ABSTRACT SUBMISSION

SUBMIT TO: Ocean Vector Wind Science Team Meeting

TITLE: SMOSops secondary payload assessment: optimal FPIR radiometer configuration for sea surface roughness characterization at L-band.

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ABSTRACT:

At L-band, the brightness temperature (Tb) over the ocean is mainly modulated by three geophysical variables: the sea surface salinity (SSS), the sea surface temperature (SST), and the sea surface roughness. The latter is the largest contributor to the deviations in Tb from the flat sea model. Moreover, pre-launch experiments/campaigns of the ESA Soil Moisture and Ocean Salinity (SMOS) L-band radiometer (i.e., Microwave Imaging Radiometer by Aperture Synthesis – MIRAS) show that sensitivities to surface roughness and SSS are of the same order. As such, additional information on the sea surface roughness is essential for an L-band radiometer to meet the SSS accuracy requirements (i.e., 0.1 psu for monthly 2° x 2° gridded SSS product). Unlike Aquarius, which carries a scatterometer for roughness estimation as secondary payload, SMOS will only carry the MIRAS L-band radiometer and, as such, auxiliary roughness information will be needed in order to try to achieve the retrieved SSS accuracy requirement.

Within the context of the SMOS follow-on mission (SMOSops), the Chinese Centre for Space Science and Applied Research (CSSAR) has offered to include, together with MIRAS, an X-band fully (or dual) polarized conical antenna beam radiometer, i.e., the Fully Polarimetric Interferometric Radiometer – FPIR, to observe sea surface roughness at about 100-km resolution.

The goals of the ESA-funded short scientific study presented are to review whether the frequency selected for FPIR (X-band) is the optimum one and whether full-pol

mode is strictly necessary. Only bands with primary allocation for remote sensing shall be considered in such trade-off. Bands with shared or secondary allocation shall not be studied. This study shall trade off a dual polarisation X-band instrument against a full polarisation one, as the former would bring considerable hardware implementation advantages. Furthermore, the study has been extended to account for several other aspects in the FPIR configuration which may have a significant impact in the optimization of the SMOSops SSS retrievals. These include the incidence angle configuration, the dual frequency consideration, and the spatial resolution. The results of this study will be presented at the meeting.