Heim, C., L. Hentgen, N. Ban, and C. Schär, 2021: Inter-model variability in convection-resolving simulations of subtropical marine low clouds. *J. Meteor. Soc. Japan*, **99,** https://doi.org/10.2151/jmsj.2021-062

Plain Language Summary: We analyse the set of 40-day-long kilometre-resolution global atmospheric simulations of the DYAMOND model intercomparison project over the South-East Atlantic to study how this new family of models simulate subtropical marine low clouds. Such clouds represent a critical uncertainty in climate-change projections. The simulations produce low cloud fields that look in general realistic in comparison to satellite images, but there are considerable inter-model differences. Detailed analyses show that the relevant dynamical and physical processes of the marine boundary layer are consistently represented by the analysed models, indicating that there is a potential to improve the simulated low cloud cover through model calibration.

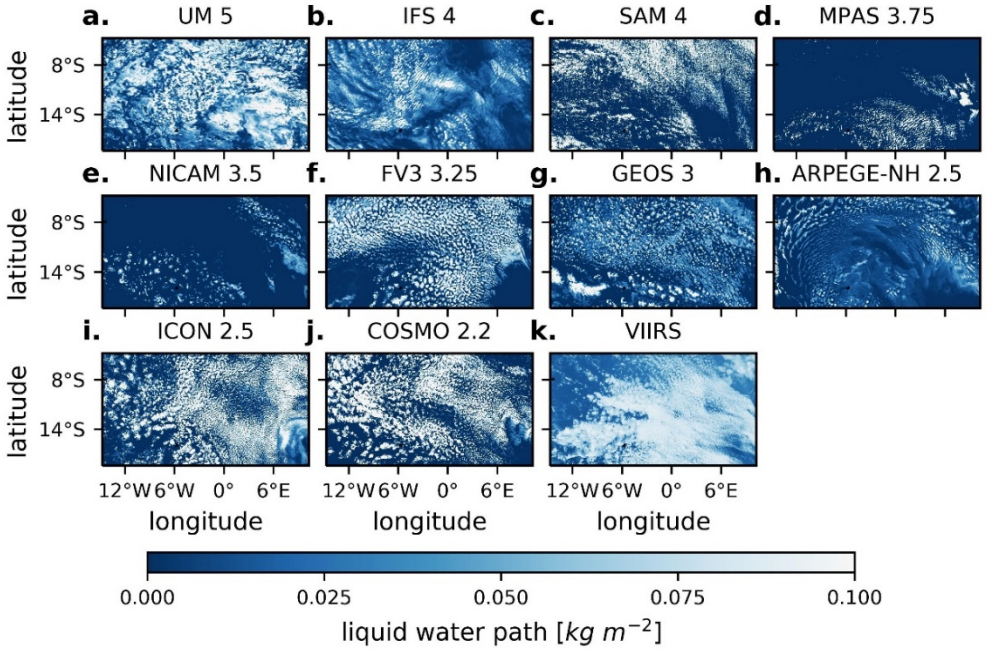

*Figure A: Snapshots of the simulated cloud field on August 14th, 2016 at 12:00 UTC over the South-East Atlantic analysis domain shown for **(a-i)** the global DYAMOND models and **(j)** the limited-area model COSMO. The simulated cloud field is visualised using the liquid water path. **(k)** The cloud field as observed by the VIIRS satellite (corrected reflectance) around noon on the same day.*

- Most models realistically simulate the low cloud field and the sharp gradients in atmospheric fields across the inversion but underestimate the albedo.
- All models overestimate outgoing longwave radiation due to underestimated free-tropospheric humidity.
- The average depth of the MBL differs considerably among the analysed models partly due to different entrainment rates. In models with stronger entrainment, the MBL grows deeper along the trade winds, leading to a higher average MBL depth. These models also tend to simulate more vigorous MBL dynamics, an increased surface latent heat flux, and an enhanced low cloud cover.
- Sensitivity experiments with the limited-area model COSMO for horizontal grid spacings between 12 km and 500 m indicate that the sensitivity with respect to resolution decreases for grid spacing below 4km. Such resolutions are thus attractive for climate studies.