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THE ARCTIC WEATHER SATELLITE INSTRUMENT AND MISSION

Abstract

A concept and design of a very compact, low cost, microwave sounder to allow for an implementation a constellation to meet one of the most pressing issues for input to Numerical Weather Prediction (NWP), the under sampling of the 183 GHz water transition, was worked out by Omnisys during 2016-2018 under internal funds. It was based on end user requirements assembled during 10-12 years from open sources and also in direct communication with Eumetsat, ECMWF, UK Metoffice, SMHI and Chalmers University of Technology. This was proposed by Omnisys to the Artic Initiative, an ESA study lead by OHB Sweden with very positive response from many parties. Under Omnisys initiative, this was then proposed to the ESA Council meeting at Ministerial level in November 2019 by Sweden and with close to 100

The AWS Element of the European Earth Watch Programme is foreseen as a Prototype Satellite for the AWS Mission with the following objectives:

- to provide a one year in-orbit demonstration for a future, operational constellation.
- to confirm the impact of increased passive microwave soundings on NWP accuracy and nowcasting, particularly over the Arctic.
- to demonstrate a cost-effective ("new space") approach.
- to finalise, in collaboration with EUMETSAT, the technical (e.g. orbital planes, number of satellites, etc.) and programmatic details of a follow-on, operational AWS Constellation.

The objectives of the AWS Mission are:

- to complement the microwave observations from the MetOp-SG and NOAA JPSS polar-orbiting, meteorological satellites.
- to increase the frequency of observations over the polar regions.
- to contribute to improved NWP accuracy and nowcasting applications over the Arctic region.
- to contribute to improved global NWP accuracy.
- to support climate change monitoring and research activities.

The instrument design will be presented as well as the approach to quality assurance to meet cost, lead time, reliability and performance requirements. Much of the QA approach will be based on experience from the ODIN satellite project, using commercial components for much of the main instrument, a submm radiometer. It is still functioning well after 21 years of operation, clearly demonstrating the potential of using COTS and a flexible approach to QA and PA issues.

The AWS instrument and mission has successfully passed PDR and work is well on its way towards a Demonstration and Qualification Model (DQM) and a CDR by the end of 2022.