

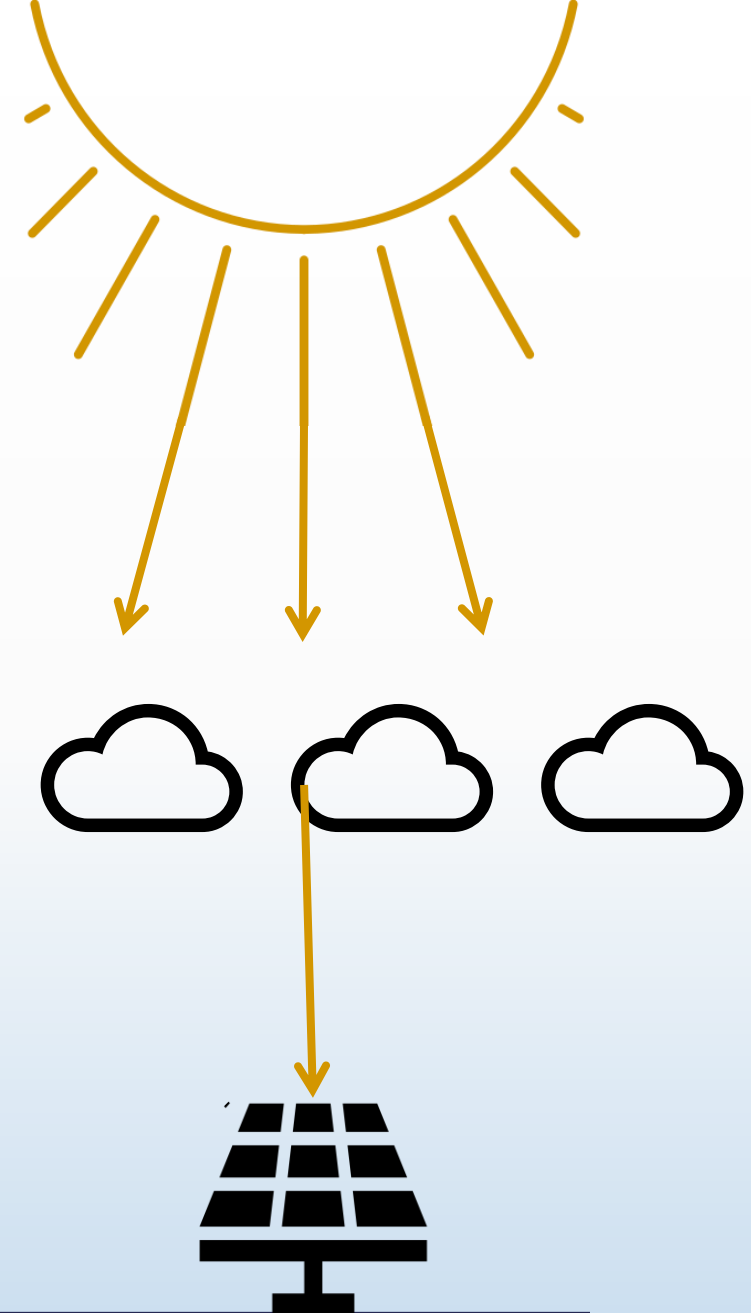
Assimilation of Observations in Large-Eddy Simulation for Solar Radiation Forecasting

18%

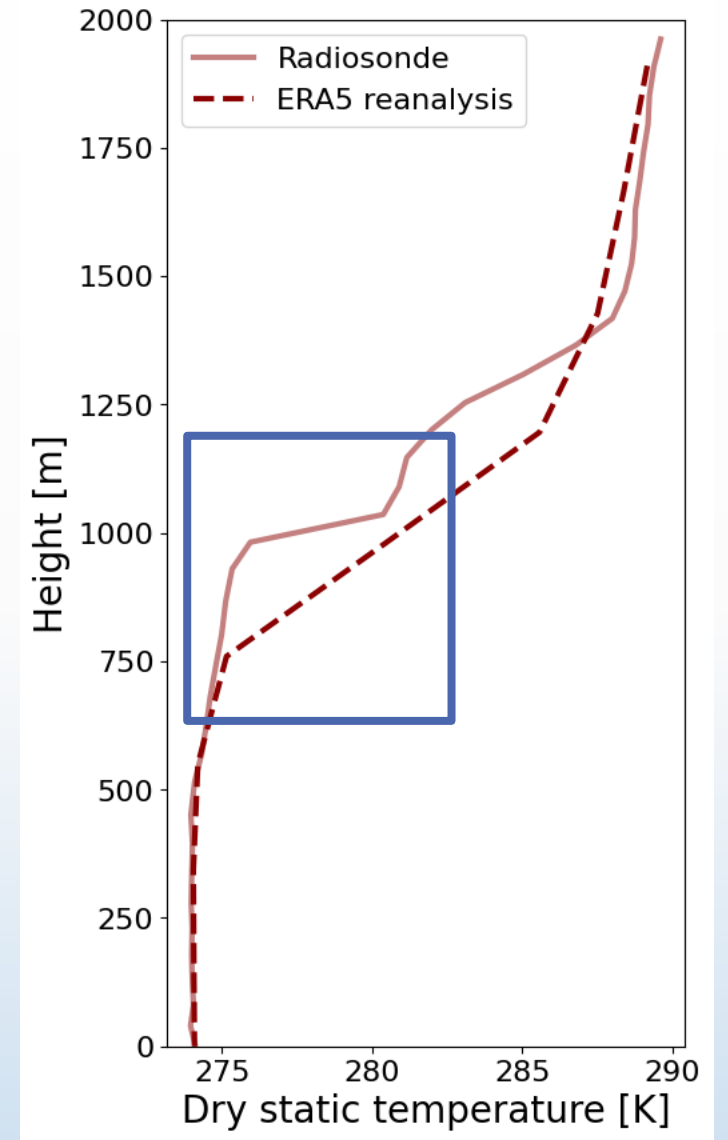
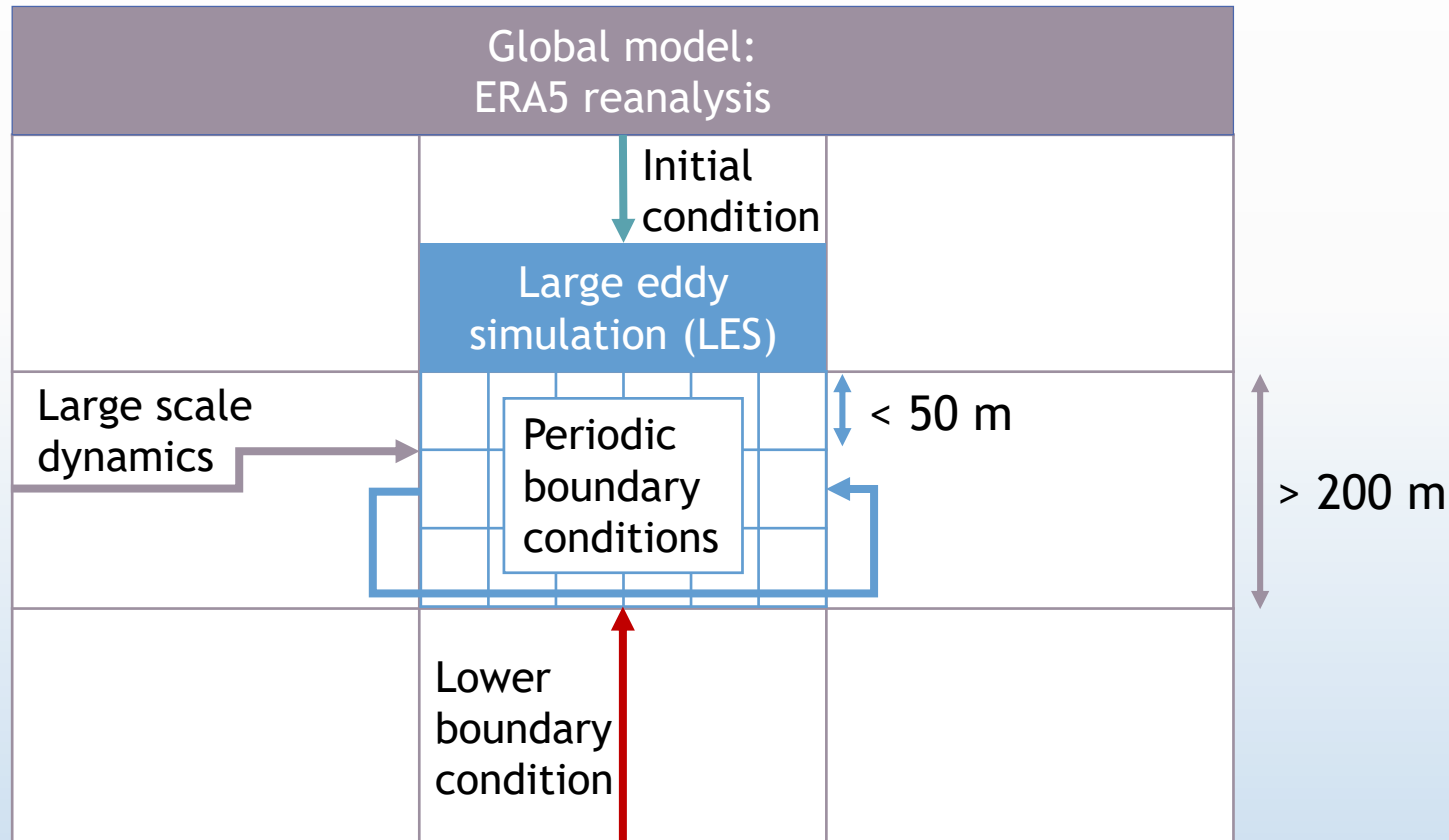
Of electricity in the Netherlands in 2023 was produced by solar panels



The electricity grid needs to be balanced, so accurate prediction of solar energy production becomes more and more important



Modeling stratocumulus clouds requires high resolution





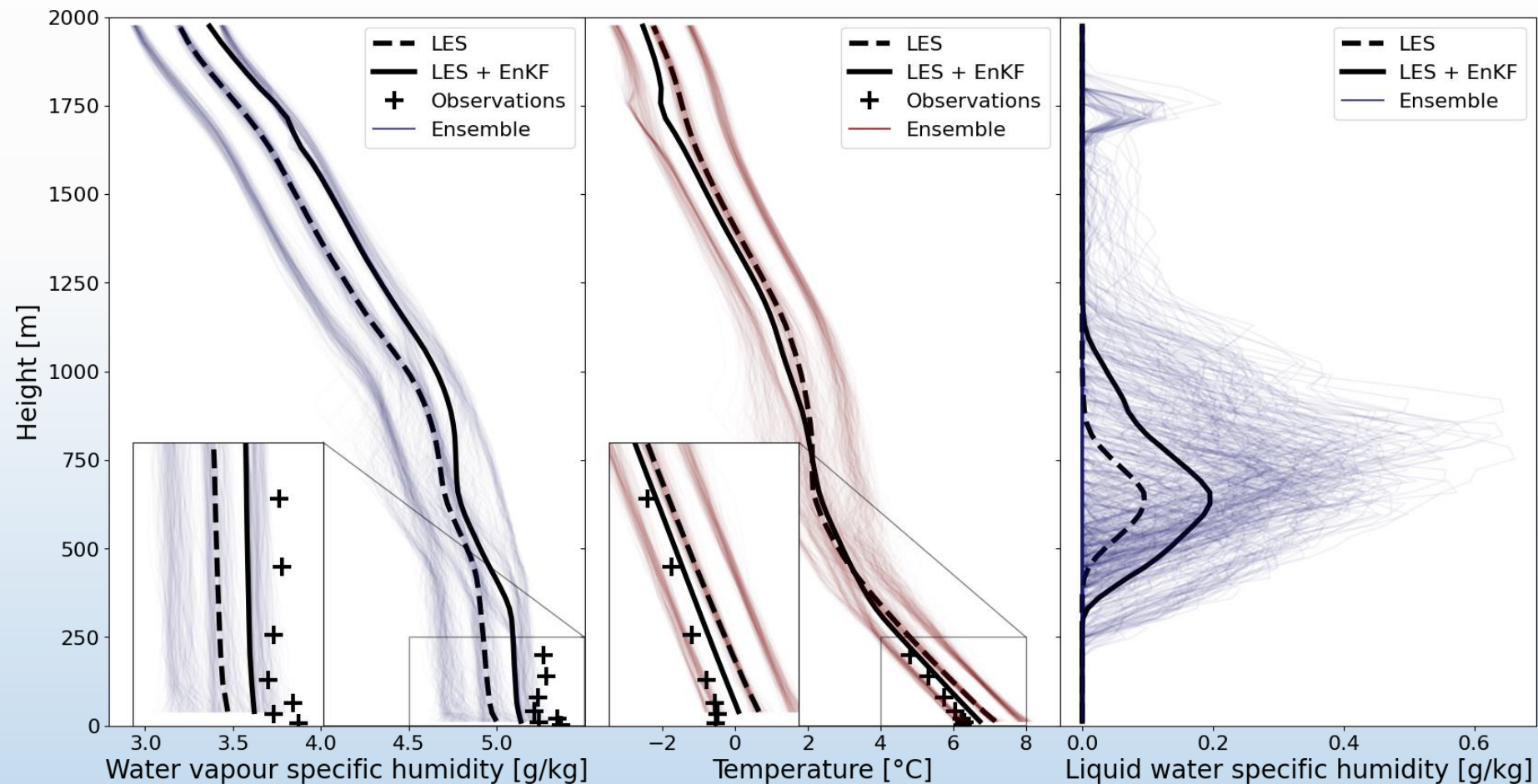
Use observations to improve the clouds in the LES initial profile

Temperature + Humidity \longrightarrow Cloud

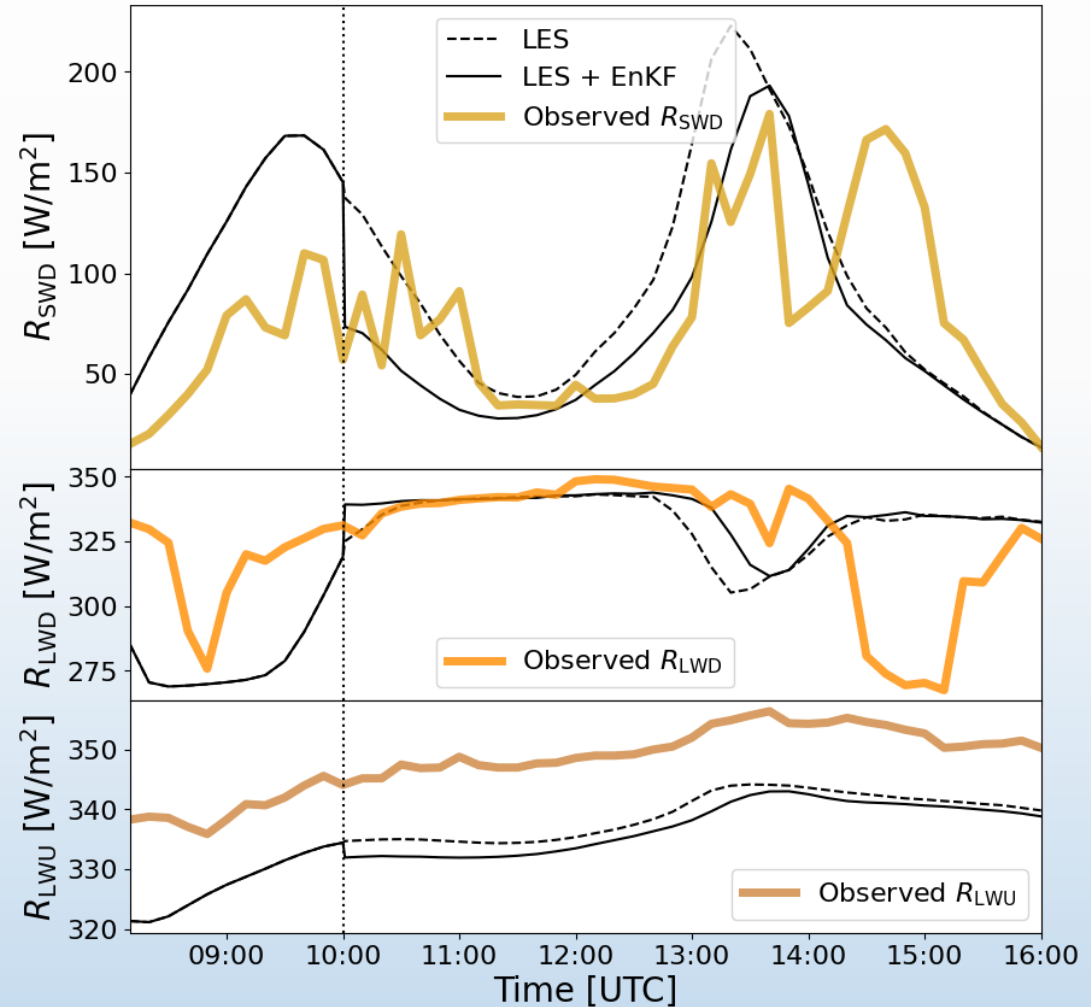
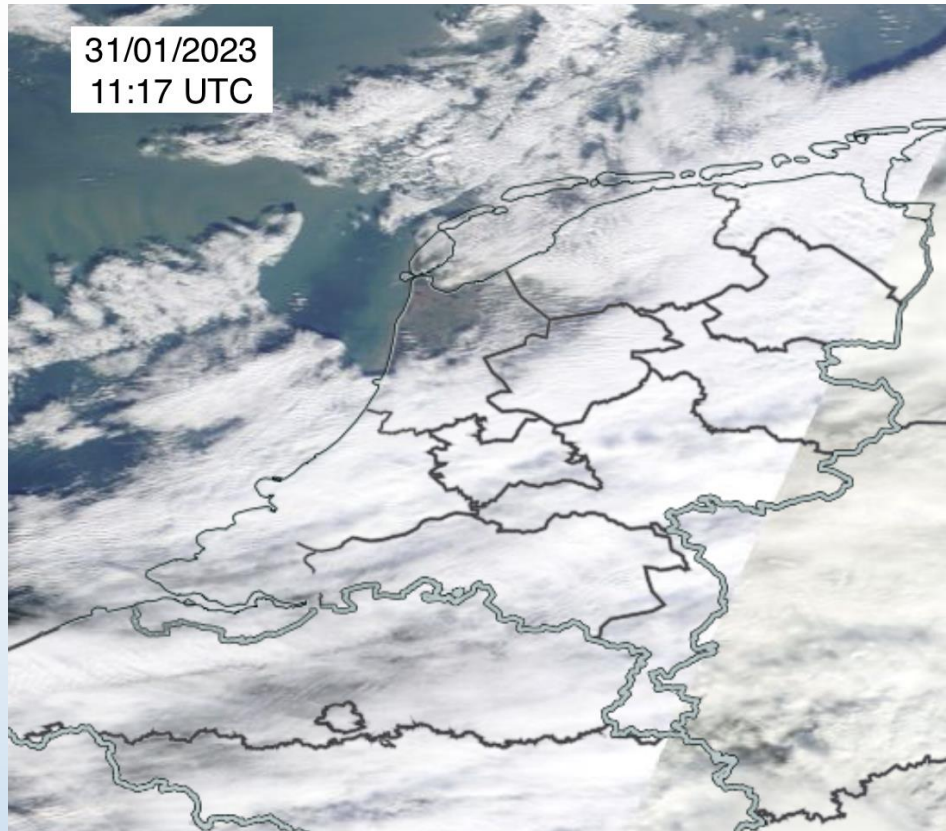
How do you use incomplete observations?



Data assimilation solution
to inverse problem:
Ensemble Kalman filter

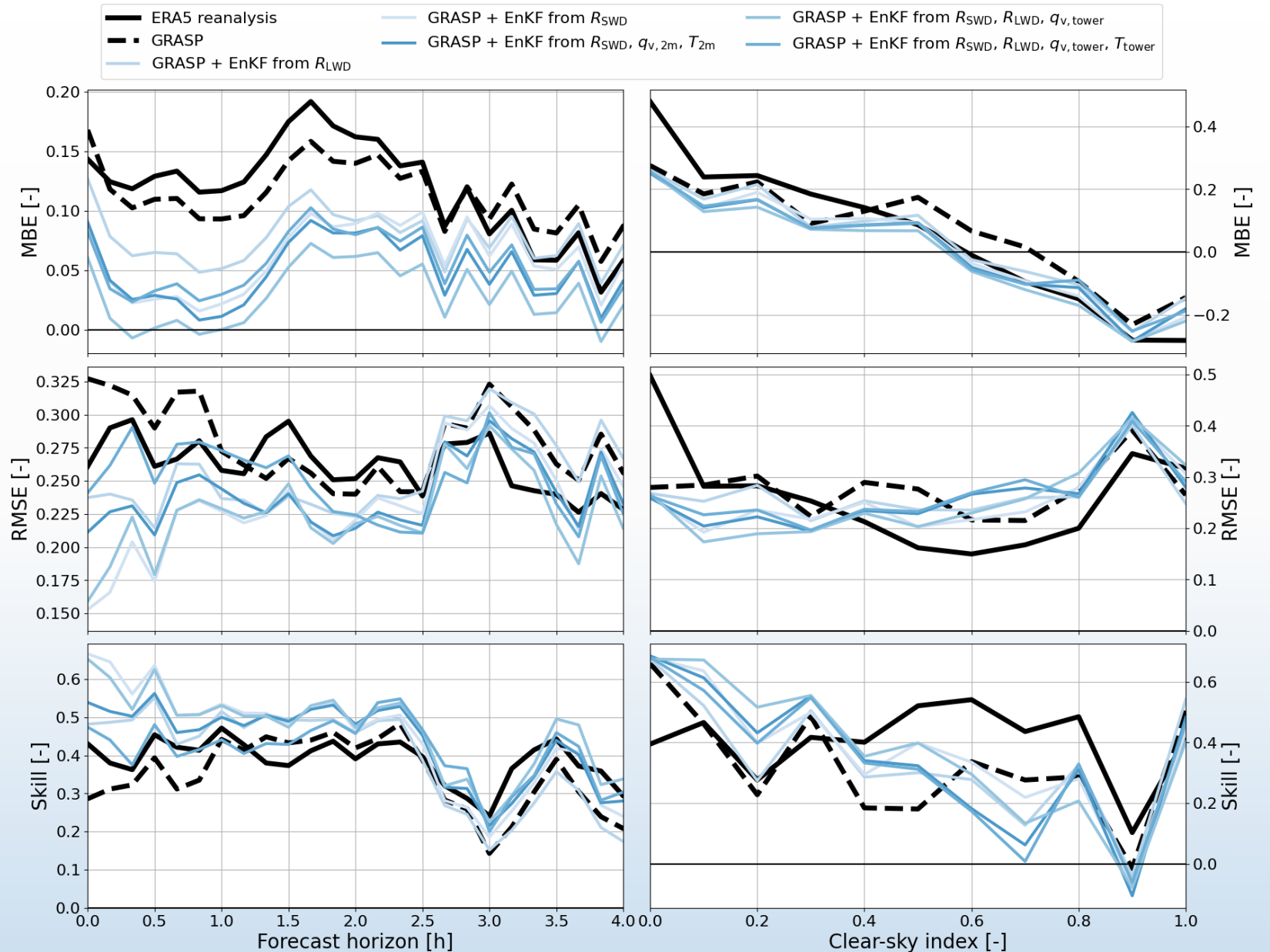


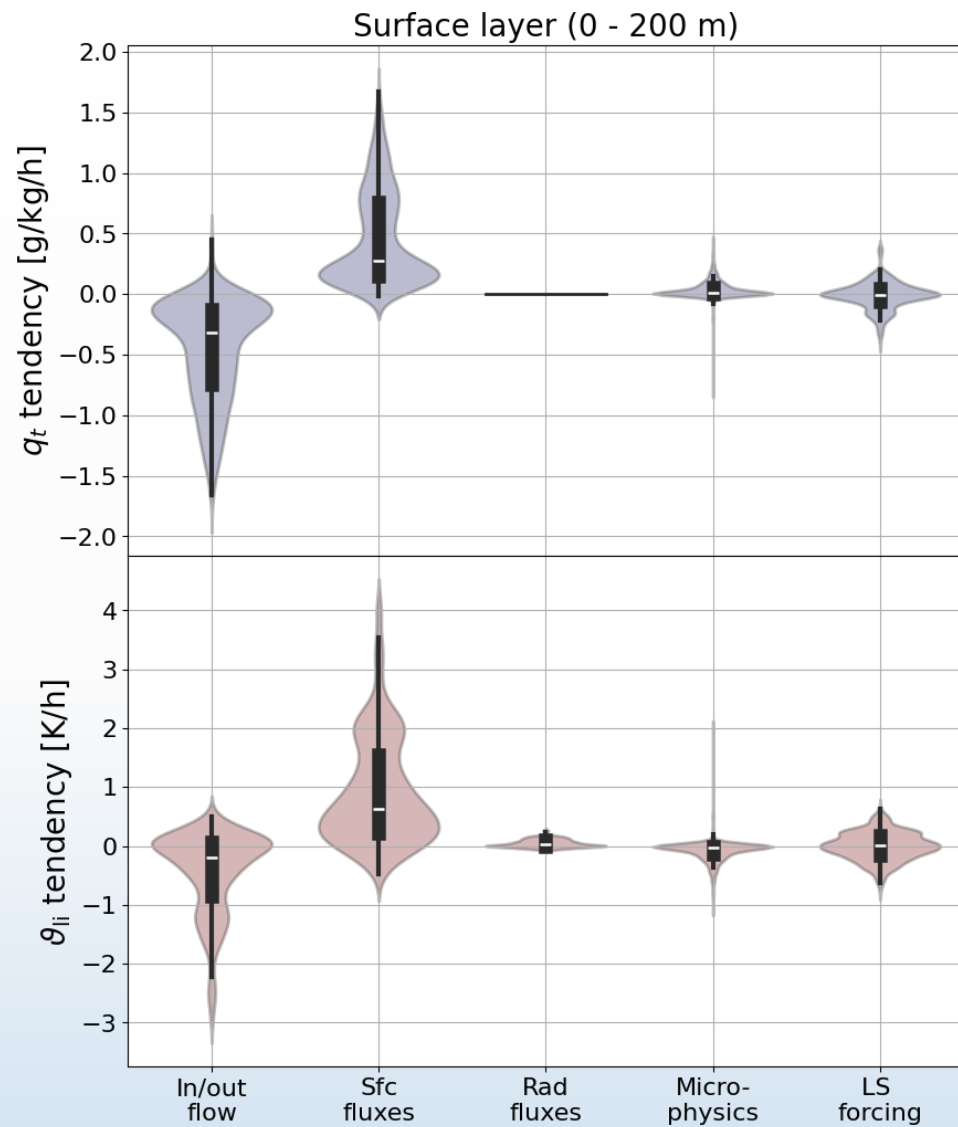
The improved cloud profile is used as initial condition



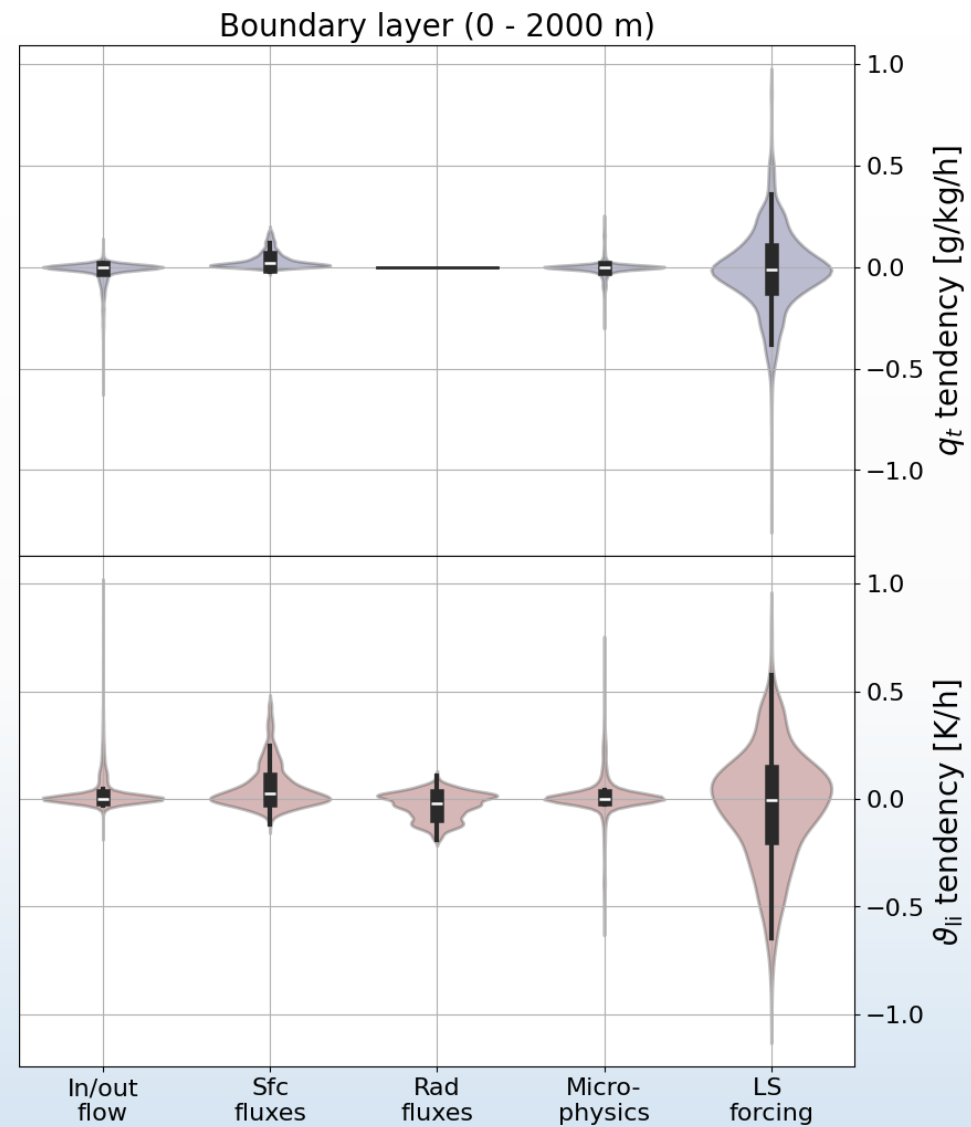
Statistics from 30 days 2023

$$\text{Clear-sky index} = \frac{R_{\text{SWD}}}{R_{\text{SWD}, \text{clear-sky}}}$$

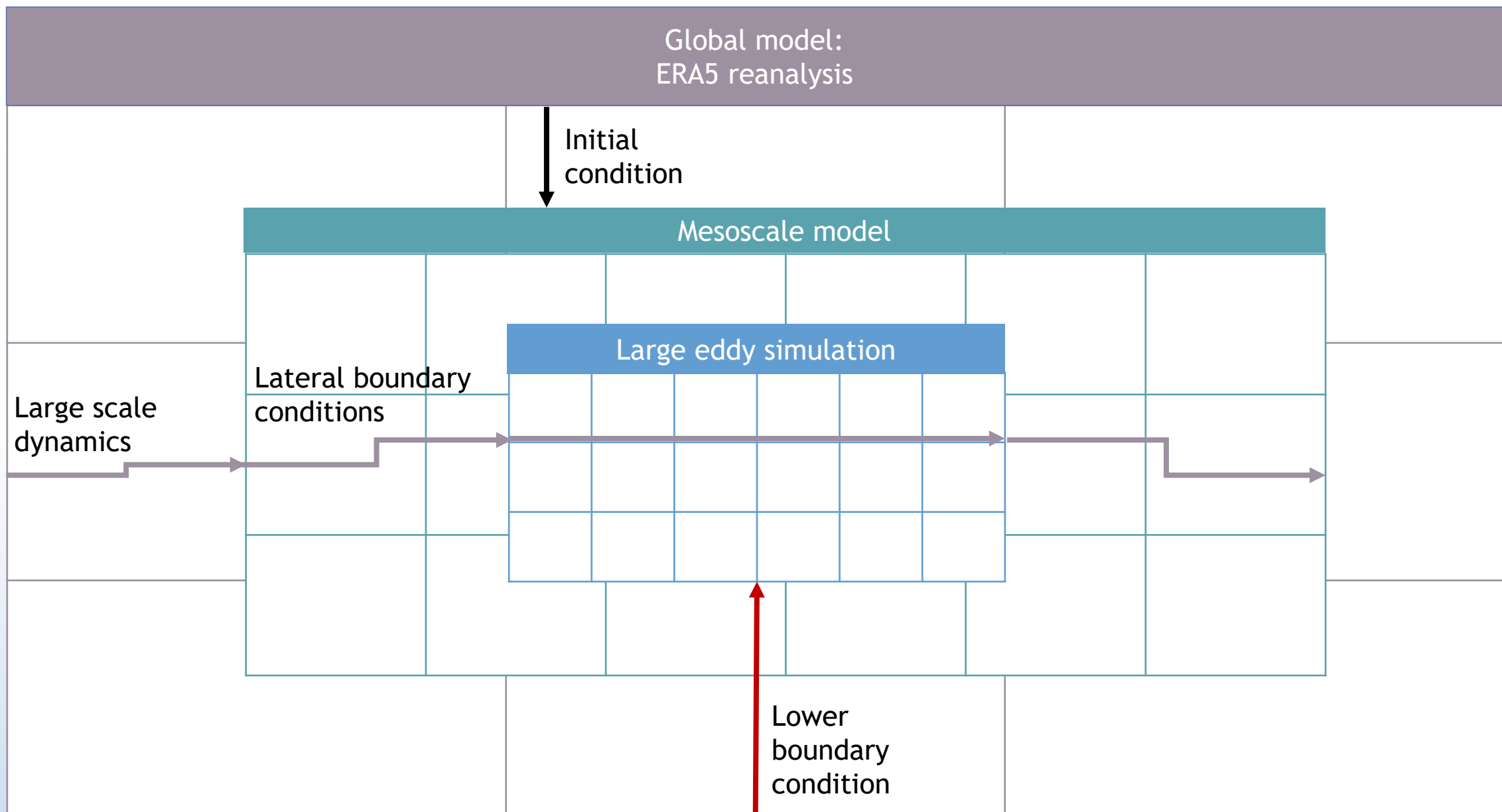




↑
Surface heat fluxes



↑
Large-scale forcing



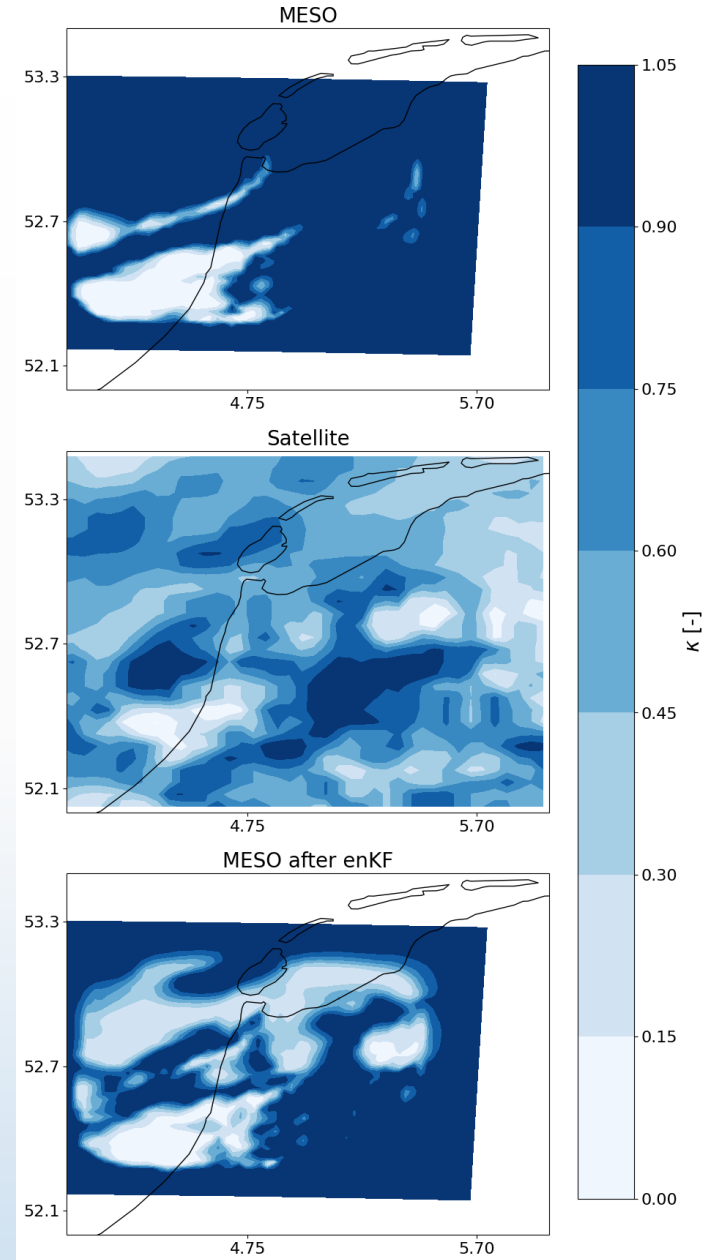
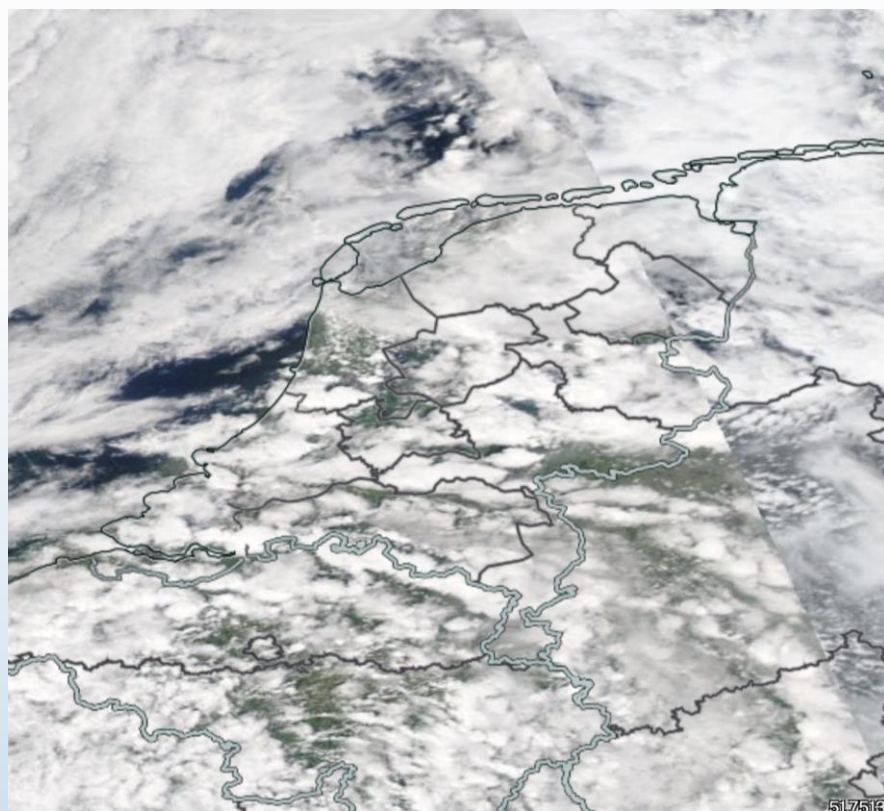


De Dijken solar park

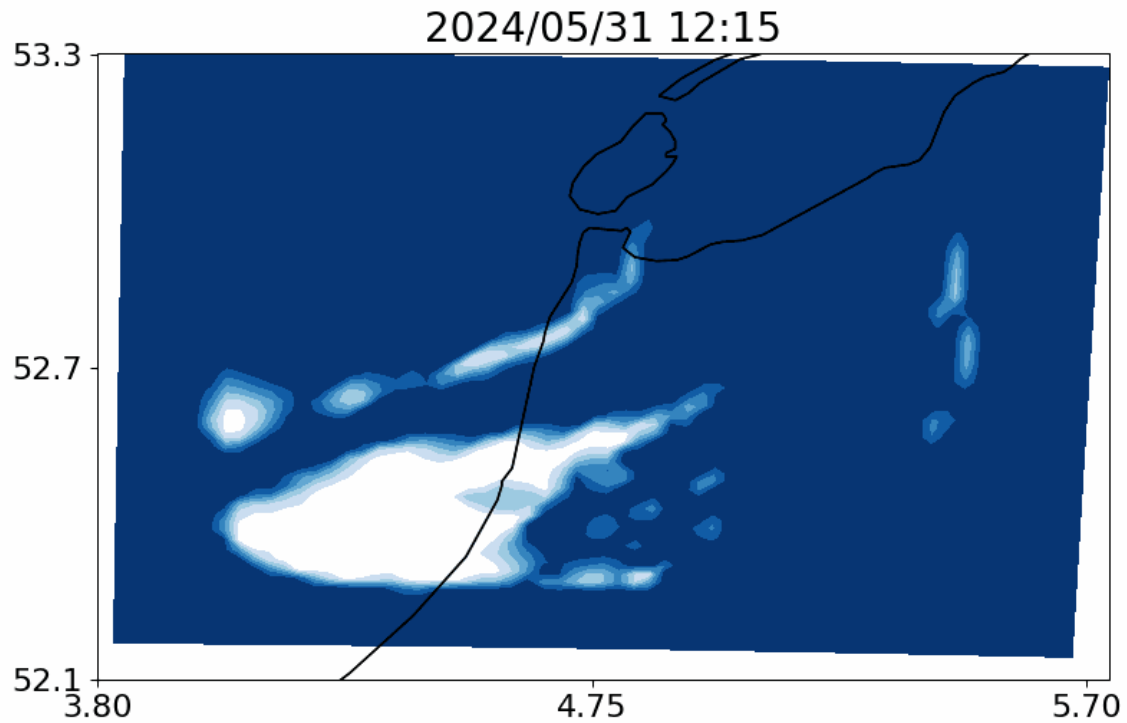
March - June 2024



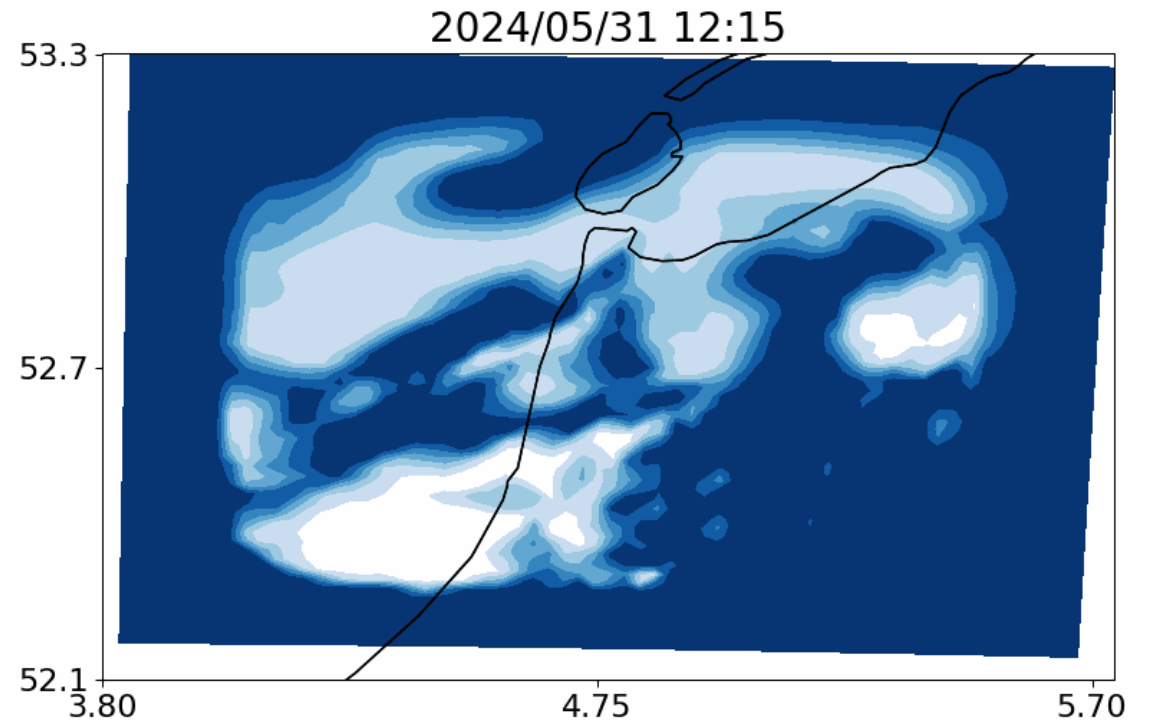
31 May 2024



Next steps



MESO



MESO + enKF