Assimilation of the reflectivity (and ZDR column) with the OSSE system

Kobra Khosravian

24-26 July 2024

SPP 2115 PROM all-hands meeting

Leipzig

What is Observational System Simulation Experiments (OSSE) ?

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Nature run
(free forecast without assimilation)

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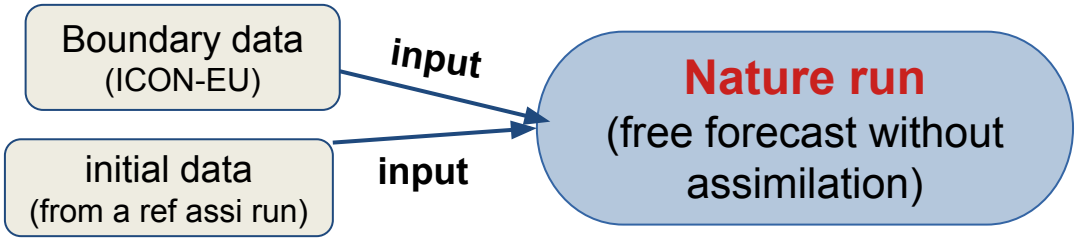

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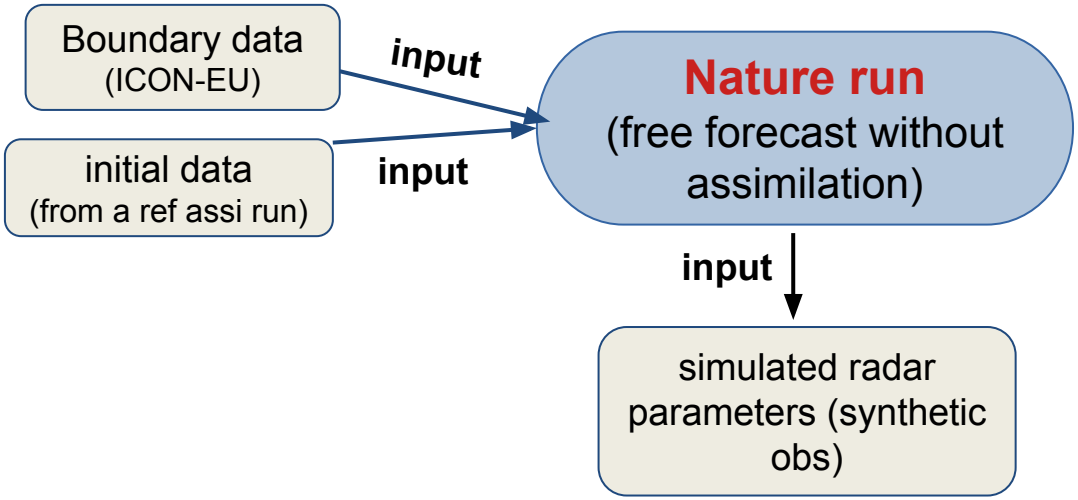

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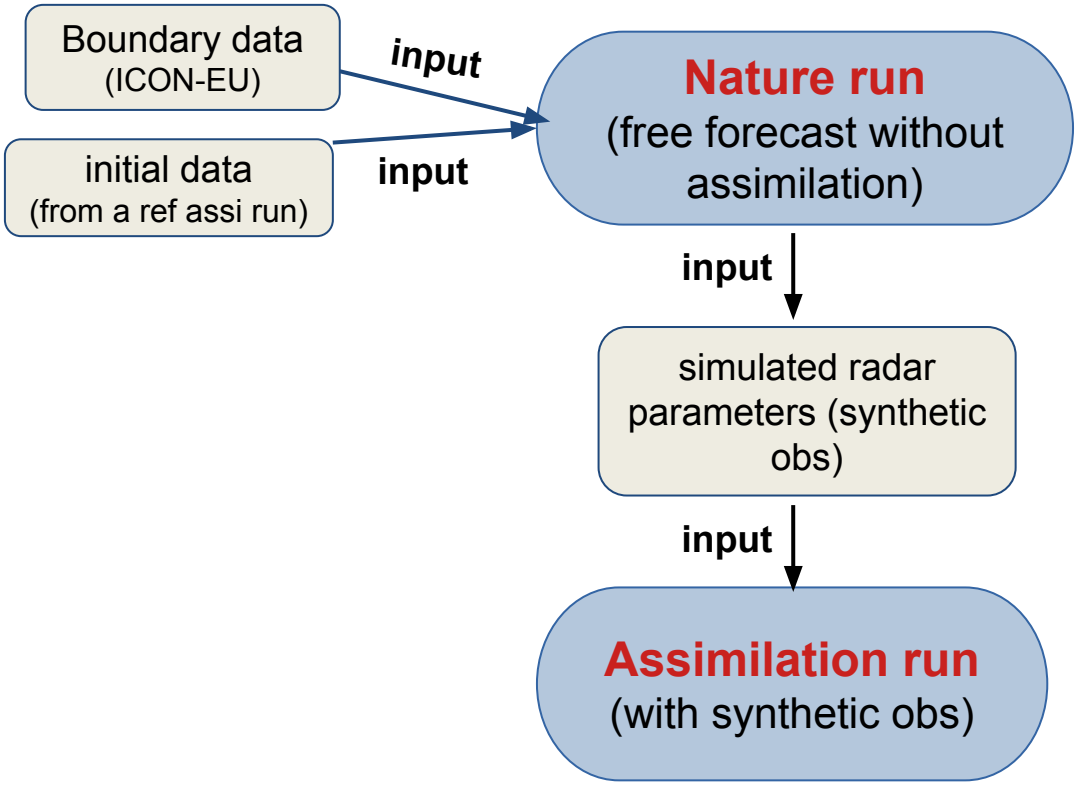

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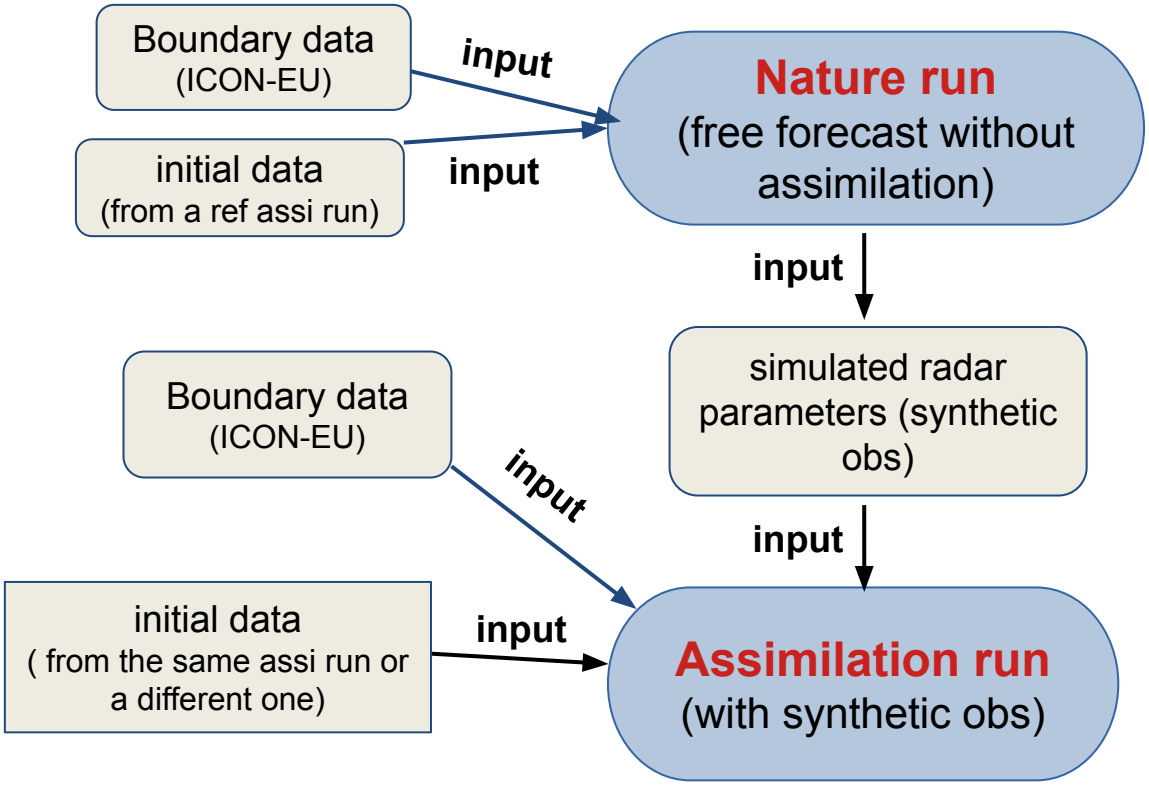

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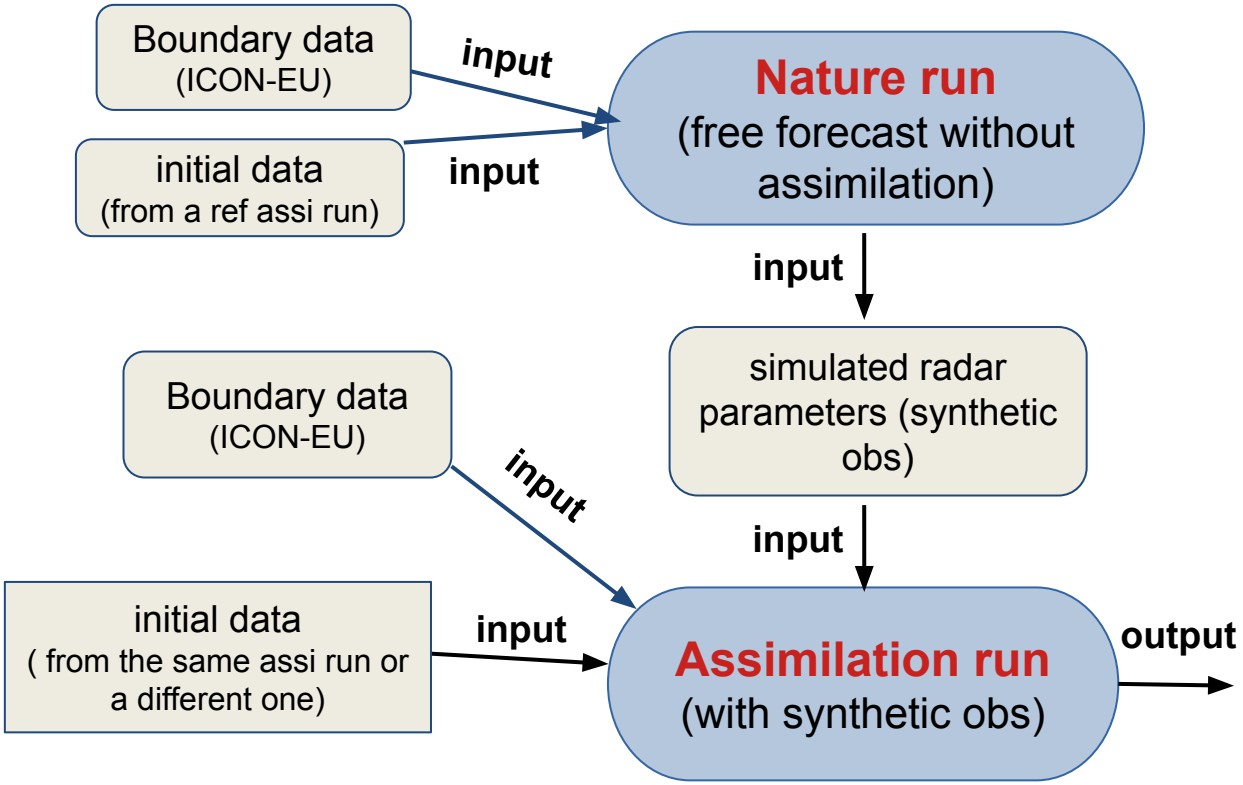

Compare the assimilated data with synthetic observation to analyse the effect of assimilation of the radar data

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- Allows for high control over various settings and parameters within the data assimilation system.

20 May 2022

- The nature run:
  - Started from 07 UTC and had 6 pre-run before using the simulated reflectivity to make the synthetic observation.
  - The initial data came from a 2-mom experiment
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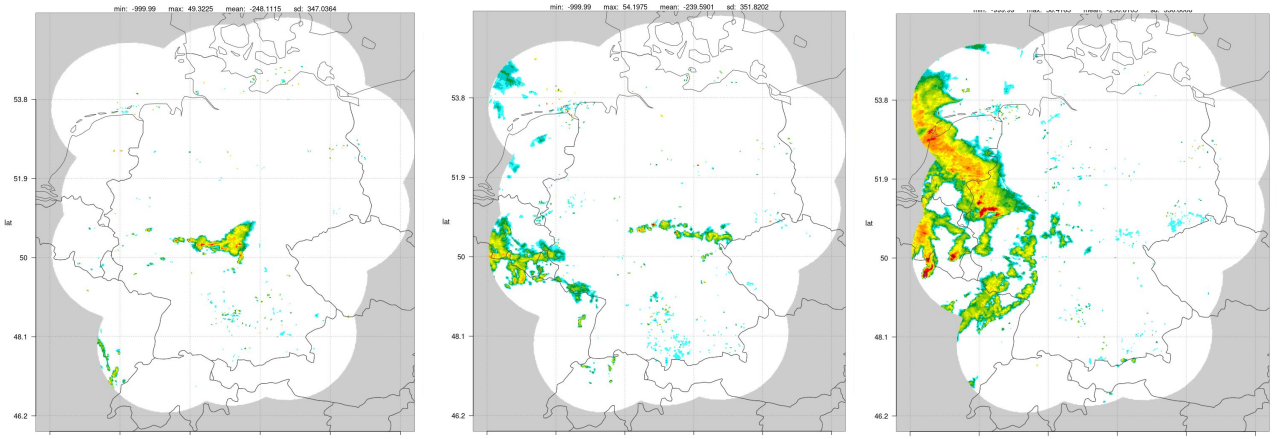
- Tornado in Paderborn,Germany
- see the Julian talk for the real case

Nature run
(model run without data assimilation)

Real Observation

07 UTC **10 UTC** **13 UTC**



Nature run
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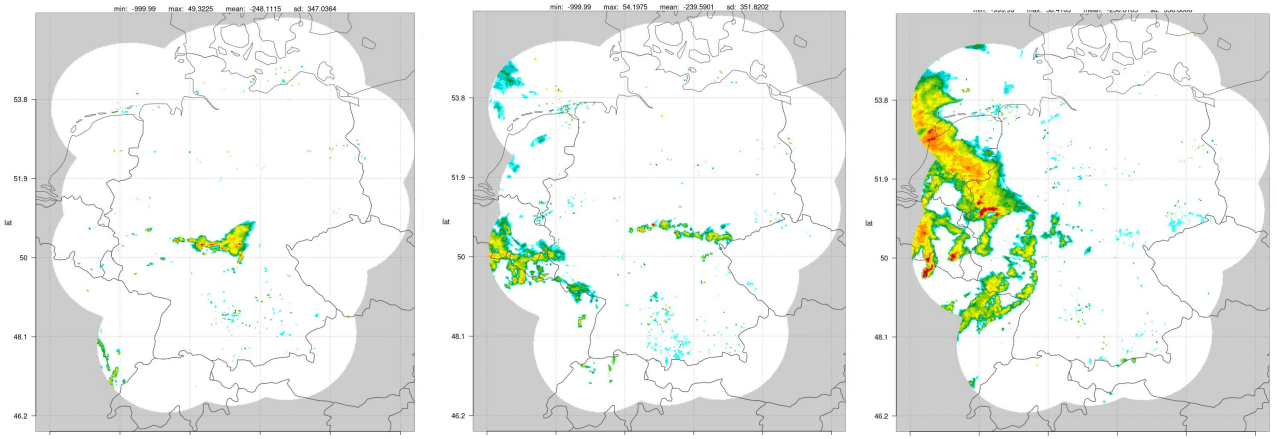
Deutscher Wetterdienst
Wetter und Klima aus einer Hand

DWD

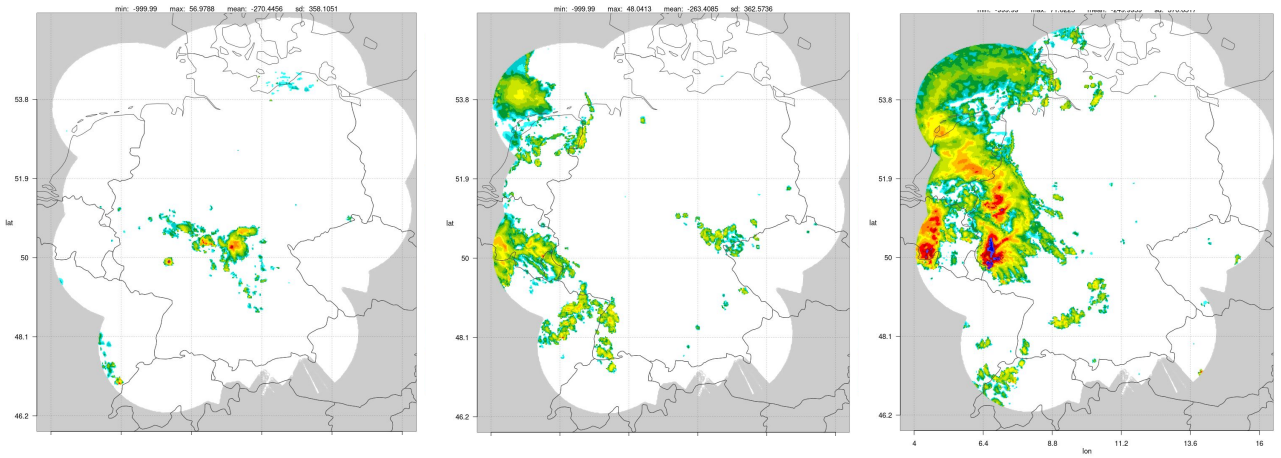
07 UTC **10 UTC** **13 UTC**

Real Observation



1st run **3h run** **6h run**

Simulated reflectivity



Example of preparing the initial data (Increase the ensemble spread)

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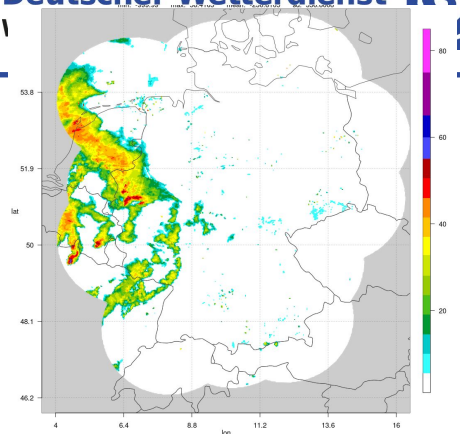

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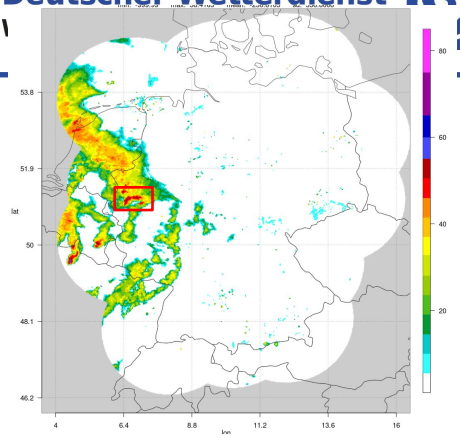

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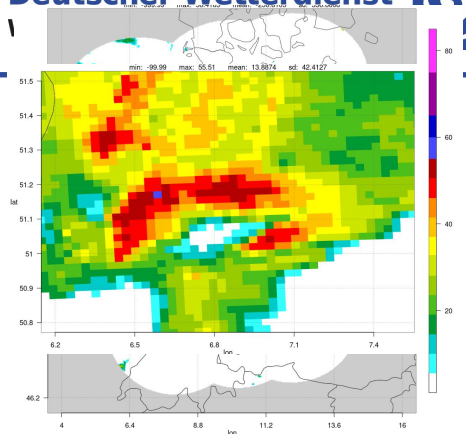

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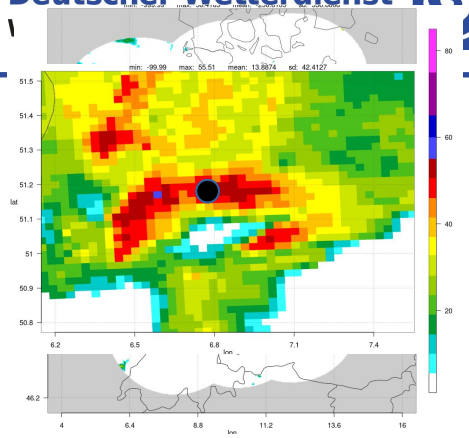

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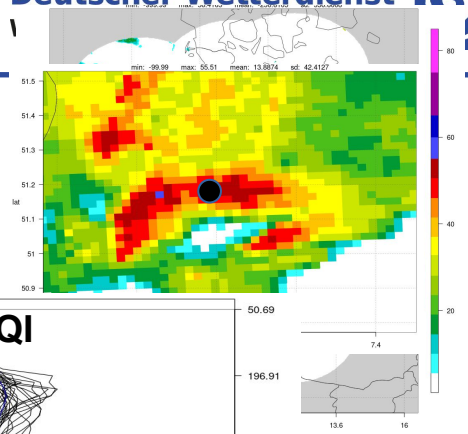
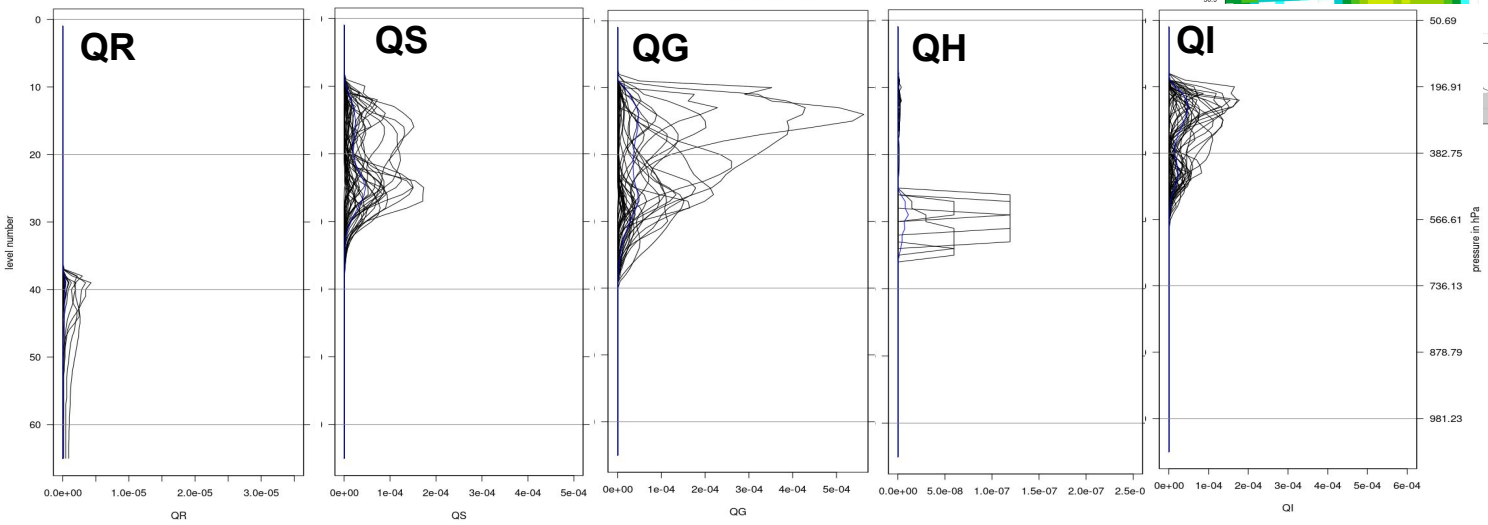


20 May 2022 at 12 UTC (after 7 assi run)

Normal assi run



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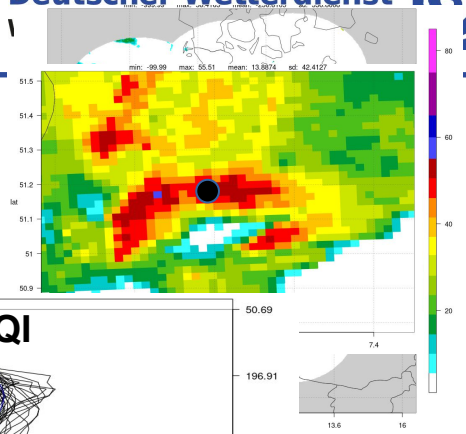

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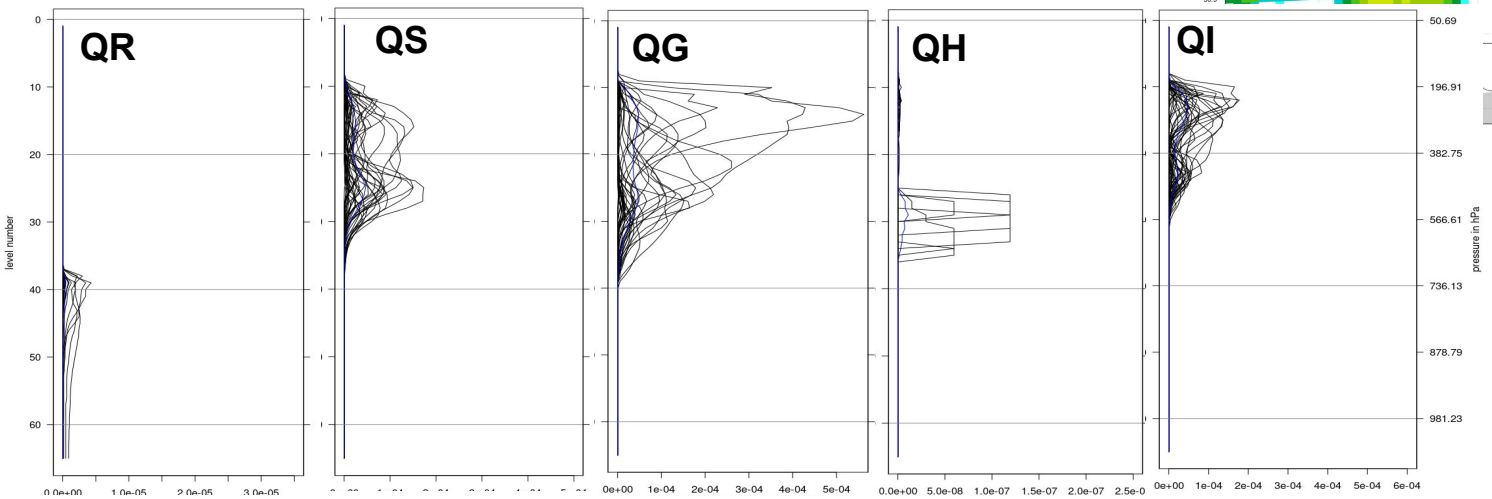
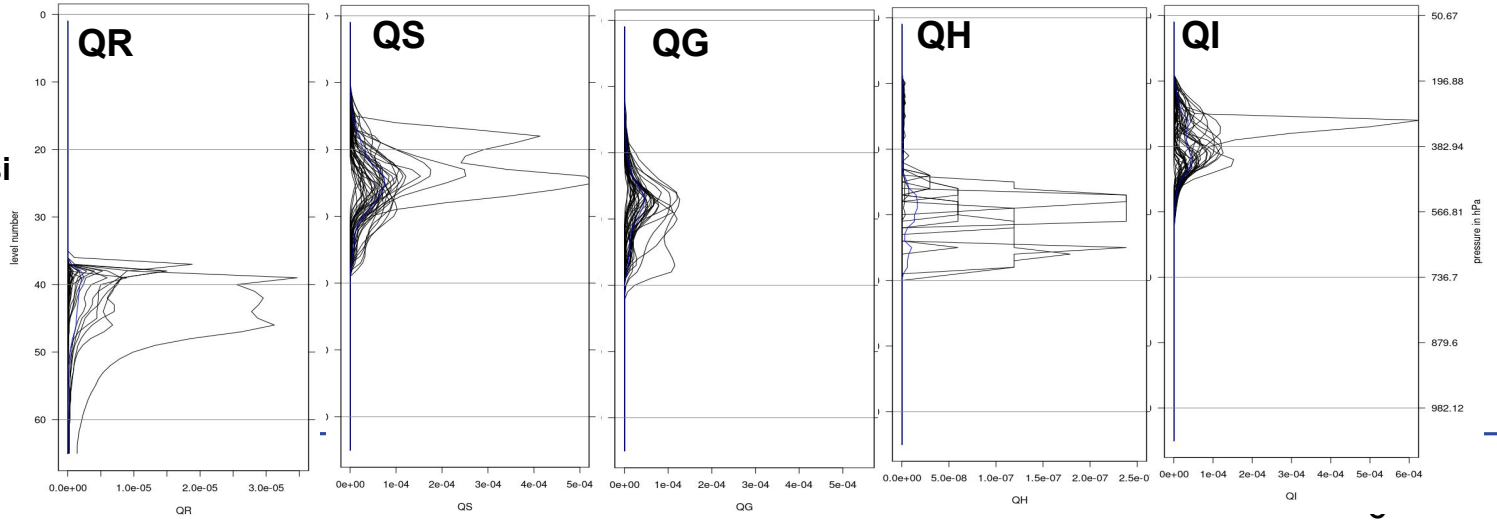


without assi (= free forecast)



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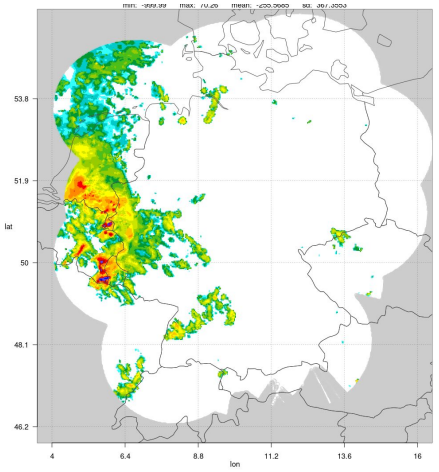
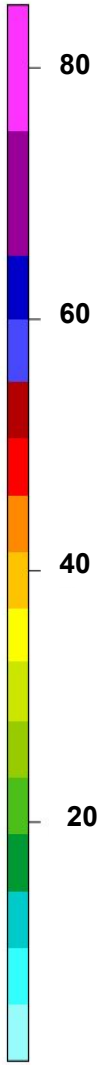
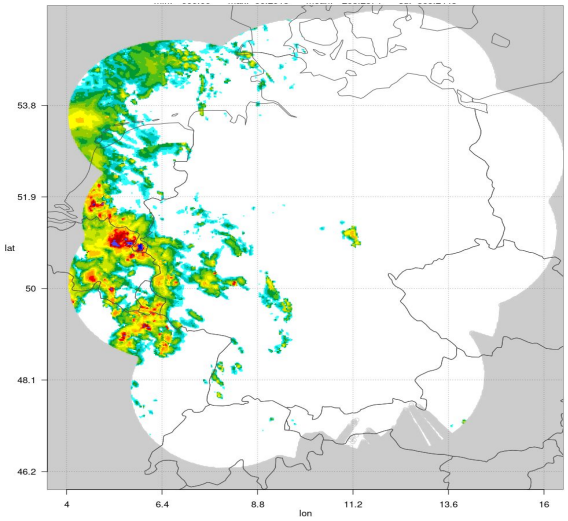
Synthetic Observation from nature run

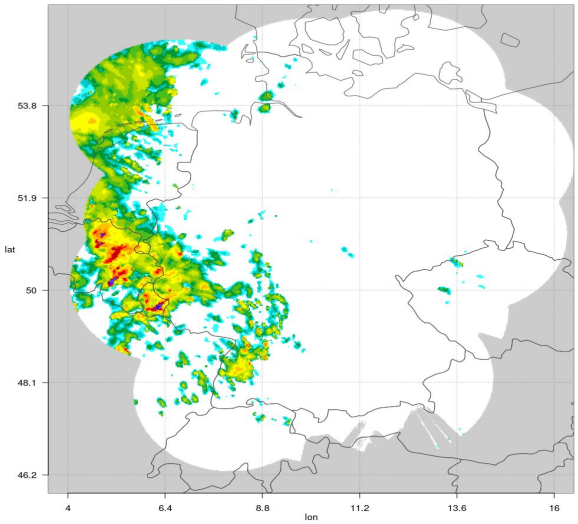




Default assimilation



Run without assimilation



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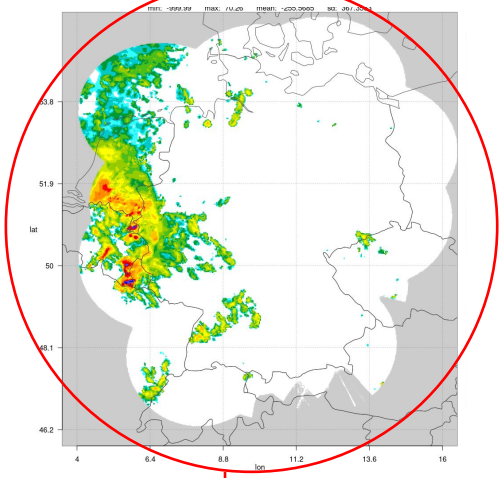

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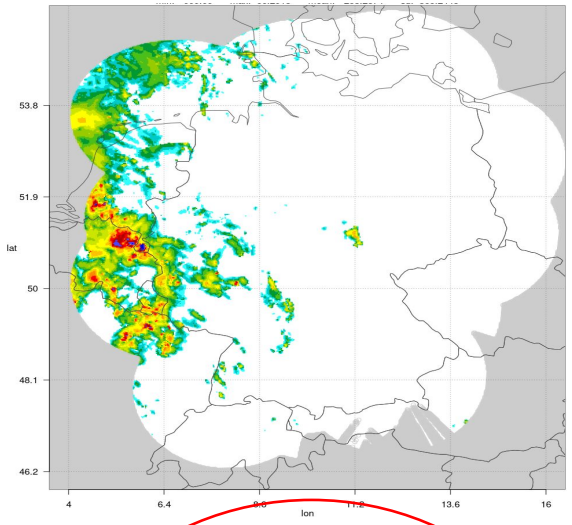

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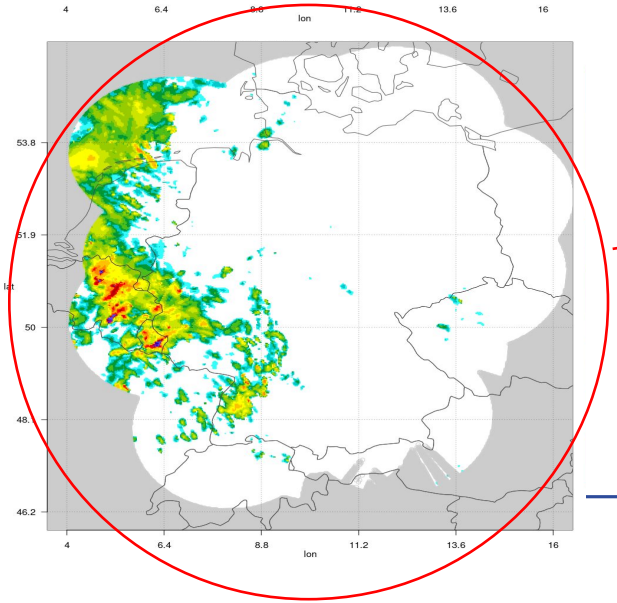
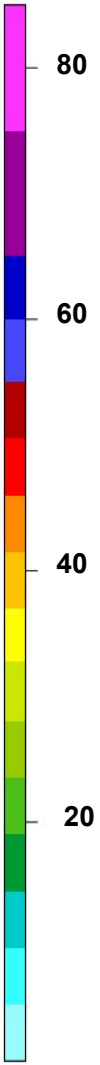


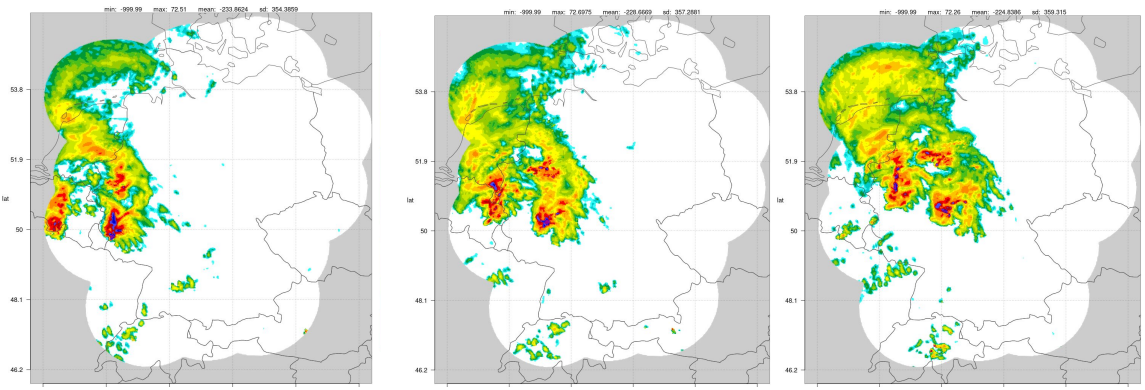
Input data for the assimilation run

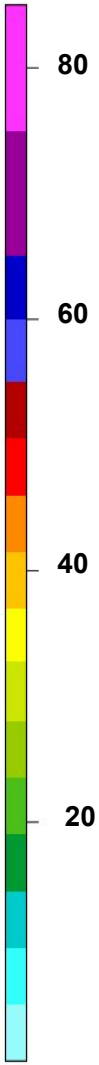


Assimilation run
20 May 2022

Observation

13 UTC **14 UTC** **15 UTC**





Assimilation run
20 May 2022

Deutscher Wetterdienst
Wetter und Klima aus einer Hand

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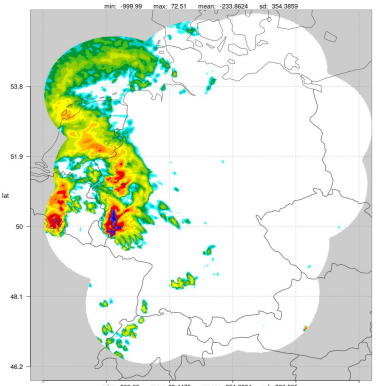
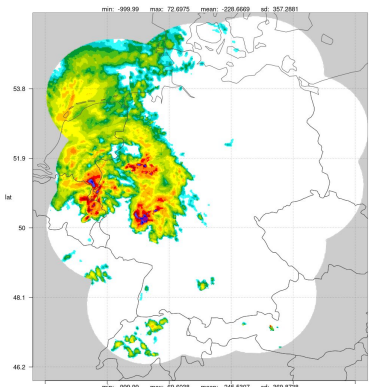
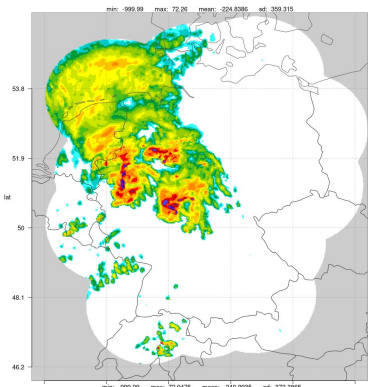
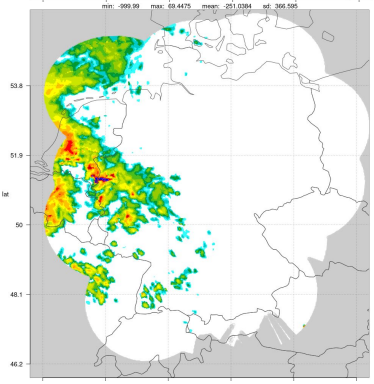
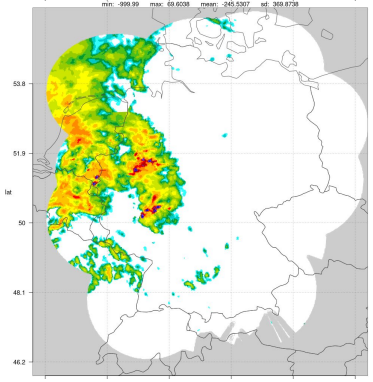
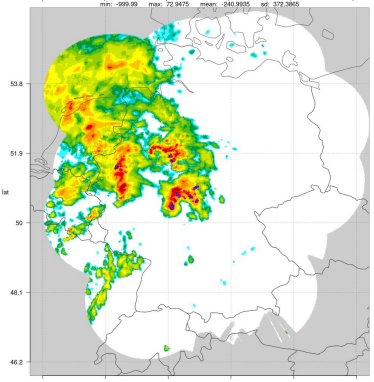
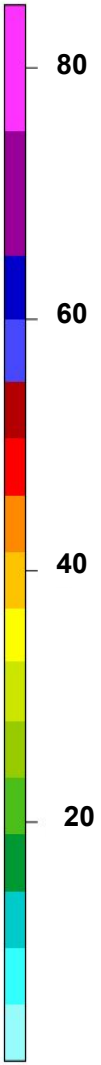
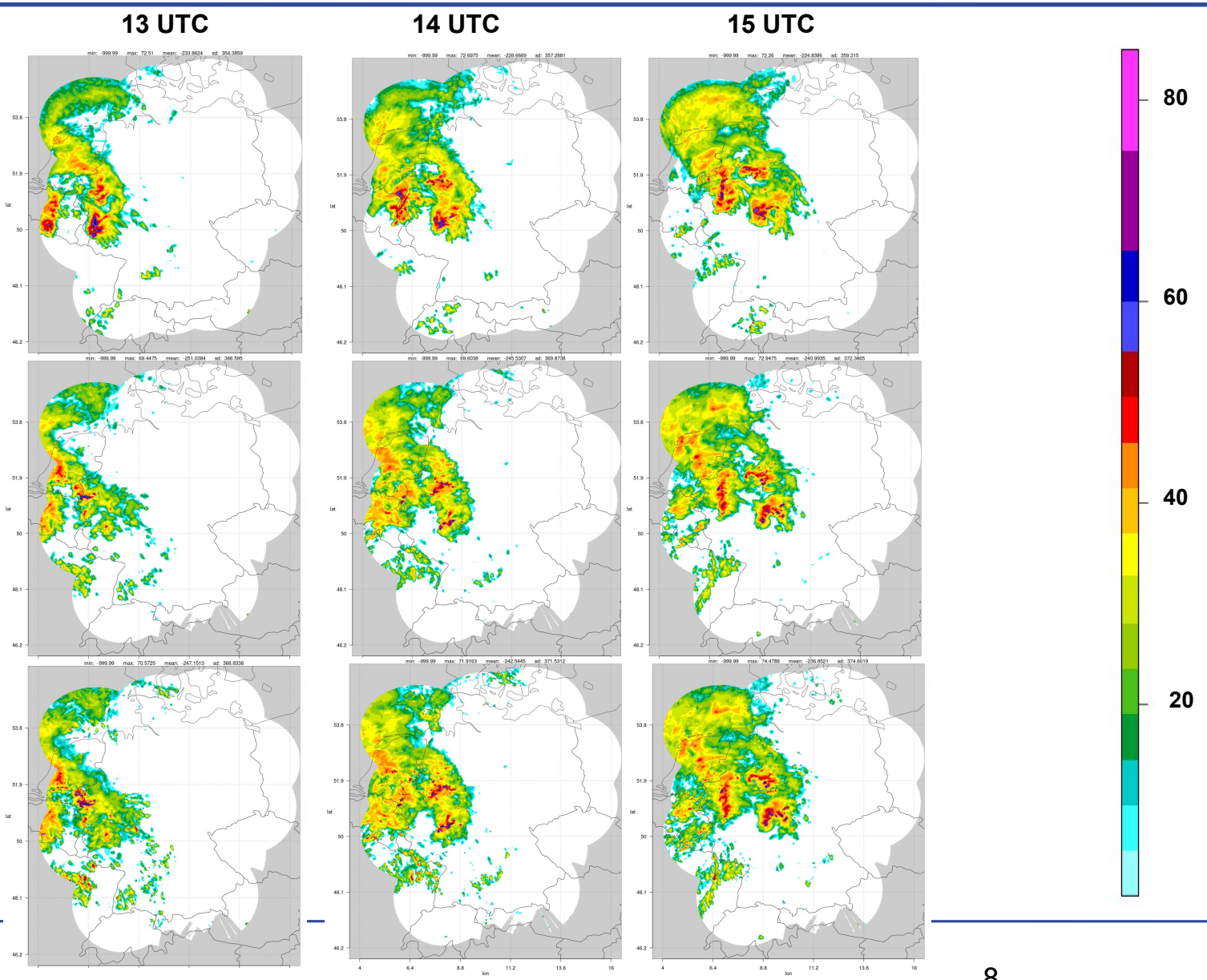
Observation			
Before assimilation			



Assimilation run
20 May 2022

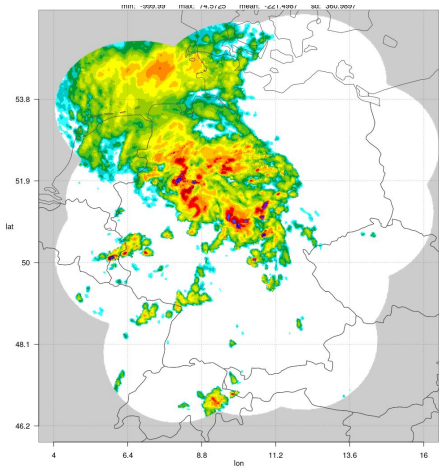
Deutscher Wetterdienst
Wetter und Klima aus einer Hand



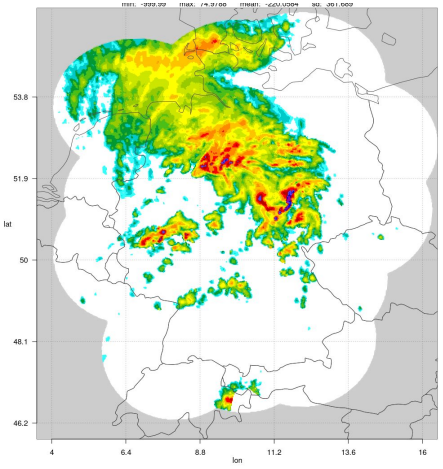
Forecast run
20 May 2022

Deutscher Wetterdienst
Wetter und Klima aus einer Hand

16:00 UTC
Observation

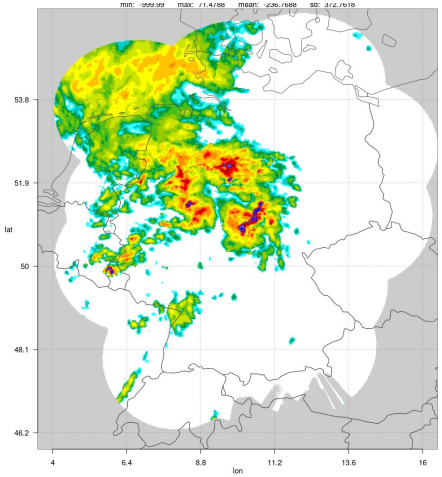


17:00 UTC
Observation

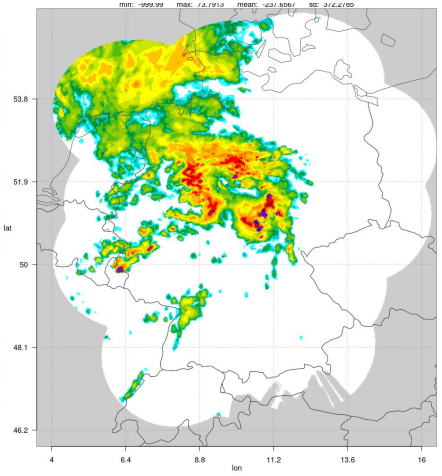


Forecast

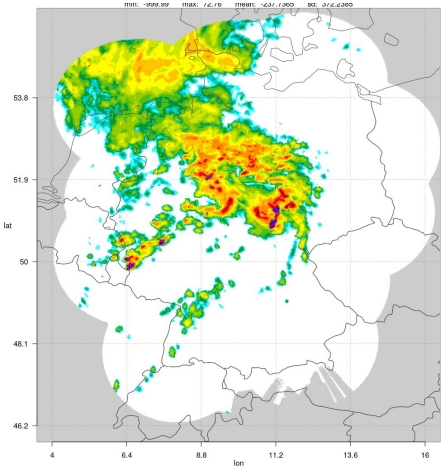
16:00 UTC



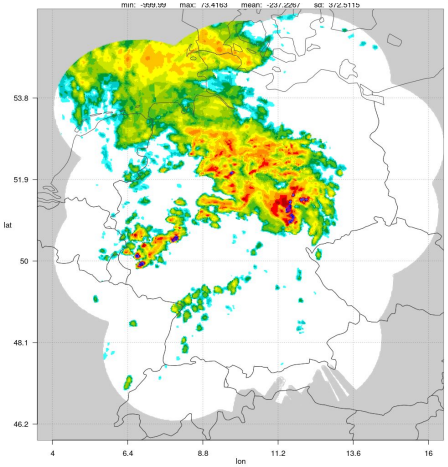
16:20 UTC

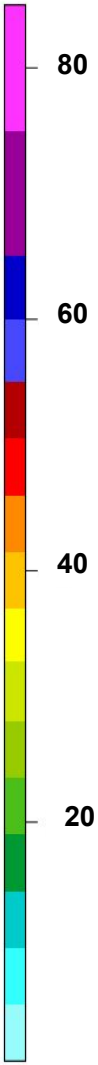


16:40 UTC

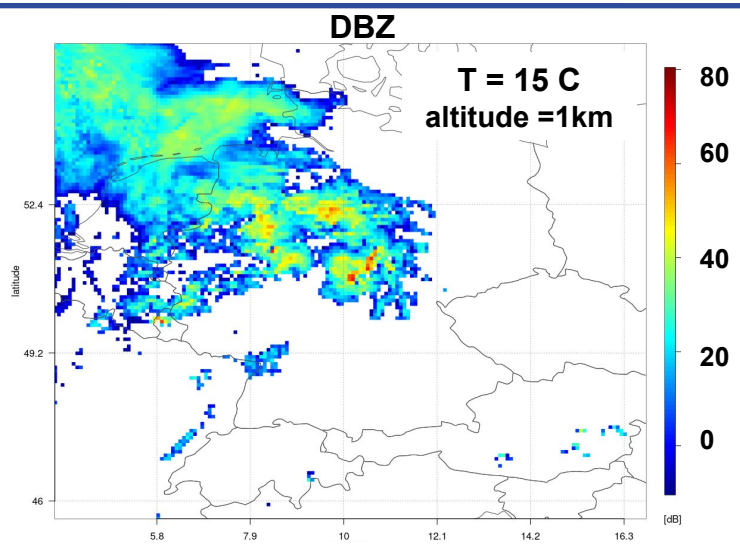


17:00 UTC

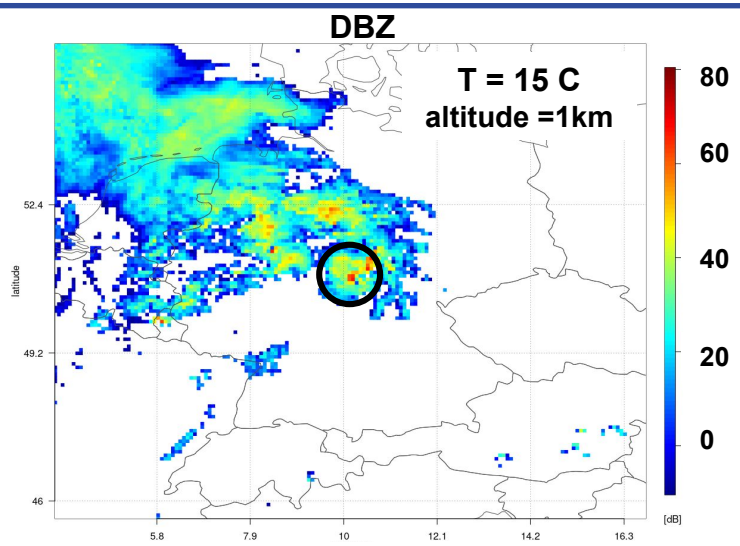




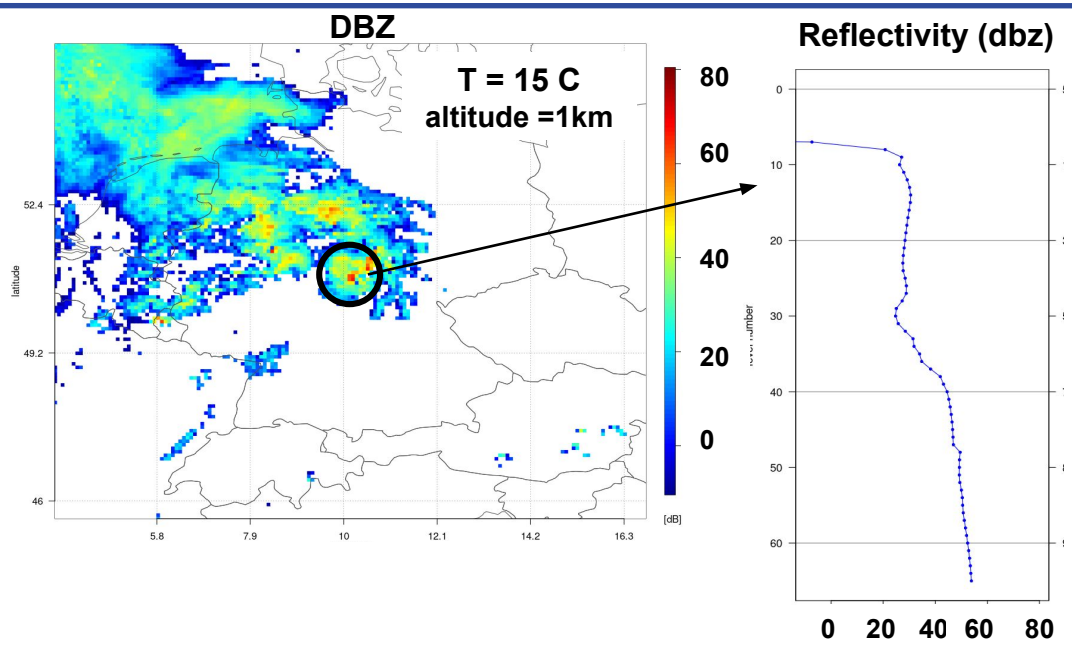
Reflectivity and zdr over the model gridpoint 20 May 2022 at 16 UTC



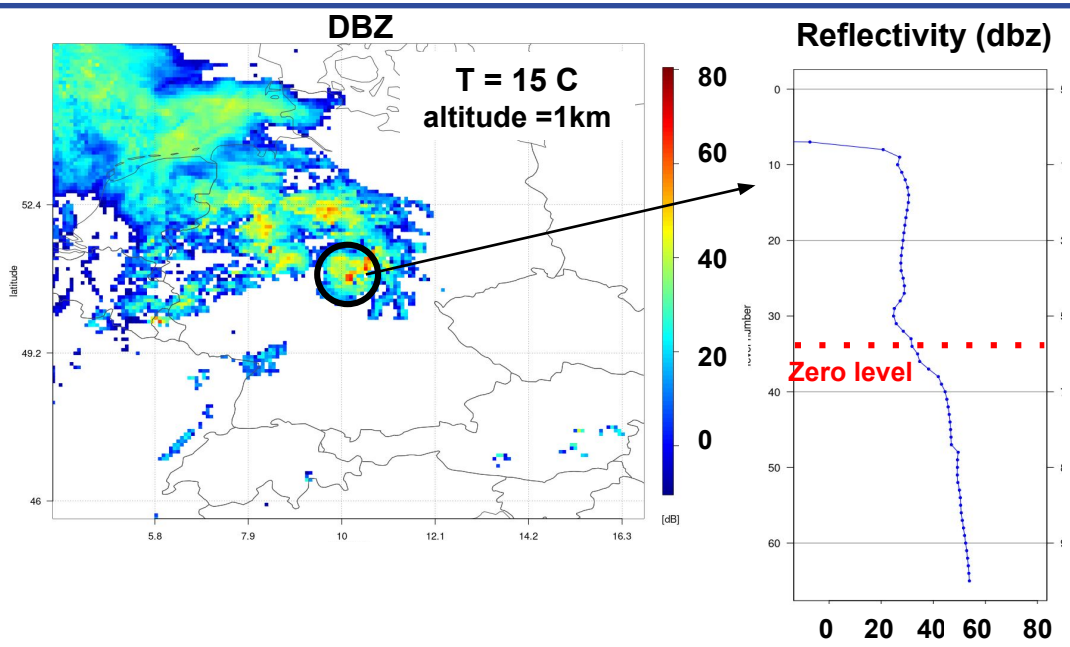
Reflectivity and zdr over the model gridpoint 20 May 2022 at 16 UTC



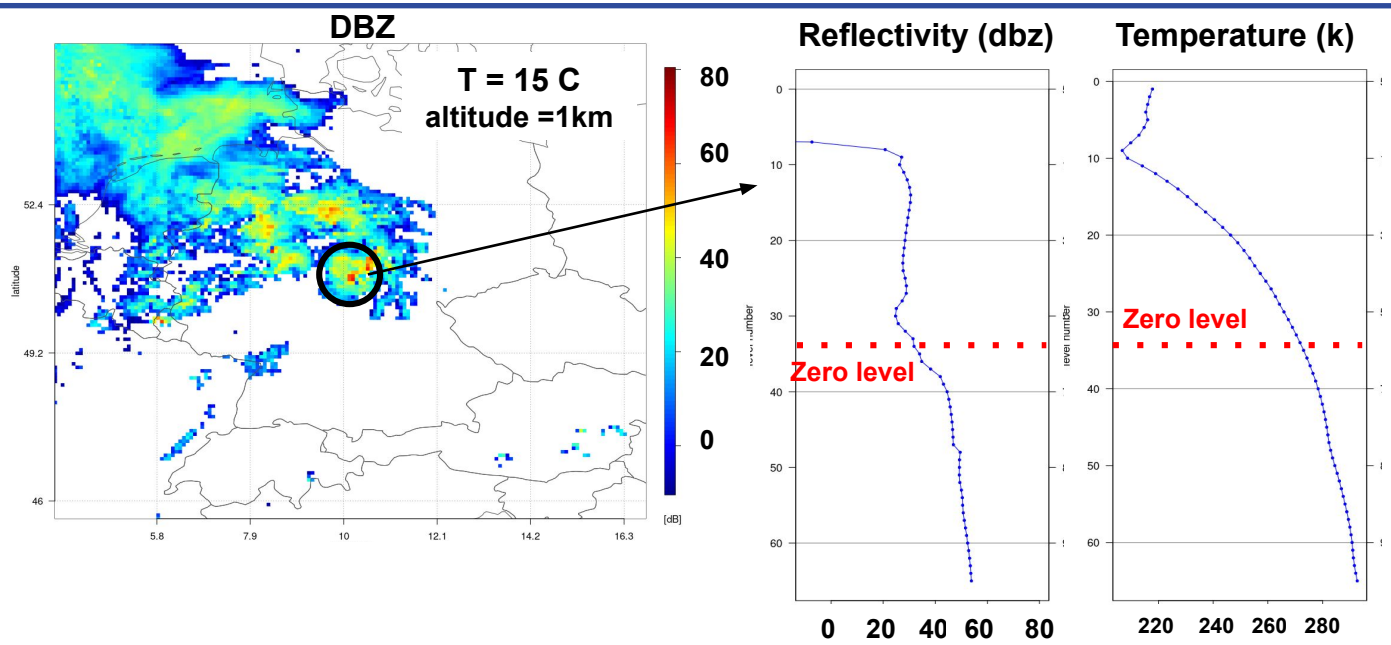
Reflectivity and zdr over the model gridpoint 20 May 2022 at 16 UTC



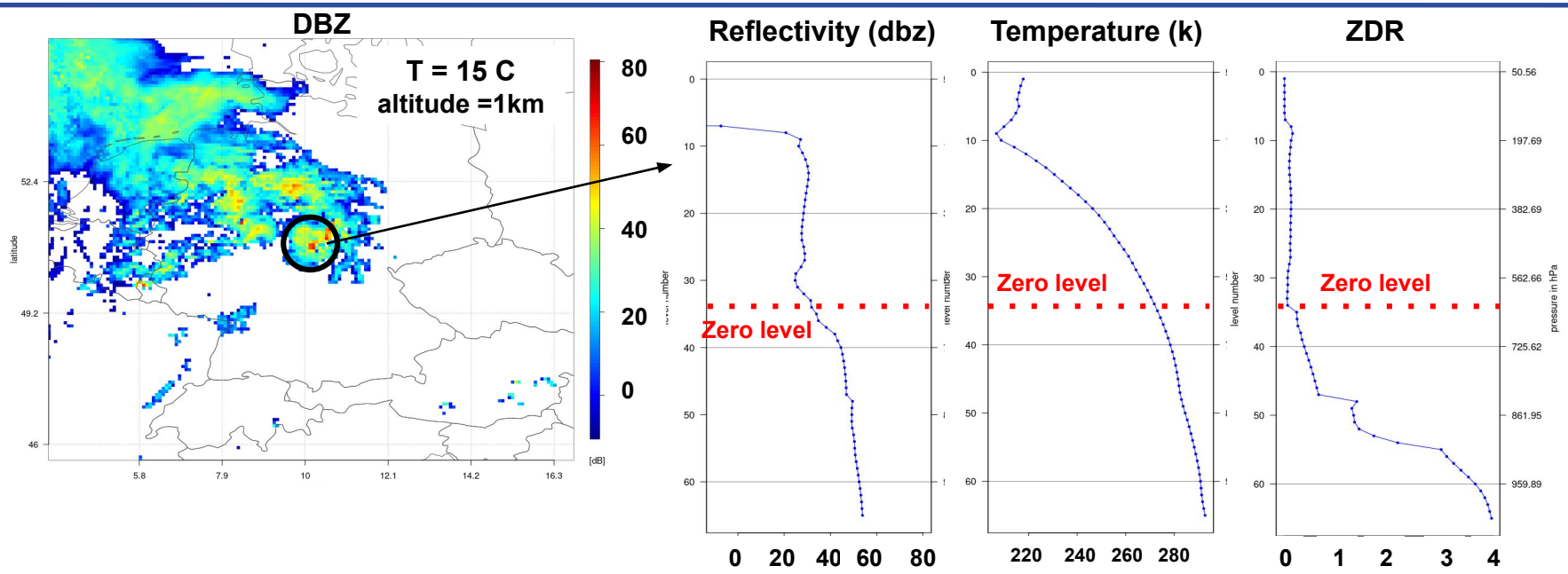
Reflectivity and zdr over the model gridpoint 20 May 2022 at 16 UTC



Reflectivity and zdr over the model gridpoint 20 May 2022 at 16 UTC

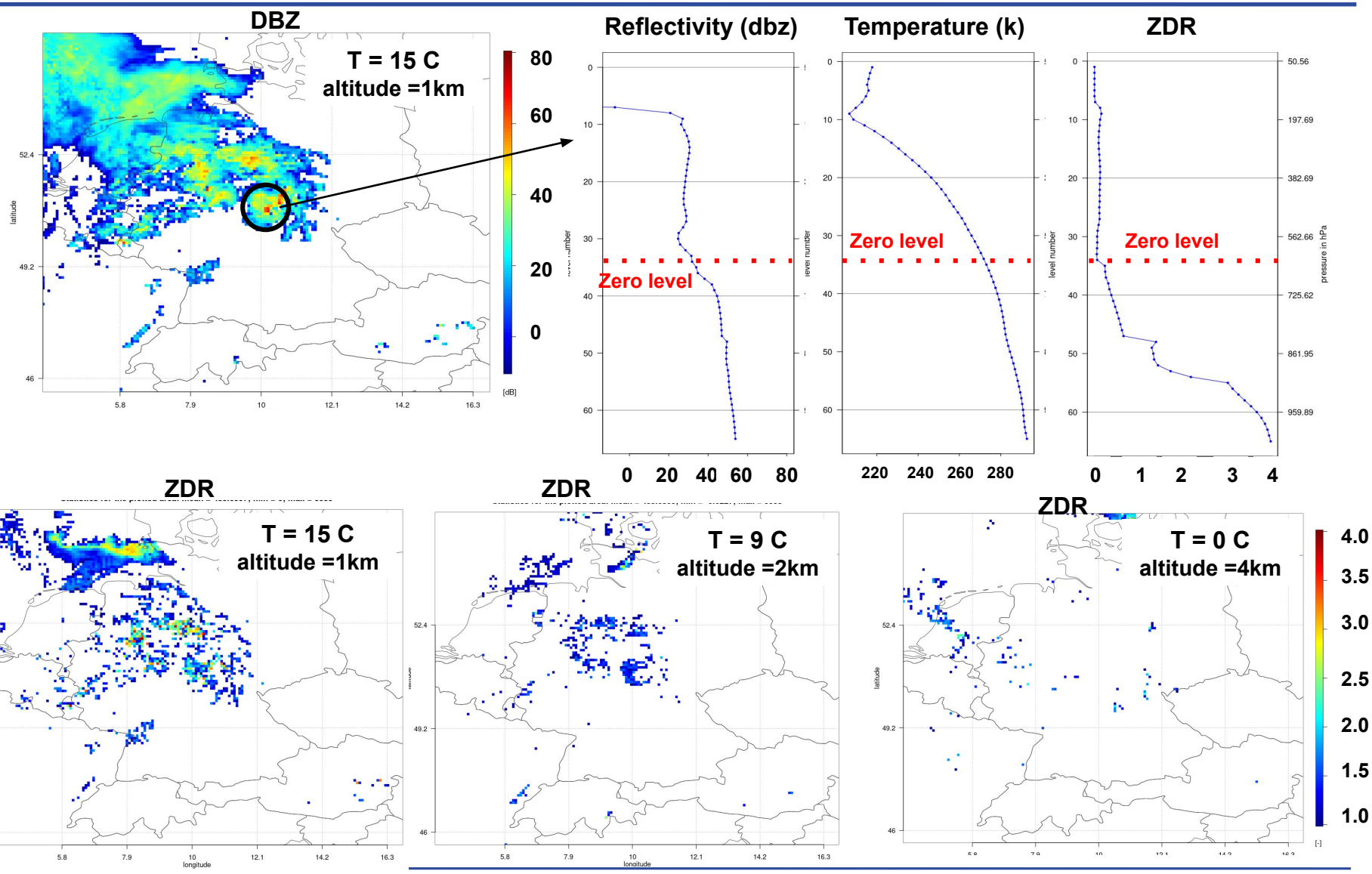


Reflectivity and zdr over the model gridpoint 20 May 2022 at 16 UTC



Reflectivity and zdr over the model gridpoint
20 May 2022 at 16 UTC

Deutscher Wetterdienst
Wetter und Klima aus einer Hand



Summary and Outlook

- The OSSE works well for radar reflectivity, as expected.

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- The OSSE works well for radar reflectivity, as expected.

Next Steps:

- The ZDR should be defined in the same way as the reflectivity composite for the entire German radar network (over the model grid or radar grid points).
  - ➢ Detect the ZDR column.
  - ➢ Define the ZDR column as a new observation object within the assimilation system.

Thank you for your attention

Any comments or questions?

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