

## **A new airborne multi-mode and multi-band low frequency radar**

G. Alberti, G. Palmese, L. Ciofaniello, D. Califano, C. Papa, G. Salzillo, S. Mattei, D. Adirosi  
*CO.R.I.S.T.A., Consortium for Research on Advanced Remote Sensing Systems viale J.F. Kennedy 5, 80125 Naples, Italy*  
F. Longo, C. Facchinetti, R. Formaro  
*Agenzia Spaziale Italiana, Viale Liegi 26, 00198 Roma - Italia*

In recent years a new class of airborne radar systems using low frequency have emerged. They are sounder working at VHF/UHF band and SAR (Synthetic Aperture Radar) that are able to provide high-resolution images at P and L band. Behind these developments lie technological advances in antenna design, low noise amplifiers, bandpass filters, digital receiver technology as well as new processing algorithms. The combination of low frequency and high bandwidth, creates a variety of military and civilian applications, ranging from the detection of targets concealed by foliage and/or camouflage or buried to forestry applications, biomass measuring, archeological and geological exploration.

Following these potentialities, the Italian Space Agency promoted the development of a new multi-mode and multi-band airborne radar system, that can be considered also a “proof-of-concept” for future dedicated spaceborne missions. The research consortium CO.R.I.S.T.A. is in charge of the design, development and flight validation of such system, that is the first airborne radar entirely built in Italy.

The radar is able to work either as nadir-looking sounder at VHF band (163 Mhz) and as side-looking imager (SAR) at P band with two channels at 450 MHz and 900 MHz.

The system uses a very flexible architecture due to the implementation of a direct digital synthesis (DDS) of transmitted signal and of stepped-frequency technology that allows the transmission of large bandwidth and facilitates multiple polarizations. Radar is controlled and timed by a powerful control unit based on FPGA technology that is also able to store all data with high data rate directly on SATA disks.

Some flight campaigns have been performed on south Italy by using an helicopter of Aeronautica Militare.

The present work describes the system and the analysis of expected performance and shows some preliminary results obtained during the flight validation campaigns.