



## **Collocating GRAS with AMSU onboard of Metop: An assessment for instrument and climate monitoring**

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Satellite observations of upper-air temperature have been dominated by the MSU and the AMSU instrument for the last several decades. These instruments flying on NOAA polar orbiting satellites were the only source for long-term temperature measurements of global coverage. The calibration of time series containing data from only one source is inevitably a demanding task. In this context, the series of METOP satellites provides unique opportunities to both meteorological and climatological applications. They carry both state-of-the-art instruments such as GRAS or IASI, and instruments which have been in use for a longer time period within the NOAA satellite program, such as AMSU or HIRS. The inherent precision of the RO technique employed by the GRAS instrument makes it a candidate for providing potential reference measurements.

Observing from the same platform gives a high number of collocated measurements from the different types of instruments, and avoids uncertainties stemming from different sampling characteristics. The nadir sounders AMSU-A, HIRS, IASI are collocated, but GRAS observes in limb sounding view either ahead of the satellite (rising occultations) or behind the satellite (setting). Most of the occultations are actually on the nadir swath, but with a few minutes ahead or delayed. The hosting of a radio occultation instrument along with nadir sounders opens an opportunity to use these continuous collocations for instrument monitoring. In particular collocations of the AMSU-A with GRAS are promising since AMSU (and previously MSU) are instruments used to generate long term data sets for climate monitoring. The AMSU-A channel primarily used for these long term data sets is peaking in the upper troposphere/lower stratosphere, thus the use of GRAS radio occultation measurements can be restricted to altitudes where no ambiguity of water vapor and temperature is present.

In this initial study, the opportunity of having the GRAS RO instrument alongside AMSU shall be used to assess the prospect of inter-calibration and instrument monitoring using GRAS. This can potentially also improve the contribution of AMSU to weather forecasting and climate monitoring.