



## **TELAER: a multi-mode/multi-antenna interferometric airborne SAR system**

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The present contribution is aimed at showing the capabilities of the TELAEER airborne Synthetic Aperture Radar (SAR) system recently upgraded to the interferometric mode [1].

TELAER is an Italian airborne X-Band SAR system, mounted onboard a LearJet 35A aircraft. Originally equipped with a single TX/RX antenna, it now operates in single-pass interferometric mode thanks to a system upgrading [1] funded by the Italian National Research Council (CNR), via the Italian Ministry of Education, Universities and Research (MIUR), in the framework of a cooperation between CNR and the Italian Agency for Agriculture Subsidy Payments (AGEA). In the frame of such cooperation, CNR has entrusted the Institute for Electromagnetic Sensing of the Environment (IREA) for managing all the activities, included the final flight tests, related to the system upgrading.

According to such an upgrading, two additional receiving X-band antennas have been installed in order to allow, simultaneously, single-pass Across-Track and Along-Track interferometry [1]. More specifically, the three antennas are now installed in such a way to produce three different across-track baselines and two different along-track baselines. Moreover, in the frame of the same system upgrading, it has been mounted onboard the Learjet an accurate embedded Global Navigation Satellite System and Inertial Measurement Unit equipment. This allows precise measurement of the tracks described by the SAR antennas during the flight, in order to accurately implement Motion Compensation (MOCO) algorithms [2] during the image formation (focusing) step.

It is worth remarking that the TELAEER system upgraded to the interferometric mode is very flexible, since the user can set different operational modes characterized by different geometric resolutions and range swaths. In particular, it is possible to reach up to 0.5 m of resolution with a range swath of 2km; conversely, it is possible to enlarge the range swath up to 10 km at expenses of a degradation of the geometric resolution, which in this case becomes equal to 5m.

Such an operational flexibility, added to the above discussed single-pass interferometric capability and to the intrinsic flexibility of airborne platforms, renders the TELAEER airborne SAR system a powerful instrument for fast generation of high resolution Digital Elevation Models, even in natural disaster scenarios. Accordingly, this system can play today a key role not only for strictly scientific purposes, but also for the monitoring of natural hazards, especially if properly integrated with other remote sensing sensors.

[1] S. Perna et al., "Capabilities of the TELAEER airborne SAR system upgraded to the multi-antenna mode", In Proceedings IGARSS 2012 Symposium, Munich, 2012.

[2] G. Franceschetti, and R.Lanari, Synthetic Aperture Radar Processing, CRC PRESS, New York, 1999.