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GEO Atmospheric Sounder Technology Project

ANDERS EMRICH
Omnisys Instruments AB

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, but geostationary observations, unlike those from LEO satellites, have the key potential advantage to provide continuous coverage, 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.

Omnisys has lead an ESA study to select candidate breakthrough concepts to meet these requirements. The selected concept and critical technologies will be demonstrated 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 200kg / 300W class, using 500+ (sub) millimeter receivers mounted on booms, simulating an 8 meters aperture.

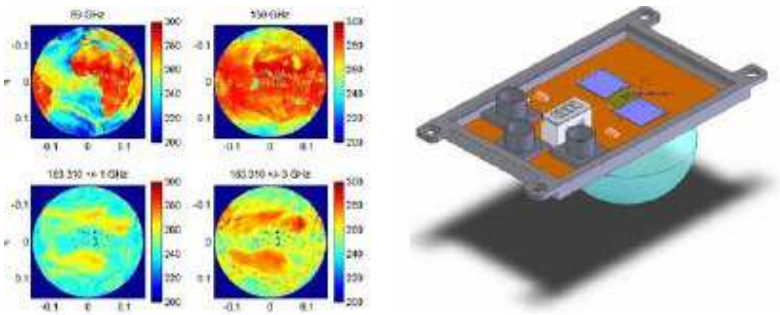

Figure 1: The earth seen in different frequency bands, and one receiver element for the 53 GHz band.