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NASA Aircraft-Satellite Instrument Calibration Project

by

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Ground-based prelaunch calibration of satellite instruments usually is not adequate to provide an accurate characterization of the in-orbit performance of a satellite instrument. This is because the ground calibrations may not simulate the in-orbit environment observations of the satellite sensor, or because the sensor characteristics have changed during launch and in-orbit operations. One technique to obtain a meaningful in-orbit calibration of satellite sensors is to acquire simultaneous observations of an Earth scene with the satellite and a well calibrated aircraft or shuttle sensor which has similar characteristics to the satellite sensor. This is a direct in-orbit calibration technique and is usually called vicarious calibration. The experiment with the control instrument must occur above the sensible atmosphere as measured by the satellite sensor to provide a useful improvement to the calibration of the satellite sensor.

NOAA/NESDIS initiated a vicarious aircraft calibration program in the early 1980's. The instrument is used primarily to calibrate the AVHRR and VISSR instruments on the NOAA operational satellites, but has also been used to check the performance of the Coastal Zone Color Scanner (CZCS) instrument on the Nimbus 7 platform. The program has recently been transferred to the Laboratory for Oceans. The primary control instrument is a

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double Ebert monochromator with a silicon photodiode detector. It is currently set to scan from 400 to 1040 nm, and flies on the NASA U-2 and ER-2 aircraft from the Ames Research Center. The spectrometer has been returned to our laboratories for requalification and careful documentation of its configuration and performance. The instrument will be tested for calibration stability at our large aperture integrating sources, and checked for operational integrity in our environmental vacuum chamber. An engineering flight is scheduled for the Summer on the Wallops Flight Facility T-39 aircraft, and operational vicarious missions will be reestablished in the Fall from Ames.

The project is assigned to Goddard under the terms of a joint NASA-NOAA Memorandum of Understanding, and NOAA personnel continue to provide the primary interface for the project with the Ames flight mission staff. The NASA portion of the mission is funded through the NASA Headquarters Flight Projects Branch.