Performance of HAILCAST and lightning potential index coupled with WRF and COSMO in convection-permitting simulations of hailstorms over the Alpine-Adriatic region

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This work was supported by the SWALDRIC (IZHRZO-180587) project, which is financed through the Croatian-Swiss Research Program of the Croatian Science Foundation and the Swiss National Science Foundation with funds obtained from the Swiss-Croatian Cooperation Programme.

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Atmospheric Research 272 (2022) 106143

Contents lists available at ScienceDirect

Atmospheric Research

journal homepage: www.elsevier.com/locate/atmosres

Performance of HAILCAST and the Lightning Potential Index in simulating hailstorms in Croatia in a mesoscale model – Sensitivity to the PBL and microphysics parameterization schemes

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https://doi.org/10.1016/j.atmosres.2022.106143

General Framework

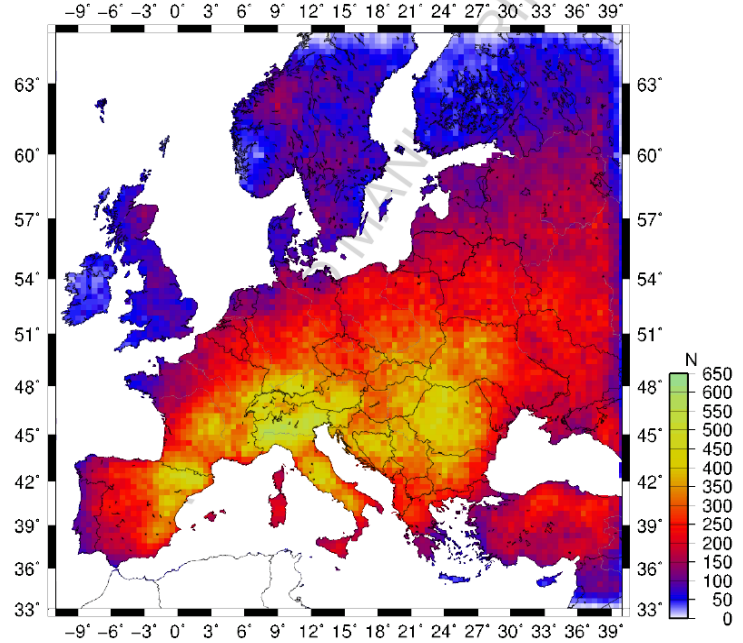
- **Hail** is a significant **severe weather hazard** in **Alpine-Adriatic region** often causing **serious crop and property damage**
- **8 selected hailstorms** occurring over the Alpine-Adriatic region are simulated using **convection-permitting COSMO (**Schär et al., 2020**) and WRF simulations**
- Boundary conditions: **ERA 5**
- **HAILCAST** and **Lightning Potential Index**

Maximum hail size

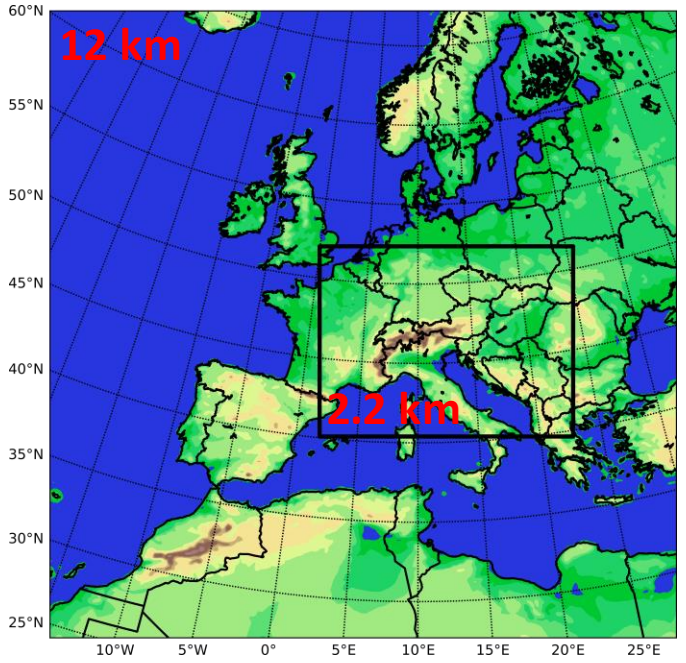
Adams-Selin and Ziegler (2016)

Potential for lightning

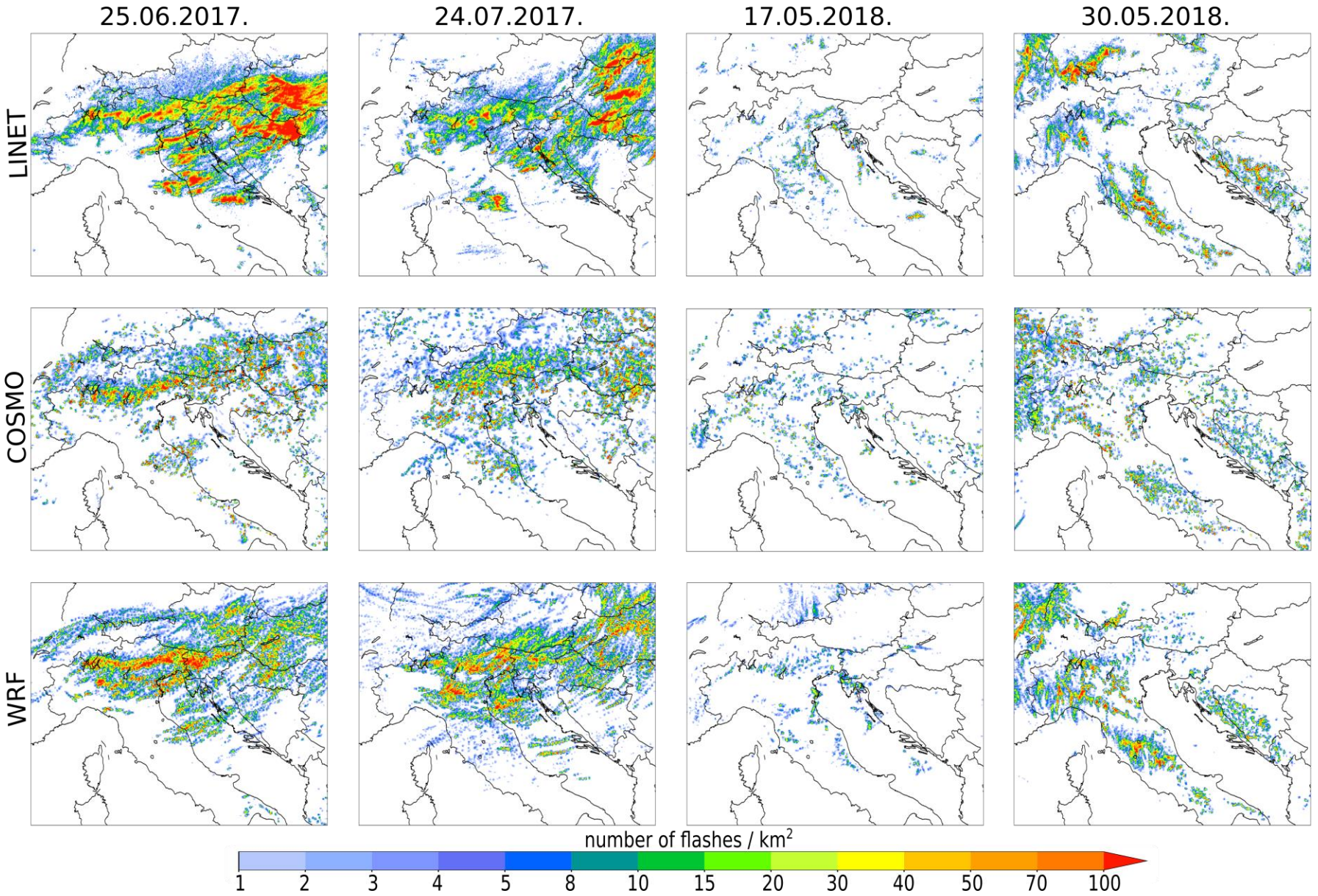
Yair et al. (2010)



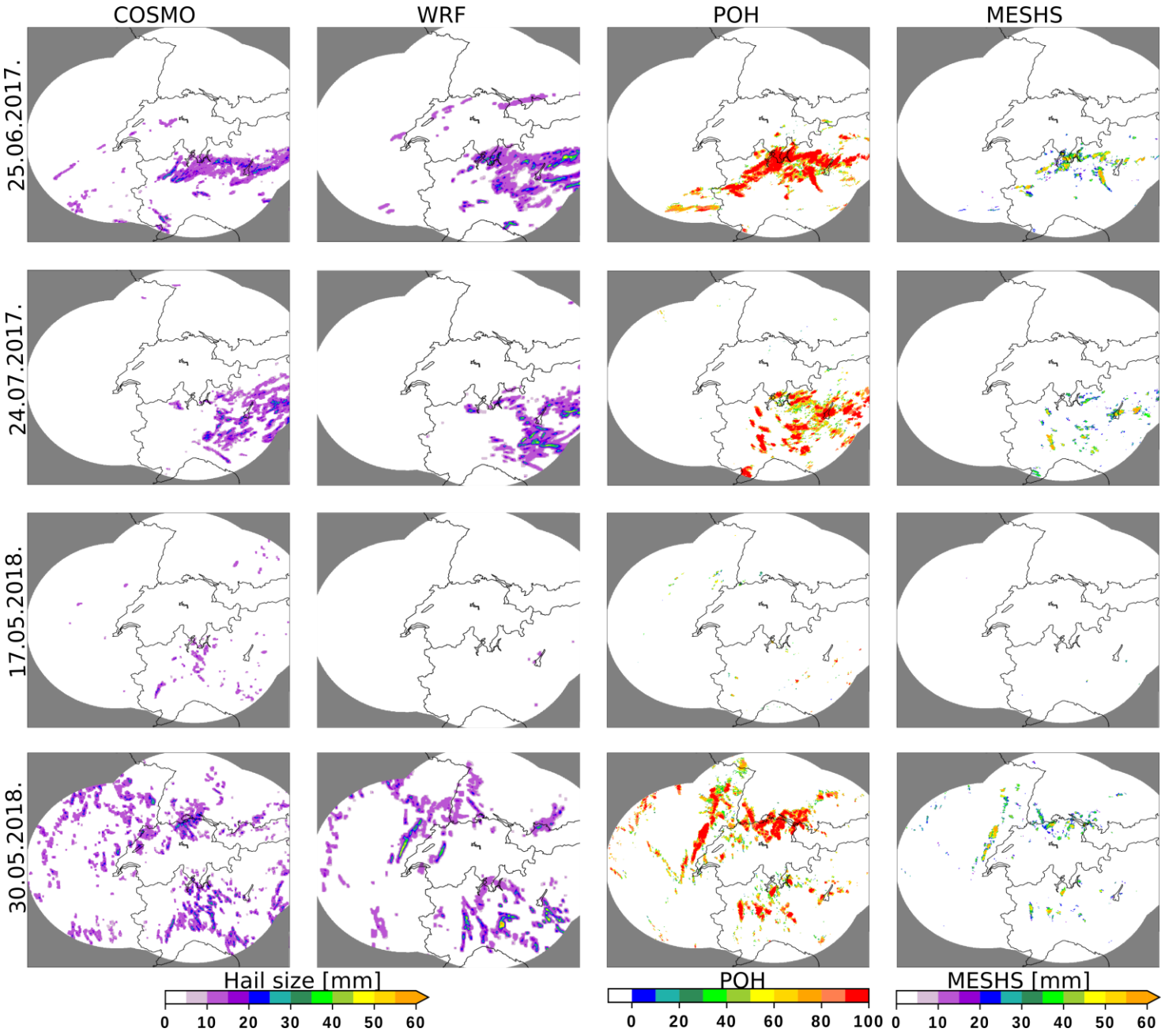
Hail event frequency (Punge et al., 2014)

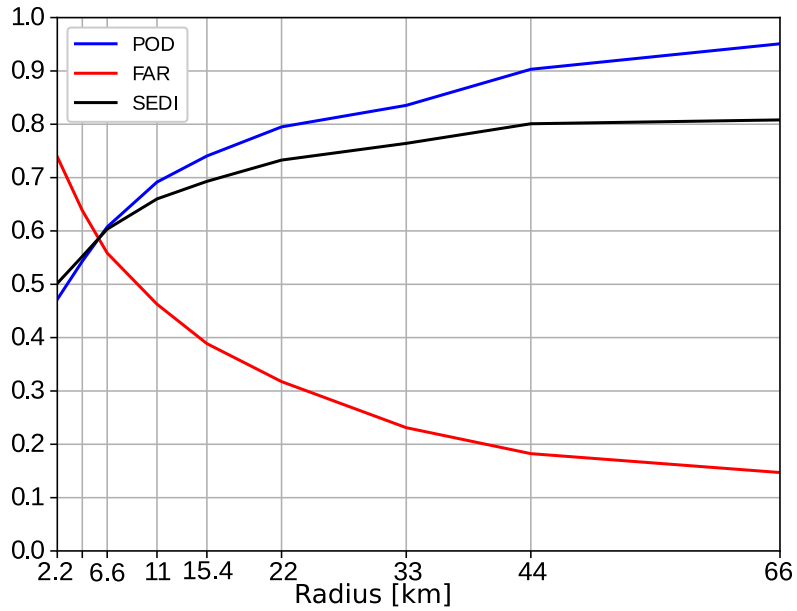


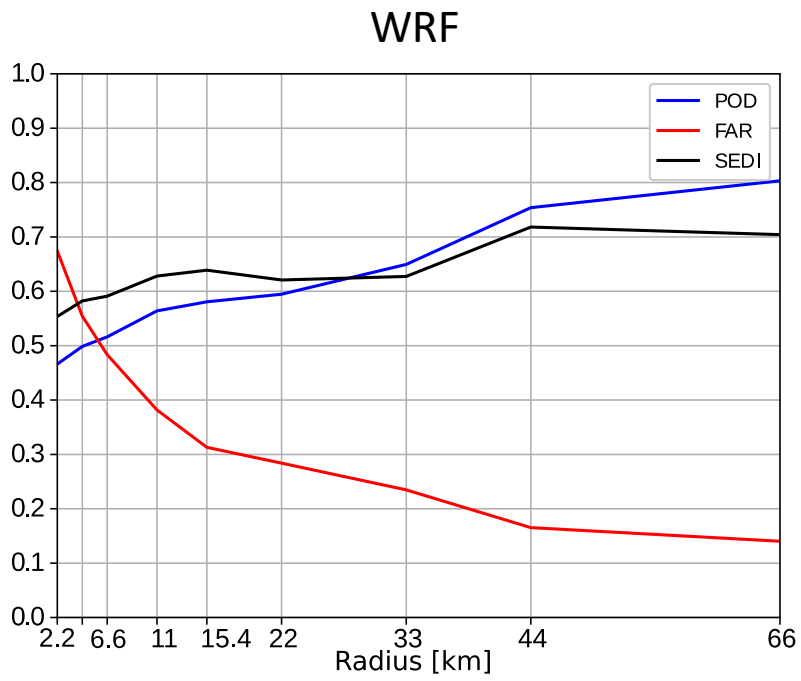
Results - Lightning



Results - Hailcast







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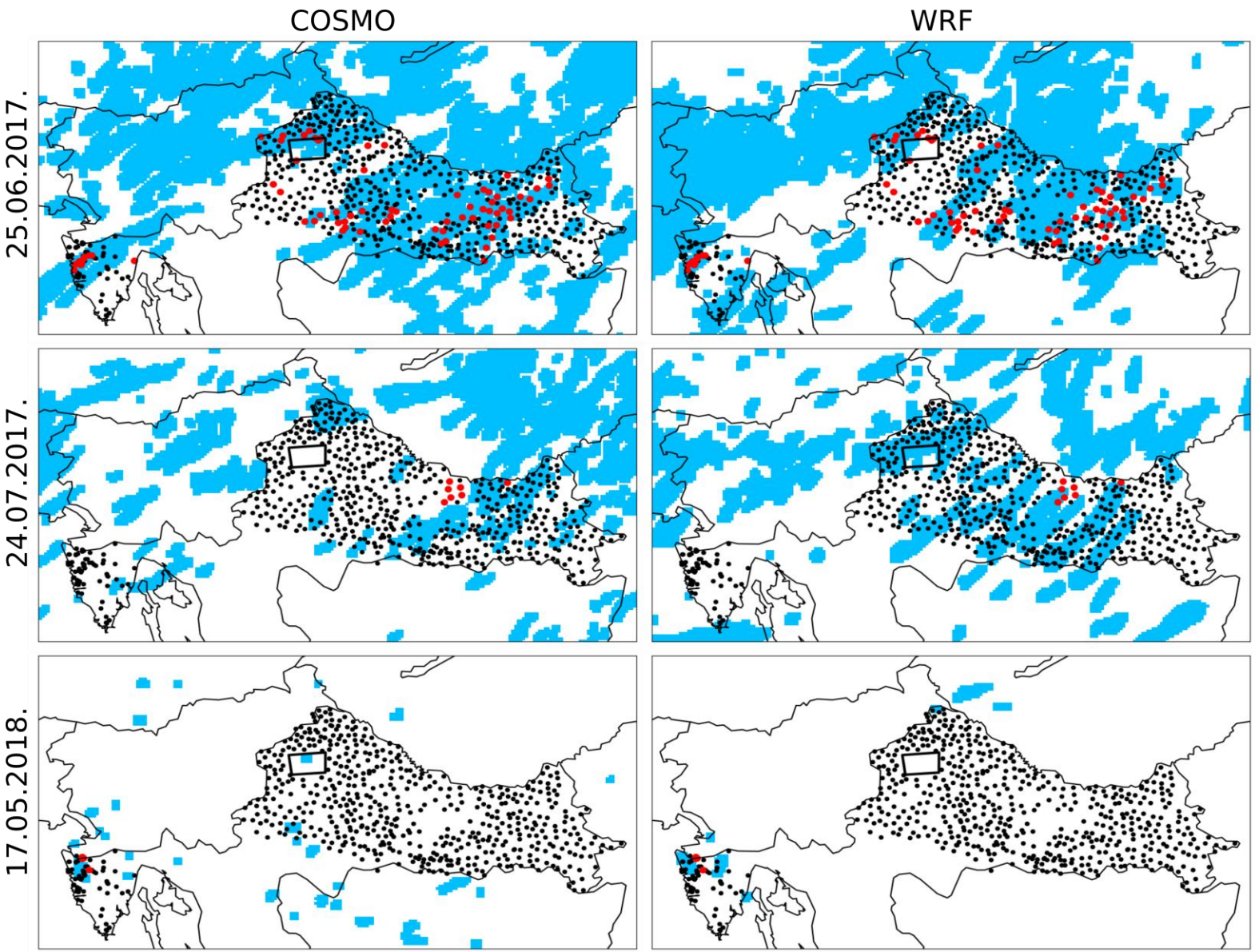

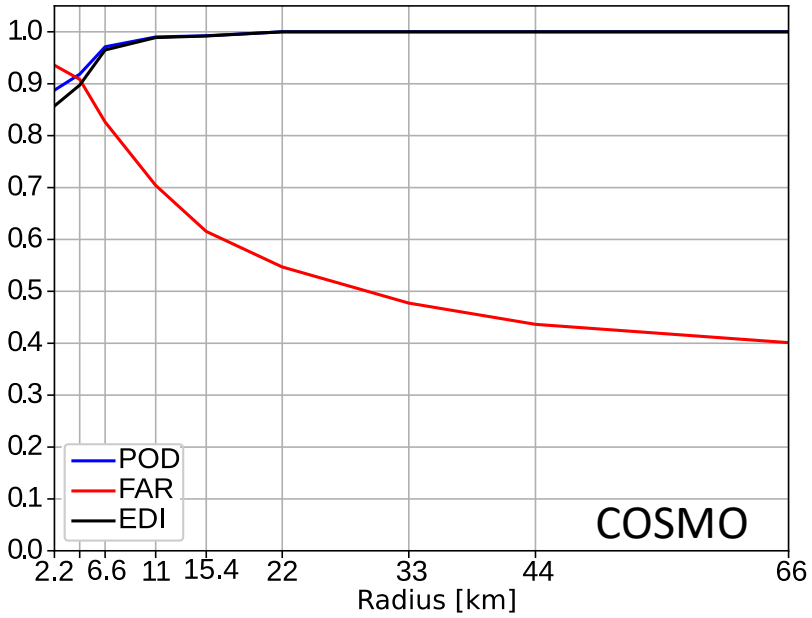

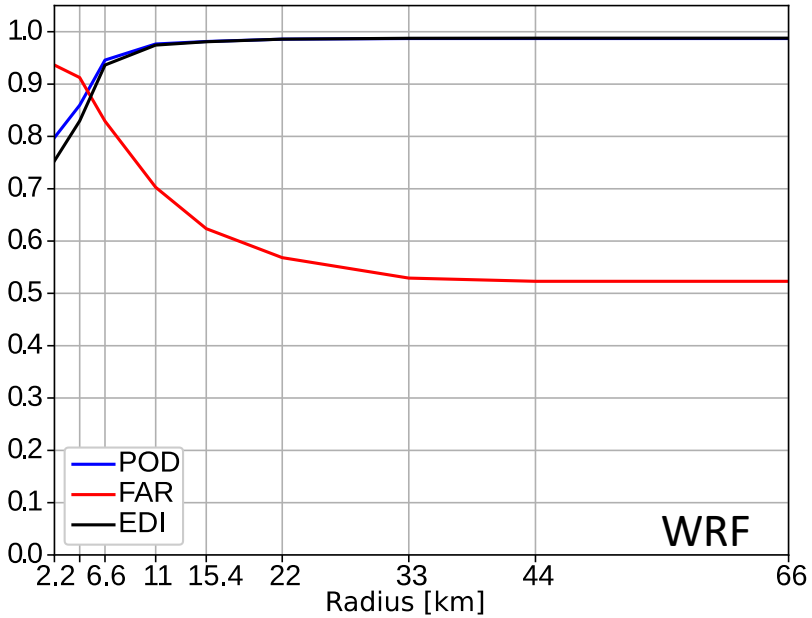

Take aways

- Overall, **lighting and hail** patterns **produced by** both **models** are **similar** and **correspond well with the observations**
- **WRF** seems to produce **less precipitation** and **smaller hail swaths** in most cases, but **larger values of LPI** and **larger hailstones**
- **HAILCAST** and **LPI** are **diagnostic tools** that **could be embedded in any high-resolution modelling system**
- The **results are promising** and indicate that both **HAILCAST and LPI could be valuable tools for real-time forecasting** or **climatological assessment** of **hail and lightning** in **present** and **future climate**

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