Evaluation of the contribution of IASI and IASI-NG for the characterization of carbon monoxyde over the Globe.

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Carbon monoxide (CO) is a gas with a relatively average lifetime sufficient to be a good tracer in the atmosphere for pollutant plume transport. Originally CO is present in small amount in the atmosphere. Its emission comes from anthropogenic sources due to incomplete combustion of carbon-composed fuel and from biomass burning. It is also emitted naturally from other sources like biomass burning.
Numerical models are continuously developed and improved to describe the chemical state of the atmosphere as the CO fields (like MOCAGE in Meteo-France or IFS-COMPO in CAMS). The modelling of the atmosphere however can be complex involving several physical and chemicals processes.
Satellites instruments provide valuable informations which contribute to the study of the atmosphere and the monitoring of species such as CO. The measurement of Tropomi in the UV/visible spectral bands, IASI and soon IASI-NG in the IR are examples of instruments used to monitor pollutants species such as CO accurately. An optimal monitoring can be achieved by combining both numerical modelling and satellites measurement. In numerical models, mainly geophysical products (Level 2 product) are assimilated. In our study we use the same approach as in NWP where radiances (Level 1 product) are assimilated in the MOCAGE CTM.
The direct assimilation of IASI radiances was implemented into the MOCAGE model during previous studies (Emili et al. (2019); El Aabaribaoune et al. (2021)). The purpose of this presentation is to asses the potential benefit of assimilating IASI-NG radiances in a CTM rather than assimilating IASI radiance for CO. An Observing System Simulation Experiment (OSSE), a method dedicated to the evaluation of simulated observations, has been used to asses both IASI and IASI-NG benefits for CO. The OSSE environnement is built from the one defined in Vittorioso et al. (2024) and will be the basis for building our study.

We will describe the OSSE framework, as well as the impact of assimilating IASI and IASI-NG CO sensitive bands over a 3 months period over the globe. In order to improve the computational efficiency, a channel selection has also been carried out for both instruments and is evaluated against the full band assimilation.