ESA Calibration/Validation Report for CEOS WGCV 20, Status and Plans.

1 Introduction

The reporting period for the status report is from the last meeting of the CEOS Working Group on Calibration and Validation in May 2002 (WGCV 19) to the next meeting on 14-16 February 2003. Calibration and validation activities of the European Space Agency during this period included routine calibration, performance monitoring and algorithm development for ERS-2, commissioning of Envisat, planning of calibration & validation for future missions and airborne simulation campaigns.

2 Missions in Orbit

2.1 ERS-2

The high quality of the ERS data products under reduced attitude stability was maintained with the exception of the scatterometer wind and SAR interferometry products which are very sensitive to yaw. Through modifications in the attitude control software as well as in the ground processing full performance of the scatterometer data quality has been achieved. It is planned to stretch ERS operation as much as possible to avoid gaps in data provision between ERS, Envisat and METOP.

2.2 ENVISAT

ESA's advanced Earth observing satellite Envisat was successfully launched on 1 March 2002 by an ARIANE-V rocket. Its calibration programme has been successfully completed. The first phase of the validation programme was completed. Results were presented at the Envisat validation workshop in December 2002. Release and distribution of data products has begun. For further details the reader is referred to the Envisat web site. http://envisat.esa.int/

2.3 MSG

Meteosat Second Generation (MSG) was launched on 28 August 2002 by an ARIANE-V rocket. The first SEVIRI image was presented on 28 November and the first GERB Image on 12 December 2002. Eumetsat is carrying out the validation programme. See also http://www.eumetsat.de/

2.4 PROBA

PROBA (PROject for On-Board Autonomy) is a highly manoeuvrable small satellite. It was successfully launched into a sun-synchronous polar orbit on 22 October 2001. For Earth Observation the main scientific interest of this mission relates to the use of the imaging spectrometer CHRIS (Compact High-Resolution Imaging Spectrometer) on-board PROBA. The data acquisition plans include vicarious calibration sites (see http://www.rsacl.co.uk/chris/). The satellite-commissioning phase has been completed on 5 April 2002. The CHRIS instrument is currently subject to in-orbit commissioning but scientific data acquisition has also been initiated. Following the achievements during the first year of operation it has been decided to extend the project initially by another year.

3 Future Missions

3.1 METOP

METOP is a joint project of Eumetsat and ESA. Eumetsat is currently drafting the METOP calibration and validation plan (See also http://www.eumetsat.de and http://www.esrin.esa.it/esa/progs/METOP.html)

3.2 Earth Explorer Missions

The following missions are part of ESA 's Earth Explorer Programme. (See http://www.esa.int/livingplanet/). Their calibration and validation requirements are currently under review. Airborne campaigns are planned for these missions as a proof-of-concept experiment or to test calibration/validation approaches. Following the issue of a worldwide announcement of opportunity for international collaboration on calibration and validation a team of principal investigators has been formed to execute the calibration and validation programme.

- GOCE -- http://www.esa.int/export/esaLP/goce.html
- CryoSat -- http://www.esa.int/livingplanet/cryosat
- ADM-Aeolus -- http://www.esa.int/livingplanet/aeolus
- SMOS -- http://www.esa.int/livingplanet/smos

Other future missions are currently being studied: EarthCARE, SPECTRA, WALES, ACE+ EGPM, Swarm and SWIFT. See http://www.esa.int/export/esaLP/futuremissions.html

3.3 Earth Watch Missions

Earth Watch mission are operational missions under development by ESA as part of the Earth Observation Programme. Pre-launch campaign and validation requirements for these are currently under review. A consolidation phase has started for a fire-monitoring mission FUEGOSAT and an imaging radar mission called TerraSAR.

4 ESA Simulation Campaigns

The main objective of the ESA simulation campaigns is to provide support for the preparation of future space programmes and their users (see http://www.esa.int/livingplanet/). Currently high priority is given to pre-launch and validation campaigns for the Earth Explorer Missions and Earth Watch Missions. During the reporting period five new campaigns for the Earth Explorers and Earth Watch programme were initiated.

4.1 AIRFLEX (Airborne Fluorescence Experiment)

This campaign is a follow-on of the successful SIFLEX campaign (see WGCV 19). It is planned to fly an airborne interference-filter Airborne Multi-Wavelength Passive Detector (APMFD) during a verification flight in June 2003 in Oberpfaffenhofen, Germany and a scientific campaign in Barrax, Spain in September 2003.

4.2 ECAV-J 2003 (EarthCARE Algorithm Verification Campaign in Japan)

The objectives of this campaign are to measure and characterise Cirrus properties, to validate synergetic lidar/radar retrieval algorithms for the EarthCARE Earth Explorer mission and to perform measurements of low cloud modifications by the continental airflow. The radar/lidar measurements are to be made from a Gulfstream-II aircraft while the cloud particle in-situ measurements are to be made by a Nakanihon B200 King Air aircraft. A third aircraft (Cessna 404) will be performing predominantly aerosol related measurements. The planned data acquisition window is from 15 March to 16 April 2003.

4.3 Cryovex (CryoSat Validation Experiment)

The first pre-launch CryoSat Validation Experiment (Cryovex) is planned in April 2003. This campaign is carried out in collaboration with NASA and involves the German research vessel Polarstern, Electromagnetic Sea ice thickness measurements, lidar measurements and radar measurements.

4.4 SMOS Calibration and Validation

A tower-based radiometer campaign is being planned in the Antarctic to establish the suitability of the Dome-Concordia area for external calibration of the SMOS L-band radiometer. To get

access to the site a science proposal is being prepared in collaboration with the ESA Life Sciences Department. The planned data acquisition window is from 1/12/03 to 31/3/04.

4.5 TerraSARSim (TerraSAR Simulation)

A multi-frequency airborne radar campaign is planned in February to support TerraSar orbit selection and algorithm development. A suitable test site in the Jordan Valley has been identified offering different land cover types, climate zones and crop growth stages. This facilitates the investigation of short-term (typically one hour to one day) variations of radar signatures at X-, C-, and L-band.