Assessment of EOS-04 (RISAT-1A) data calibration

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Radar imaging SATellite (RISAT-1A), also known as Earth observation satellite-04 (EOS-04), is a follow-on mission of India's first indigenously developed space-borne C-band synthetic aperture radar (SAR) on-board RISAT-1 satellite. This article provides a description of the post-launch calibration and data quality evaluation of EOS-04 launched on 14 February 2022. Calibration devices (corner reflectors) of different shapes and sizes were deployed at Ahmedabad and Amrapur calibration sites in Gujarat, India from 2 to 24 April 2022, and their response in the EOS-04 data was used to assess the radiometric and polarimetric calibration. The results of the analysis showed satisfactory radiometric and polarimetric data quality. Geolocation accuracy was assessed using the ground-surveyed position of the corner reflectors and was found to be in accordance with the specified values of less than 50 m.

Keywords: Cross talk, EOS-04, geometric calibration, polarimetric calibration, radiometric calibration.

Introduction

additional mode) as in RISAT-1, several programmability features are introduced in EOS-04, which enhances payload operation flexibility in several mission scenarios. Owing to its several programmability features, ScanSAR mode in EOS-04 can be operated with different number of beams (maximum 12 beams). A new 8-beam MRS mode is introduced according to the user requirements, which is being used for systematic coverage. This improvement helps in reducing revisit time to 17 days from 25 days. The payload has been successfully operating since launch and all major modes are operated. The details of the EOS-04 sensor are provided in the report by the Space Applications Centre (SAC)[1].

Since its launch in February 2022, calibration campaigns have been carried out to generate well-calibrated data products that can meet the accuracy requirements for science applications. Multiple external calibration campaigns for each imaging mode were carried out from 2 to 24 April 2022. Point targets such as corner reflectors (CRs) and active radar calibrator (ARC) were deployed at Ahmedabad and Amrapur calibration sites in Gujarat, India synchronous to