L-BAND

On the continuity of L-BAND satellite missions: new paradigms in products and applications

The European Space Agency’s (ESA) Soil Moisture and Ocean Salinity (SMOS) mission can be considered a success story from many points of view.

On the technological side, the instrument has proved to be very stable and robust, providing high-quality measurements, despite the processing complexity. On the scientific side, the SMOS data have exceeded all expectations. In particular, maps of the main mission variables (soil moisture and sea surface salinity) are currently served with higher accuracy and resolution than foreseen. Moreover, new emerging applications of high societal impact are currently being derived and exploited from SMOS data. By understanding the value and uniqueness of the L-band radiometry information content, ESA and NASA have recently launched several initiatives on the continuity of passive low-frequency microwave missions. While the possibility of a SMOS follow-on is being openly discussed, a gap-filler, i.e., the Chinese Ocean Salinity mission, has already been approved to be launched around 2019.

One of the most important emerging applications of L-band radiometers comes from their ability to provide sea ice thickness estimates below 0.7 meters, i.e., thin ice. Although thin ice was considered exceptional (and seasonal) a few decades ago, nowadays the presence of thin ice can represent up to 80% of the Arctic sea ice. Moreover, traditional cryosphere satellite radar missions are unable to provide ice thickness estimates below 1 meter. The precise knowledge of

sea ice is crucial to improve climate model forecasts and to assess the impact of the current Arctic sea ice melting trend on Europe's climate. It is thus strategic for Europe and Spain to have continuous, good quality monitoring of the Arctic thin ice, which can only be provided by L-band radiometers like SMOS and the Soil Moisture Active Passive (SMAP) mission.

Other emerging applications include the estimation of extreme winds, the detection and monitoring of serious threats for agriculture and forestry resources, and new research on the impact of the slow dynamics of ocean salinity on Earth climate.

In the L-BAND project, we will further exploit the information content of L-band radiometers in order to ensure the successful exploitation of future missions. In particular, we will develop new products for applications of high economic and societal impact, and that will demonstrate the need for L-band continuity Spain is strategically very well positioned for a SMOS follow-on mission, since both the industry and the academia had a main role in the inception, design, construction, and operations of SMOS. With the L-BAND project, we aim at consolidating the leading role of Spain in the development and operations of any future mission exploiting L-band capabilities.

Partners

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Dates

01/01/2008 – 31/12/2020