PRELIMINARY RESULTS OF THE PASSIVE ADVANCED UNIT SYNTHETIC APERTURE (PAU-SA)

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1. INTRODUCTION

The Passive Advanced Unit (PAU) for ocean monitoring is a new instrument that combines in a single receiver and without time multiplexing a microwave radiometer at L-band (PAU-RAD) and a GPS-reflectometer (PAU-GNSS/R), which, in conjunction with an infra-red radiometer (PAU-IR), will simultaneously provide the sea surface temperature and –more important– the sea state information needed to accurately retrieve the sea surface salinity. In [1] a general overview of the PAU system was analyzed. A real aperture version of it (PAU-RA) is described in [2]. A synthetic aperture version of it (PAU-SA) is described [3]. It is composed by Y-shaped array of 8 antennas per arm plus one in the center for the synthetic aperture radiometer. The reflectometer part uses and independent receiver for GNSS-R applications. The main purpose of PAU-SA is to test some possible improvements over the current Microwave Imaging Radiometer by Aperture Synthesis (MIRAS) instrument design for future Soil Moisture and Ocean Salinity operational system (SMOSops) missions.

2. PAU-SA'S CONTRIBUTIONS

These contributions basically focus on the replacement of analog by digital subsystems such as: I/Q down-conversion, digital filtering and power estimation etc. Due to the large number of these elements in the instrument, it is recommended to obtain quasi-perfect matching, mass reduction and no temperature and frequency drifts. All these errors can be neglected using digital techniques. Moreover, PAU-SA provides others improvements such as: non-sequential full-polarization receivers design, a dummy antenna at the end of each arm to improve the inter-antenna pattern similarity, reduction in the antenna spacing to increase the alias-free Field of View, use of a centralized reference clock with internal Local Oscillator (LO) generated in each receiver to minimize offsets, and the potential use of Pseudo-Random Noise (PRN) signals instead of a centralized noise source for calibration purposes [4].

3. TESTS ON INSTRUMENT PERFORMANCE

This paper will present the results of the integration of the PAU-SA instrument: its calibration, the stability (or drifts), the radiometric sensitivity and the angular resolution, as well as some preliminary imaging results using or not the so-called Flat Target Transformation (FTT) [5].

4. REFERENCES

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