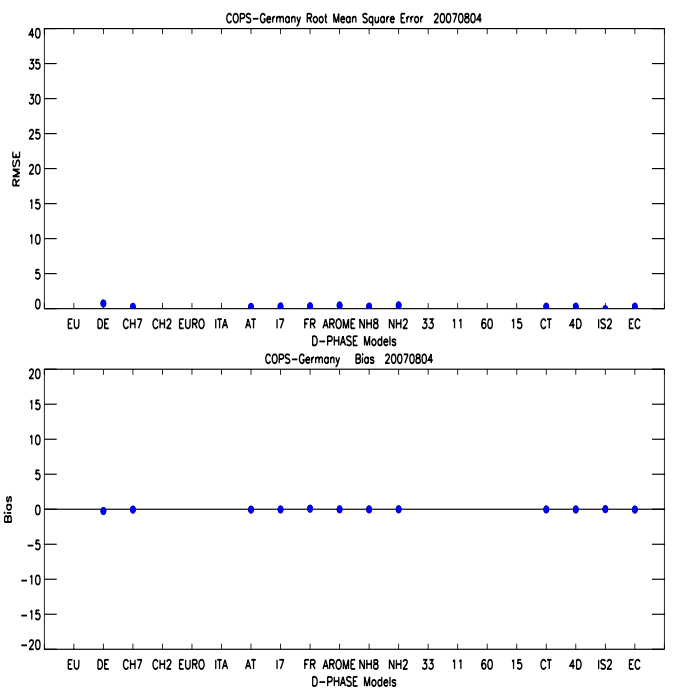
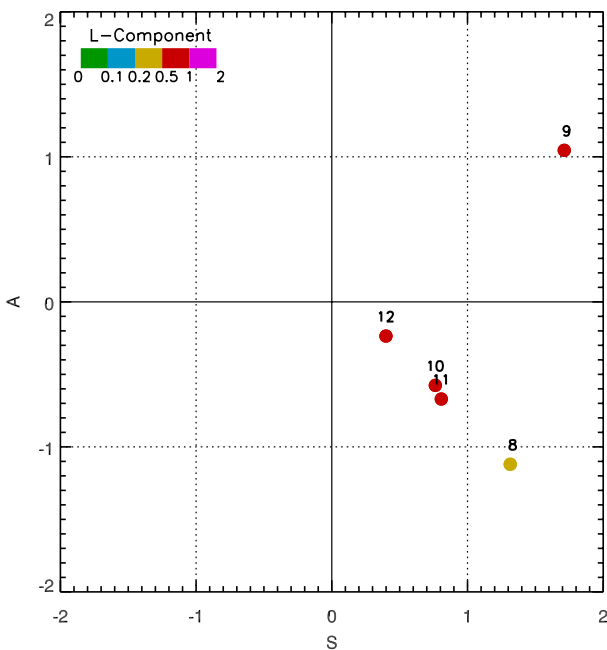
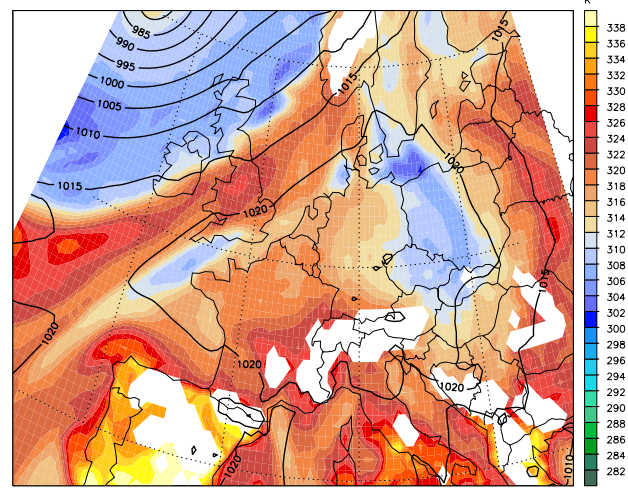
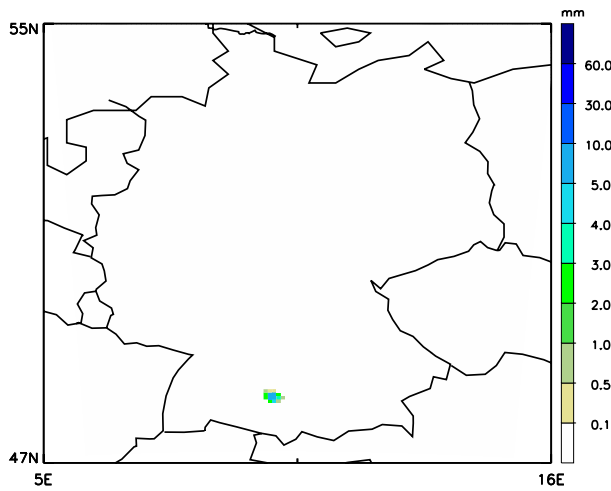
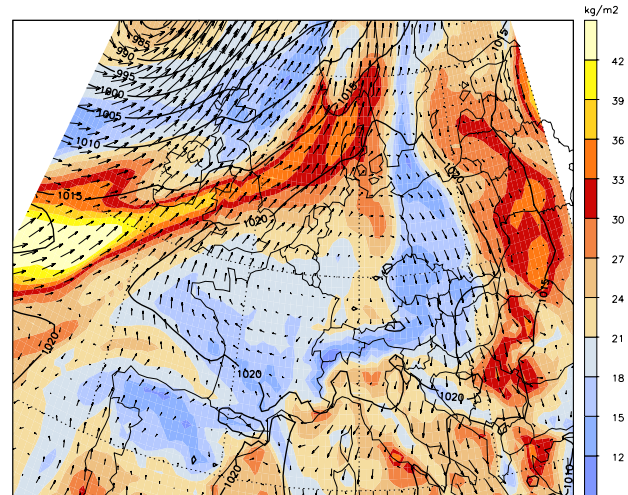
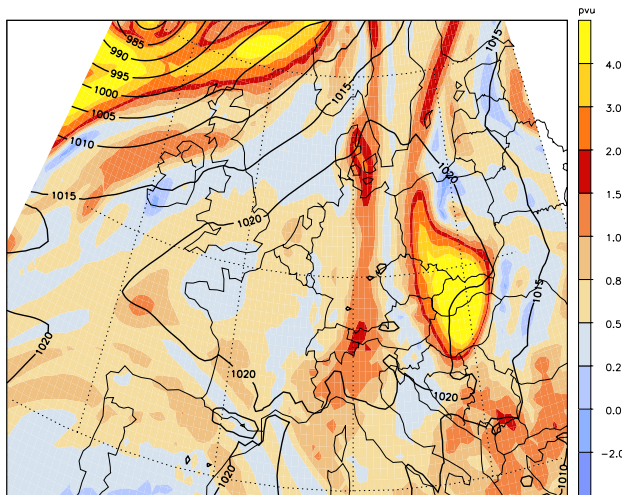
Meteorologische Situation und Qualität der Niederschlagsvorhersage für COPS-DE am 1. August 2007.



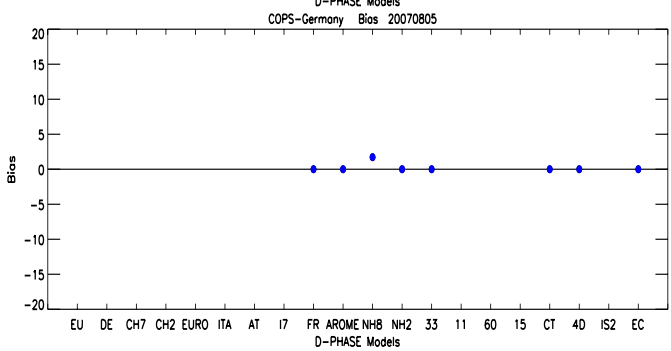
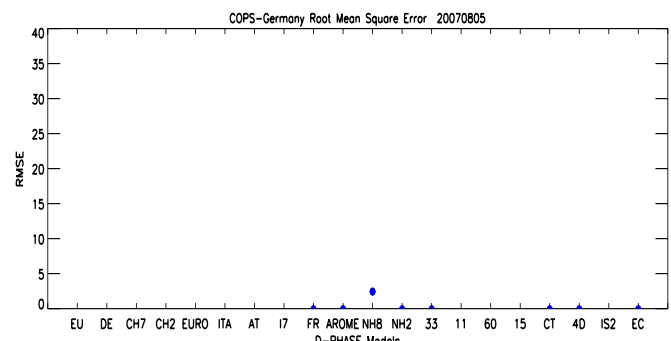
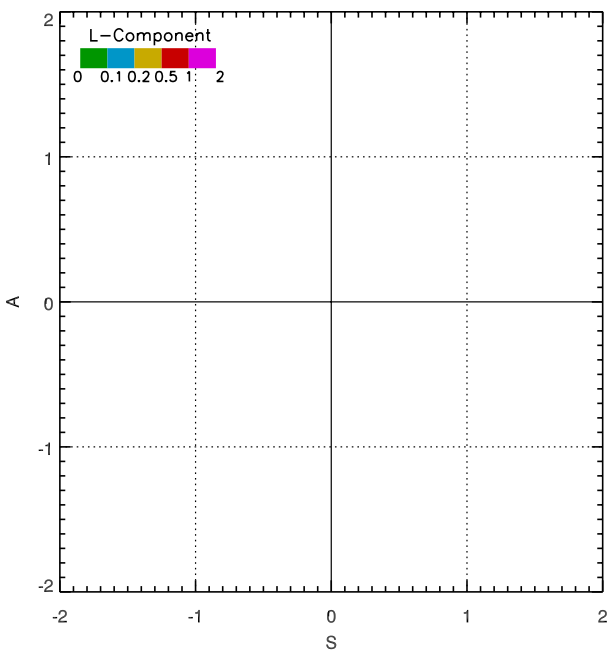
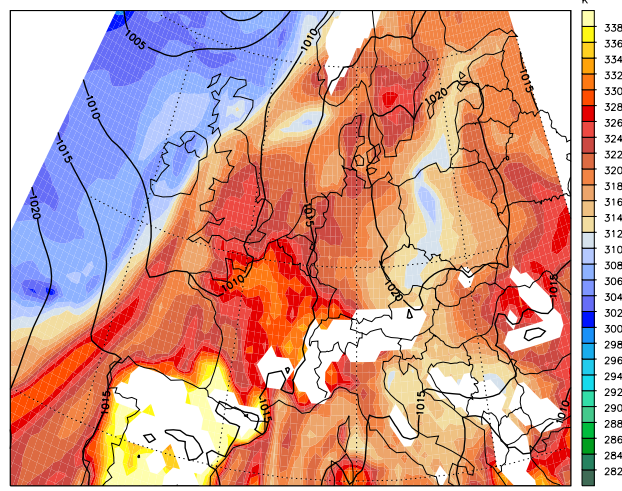
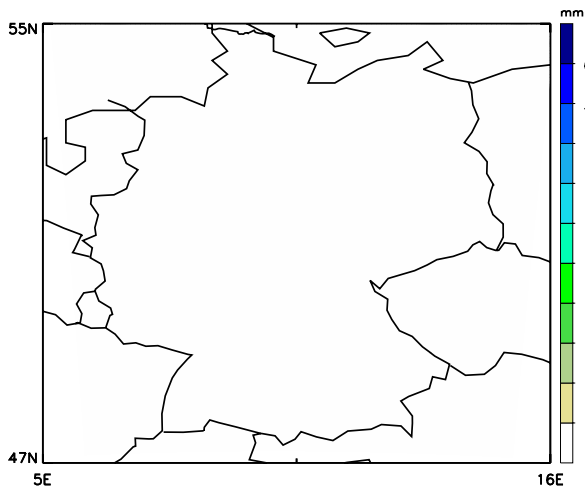
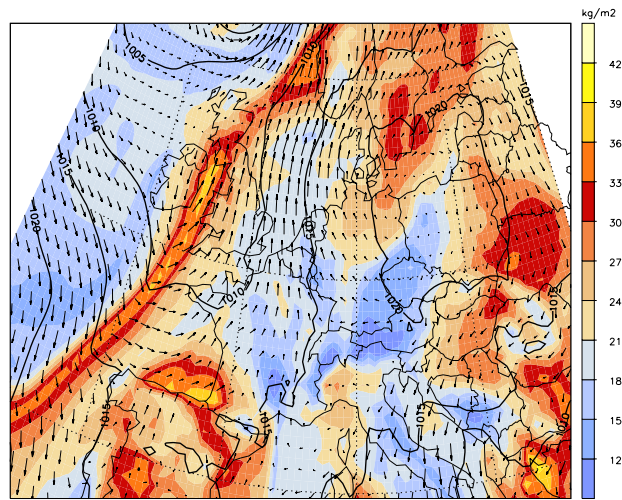
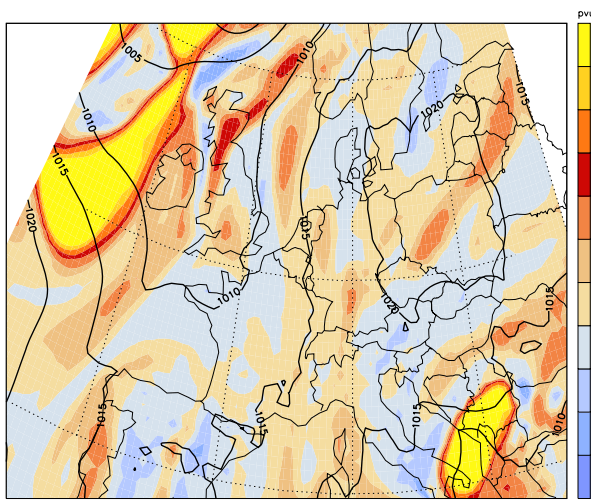
Meteorologische Situation und Qualität der Niederschlagsvorhersage für COPS-DE am 2. August 2007.



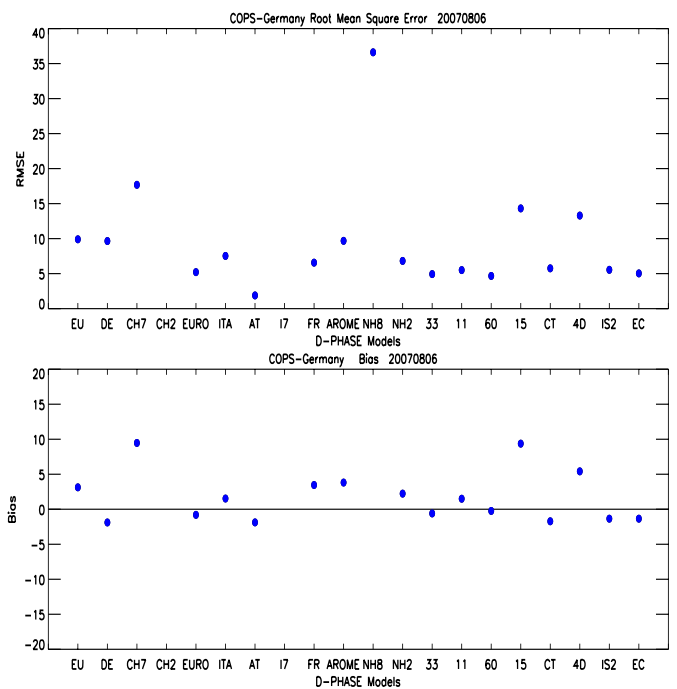
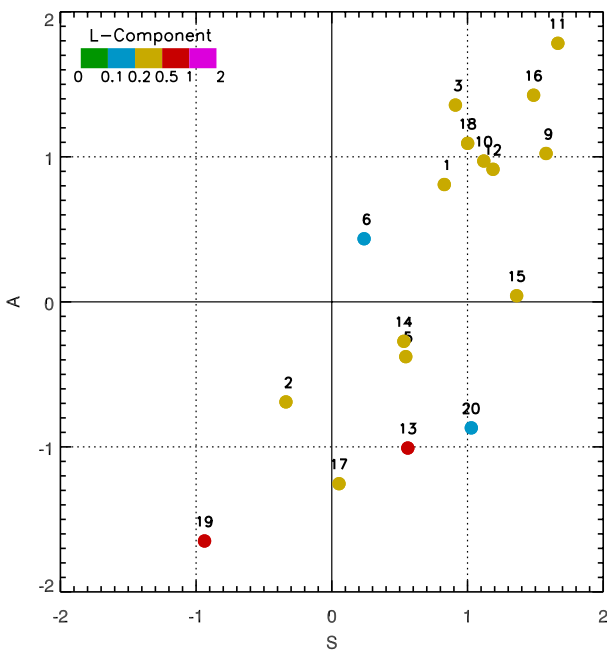
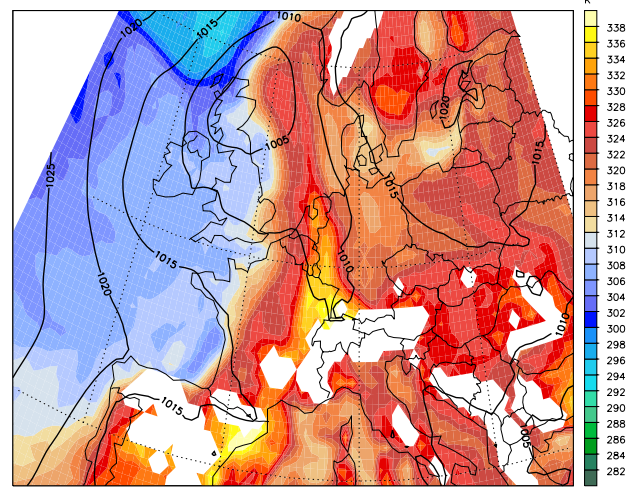
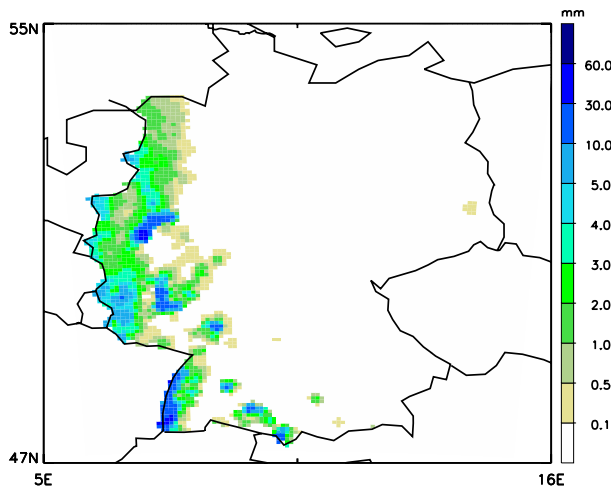
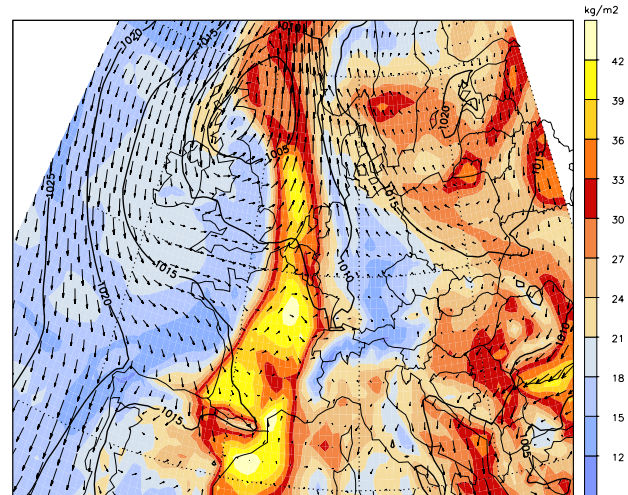
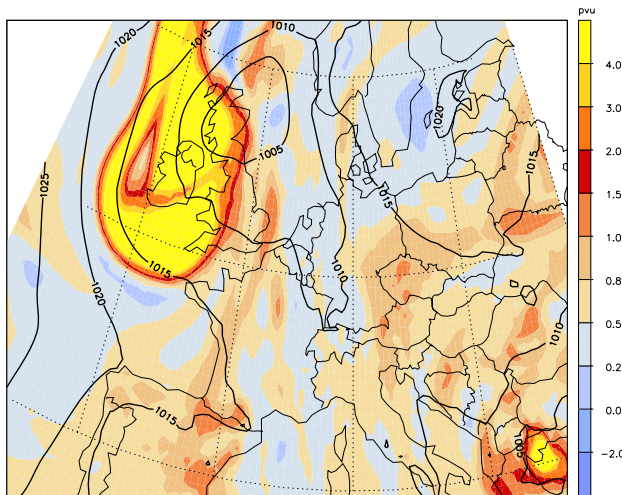
Meteorologische Situation und Qualität der Niederschlagsvorhersage für COPS-DE am 3. August 2007.



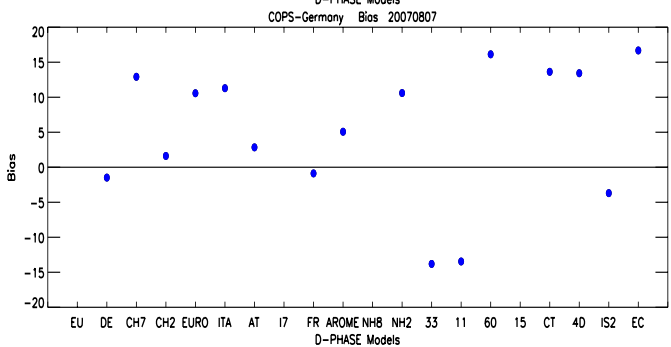
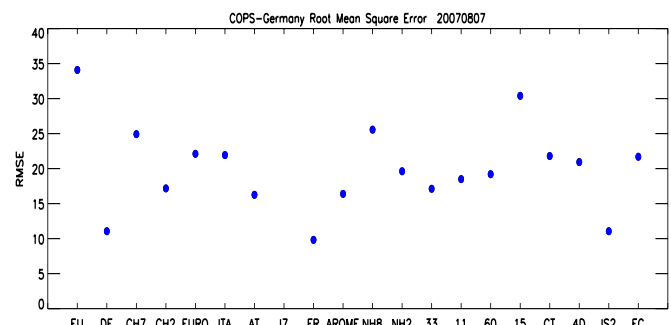
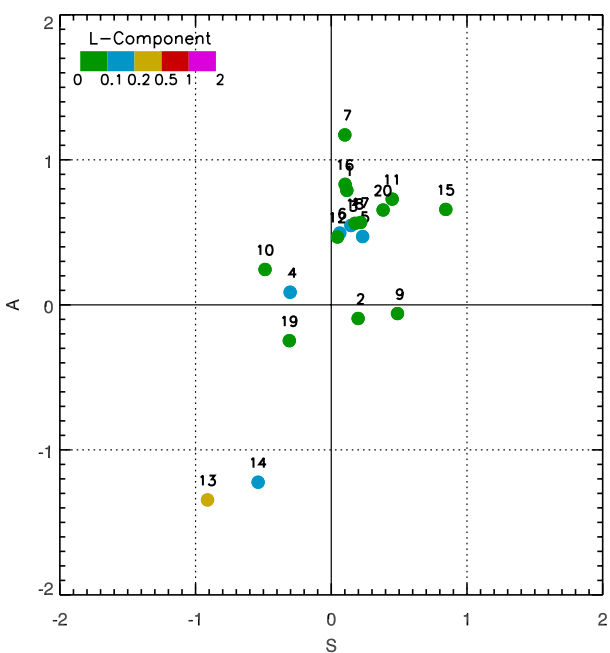
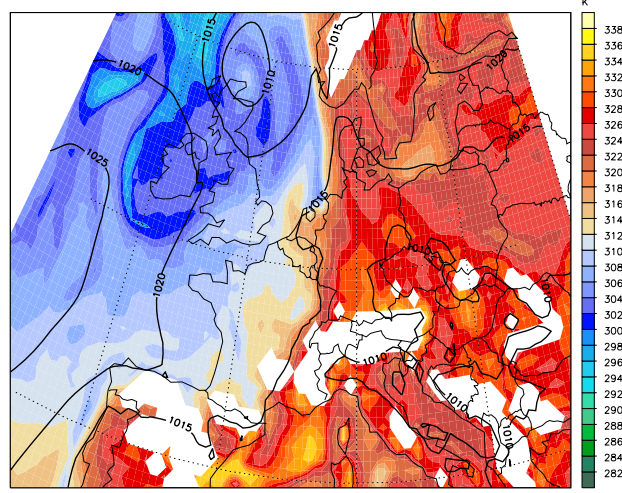
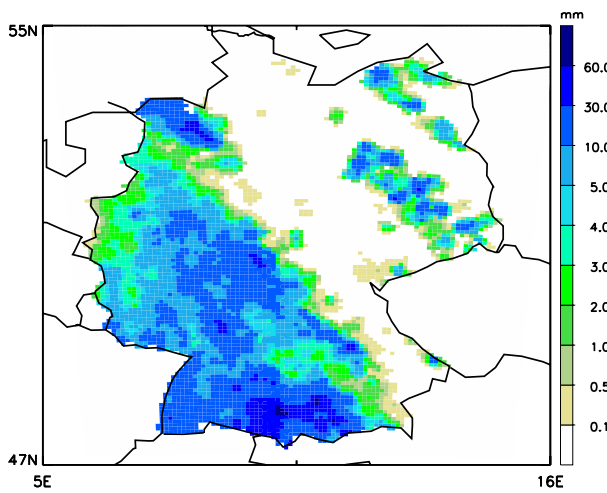
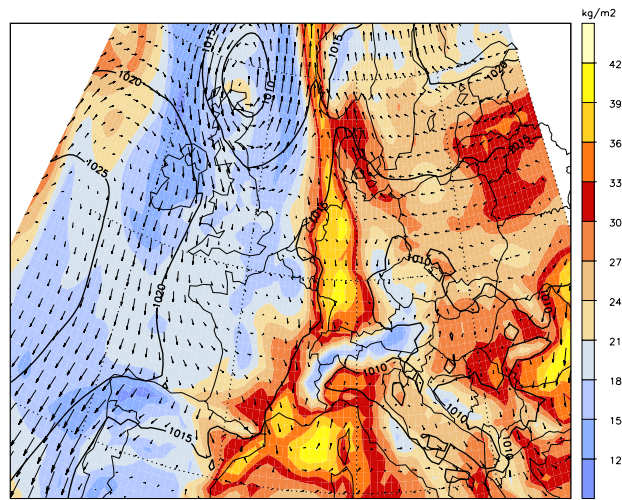
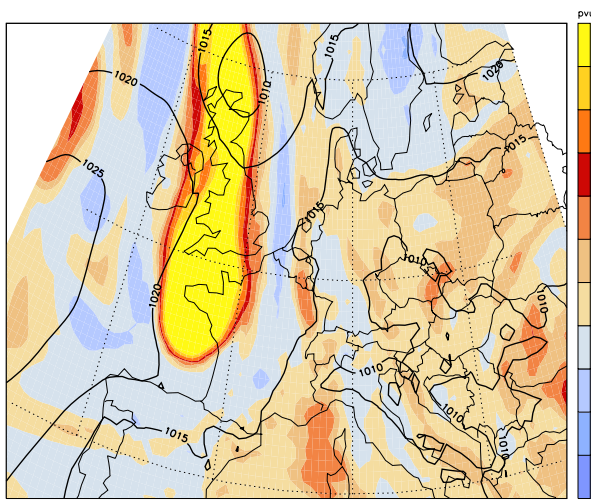
Meteorologische Situation und Qualität der Niederschlagsvorhersage für COPS-DE am 4. August 2007.



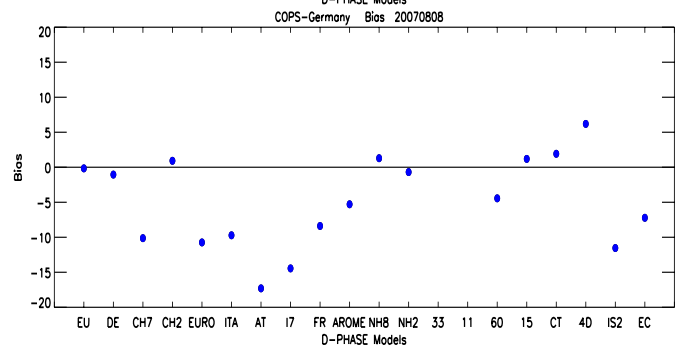
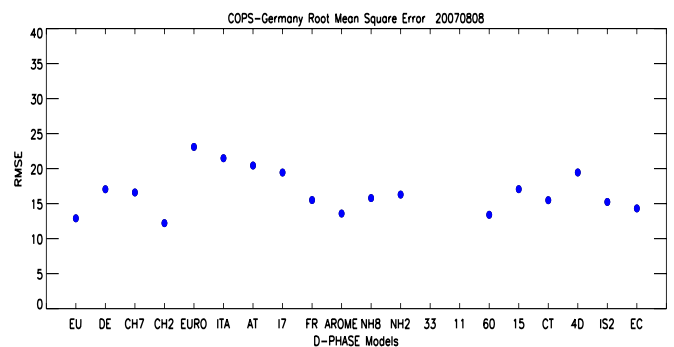
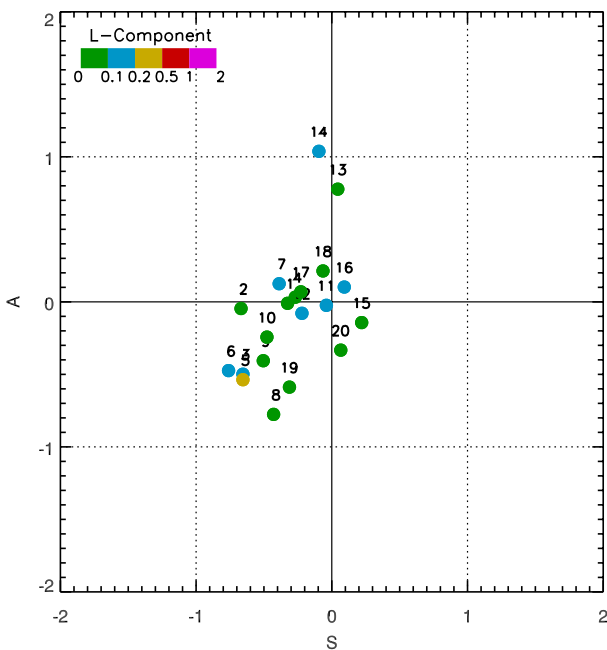
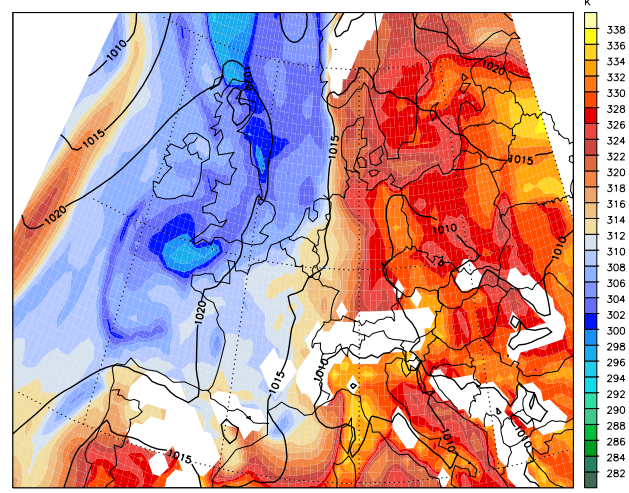
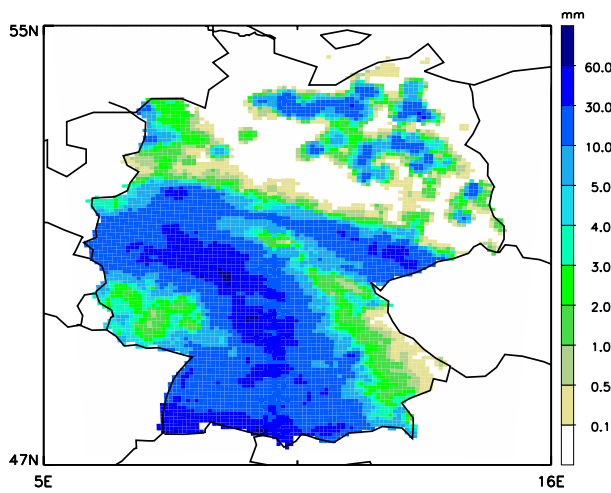
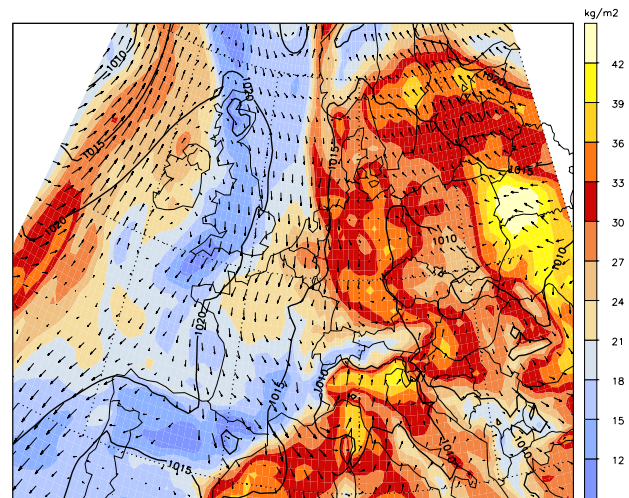
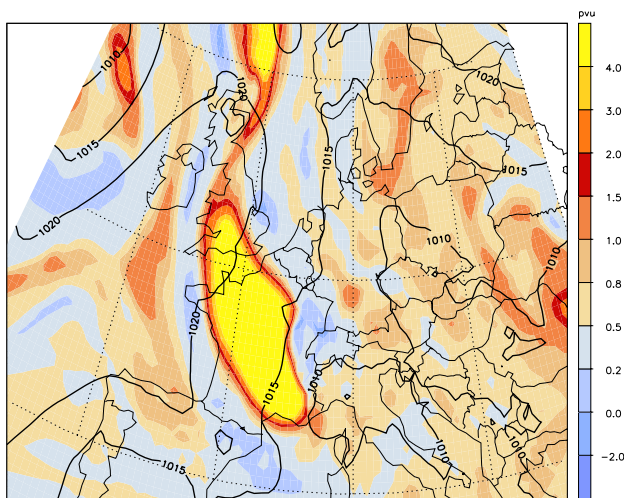
Meteorologische Situation und Qualität der Niederschlagsvorhersage für COPS-DE am 5. August 2007.



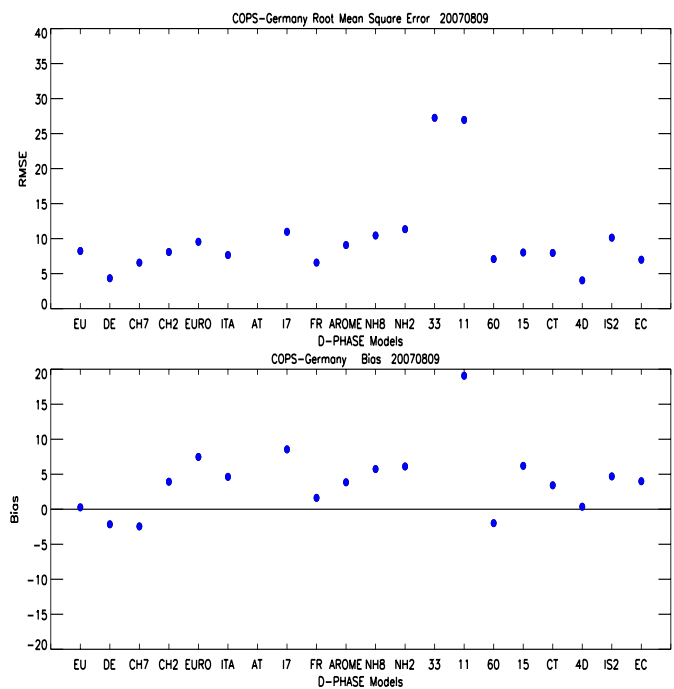
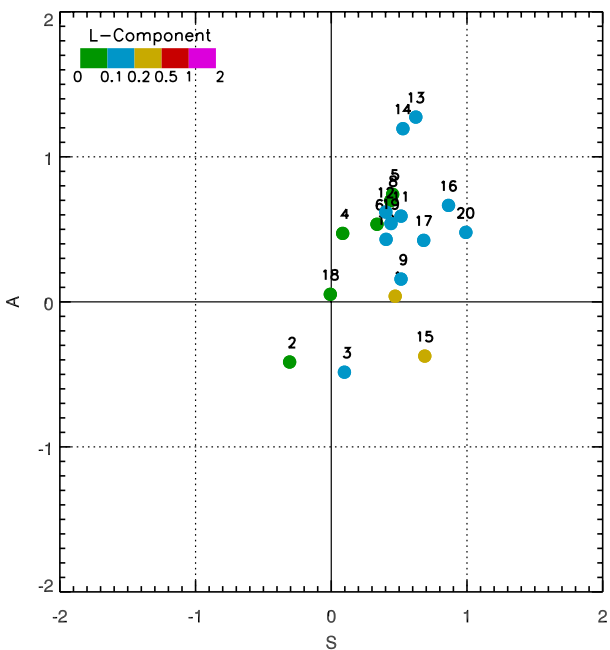
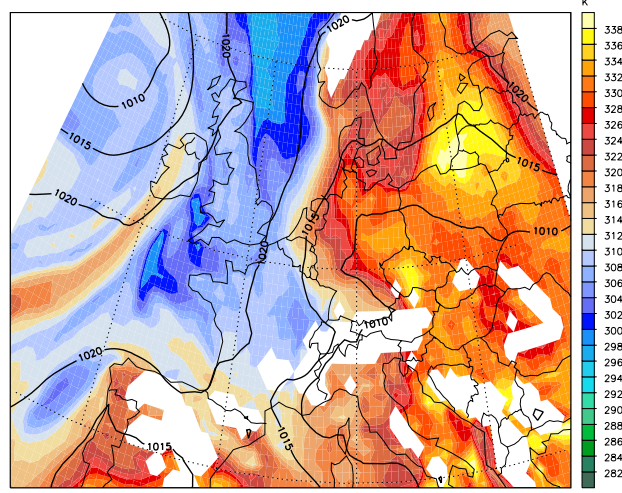
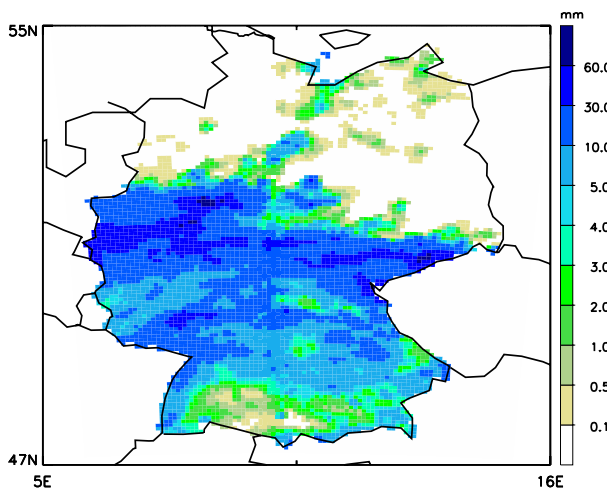
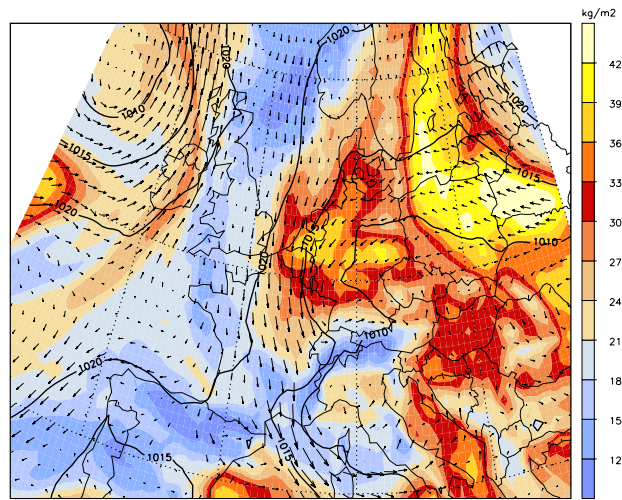
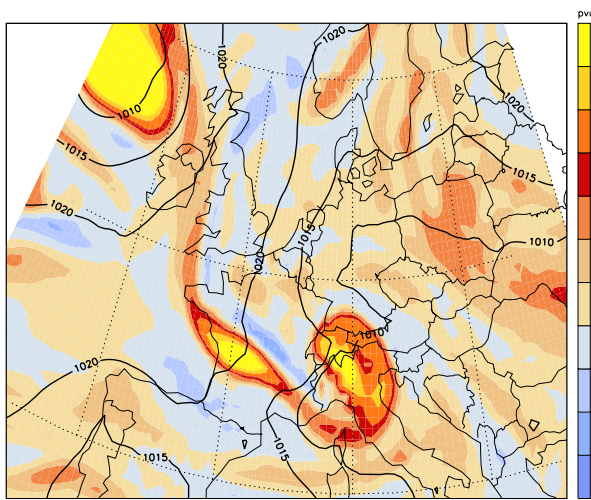
Meteorologische Situation und Qualität der Niederschlagsvorhersage für COPS-DE am 6. August 2007.



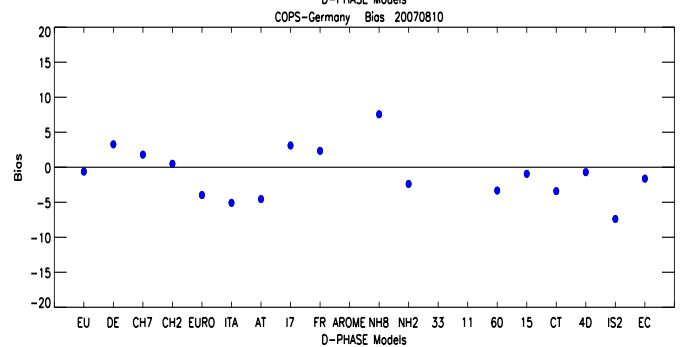
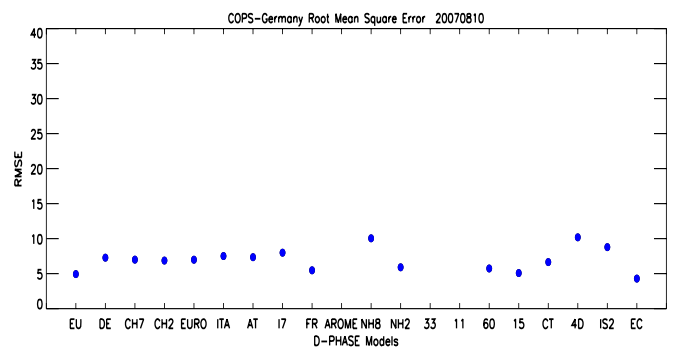
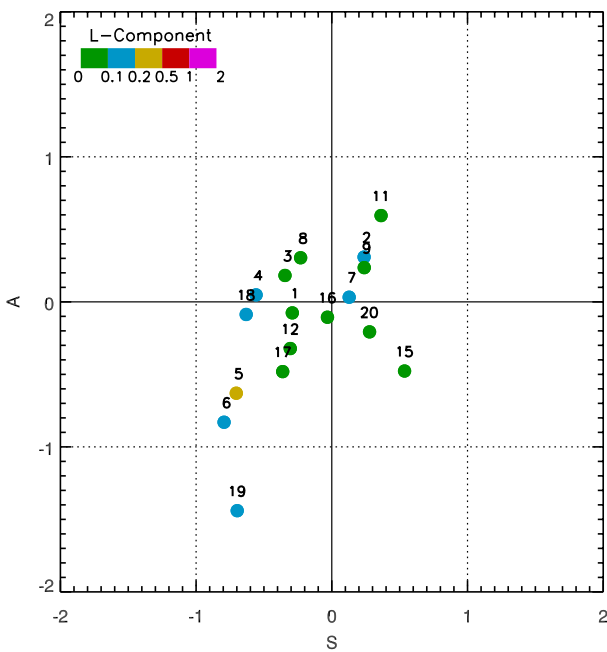
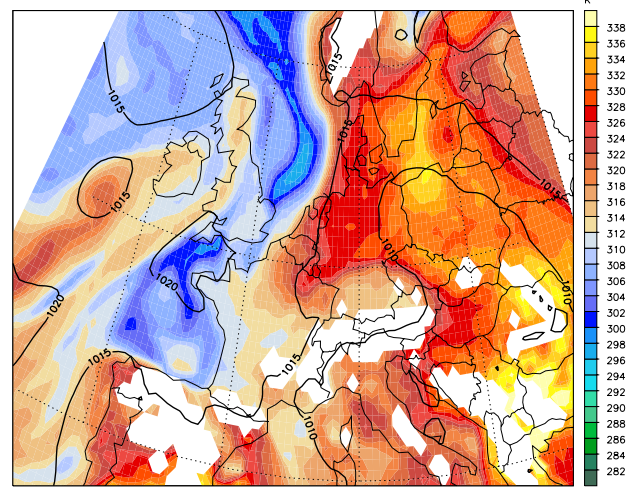
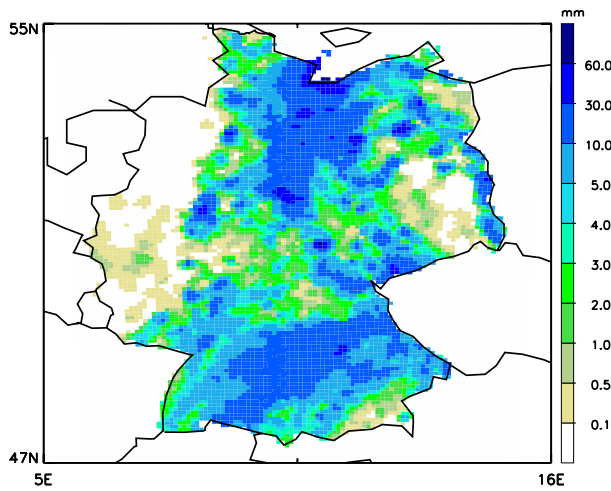
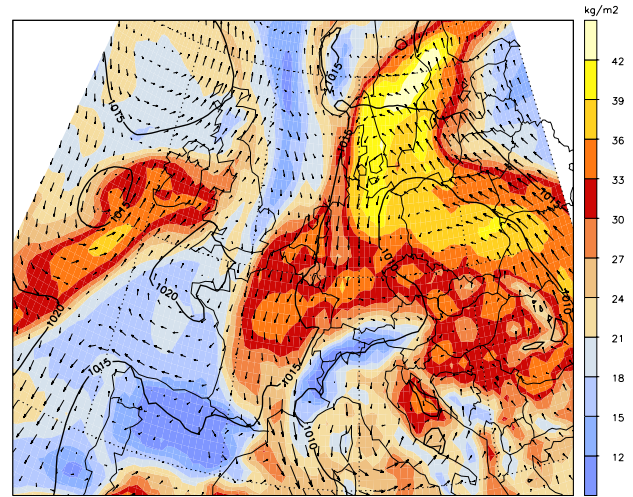
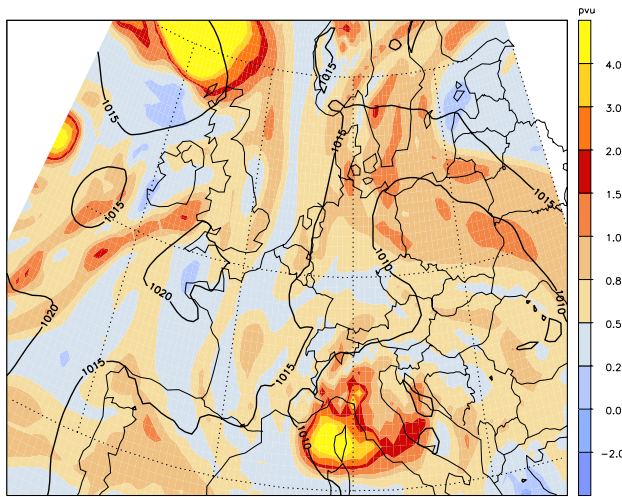
Meteorologische Situation und Qualität der Niederschlagsvorhersage für COPS-DE am 7. August 2007.



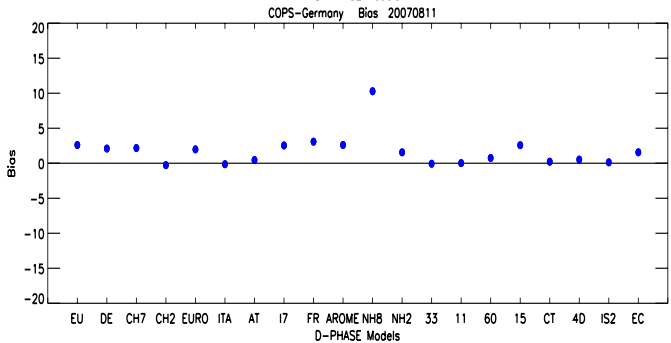
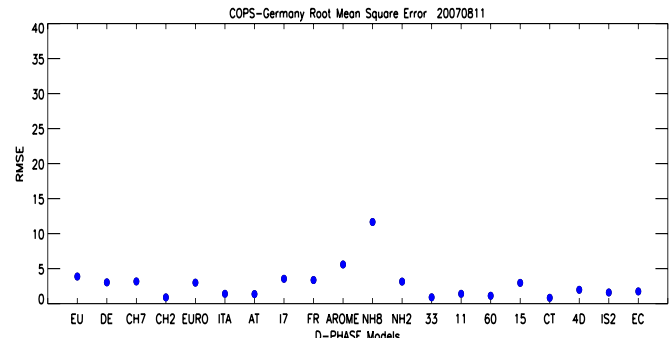
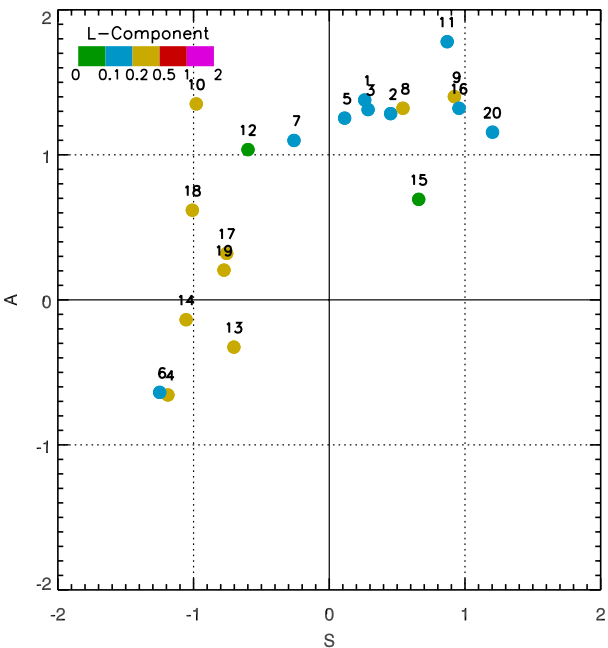
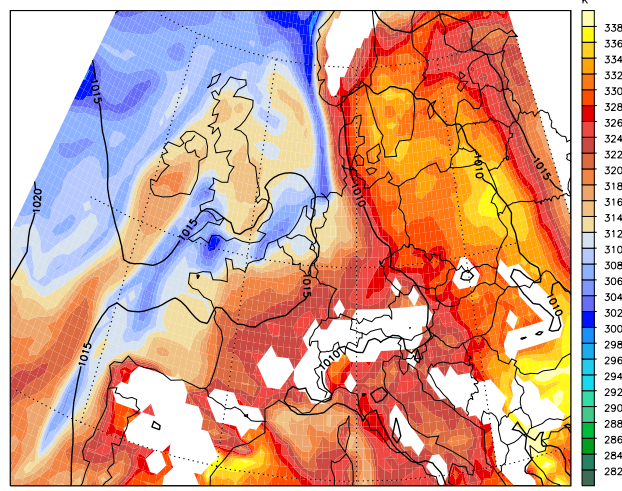
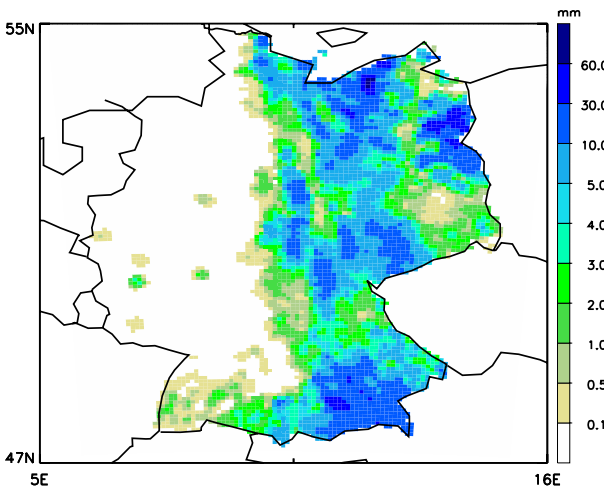
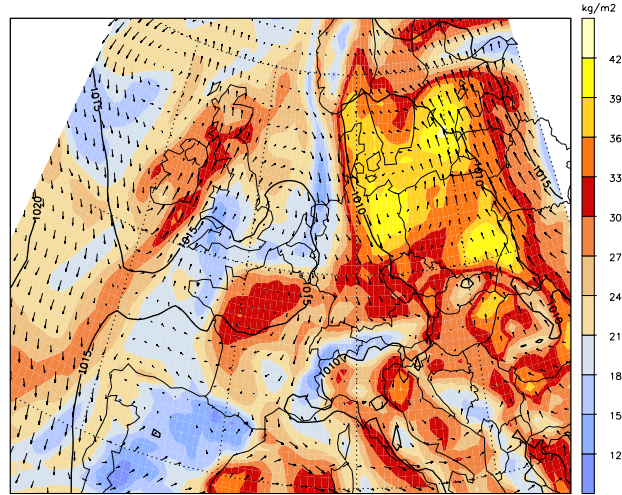
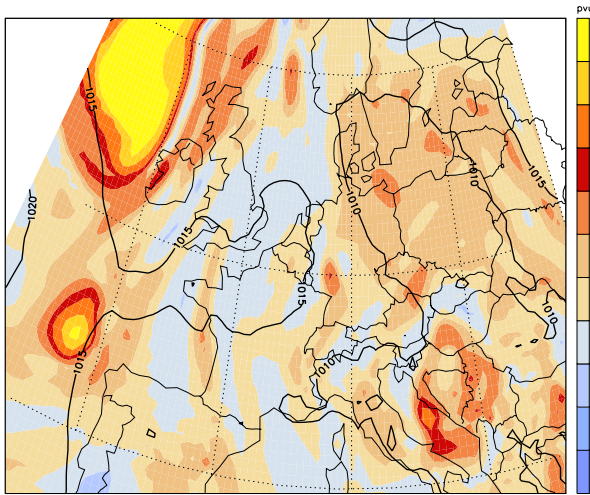
Meteorologische Situation und Qualität der Niederschlagsvorhersage für COPS-DE am 8. August 2007.



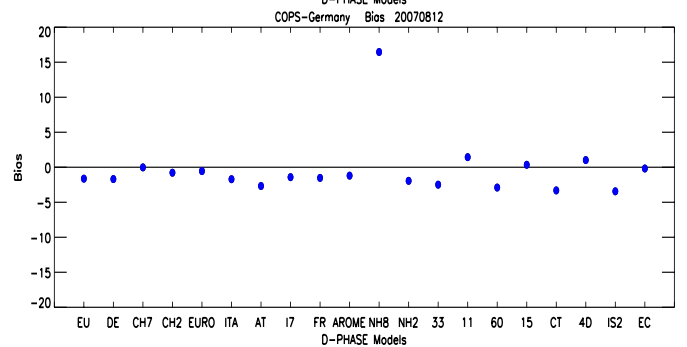
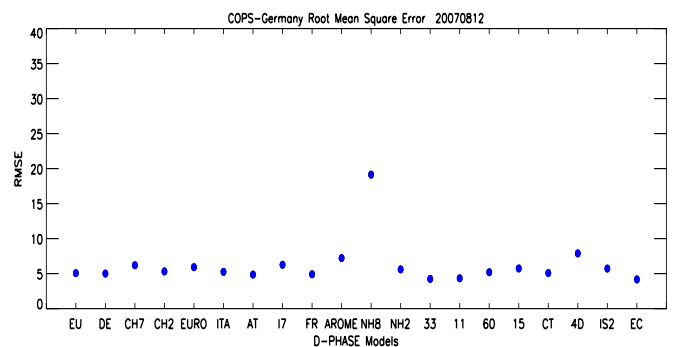
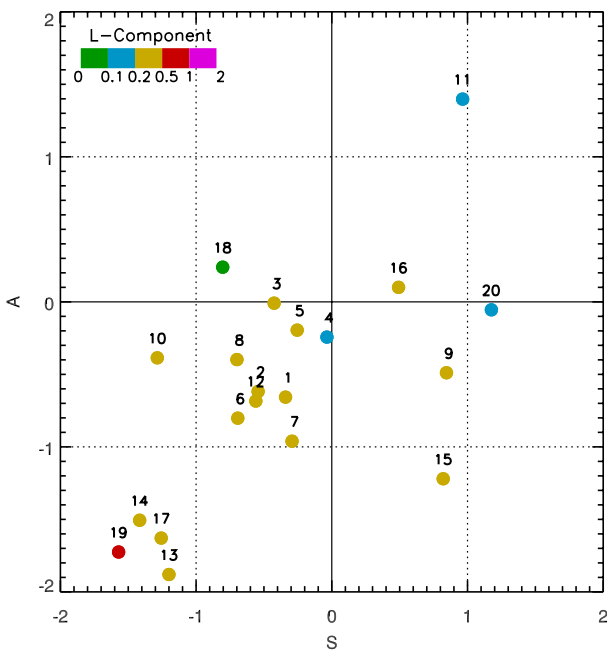
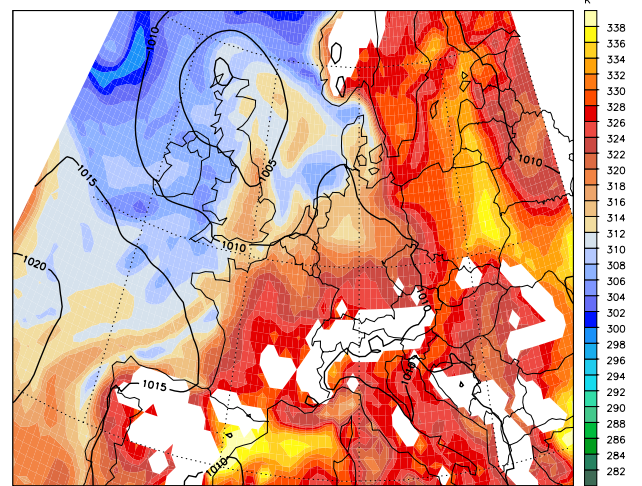
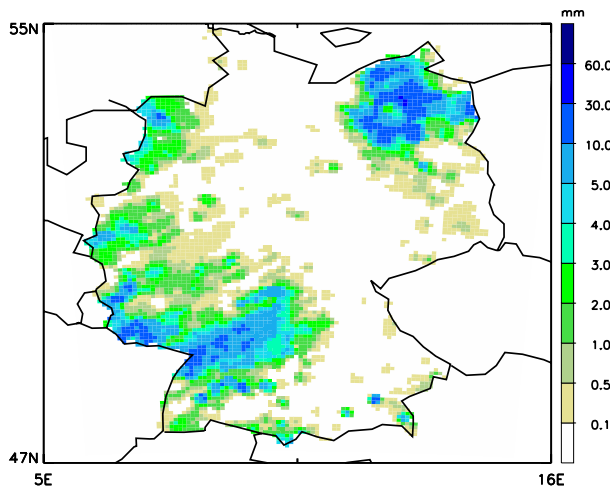
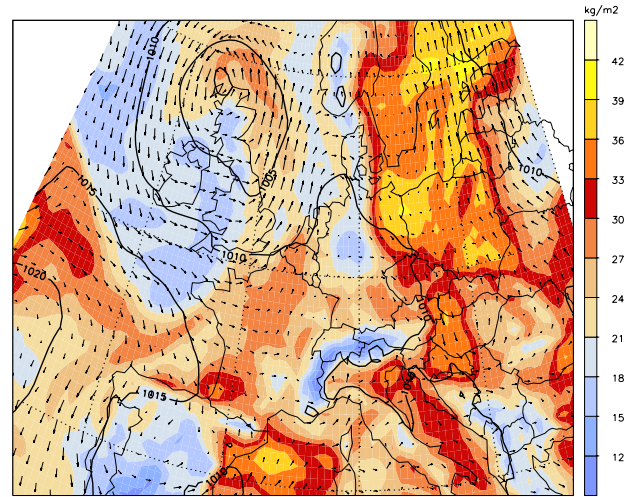
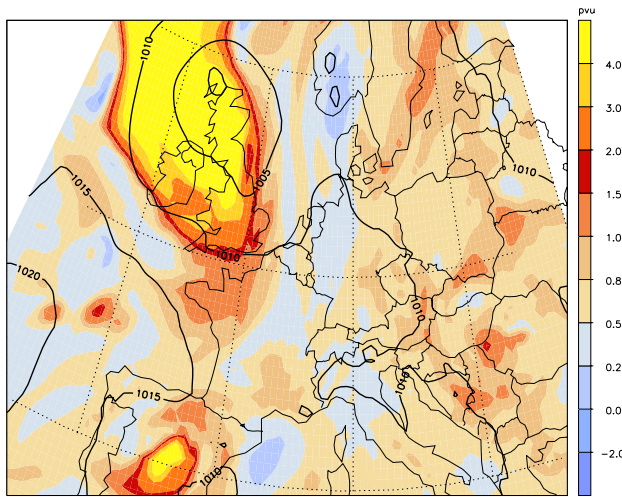
Meteorologische Situation und Qualität der Niederschlagsvorhersage für COPS-DE am 9. August 2007.



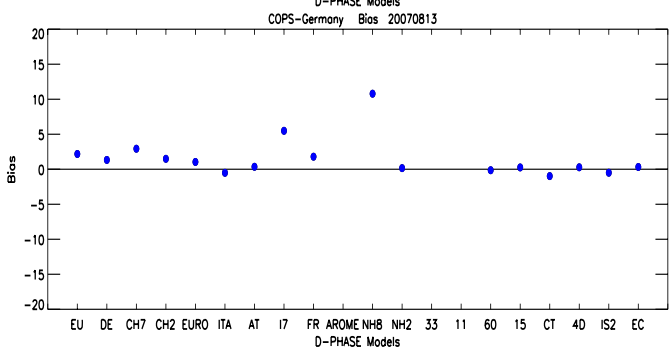
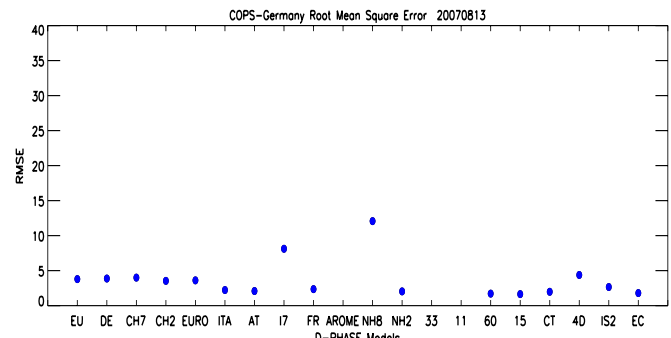
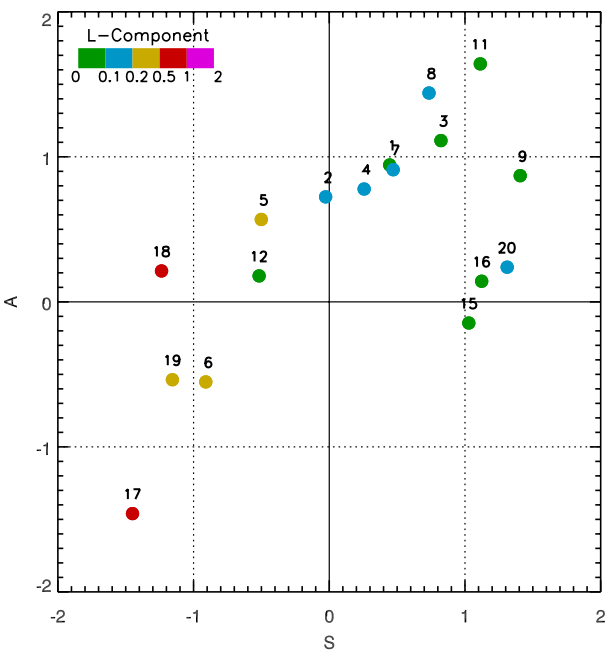
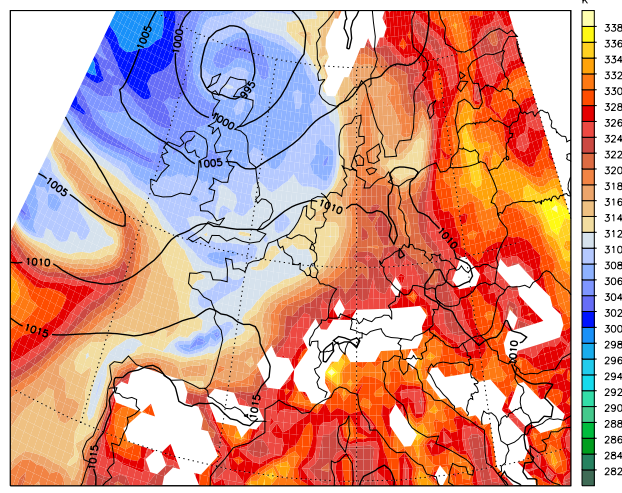
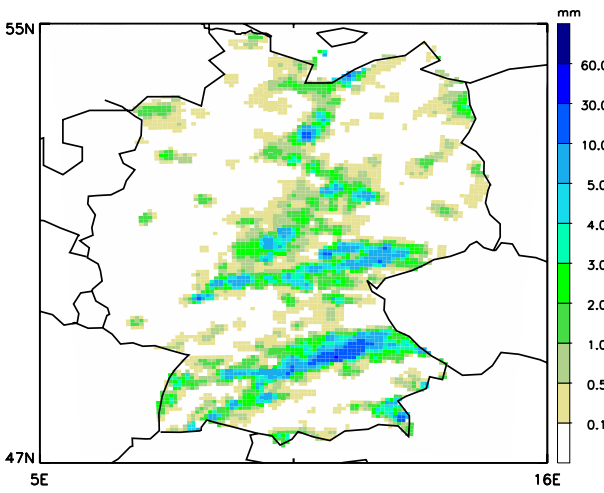
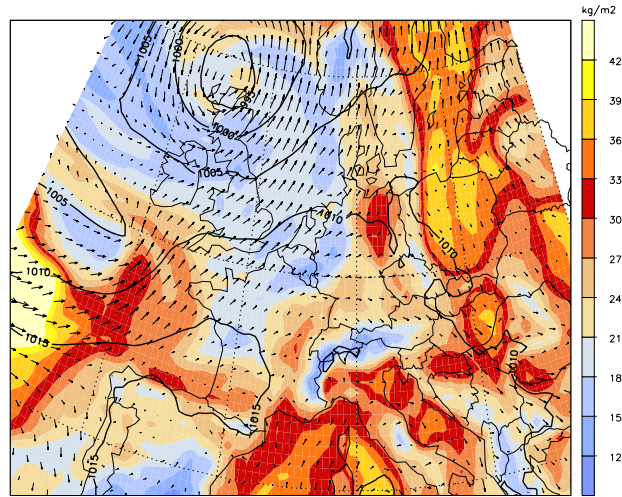
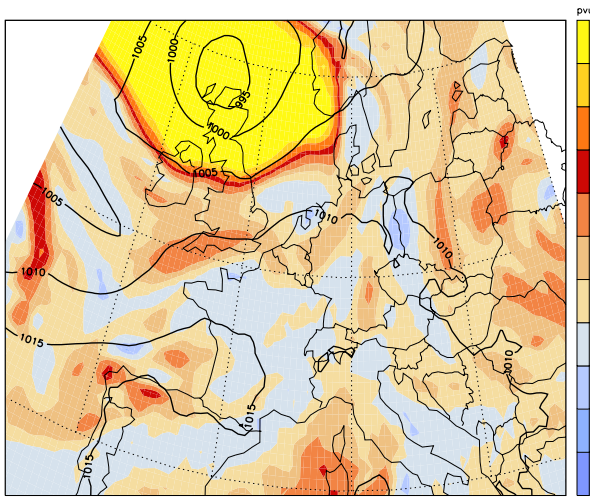
Meteorologische Situation und Qualität der Niederschlagsvorhersage für COPS-DE am 10. August 2007.



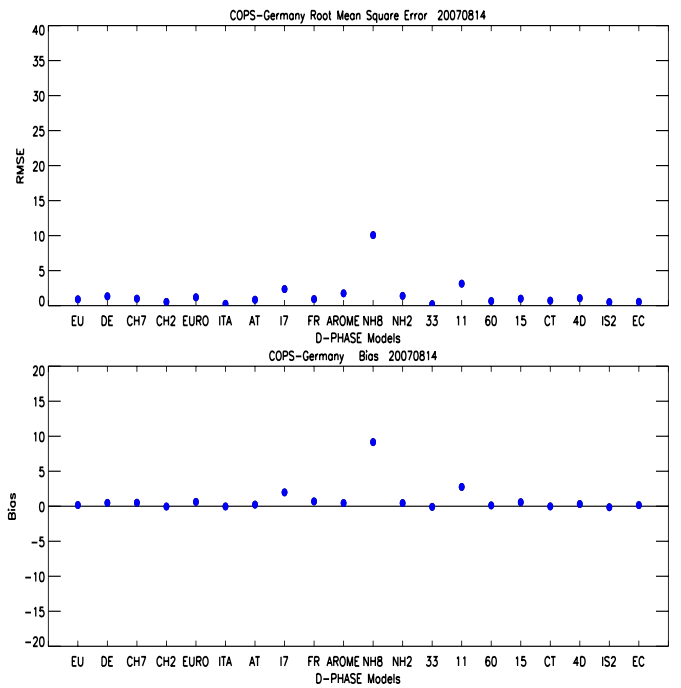
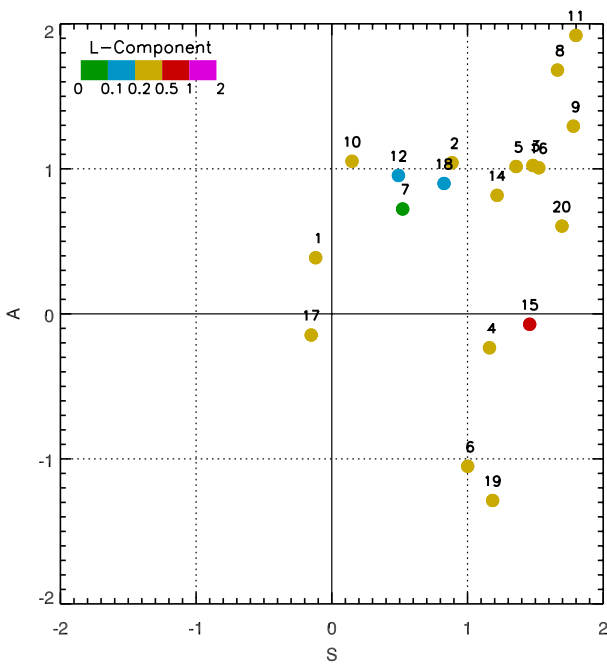
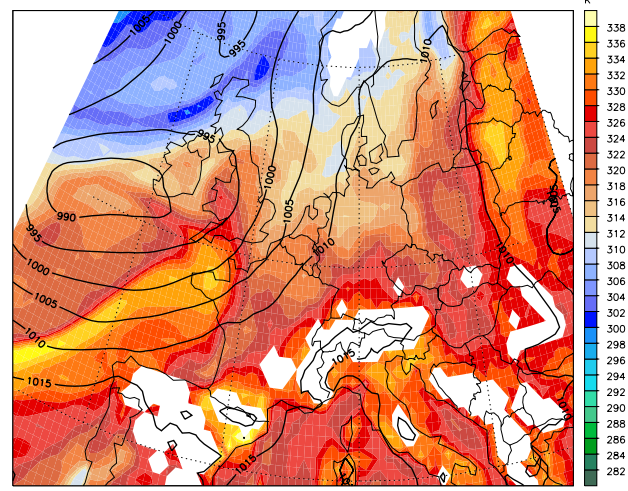
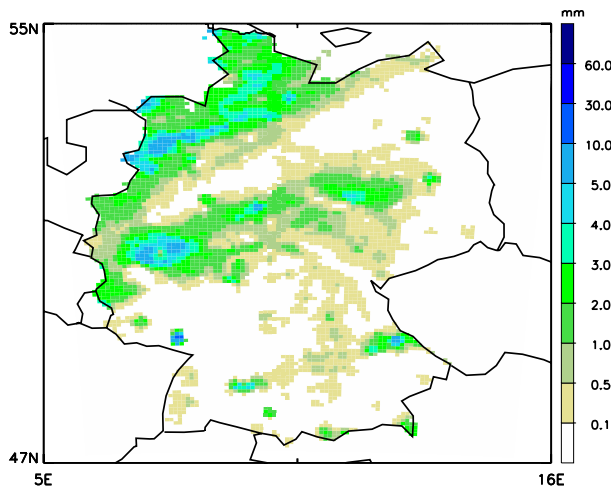
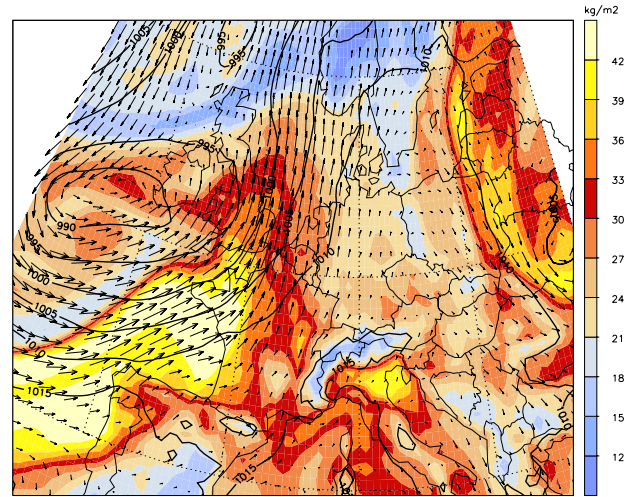
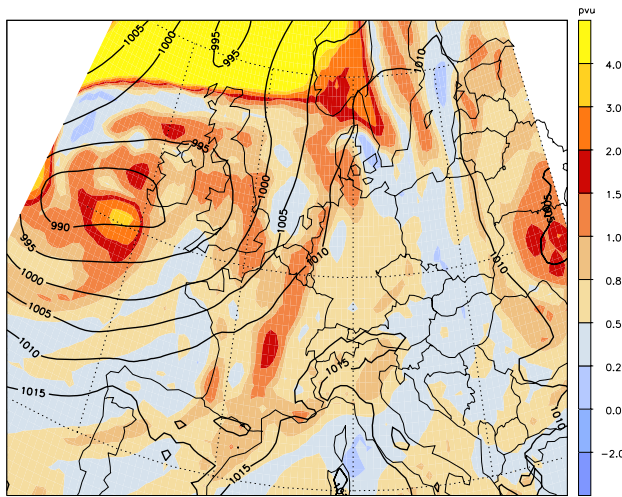
Meteorologische Situation und Qualität der Niederschlagsvorhersage für COPS-DE am 11. August 2007.



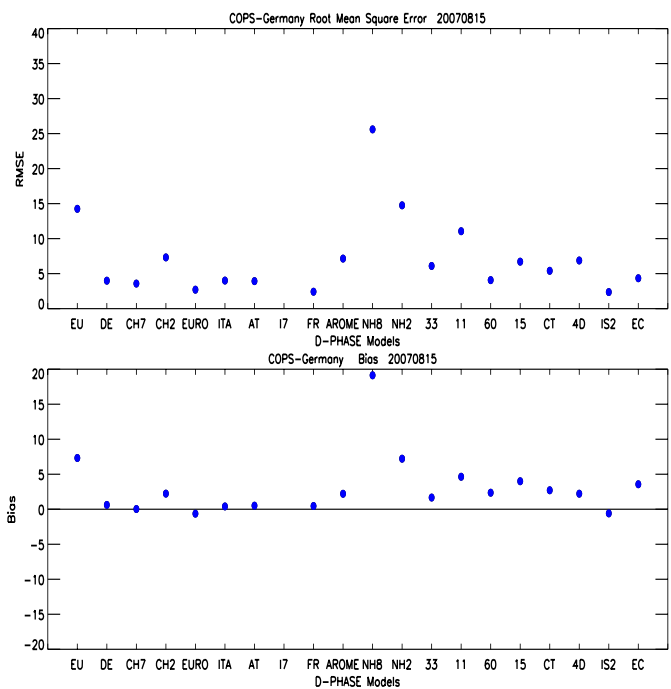
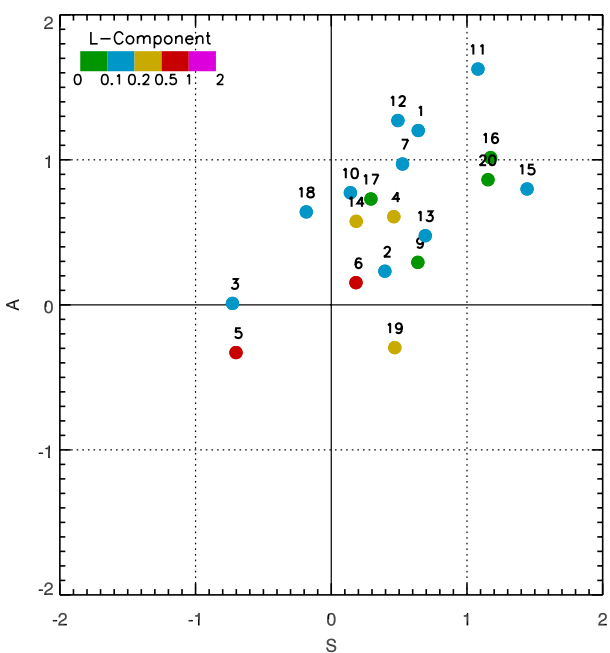
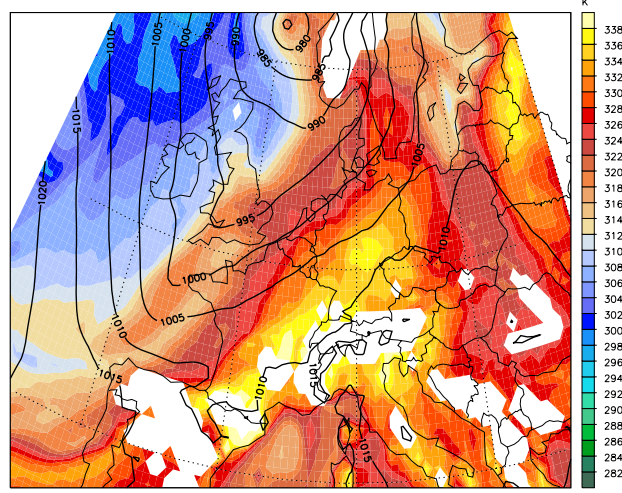
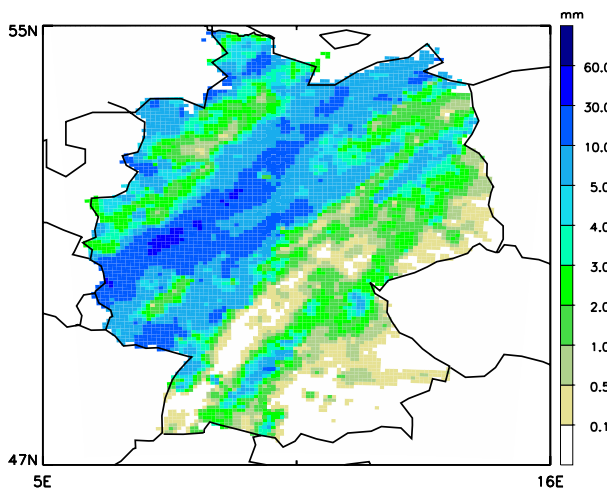
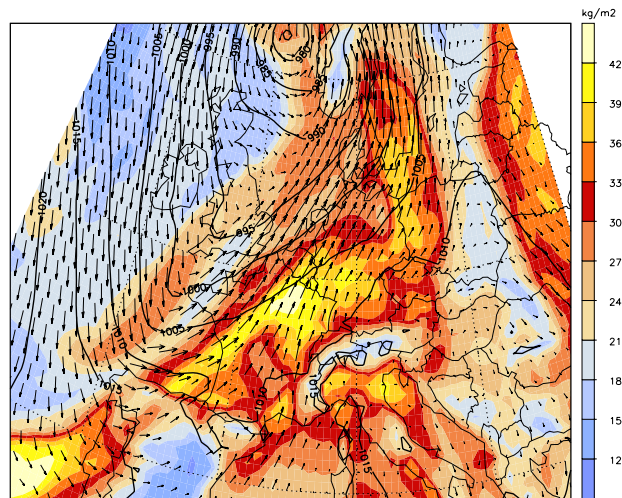
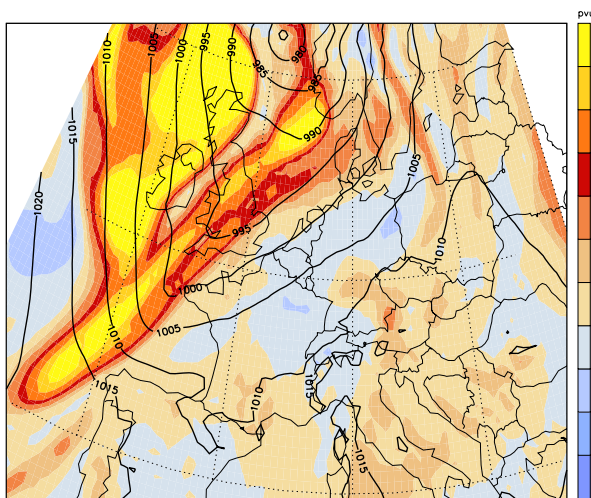
Meteorologische Situation und Qualität der Niederschlagsvorhersage für COPS-DE am 12. August 2007.



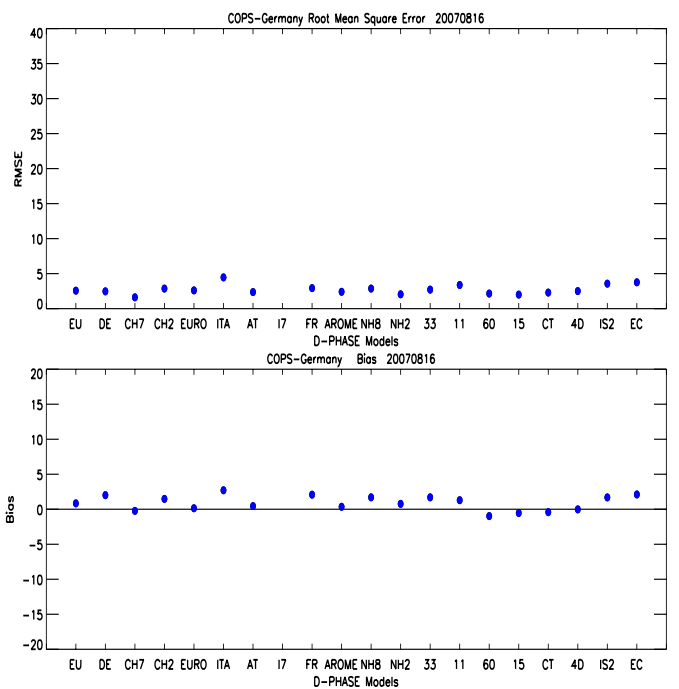
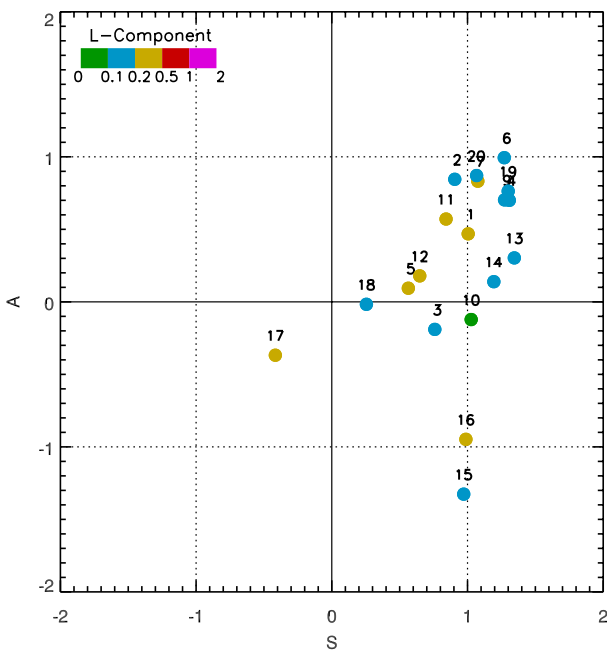
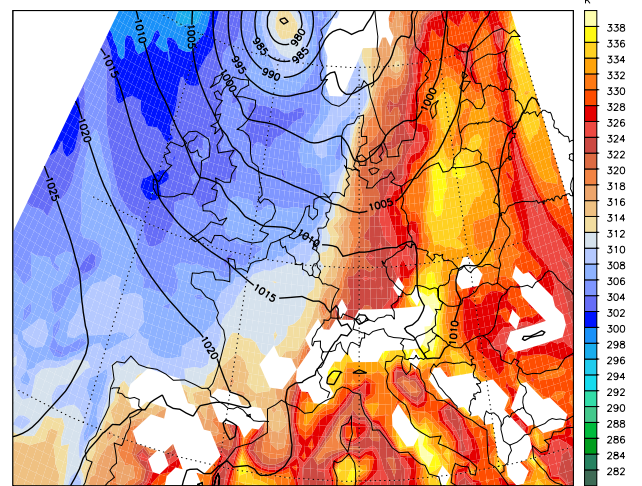
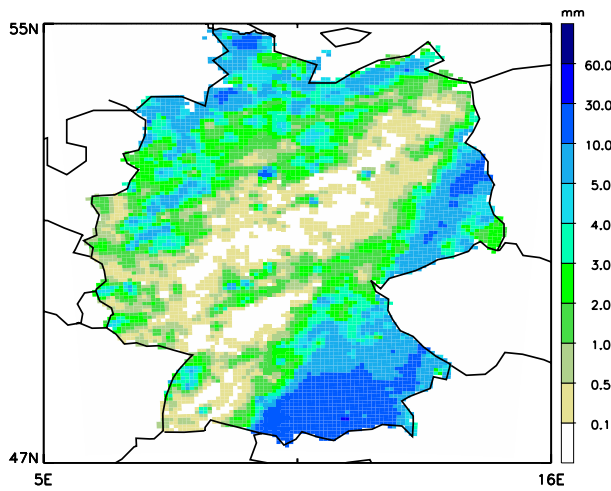
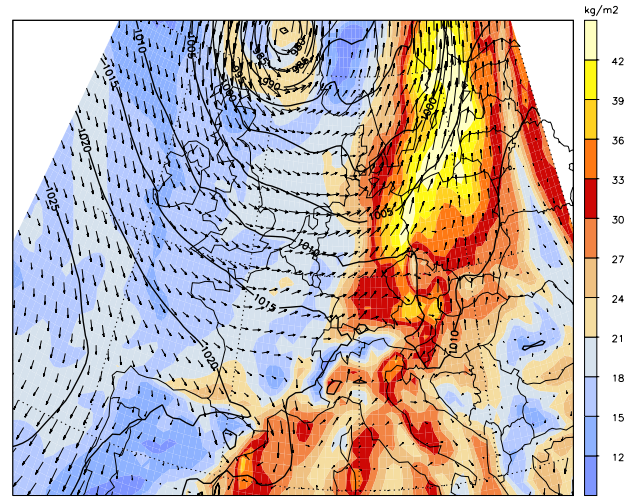
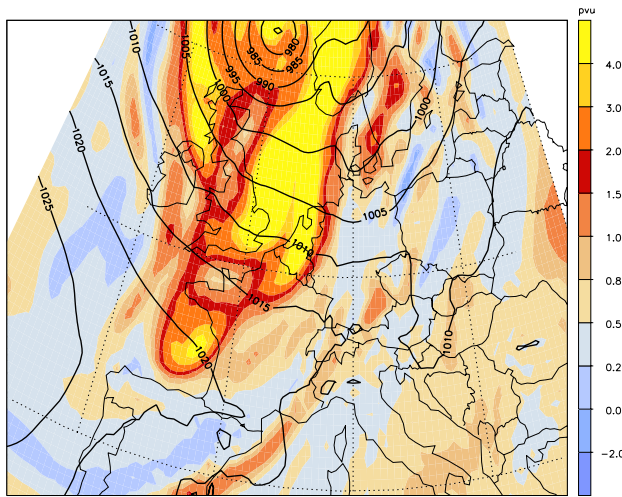
Meteorologische Situation und Qualität der Niederschlagsvorhersage für COPS-DE am 13. August 2007.



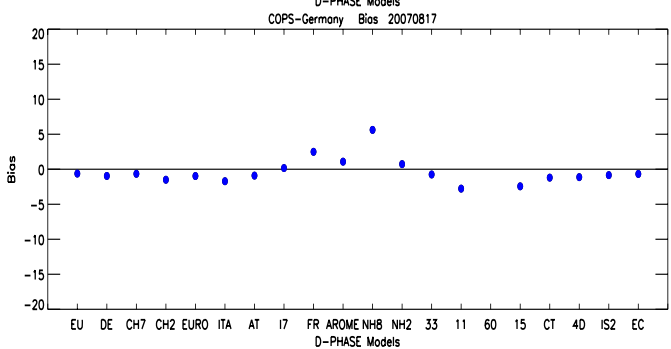
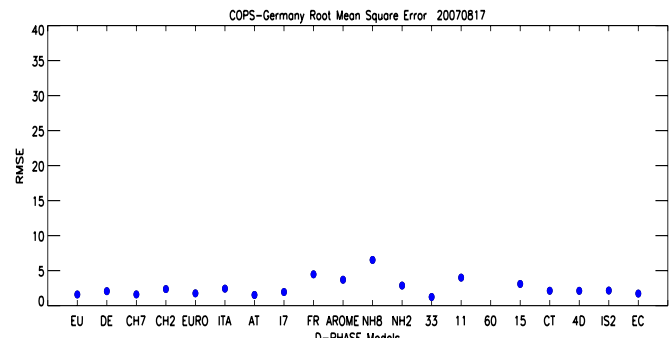
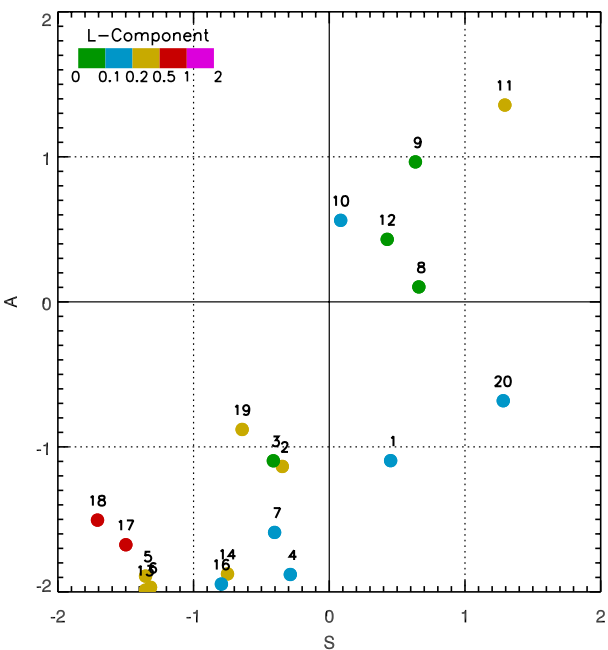
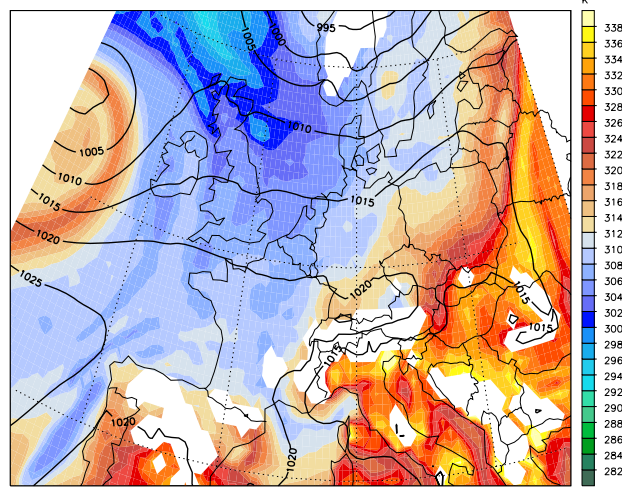
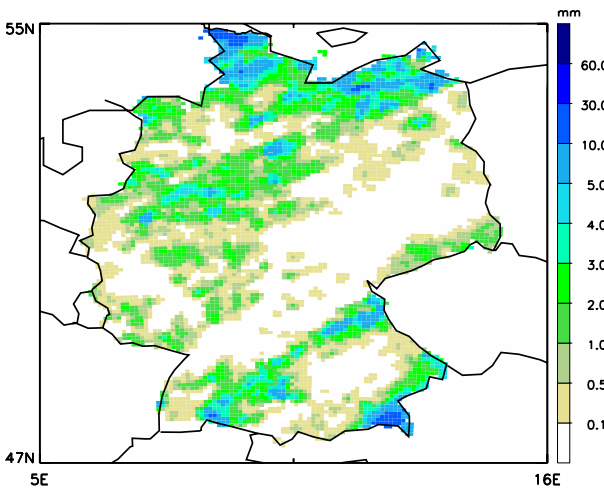
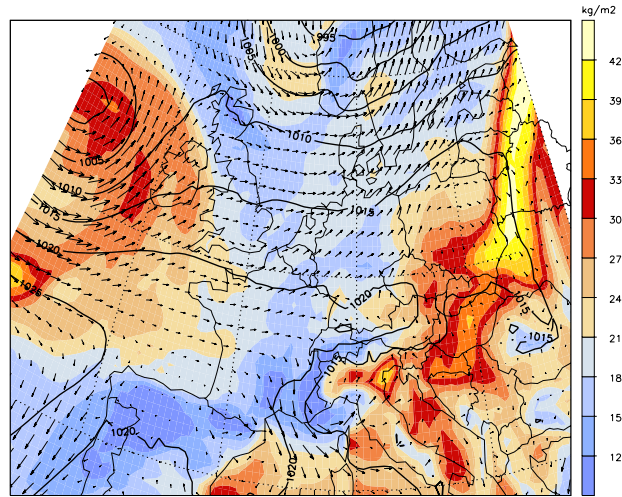
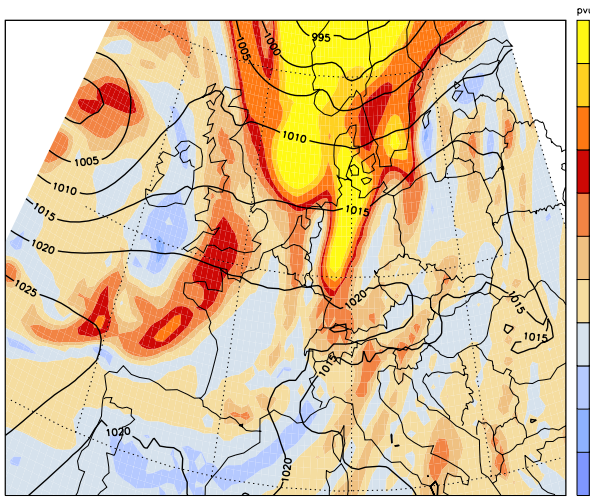
Meteorologische Situation und Qualität der Niederschlagsvorhersage für COPS-DE am 14. August 2007.



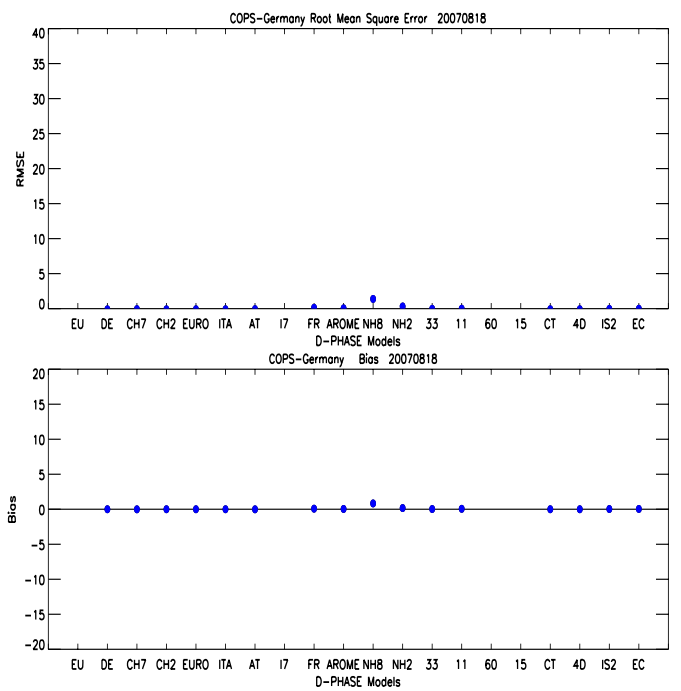
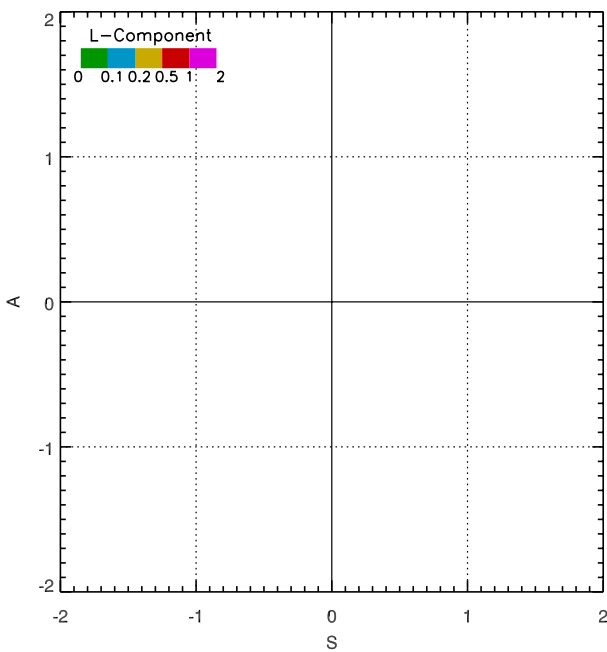
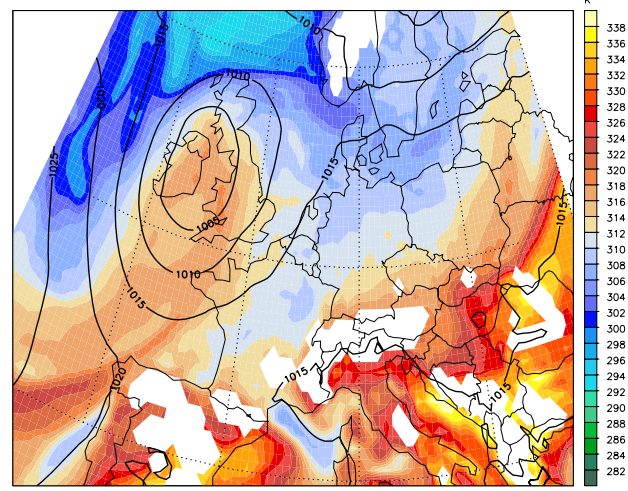
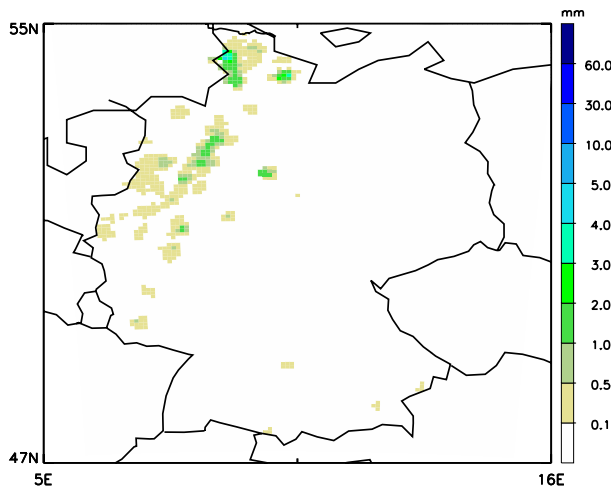
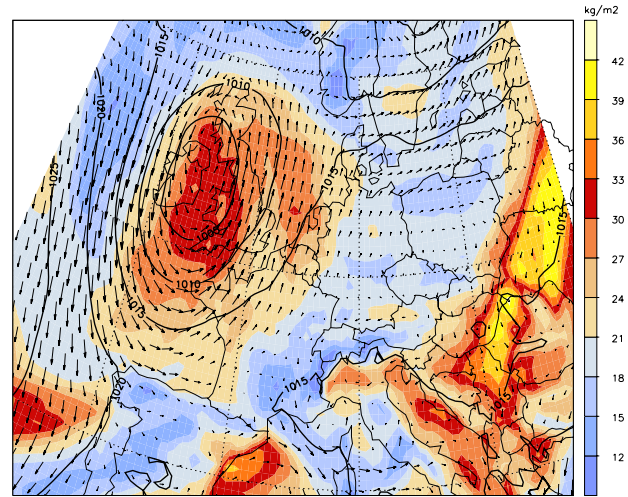
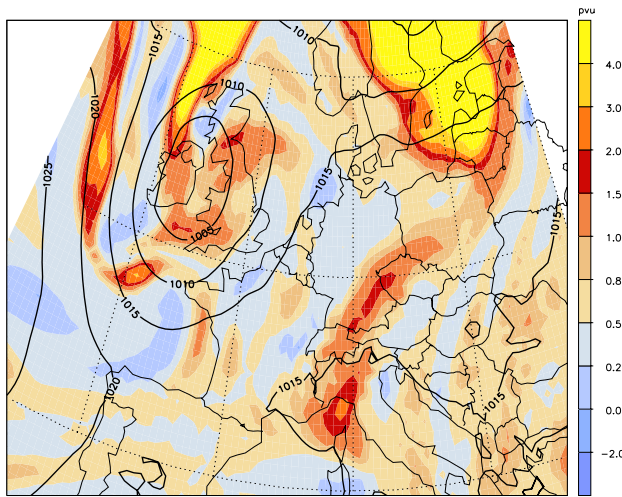
Meteorologische Situation und Qualität der Niederschlagsvorhersage für COPS-DE am 15. August 2007.



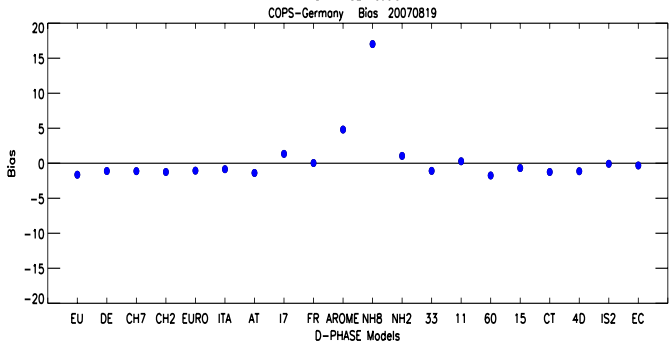
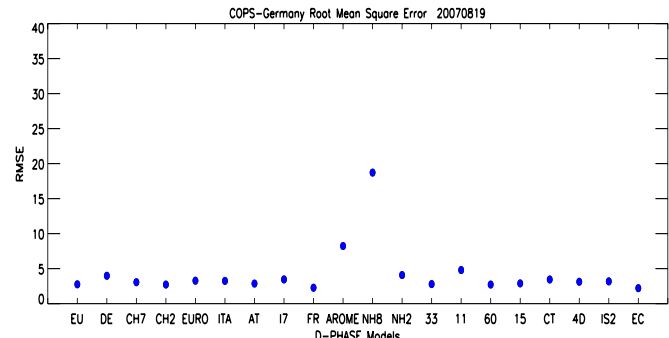
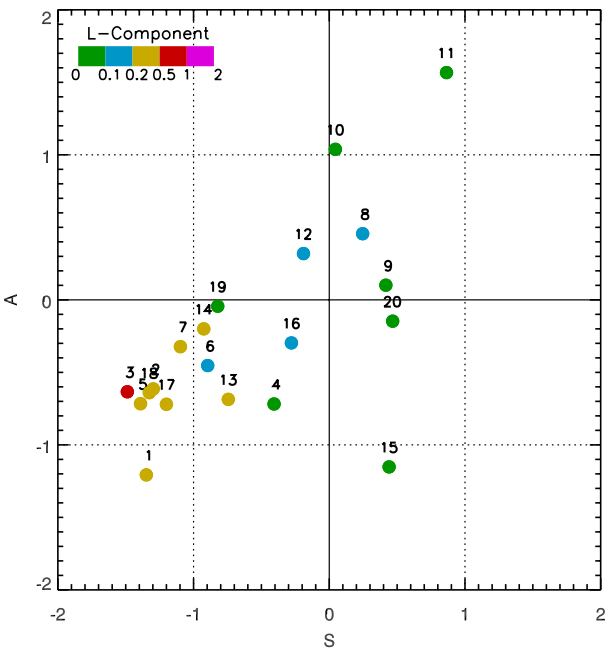
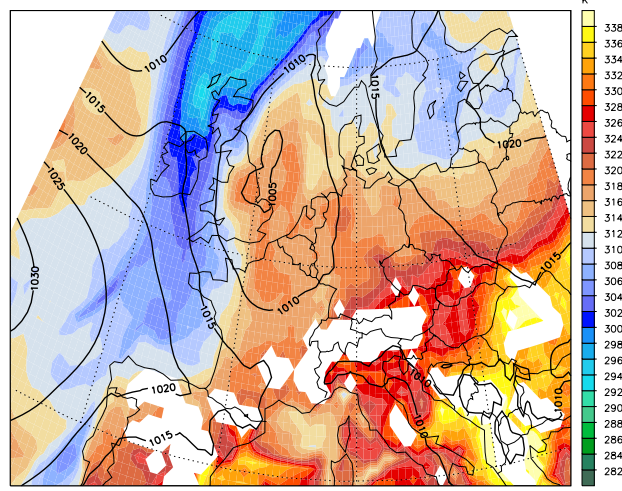
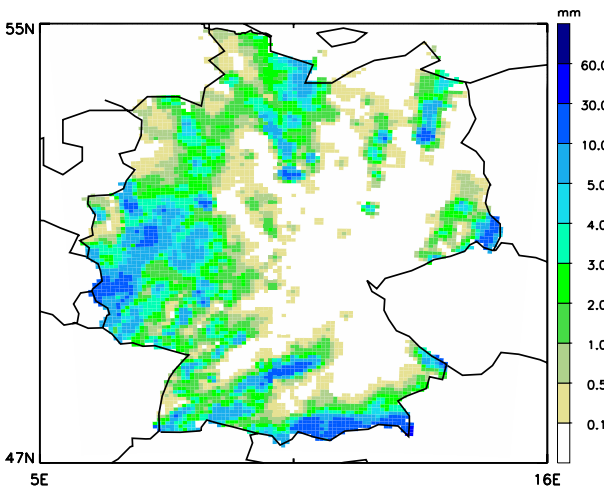
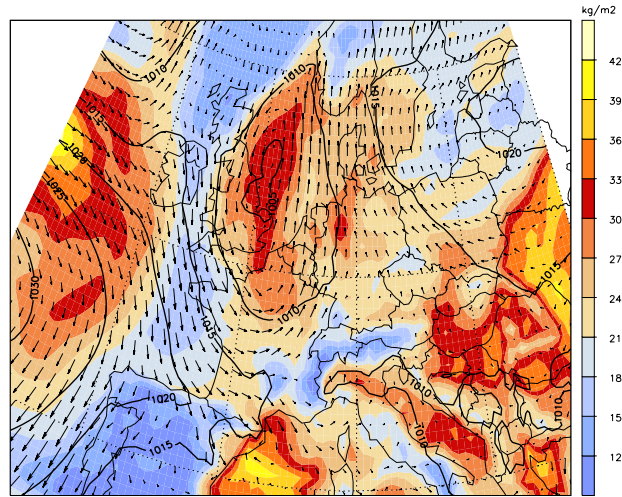
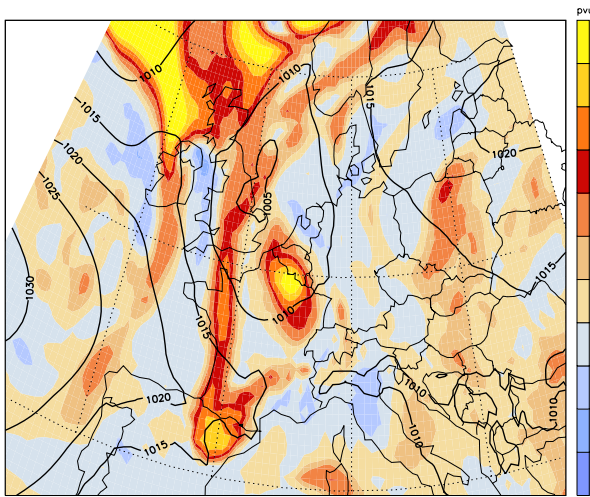
Meteorologische Situation und Qualität der Niederschlagsvorhersage für COPS-DE am 16. August 2007.



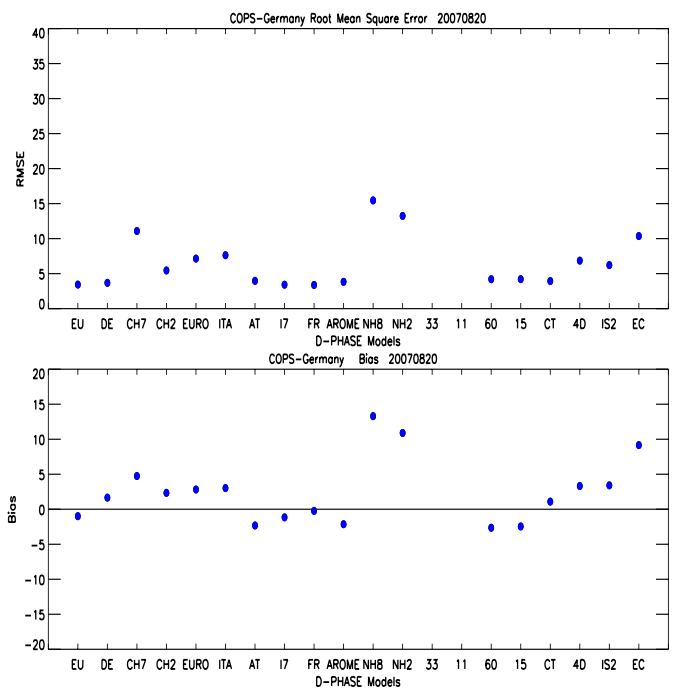
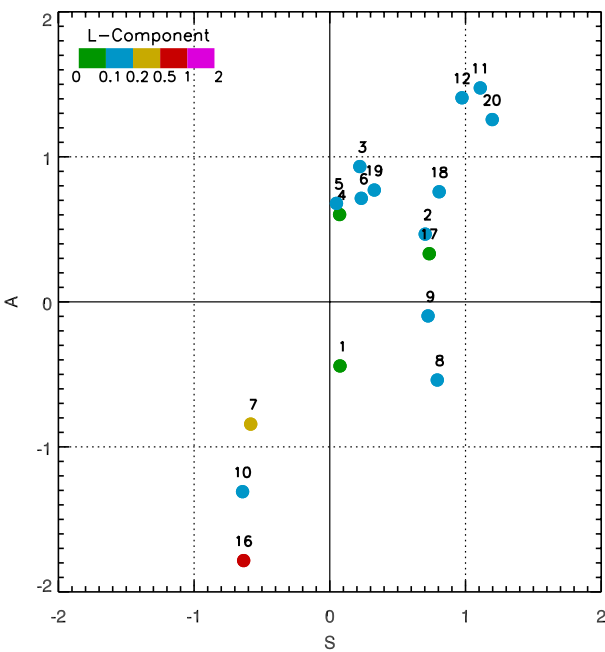
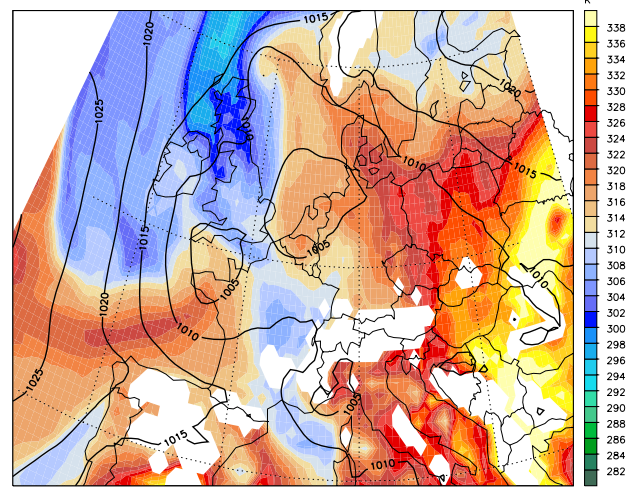
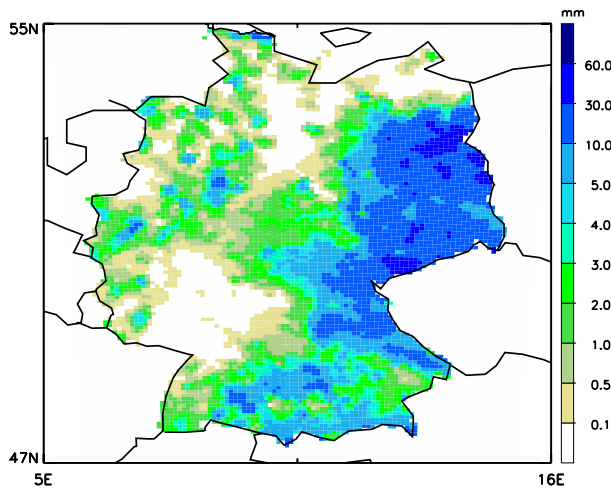
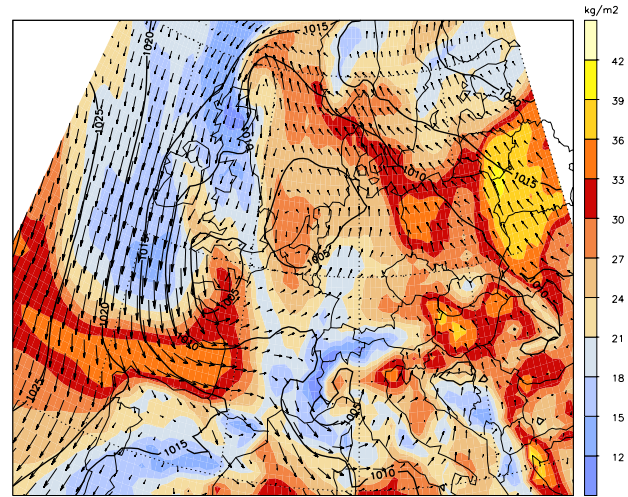
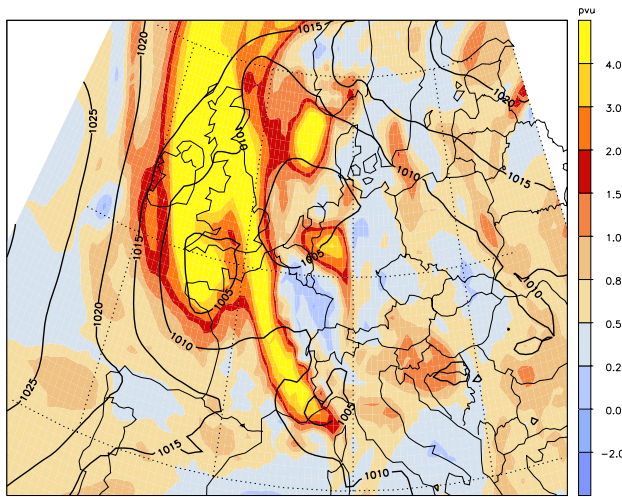
Meteorologische Situation und Qualität der Niederschlagsvorhersage für COPS-DE am 17. August 2007.



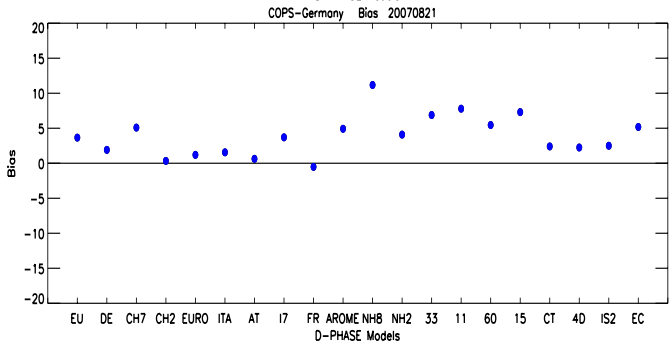
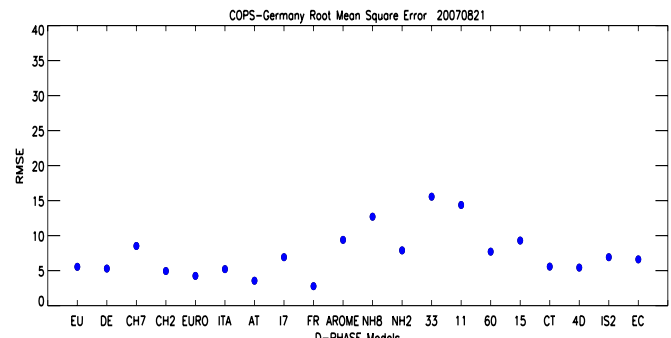
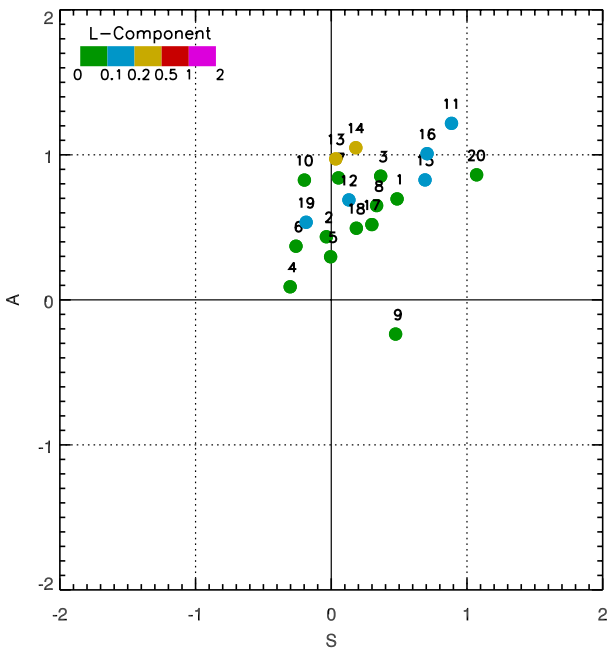
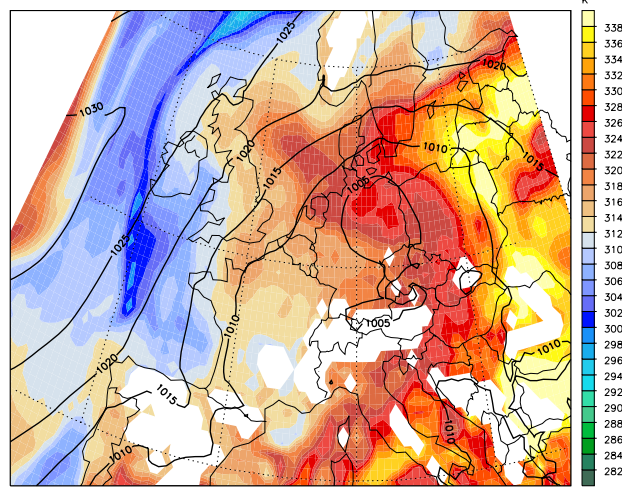
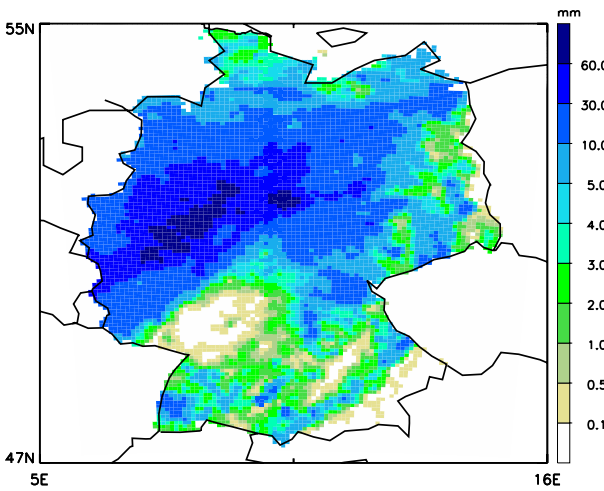
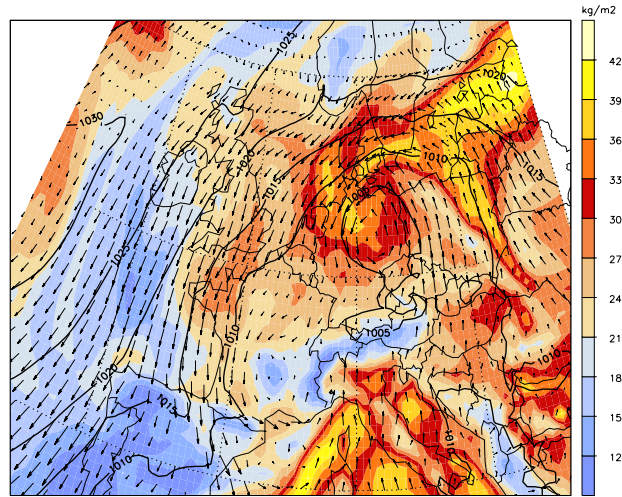
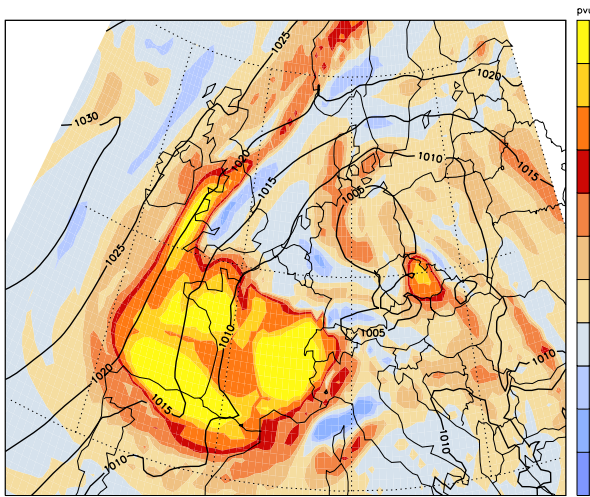
Meteorologische Situation und Qualität der Niederschlagsvorhersage für COPS-DE am 18. August 2007.



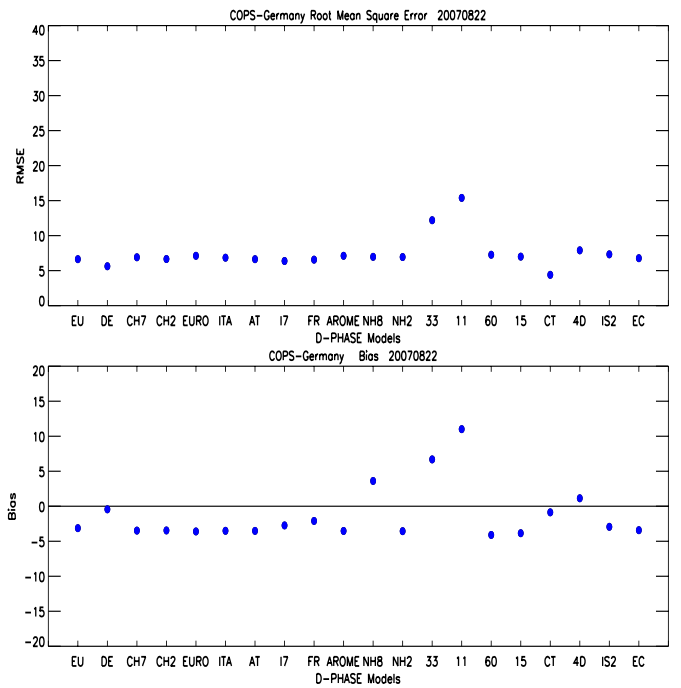
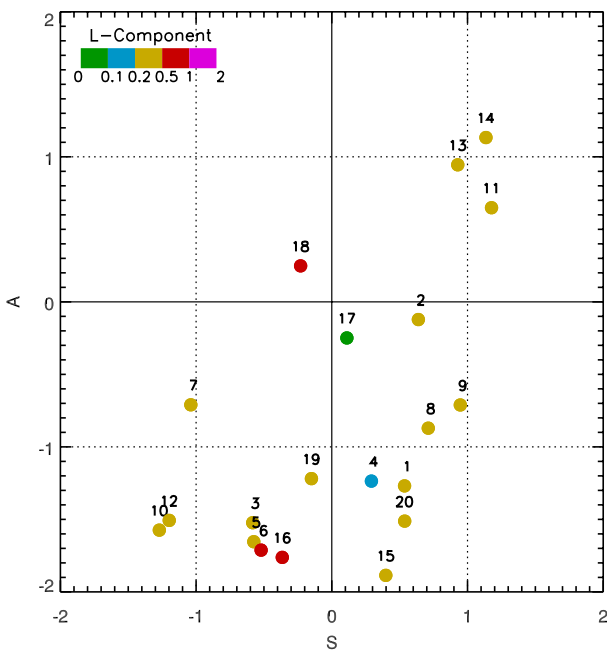
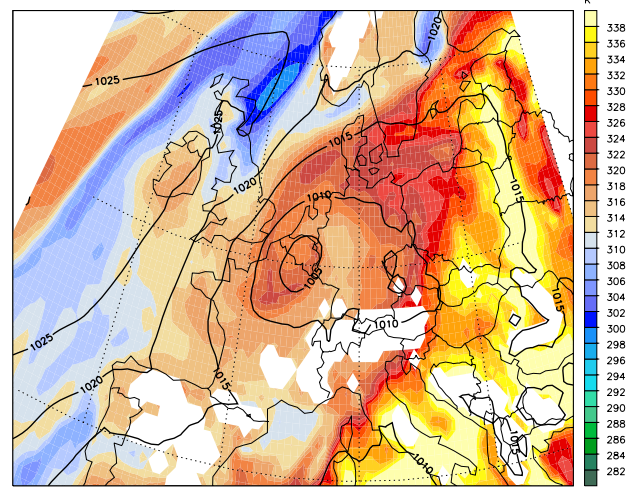
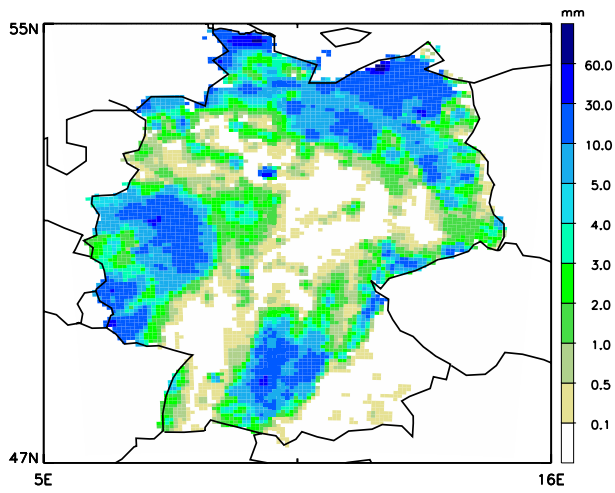
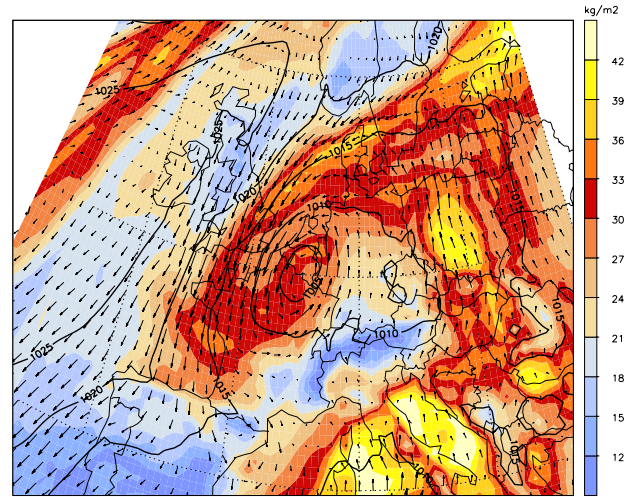
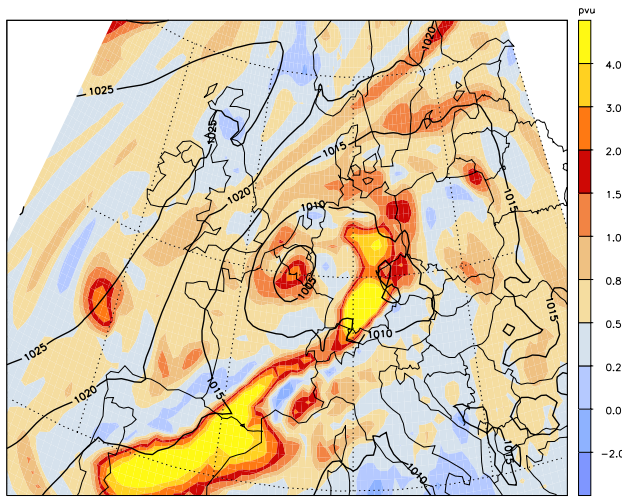
Meteorologische Situation und Qualität der Niederschlagsvorhersage für COPS-DE am 19. August 2007.



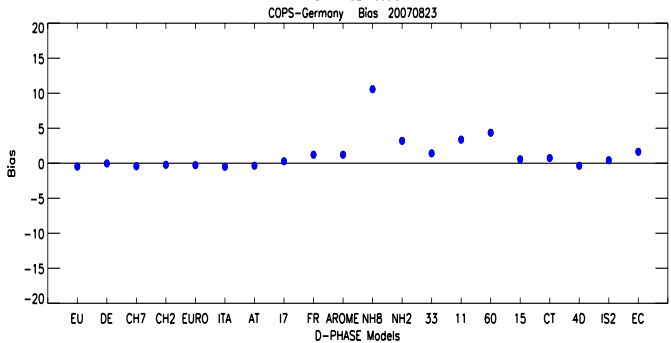
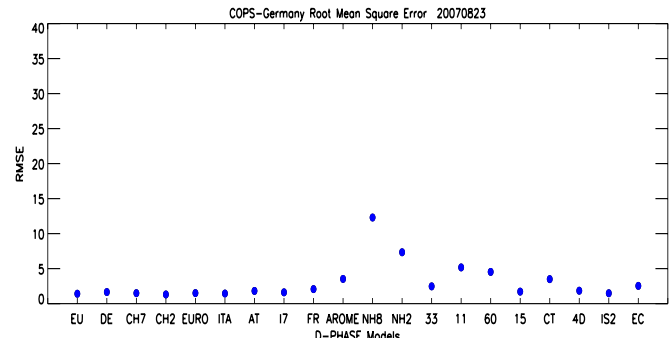
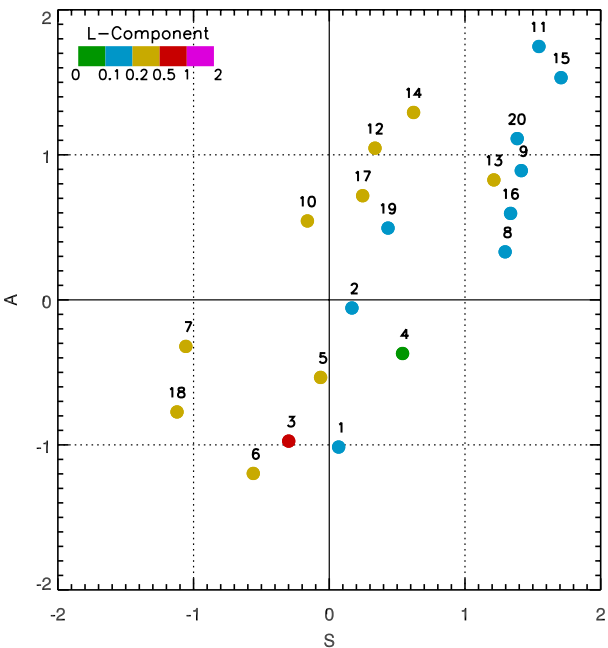
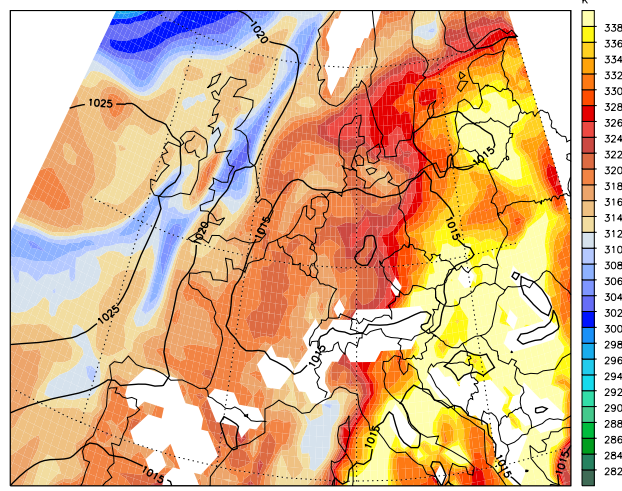
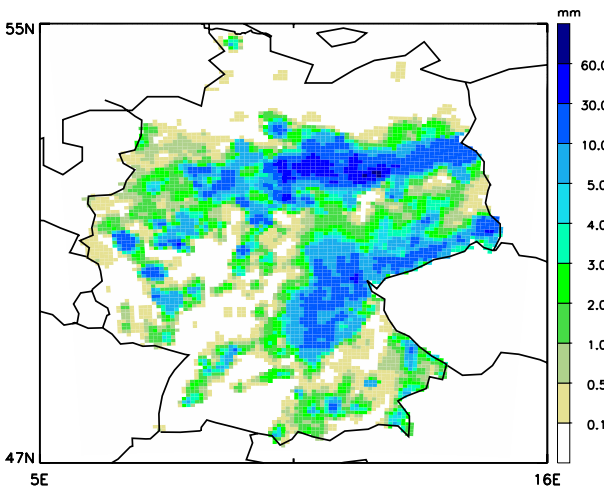
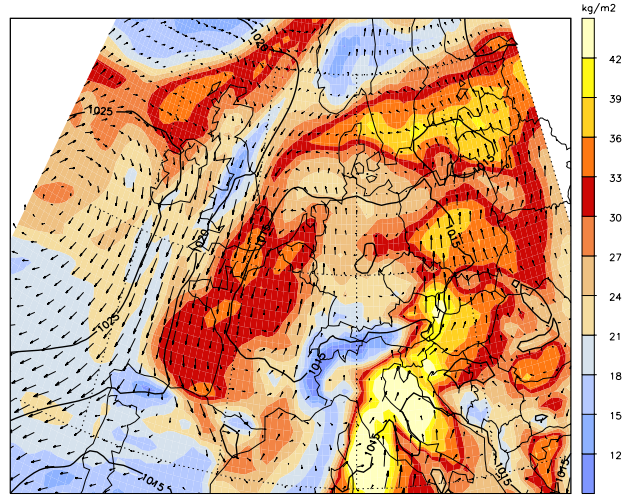
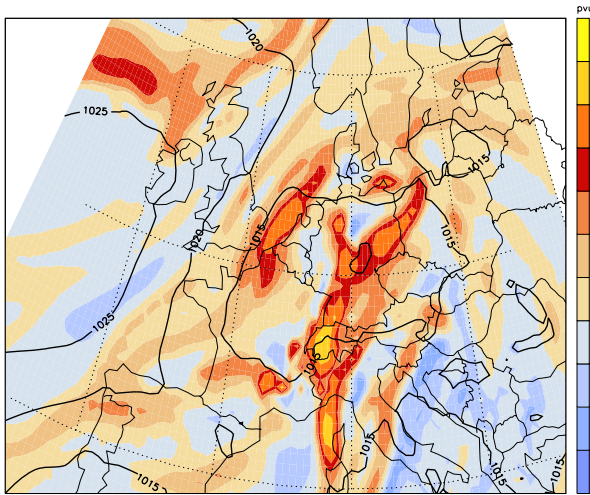
Meteorologische Situation und Qualität der Niederschlagsvorhersage für COPS-DE am 20. August 2007.



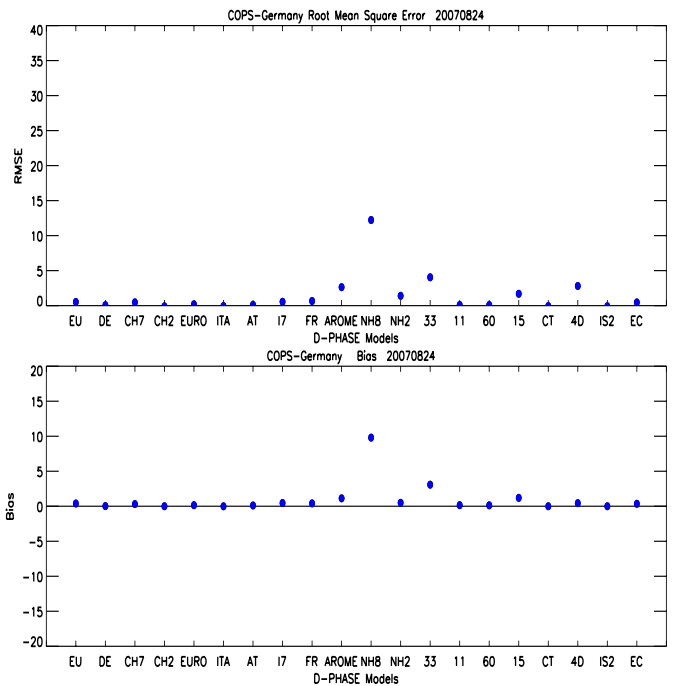
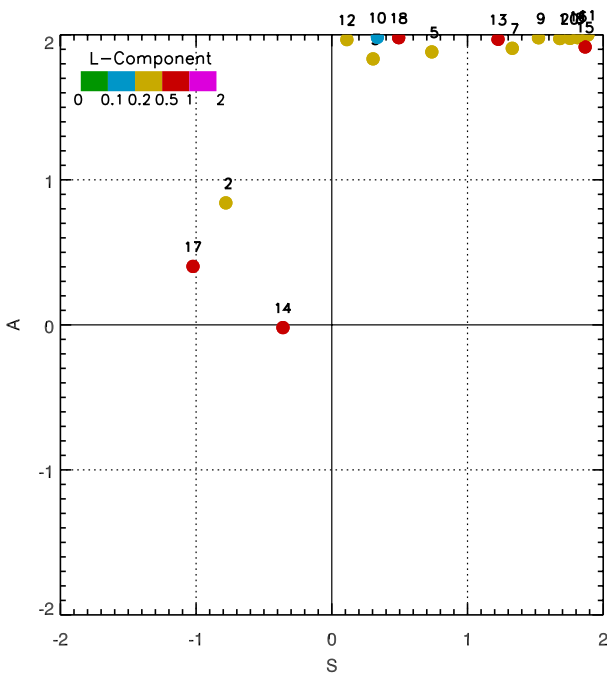
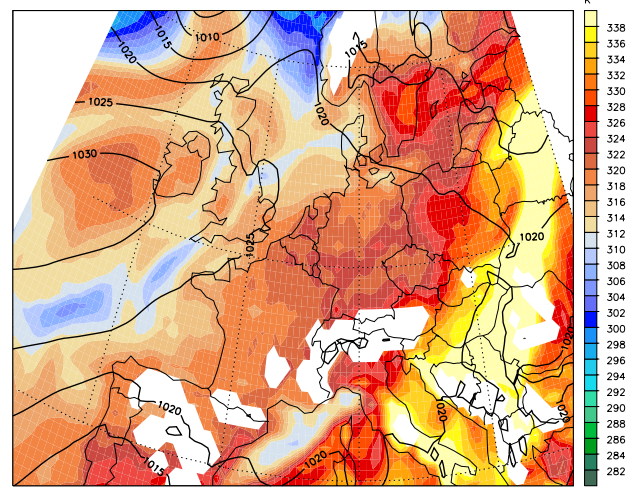
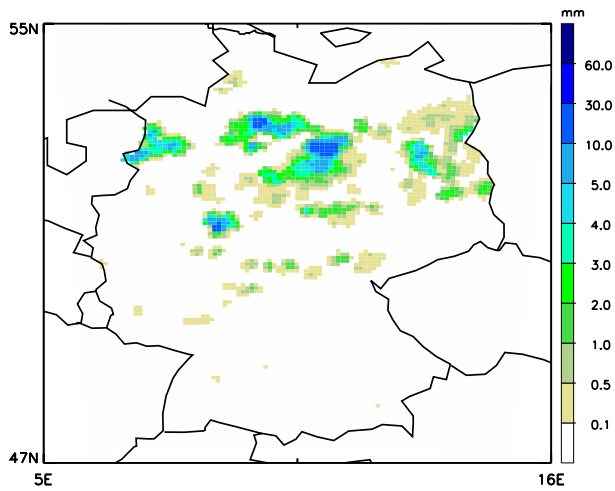
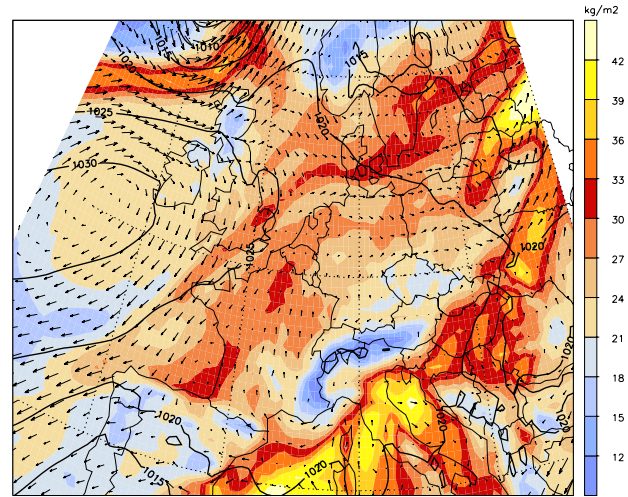
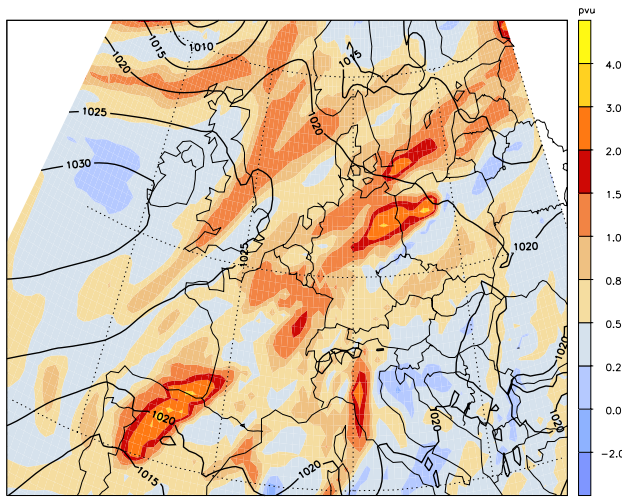
Meteorologische Situation und Qualität der Niederschlagsvorhersage für COPS-DE am 21. August 2007.



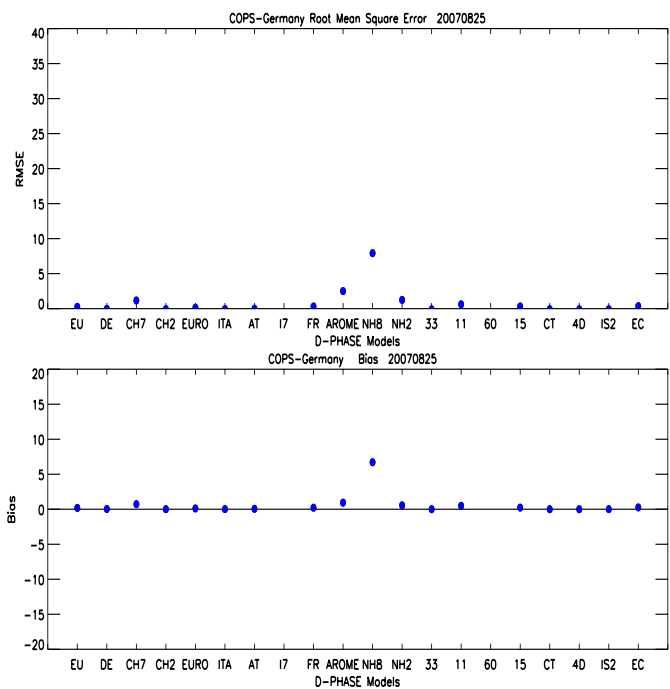
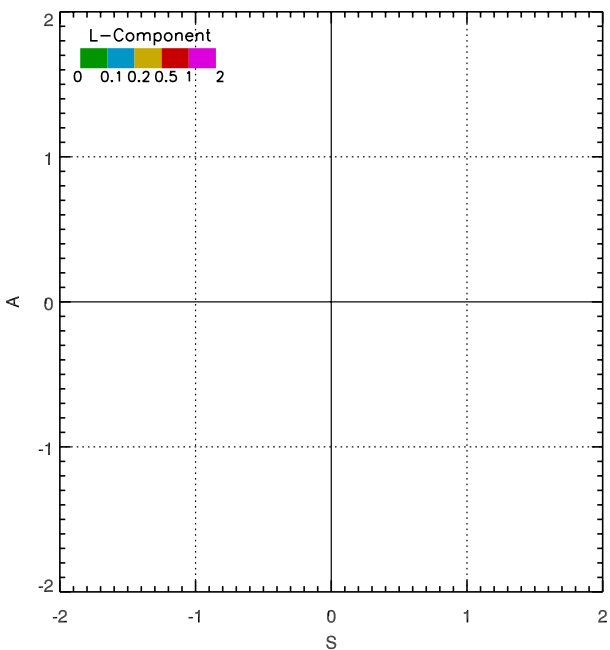
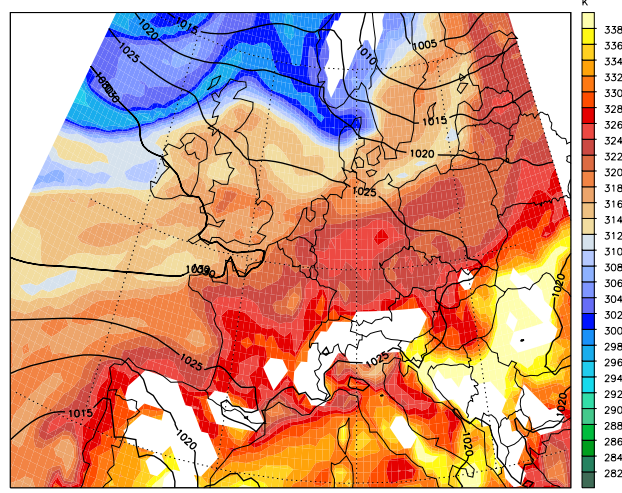
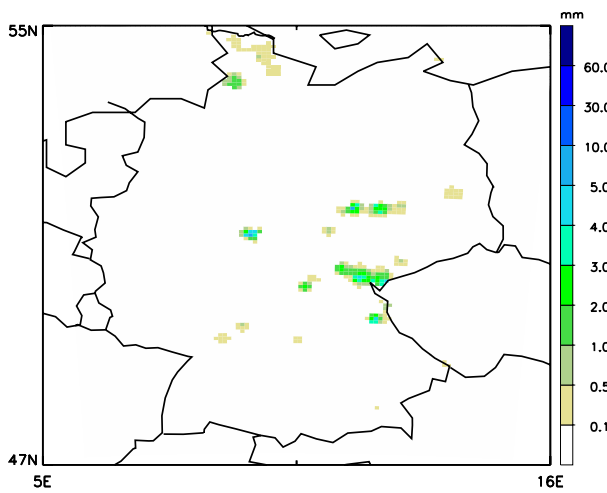
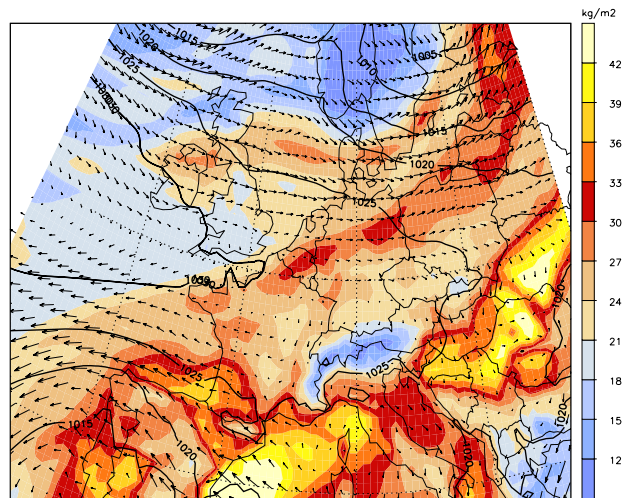
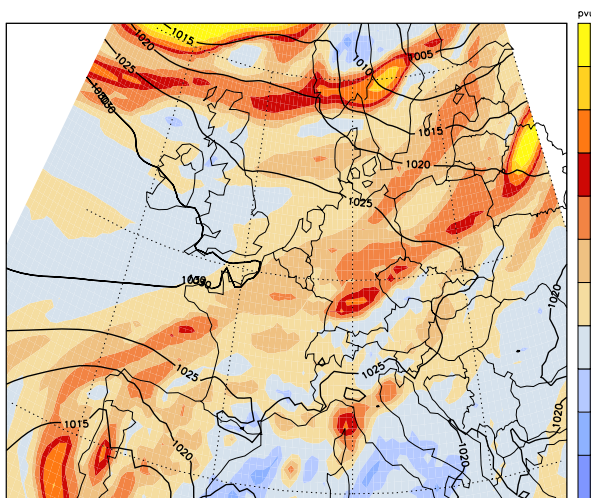
Meteorologische Situation und Qualität der Niederschlagsvorhersage für COPS-DE am 22. August 2007.



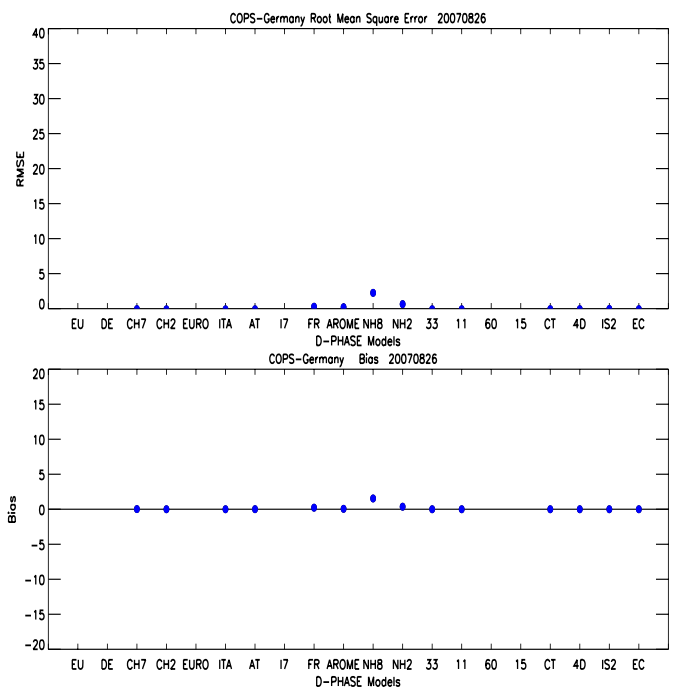
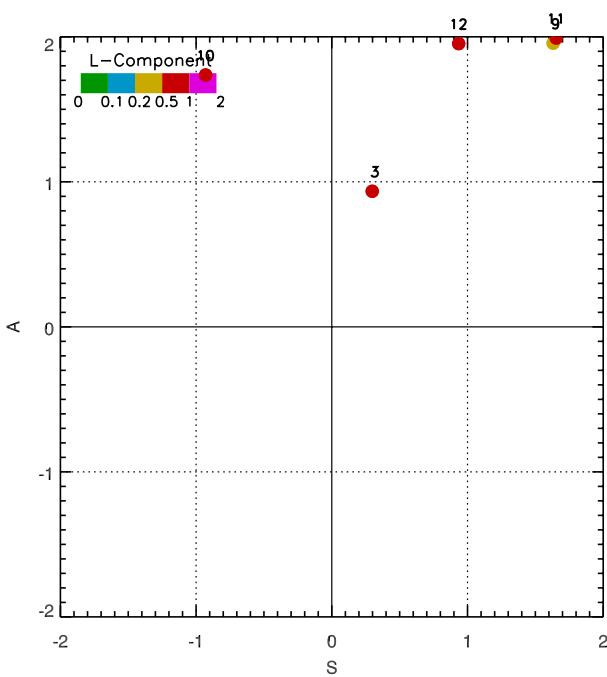
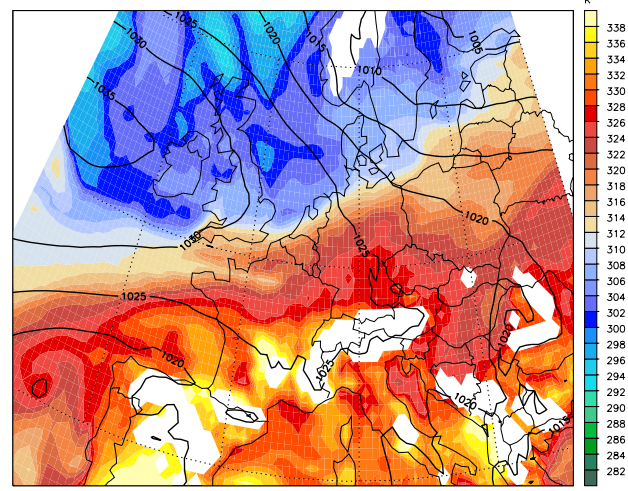
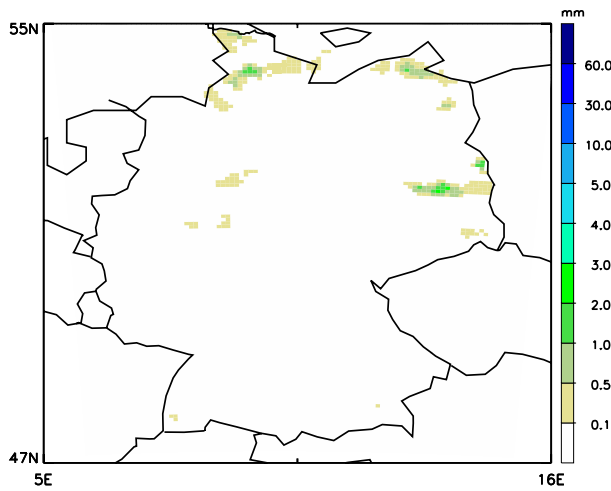
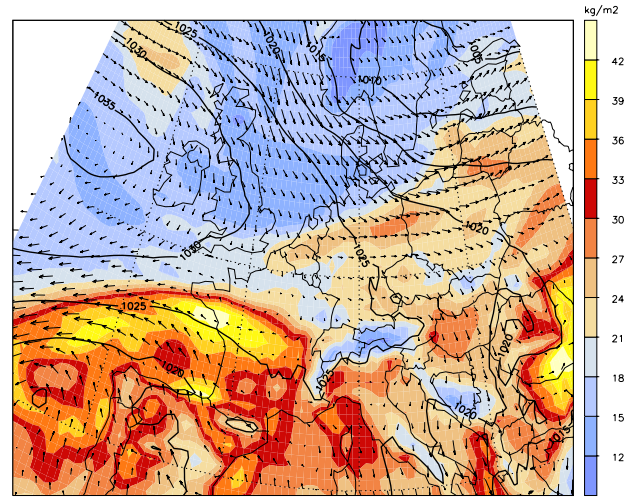
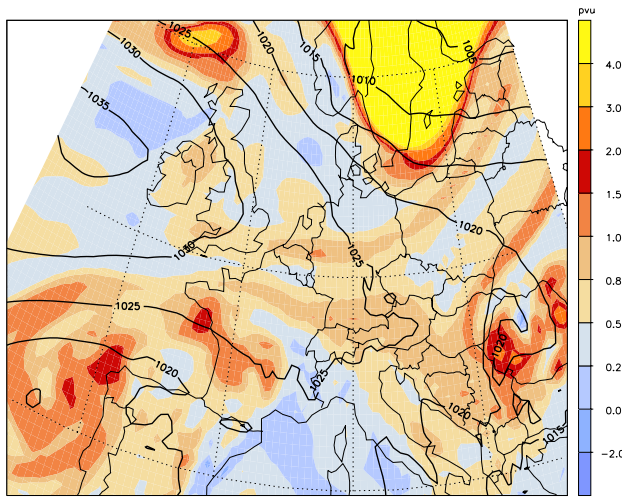
Meteorologische Situation und Qualität der Niederschlagsvorhersage für COPS-DE am 23. August 2007.



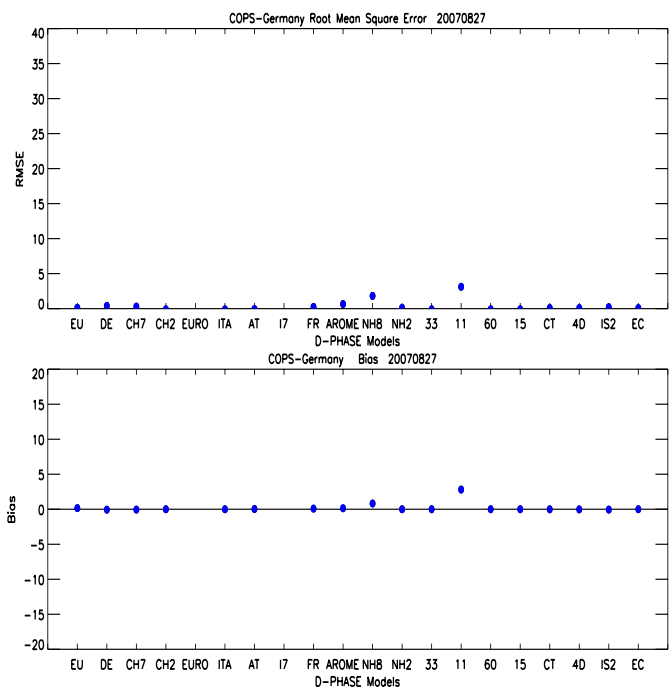
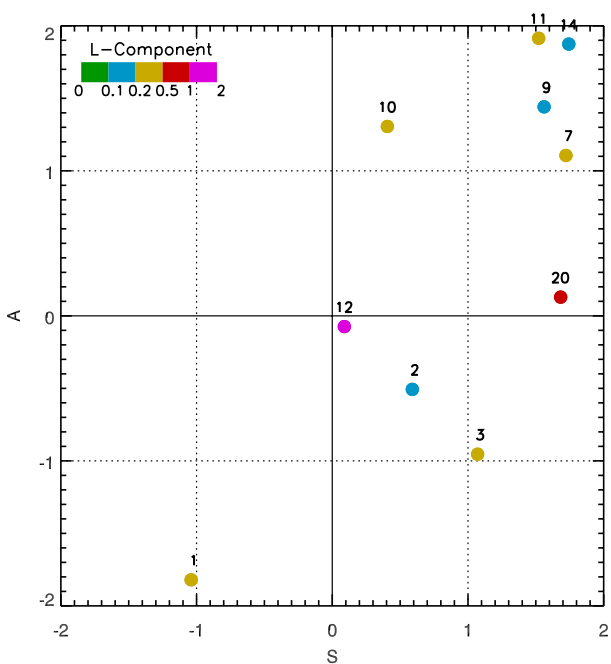
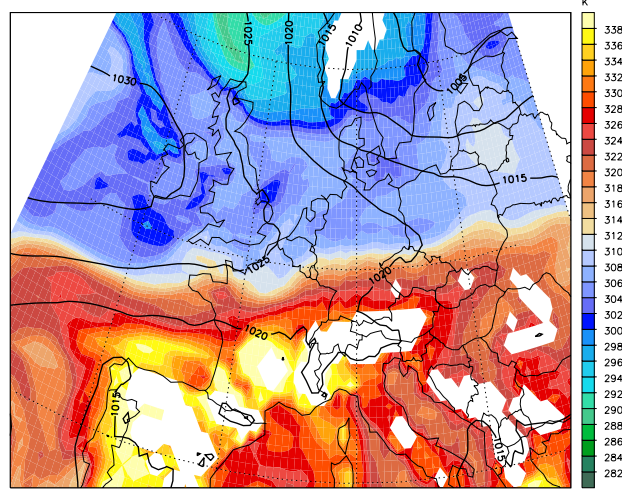
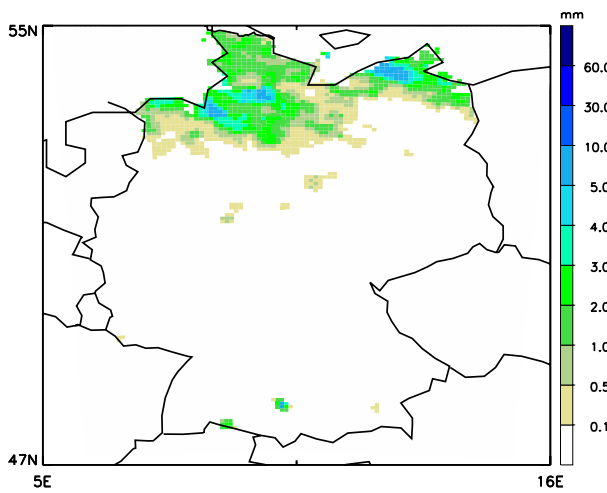
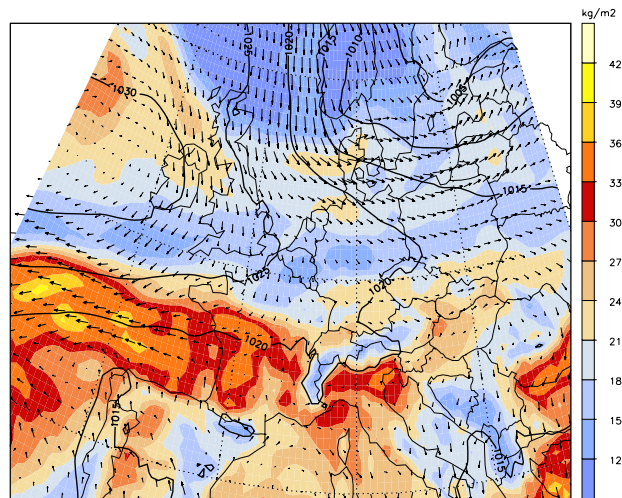
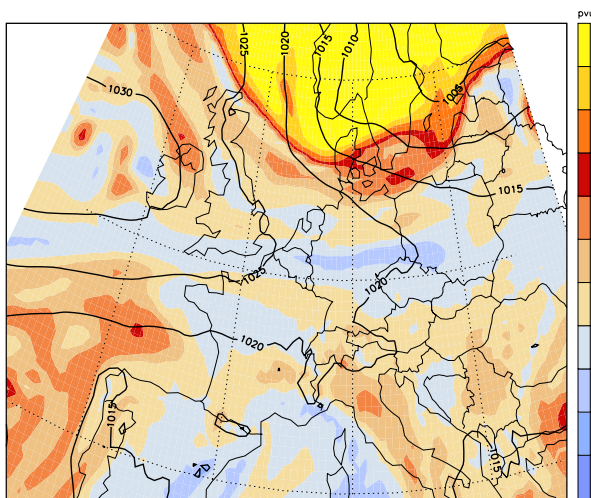
Meteorologische Situation und Qualität der Niederschlagsvorhersage für COPS-DE am 24. August 2007.



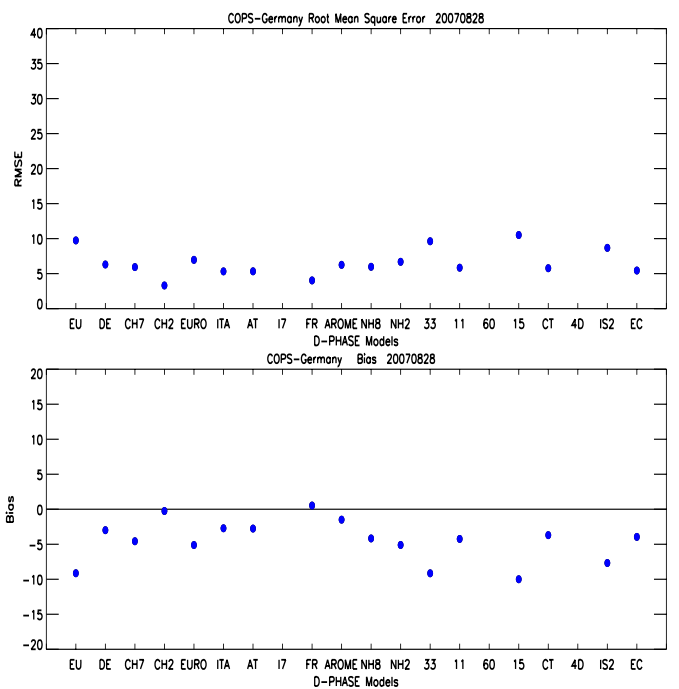
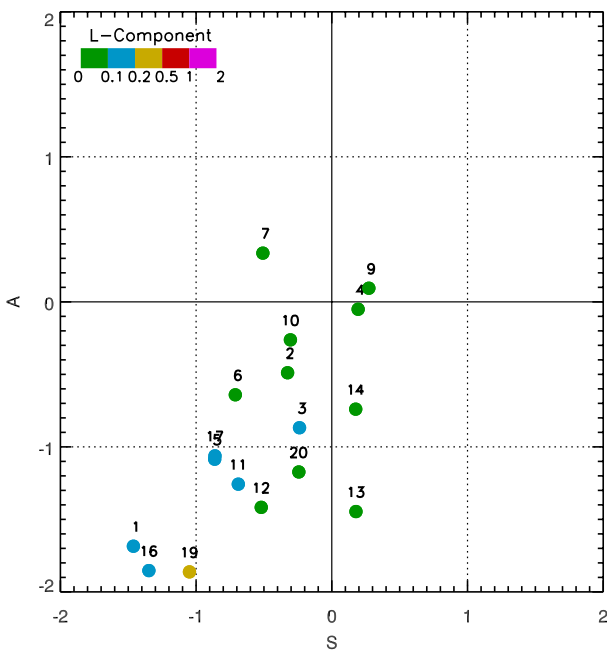
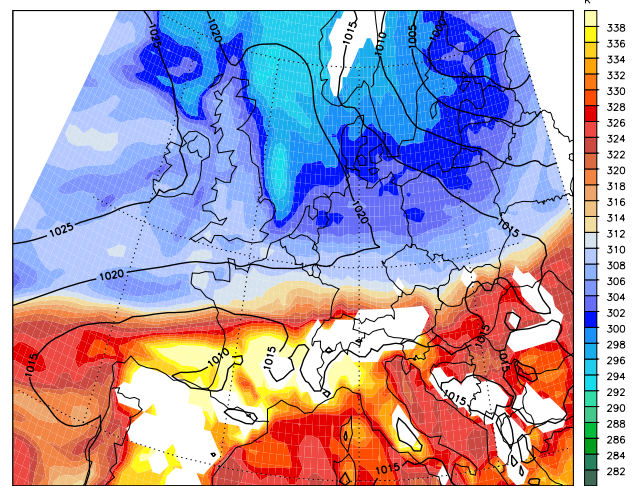
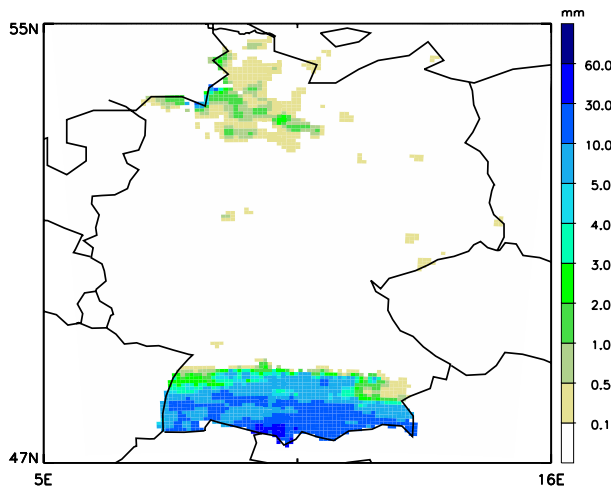
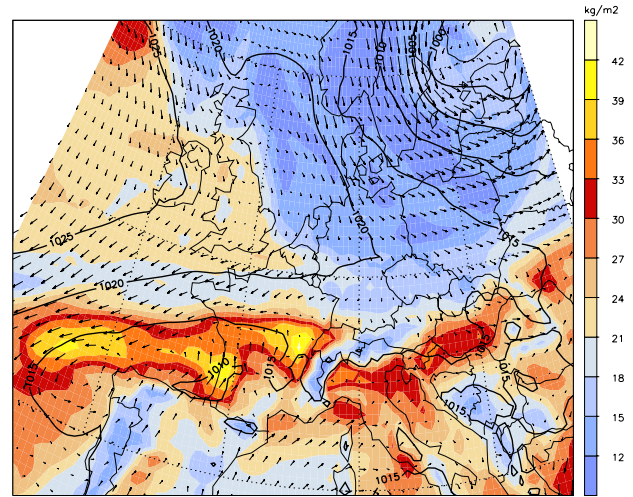
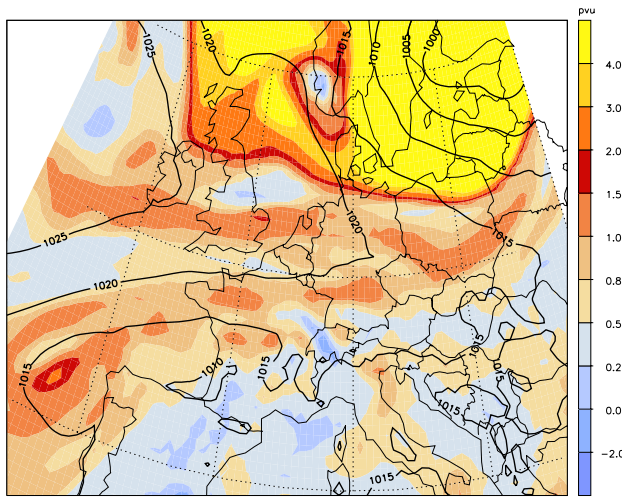
Meteorologische Situation und Qualität der Niederschlagsvorhersage für COPS-DE am 25. August 2007.



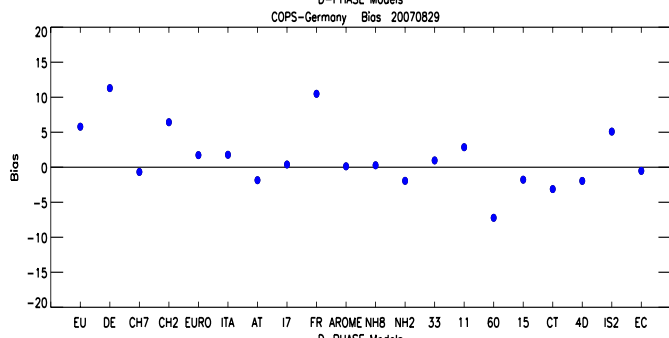
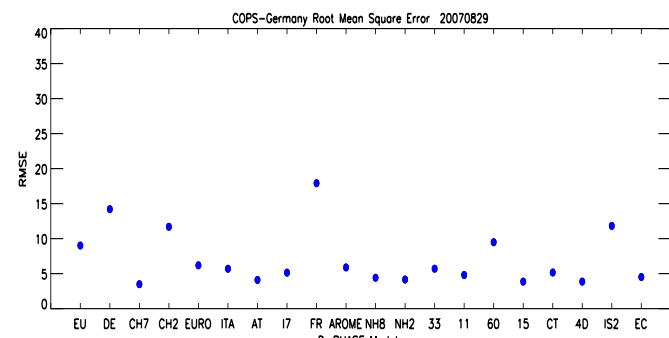
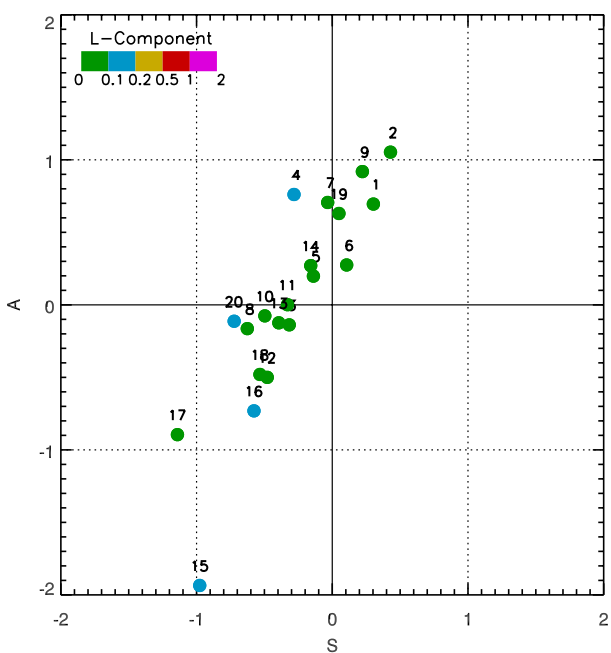
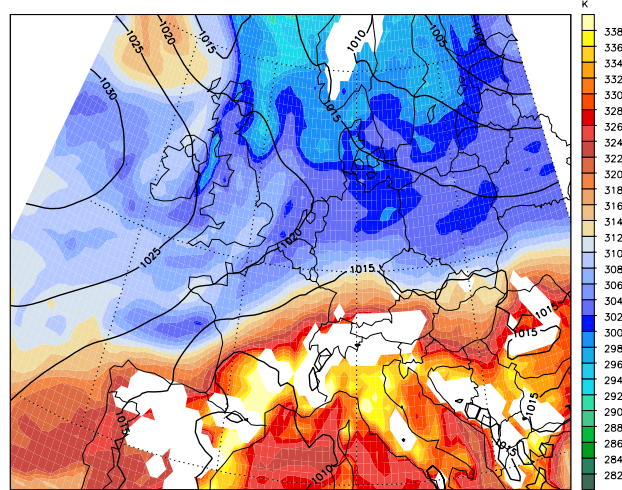
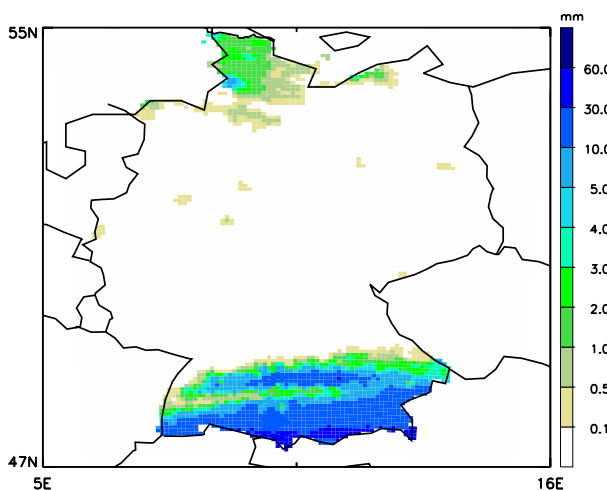
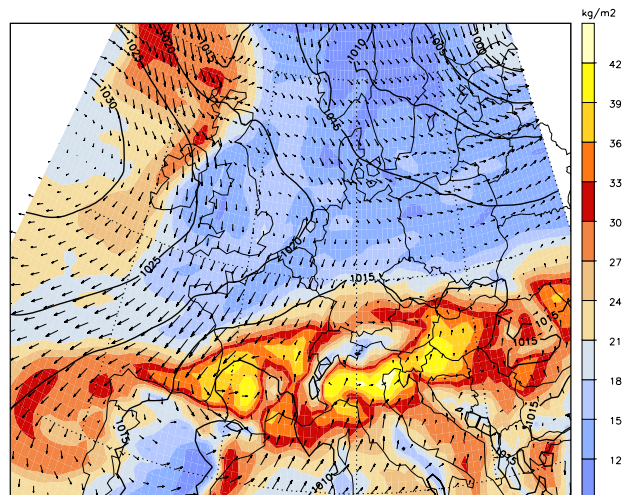
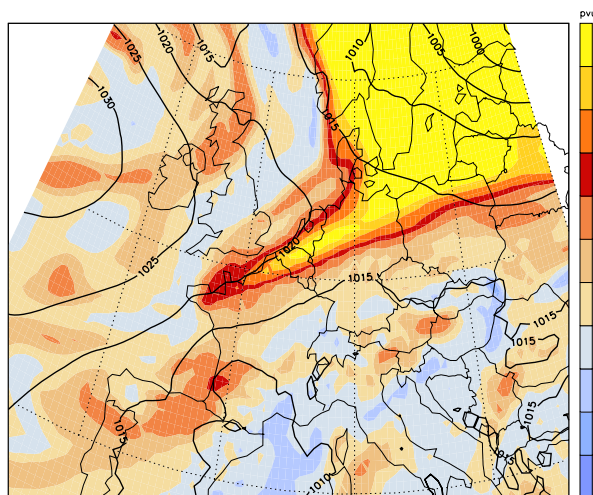
Meteorologische Situation und Qualität der Niederschlagsvorhersage für COPS-DE am 26. August 2007.



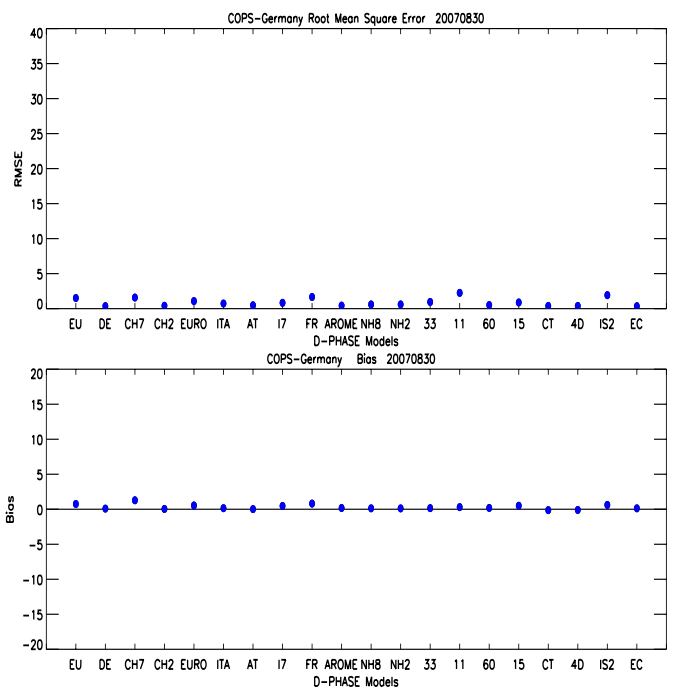
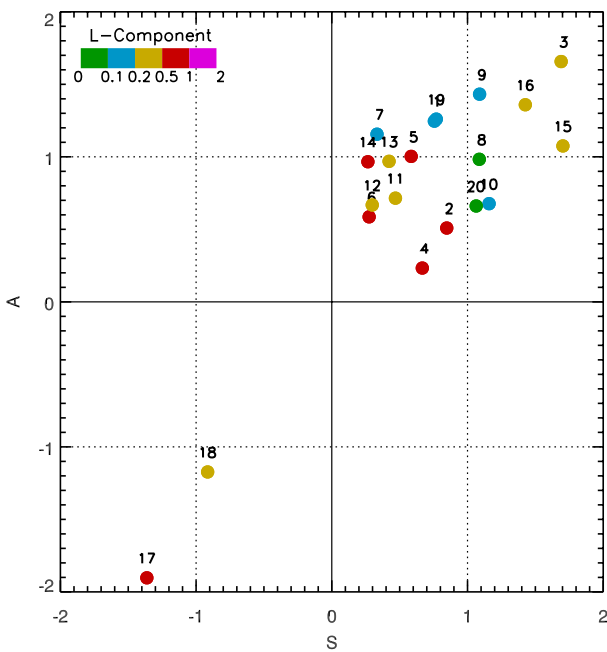
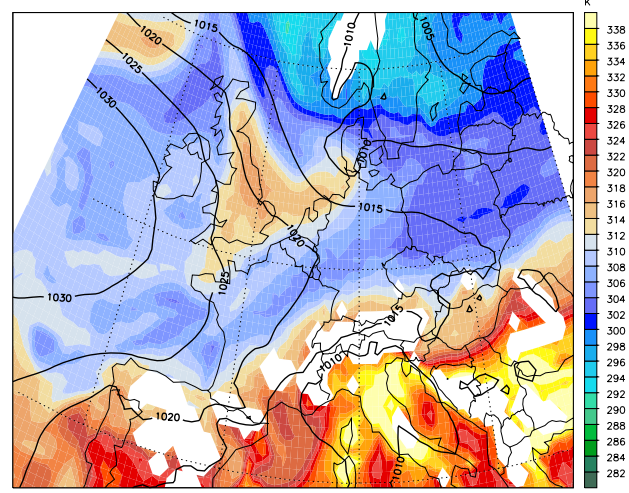
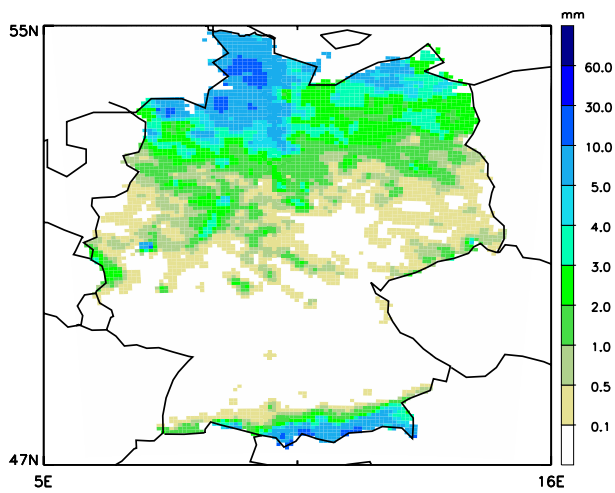
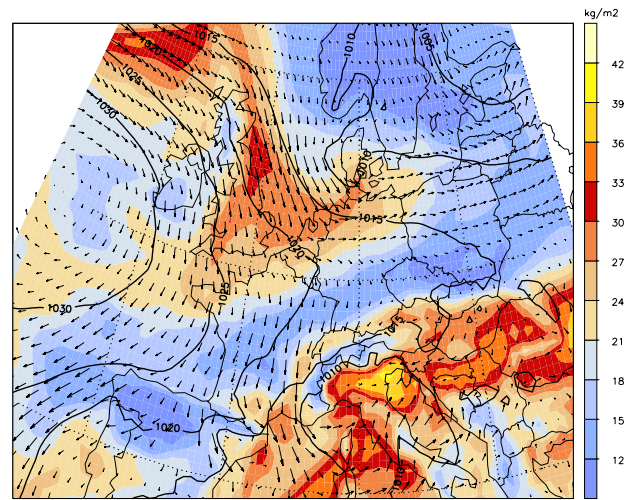
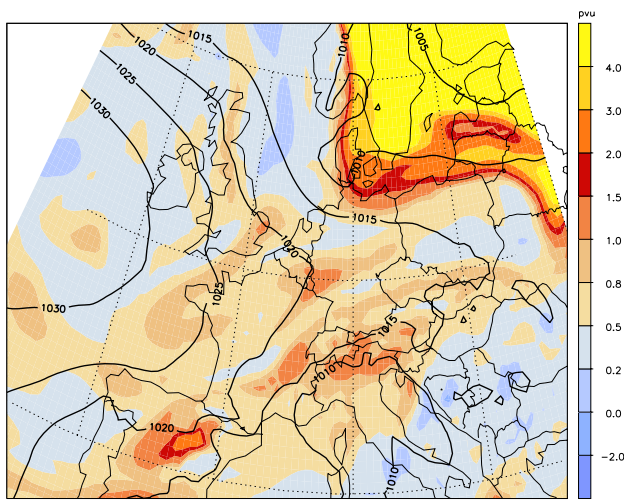
Meteorologische Situation und Qualität der Niederschlagsvorhersage für COPS-DE am 27. August 2007.



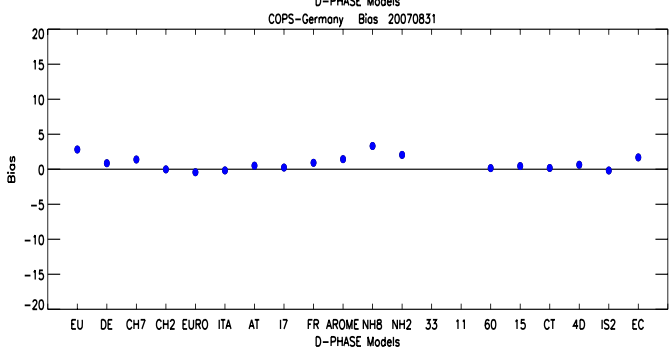
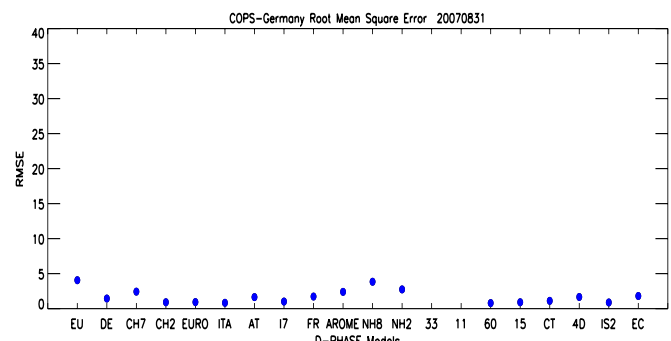
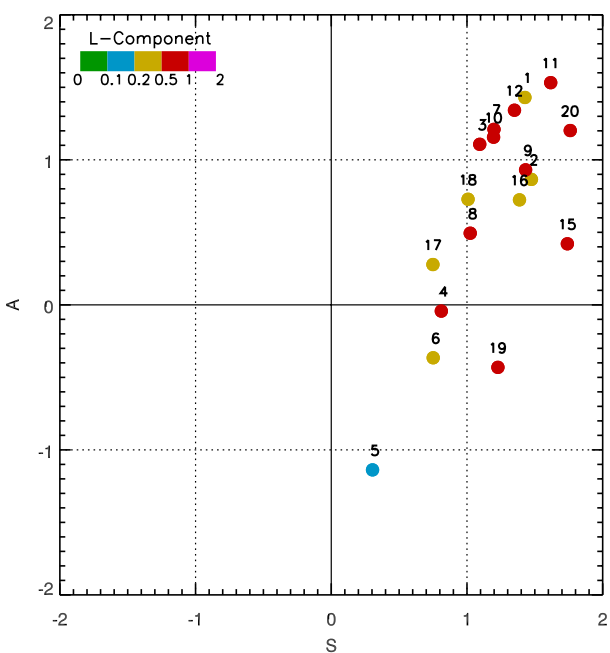
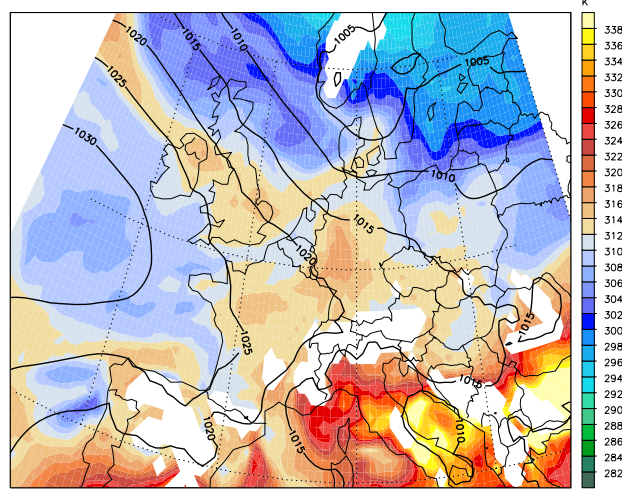
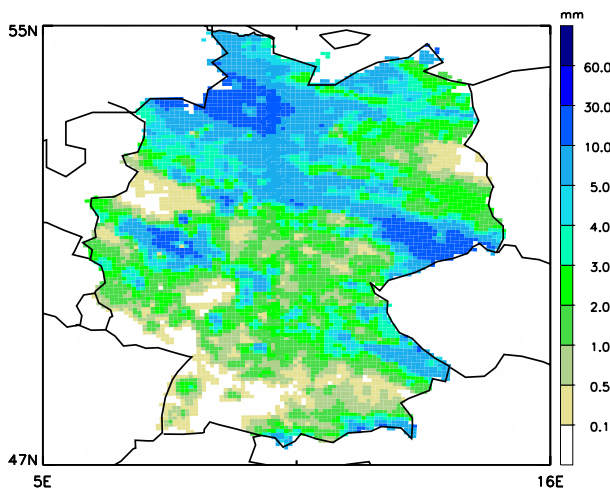
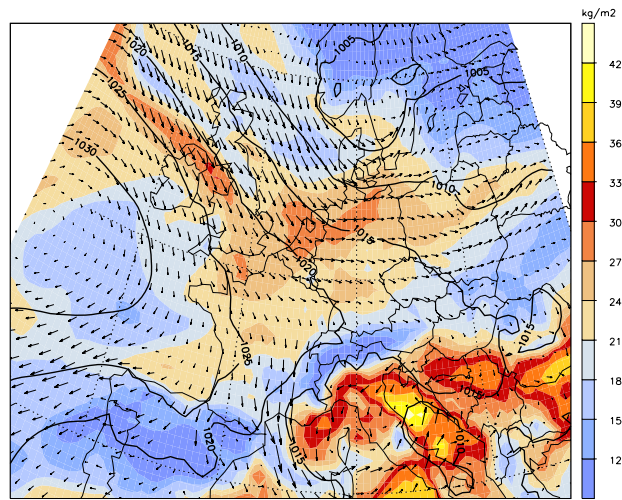
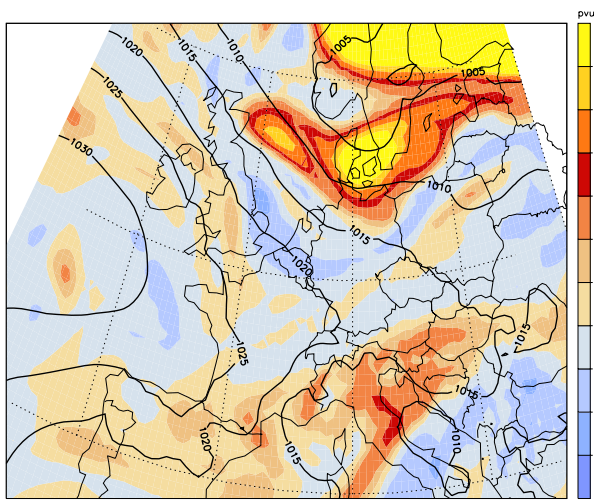
Meteorologische Situation und Qualität der Niederschlagsvorhersage für COPS-DE am 28. August 2007.



Meteorologische Situation und Qualität der Niederschlagsvorhersage für COPS-DE am 29. August 2007.



Meteorologische Situation und Qualität der Niederschlagsvorhersage für COPS-DE am 30. August 2007.



Meteorologische Situation und Qualität der Niederschlagsvorhersage für COPS-DE am 31. August 2007.