

IAF EARTH OBSERVATION SYMPOSIUM (B1)
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Author: Mr. Rakesh Kumar Bhan
Indian Space Research Organization (ISRO), India, rakeshbhan@sac.isro.gov.in

Dr. Soumyabrata Chakrabarty
Space Applications Centre (ISRO), India, soumya@sac.isro.gov.in
Mr. V Manavalan Ramanujam
Space Applications Centre (ISRO), India, vmanavalan@sac.isro.gov.in
Mrs. TJVD Suneela
Space Applications Centre (ISRO), India, suneela@sac.isro.gov.in
Mr. Manish Kumar
Space Applications Centre (ISRO), India, manish@sac.isro.gov.in
Mrs. Harshita Tolani
Space Applications Centre (ISRO), India, harshita@sac.isro.gov.in
Mrs. Shruti Sinha
Space Applications Centre (ISRO), India, shrutikavdia@sac.isro.gov.in
Mrs. Shalini Gangale
Space Applications Centre (ISRO), India, shalinisethia@sac.isro.gov.in
Mr. Rajeev Jyoti
Space Applications Centre (ISRO), India, rajeevjyoti@sac.isro.gov.in
Mr. Tapan Misra
Indian Space Research Organization (ISRO), India, misratapan@sac.isro.gov.in

DUAL FREQUENCY SYNCHRONIZED L&S BAND AIRBORNE SAR SYSTEM

Abstract

The Indian Space Research Organisation (ISRO) and the National Aeronautics and Space Administration (NASA) are jointly developing a Dual Frequency (L&S Band) Synthetic Aperture Radar called NASA-ISRO Synthetic Aperture Radar (NISAR) with a repeat cycle of 12 days, in which, ISRO is developing S-Band Radar. Both the radars are synchronized at 10MHz basic clock, transmit pulse and return echo sampling clock. Lot of new technological elements including hardware, processing algorithms and applications are being developed for NISAR mission. As a pre-cursor to the NISAR mission, ISRO planned a dual band (L&S) airborne SAR which is similar to NISAR in terms of hardware organization and synchronization system (except antenna). This dual band airborne SAR system is providing analogue data products to the science community. It is a fully polarimetric stripmap SAR which operates at a nominal height of 8000mts and can be operated in single, dual, compact, quasi-quad and full polarimetry modes. It has a wide incidence angle coverage from 24deg-77deg with swath coverage from 5.5km to 15 km. Apart from simultaneous imaging operations, this system can also operate in standalone L or S modes. Antenna for this SAR is rigidly mounted to the aircraft, whereas, motion compensation has been implemented in the software processor. Data products for this airborne SAR is available in slant and ground range azimuth dimensions and geocoded in HDF5/Geotiff formats. Primary science requirements are (a) Development of tools, techniques and methods for applications of SAR data for Management of natural resources, Enhanced crop and vegetation monitoring, Ecosystem dynamics study, Coastal process monitoring, Ocean parameter retrieval, Land geo-physical parameter retrieval, Geological

applications, Urban applications, Weather and hydrological forecasting and Natural disaster management.
(b) Development of schemes for calibration and validation of algorithms and data products, extraction of geophysical parameters from the calibrated images and ground truth data and validation of the estimated geophysical parameters. This paper provides details of L&S band airborne SAR system design, hardware synchronization and initial results of imaging and calibration activities.