## **GEO Atmospheric Sounder Technology Project**

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## ABSTRACT

Microwave and (sub) millimetre wave atmospheric sounders provide information on the distribution of radiation emitted by the atmosphere from which vertical profiles of temperature and humidity through the atmosphere may be obtained. Current generation of sounders are embarked on-board low Earth orbit (LEO) satellites for providing primarily meteorological data for numerical weather forecasting, and on the second level global observations for climate monitoring. Geostationary observations, unlike those from LEO satellites, have the key potential advantage to provide continuous coverage of the same region, which is essential for now casting.

A preliminary review of potential Geostationary Earth Orbit (GEO) missions, based of geophysical parameters, gave consideration to three main application areas for GEO sounding: numerical weather prediction (NTASK), climatology and now casting. In contrast to LEO microwave sounders in operation today, the proposed straw man GEO instrument uses many more channels that range in frequency from 89 GHz through to 874 GHz. Due to the large aperture size required to achieve a reasonable horizontal resolution, its use has so far been restricted to the case of Low Earth Orbit (LEO) satellites.



The earth seen in different frequency bands, and one receiver element for the 53 GHz band.

The overall objective of this activity is to develop and demonstrate enabling instrument concepts to achieve accurate observation at significant spatial resolution with microwave and (sub)millimetre wave sensors from Geosynchronous Earth Orbit (GEO). This will entail the development and demonstration of the required innovative technologies as part of a demonstrator.

Omnisys has lead an ESA study to select candidate breakthrough concepts to meet the requirements. The selected concept will be demonstrated and bread boarding of the critical technologies be performed during the second part of the study. The overall instrument concept will be presented as well as key technology development areas. In terms of performance, the specification is: 30 km resolution (400x400 map), covering the bands 53, 90, 119, 160, 183, 340, 380 GHz, and an update rate of 30 minutes. This will be accomplished with an instrument in the 200 kg / 300 W class, using 500+ (sub)millimeter receivers mounted on booms. The deployed booms stretch over an 8 meter diameter.