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Evaluation of model predicted daytime cylces of precipitation using MSG-SEVIRI and European weather radar network (OPERA) observations

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We present the evaluation of the daylight cycle of precipitation occurrence and intensity as predicted by the Regional Atmospheric Climate Model (RACMO) using corresponding information retrieved from the Spinning Enhanced Visible and Infrared Imager (SEVIRI) on-board METEOSAT-8, and observations from the European weather radar network (OPERA).

SEVIRI is the first satellite instrument with the potential to provide accurate information on daylight cycles of precipitation. Roebeling and Holleman (2009) presented a method to detect precipitation and retrieve rain rates from SEVIRI observation during daylight hours. They showed that these retrievals agree very well with weather radar observations over the Netherlands. The objectives of this study are twofold. First, we will show the validity of the SEVIRI retrievals of precipitation occurrence and intensity over Europe, through a comparison against corresponding observations from about 100 weather radars of the OPERA network. Second, we will evaluate RACMO predicted daylight cycles of precipitation occurrence and intensity for the ocean, continental and Mediterranean climate regimes of Europe during summer. The daylight cycles of the above mentioned precipitation properties are analysed in their mean values, the time of the daylight maximum, and the daylight normalized amplitude.

The first results show good agreement between SEVIRI and OPERA precipitation properties. Part of the differences are explained by parallax shifts in the SEVIRI data, by uncertainties in the OPERA data due to differences in the distance from the weather radar to the observed location, and due to differences in methods used to calibrate and process the observations of the different weather radars. In the evaluation of precipitation intensity as predicted by the RACMO model we show that the model predicted intensities are up to 50% higher than the intensities retrieved from SEVIRI or OPERA over Europe.

In conclusion, this study shows that the SEVIRI and OPERA dataset of precipitation properties proves to be a powerful tool for evaluating parametrizations of cloud processes in weather and climate prediction models, and thus helps to increase the confidence in these models.