Impact of Megha-Tropiques SAPHIR radiances in T574L64 global data assimilation and forecasting system at NCMRWF

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Abstract: The Sounder for Probing Vertical Profiles of Humidity (SAPHIR) is a sounding instrument of Megha-Tropiques (Indo-French joint satellite); launched by the Indian Space Research Organization on 12 October 2011 with six channels near the absorption band of water vapour at 183 GHz. In the framework of this work, the assimilation scheme has been first modified to enable the SAPHIR radiance observations being used as additional observation type, and second, a methodology has been prepared to remove the radiance pixels significantly affected by clouds. The impact of SAPHIR radiances on analysis as well as forecasts of the National Centre for Medium Range Weather Forecasting-Global Forecast System (NGFS) at T574L64 resolution has been investigated through data assimilation. Measurements from SAPHIR are incorporated into the Gridpoint Statistical Interpolation three-dimensional variational assimilation system to provide the improved initial conditions. To find out the impact, analysis/forecast cycling experiments with and without SAPHIR radiances are performed during the period 10ï 29 November 2013. The impact of the improvement in term of root mean square error has been clearly evaluated for five parameters, namely, relative humidity, temperature, wind, geopotential height, and specific humidity. It is demonstrated that the assimilation of SAPHIR observations results in a considerable improvement for the five parameters over the global region. During the study period, two tropical cyclones (HELEN, 19ï 22 November and LEHAR, 23ï 28 November) were formed over the North Indian Ocean. Impact on specific humidity and track forecast errors of tropical cyclone are also examined. Overall, initial results show the usefulness of SAPHIR radiances in the NGFS.