

# SINFONY: A new Seamless Integrated Forecasting System for very short range convective-scale forecasting at DWD

Deutscher Wetterdienst  
Wetter und Klima aus einer Hand



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## Motivation and project overview

New internal project at DWD to develop a seamless ensemble prediction system for convective-scale forecasting from observation time up to +6 h / +12 h forecasts.

**Focus:** severe summertime convective events (heavy precipitation, hail, wind gusts, etc.)

**Up to now,** the first 1-2 h covered by purely observation-based nowcasting, whereas convection-allowing ensemble NWP (COSMO-DE-EPS) only reaches/outperforms quality of nowcasting at later times. New NWP forecasts only every 3 h and after some technical time delay.

**Moreover,** nowcasting and ensemble NWP treated as two separate and independent methods, few common products available for the forecasters.

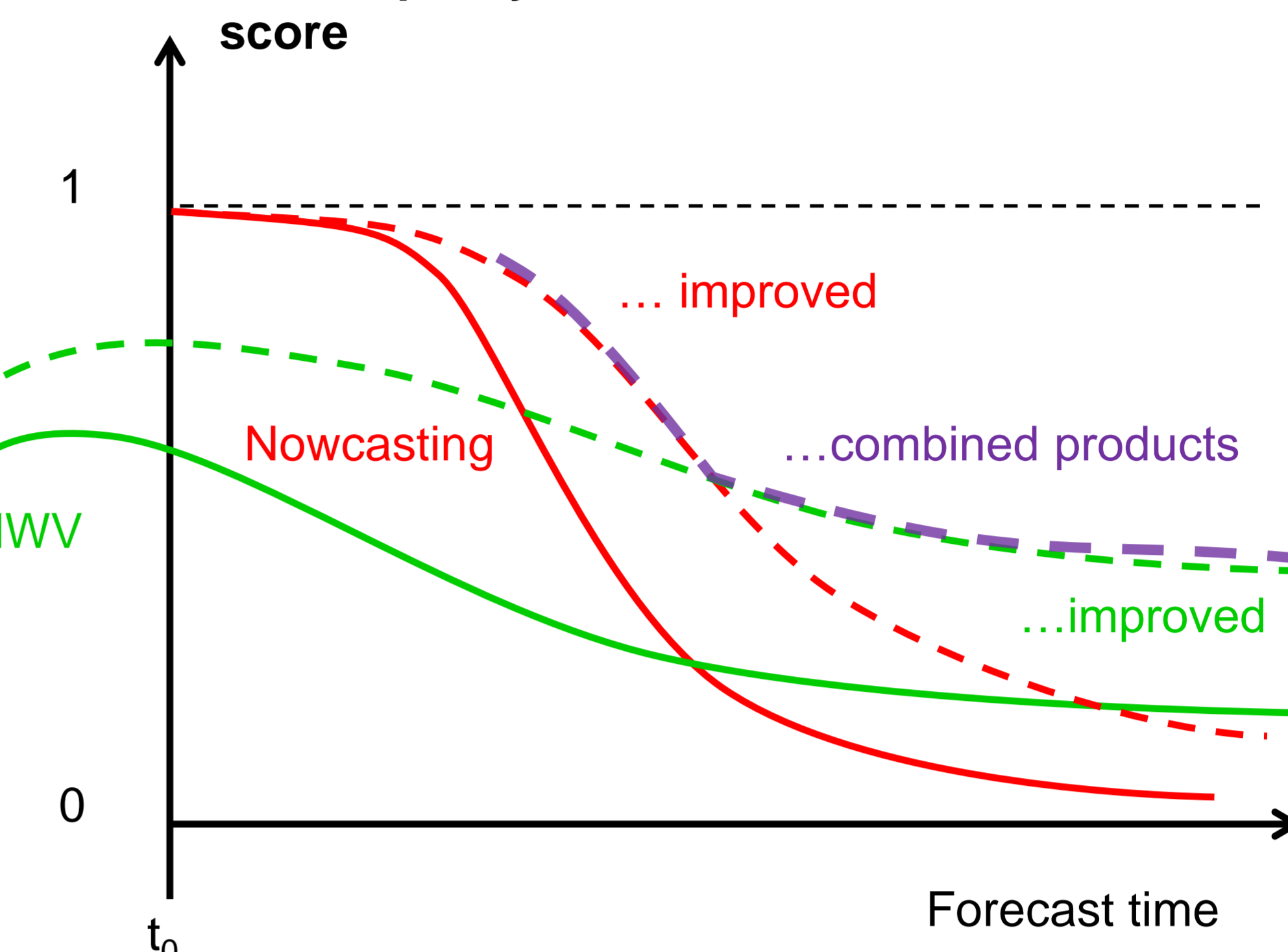
**Goal:** narrow down these gaps, on the one hand by enhancements to both nowcasting and NWP separately and on the other hand by mutual information exchange and combination. Use of high-resolution observational data (3D radar, satellite, GPS-derived moisture, lightning, etc.).

We consider in particular:

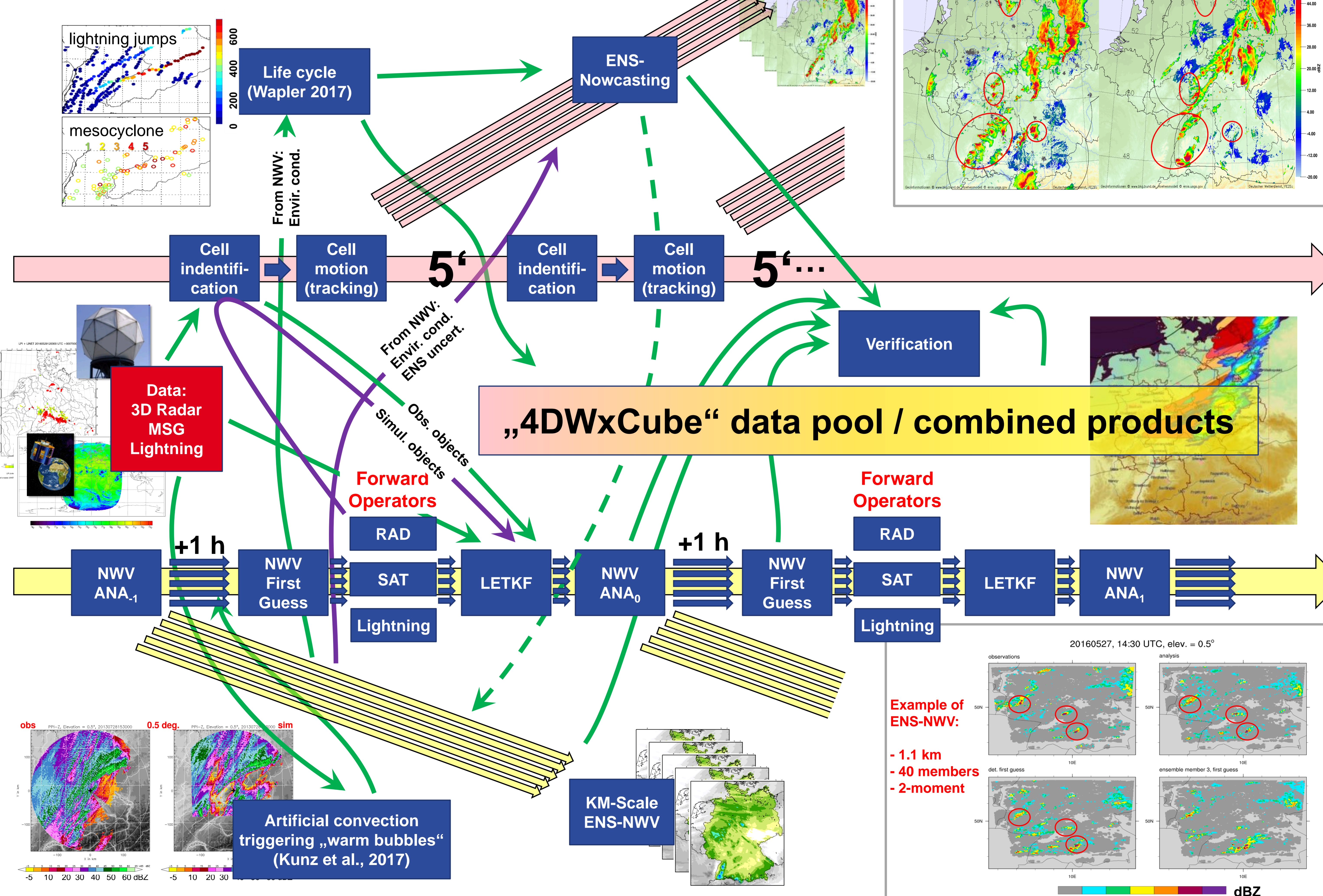
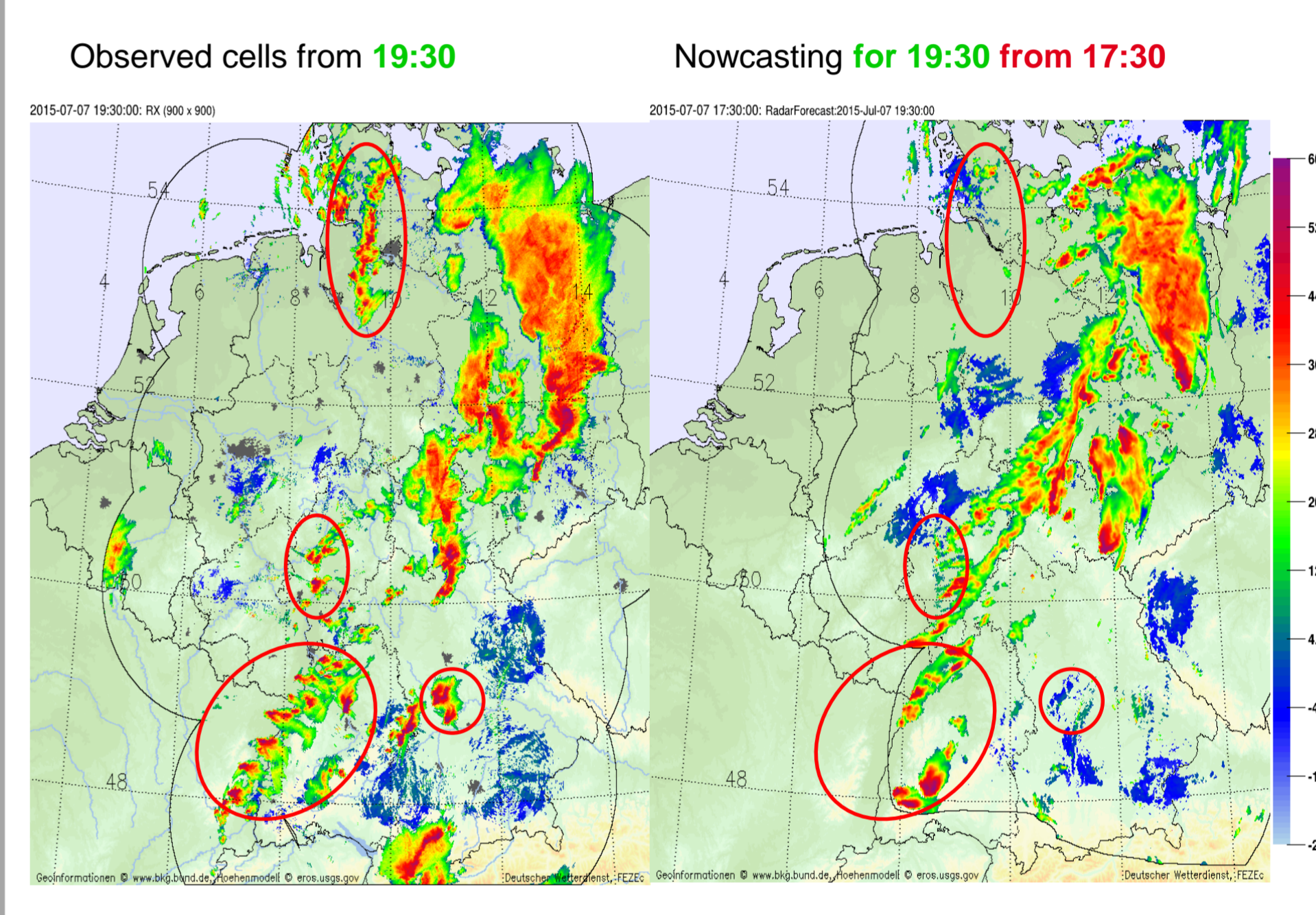
- **Nowcasting ensembles of "fields" and "objects"**, also informed by uncertainties from NWP
- **Life cycle in nowcasting** (Wapler, 2017), informed by radar, lightning and satellite data, and by ensemble NWP
- **Rapid Update Cycle (RUC) ensemble NWP:** 1-km-scale, LETKF, hourly update, ~40 members, advanced physics (2-moment microphysics including hail, 3D turbulence)
- **LETKF assimilation** (Schraff et al., 2016) in ensemble NWP in observation space of
  - **3D radar data** (Bick et al., 2016; Zeng et al., 2016) - native observations & nowcast "objects"
  - **MeteoSat SEVIRI IR / VIS** (Scheck et al., 2016)
  - **Lightning** flash density using the Lightning Potential Index as a forward operator
  - Assimilate severe conv. cells into ENS-NWP at correct location as early as possible
- **New products** combining nowcasting and NWP for our forecasters

## SINFONY concept

Some forecast quality



Typical example of problems with nowcasting for longer lead times:



## References

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