ESA Calibration/Validation Report for CEOS WGCV 21, 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 February 2003 (WGCV 20) to the next meeting on 15-17 October 2003. Calibration and validation activities of the European Space Agency during this period included routine calibration, performance monitoring and algorithm development for ERS-2 & 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. It is planned to stretch ERS operation as much as possible to avoid gaps in data provision between ERS, Envisat and METOP. See also below under Envisat.

2.2 ENVISAT

ESA's advanced Earth observing satellite Envisat is now in its operational exploitation phase following successful calibration and initial validation programmes. Data were released for distribution. The quality of Envisat 's data products is being ensured with the support of data quality working groups for each instrument as well as with validation teams for level-2 data products (geophysical variables). The scientific and commercial exploitation of ERS and Envisat 's data is being reviewed during a series of dedicated workshops. Recent ERS and Envisat 's achievements will be at the Envisat/ERS symposium planned on 6 to 10 September 2004 in Salzburg, Austria. 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 project has completed its first full-scale science programme. A further extension of the operations during 2004 is envisaged. CHRIS data were acquired in conjunction with MERIS, MSG and airborne sensors for cross-calibration and for studying spatial scaling effects. Radiometric biases found between MERIS and CHRIS are currently being analysed and discussed in IVOS.

3 Future Missions

3.1 METOP

METOP is a joint project of Eumetsat and ESA. For details on calibration and validation see 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.

- 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 four new campaigns for the Earth Explorers and Earth Watch programme were initiated.

4.1 SPARC

The objectives of SPARC (SPectra bARrax Campaign) are to support the Earth Explorer Spectra Phase A study in particular by Validation of the BRDF forward function, of Spectra geo-physical parameter retrieval algorithms and of Atmospheric correction and co-registration algorithms for multi-view images. The experiment took place July 12 – 14, 2003. Many different complementary data sets were collected including satellite acquisitions (CHRIS/Proba, MERIS, SEVIRI), DLR airborne acquisitions (HyMAP, ROSIS), atmospheric profiling (radiosondes, sun-photometers, Lidar) and Field soil and vegetation measurements (radiometry, LAI, fCover, Chlorophyll, etc.). Over 4000 LAI samples were collected, chlorophyll, water content, leaf biomass were derived for all studied crops and atmospheric data (radiosondes), solar irradiance and aerosols Lidar data were collected for each satellite/airborne overpass. The DLR plane acquired two HyMAP and four ROSIS flight lines. Satellite data were acquired during three overpasses of CHRIS, one of MERIS and one of SEVIRI. First results will be presented in a progress meeting in November in Valencia, Spain.

4.2 EgyptSAR

EgyptSAR is a French led campaign in 2004 to study radar surface penetration at L-band and P-band. The objectives for this activity include the exploration of application potential for Geology, Archaeology, Hydrology and mine detection. This campaign contributes to spaceborne radar applications development at L- and P-band the main issues being the impact of surface penetration in particular on DEM generation as well as the development of hydrological and of geological applications.

4.3 Cecina

This ESA campaign is in response to an airborne Remote Sensing support request from the Cecina Project led by the Internal Water Protection Service (TAI) and the Waste Management and Decontaminations Service (GRB) of the Italian Ministry of Environment. Detailed user

requirements are currently being discussed. Cecina is a pilot site for the EU Water Framework Directive (see http://europa.eu.int/comm/environment/water/water-framework/index_en.html).

4.4 TREESAR

In support of future radar-based estimation of forest biomass L-band and P-band airborne radar images are being acquired over a forest test site east of Munich, Germany. This campaign called TREESAR supports the study of time decorrelation of radar echoes at L-band which could shed some light on the feasibility of forest biomass determination using L-band interferometry with repeat intervals in the order of 10 – 20 days. The results will be compared with simultaneous P-band acquisitions.