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Aerosol-Cloud-Radiation Interactions and their Impact on MACC/ECMWF Forecasts

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Prognostic aerosols were experimentally introduced in the ECMWF Integrated Forecasting System (IFS) as part of the GEMS project in 2005. Their representation was refined as part of the MACC project, starting in 2009.
Here, the MACC aerosol system (with sea-salt, dust, organic and black carbon, sulphate aerosols) is used to explore the impact of different levels of interactions between the aerosols and either the radiation and/or the cloud processes on radiation and precipitation fields, and objective scores.
Ten-day forecasts including fully interactive aerosols are also compared to forecasts with aerosols specified from the analysis and kept constant thereafter.
Whereas the temporal variability of the prognostic aerosols is shown to have strong local effects on surface parameters, the impact on standard meteorological objective scores is much smaller.