

The Assimilation of Clear-Sky Infrared Radiances in the HIRLAM Model

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The limited-area numerical weather prediction model HIRLAM has been adjusted to make use of the infrared (IR) radiances measured by SEVIRI on-board the MSG satellites. Therefore, the HIRLAM variational data assimilation system has been modified to take advantage of this additional observation type. Especially 4D-Var frameworks, which is one option in HIRLAM's assimilation system, are assumed to be capable of utilizing the information content provided by SEVIRI with its high temporal resolution. For the time being, only the two water vapour channels are considered. Observation impact studies have been carried out for different time periods using 3D-Var and 4D-Var. For 3D-Var the nearest SEVIRI timeslot is chosen, whereas for 4D-Var SEVIRI data from six slots are used, which are equally distributed over the 6 hour assimilation window. For these experiments, all cloud contaminated pixels had been rejected. Generally, the impact studies show a neutral to slightly positive impact of SEVIRI's clear sky infrared data on analysis and forecast fields. In all studies, the system seems to be able to use SEVIRI observations to decrease an upper-tropospheric humidity bias in the NWP model, which is found when comparing model fields and colocated radiosondes. This impact is visible up to 48 hours integration time with a decreasing magnitude. In addition, we find a slight positive impact on geopotential height and mean sea level pressure forecasts. This impact is a bit more distinct for 4D-Var and during summer. These results, as well as examples of preceding data preparation steps such as spatial thinning and quality checks, will be presented.

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