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Several studies have been undertaken with the Météo-France 4D-Var system ARPEGE in order to evaluate the impact of bending angles from GNSS-RO receivers on the accuracy of the atmospheric state and on forecast skills.

First, Observing System Experiments (OSEs) have been performed over a 6 month period (October 2019 - March 2020). A low resolution 4D-Var system has been used where the main observation groups are individually excluded from the baseline. We will present the experiment with no GNSS-RO and highlight the major impact of their assimilation on temperature in the upper troposphere and lower stratosphere.

Forecast Sensitivity to Observation Impact (FSOI) studies have also been undertaken within the Météo-France operational 4D-Var system. We will show the contribution of the GNSS-RO measurements to the reduction of short-range forecast errors.

Lastly, the introduction of the 4,000 COSMIC-2a daily profiles in the Météo-France operational 4D-Var system has been evaluated together with the KOMPSAT-5, FY-3D and PAZ measurements. The impact of these additional data on the accuracy of the analysis and the forecast skills will be discussed using several diagnostics : Degree of Freedom to Signal (DFS), forecast skill scores and FSOI results.
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