Towards the assimilation of IASI radiances for sand and dust

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ABSTRACT

Desert dust are fascinating aerosols because they play an important role in climate and meteorology. They are much studied because of their abundance, ability to form clouds and ability to travel great distances (several thousands km). It is therefore important to have a good estimate of their space-time distribution. For this purpose, Météo-France uses a chemistry-transport model, MOCAGE (MOdèle de Chimie Atmosphérique de Grande Echelle), to model the emissions, transport and sinks of desert dust. Assimilation seems to be a good choice for achieving greater accuracy in this modelling. The IASI sensor was chosen for its ability to make day and night observations (because it's an infrared sensor) over a wide area, its sensitivity to desert aerosols and its revisit time of twice a day. This is why the aim of this study is in 2 times, to radiances assimilations from IASI (L1) and then the AEROIASI product (L2) (CUESTA et al., 2015), in the chemistry-transport model (MOCAGE).

This study can be answered in 4 stages. First, we have made a selection of IASI channels sensitive to desert dust. Then we selected IASI observations only under clear skies and over the oceans to limit approximations. For cloud detection, we use AVHRR on MetOp but, unfortunately, it detects high aerosol densities as clouds. To avoid rejecting them, we use the dust index and the CADS software from NWP-SAF to detect whether there is a high concentration of aerosols. Then we assimilated the right IASI observations and AEROIASI product. For assimilation, we simulate IASI spectra from MOCAGE chemistry data with the RTTOV v13 (Radiative Transfer for TOVs) radiative transfer model and then try to minimise the difference between the observations and the model. Finally, we will compare our 2 results.