



First test results of the airborne dispersive pushbroom imaging spectrometer APEX

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APEX, ESA-Prodex “Airborne Prism Experiment” comprises the development of an airborne dispersive pushbroom imaging spectrometer and has originally been designed as flexible hyperspectral mission simulator and calibrator for existing and upcoming or planned future space missions. The APEX project is co-funded by Switzerland and Belgium and built by a Belgian-Swiss industrial team under the prime RUAG Aerospace (CH), responsible for the total system and the mechanical components, OIP (Oudenaarde, BE) contributing the spectrometer, and Netcetera (Zurich, CH) being responsible for the electronics. RSL (University of Zurich, CH) acts as scientific PI together with the Co-PI VITO (Mol, BE).

The APEX sensor is operating between 380 nm and 2500 nm in more than 300 freely configurable bands (up to 512 bands in full spectral mode), by means of two dispersive spectrometer channels. 1000 pixels across track and a total field of view of 28° define the ground pixel size (e.g. 2,5 m from 5000 m AGL). A stabilized platform (Leica PAV-30) reduces major geometric distortions due to aircraft instabilities while a GPS/IMU system (Applanix PosAV 410) measures continuously the sensors’ position and orientation allowing direct georeferencing of the acquired data . The system is currently in phase D, the calibration and test phase, and first testflights have been performed on a Do-228 in cooperation of DLR while the acquired data is currently under evaluation. Discussions are ongoing to fly APEX on the new DLR High Altitude Research Aircraft (HALO) as well.

The system is currently in phase D, the calibration and test phase, and will deliver first scientific data to users by mid 2009.

The APEX processing and archiving facility (PAF) is hosted by VITO in the APEX Operations Center (AOC) at Mol, Belgium . A specific level 0-1 processing software module producing uniform, radiometrically calibrated data has been developed by RSL and is integrated into the PAF by VITO. An APEX Calibration Home Base has been developed at DLR and serves as generic institution for the calibration of imaging spectrometers. Since special emphasis is on delivering reliable, well calibrated data, an in-flight calibration tool in form of a diffuser disk and specific absorption filters are used to monitor the stability of the APEX system.

We anticipate major application innovations in limnology and coastal oceans research, atmospheric studies, in agriculture as well as land use and ecosystems mapping and monitoring, in geology and security questions..

The paper describes the APEX system, overall specifications as well as system validation procedures and preliminary performance results. A 5-year’s exploitation phase is planned from mid 2009 onwards. The programme and flight opportunities will be addressed, and researchers invited to propose experiments.