

Gamma Remote Sensing AG

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RESEARCH AND DEVELOPMENT

SIBERIA-II : Multi-sensor concepts for greenhouse gas accounting of northern Eurasia

In January 2002 the Project SIBERIA-II: Multi-sensor concepts for greenhouse gas accounting of northern Eurasia, started. SIBERIA-II is a project in the frame of the EC Environment and Climate Programme, Framework 5, CEO. GAMMA's part is supported by the Swiss Federal Office for Science and Education. The overall objective of SIBERIA-II is to demonstrate the viability of full carbon accounting (including greenhouse gases (GHGs): CO₂, CO, CH₄, N₂O, NO_x) on a regional basis using the environmental tools and systems available to us today and in the near future. The region under study is Northern Eurasia, covering an area of 200 million ha and representing a significant part of the Earth's boreal biome which plays a critical role in global climate. The tools and systems to be employed include a selected yet spectrally and temporally diverse set of multi-sensor Earth Observation instruments, detailed existing databases of field information and some of the worlds most advanced climate models to account for fluxes between land and atmosphere.

ESA GSTP - Development of SAR Inversion Algorithms for Land Applications (2003 – 2005)

In Feb. 2003 the ESA GSTP Study on "Development of SAR Inversion Algorithms for Land Applications" done in cooperation with DISP, University Tor Vergata, Rome, Italy, CNR-ISSIA, Bari, Italy, Universite Catolique de Louvain (UCL), Belgium, and LHWM, University of Ghent, Belgium, was started. In the frame of this two years project new prototype retrieval algorithms using advanced SAR data for the combined retrieval of vegetation and soil parameters are developed. GAMMA acts as coordinator of this project.

ESTEC/17508/03/NL/LvH/bj – Flashing fields! A preliminary investigation (2003-2004)

The launch of Envisat in 2002 with the ASAR instrument has immediately questioned some important assumptions concerning the nature and stability of radar measurements of soils and vegetation. The key observations concern large localised discrepancies ("flashing") between measurements made by the Envisat ASAR instrument and the ERS-2 AMI, within 30 minutes of each other over Flevoland in the Netherlands. The objectives of the 6-months study are to provide an initial characterisation of the "flashing field" anomalies, to place the anomalies in a wider context of historical observations, to suggest quatitative explanations for the effects seen, and to put forward potential strategies for reducing or eliminating them in future SAR missions.

ESA – DUP – VENEZIA (Nov. 2001 –2003)

The project VENEZIA: land subsidence monitoring service in the lagoon of Venice for regional and administrative authorities was a small service project in the frame of ESA's Data User Programme (DUP). VENEZIA was lead by GAMMA with CNR-ISDGM, Venice, Italy as project partner and lasted for two years. The responsibility of GAMMA included the setting up of land surface deformation services based on conventional differential interferometry as well as on interferometric point target analysis (IPTA). A continuation of the service using ENVISAT ASAR data is currently seriously considered.

ESA – DUP – GLASNOWMAP (Nov. 2001 –2003)

The project GLASNOWMAP: Glacier and snow monitoring service was a DUP small service project lead by Carlo Gavazzi Space, Milano, Italy with CNR-IREA, Milano, Italy, and GAMMA as project partners. GAMMA's role was to support the definition and implementation of services for the monitoring of snowcover extent, water run-off, and glacier extent with SAR data.

ESA – DUP – ALPSLOPE (Nov. 2001 –2003)

The project ALPSLOPE: Monitoring of unstable slopes in the Italian Alps based on Remote Sensing was a small service project in the frame of ESA's Data User Programme (DUP). ALPSLOPE was lead by Teledata Geoconsult GmbH, Bozen, Italy, with GAMMA as project partner. The service was demonstrated to the users based on historic ERS data. For the continuation of the service ENVISAT ASAR data can be used.

ESA – EOMD – UNOSAT (Nov. 2001 – 2004)

The UNOSAT project is a long term market development activity under the Earth Observation Market Development (EOMD) element. UNOSAT addresses thematic mapping for humanitarian aid and international development. UNOSAT is lead by the United Nations Office for Projects Services (UNOPS), Switzerland. Project partners are Spot Image, France, Digitech, France, UNITAR, Switzerland, and GAMMA. GAMMA acts as SAR specialist of the team.

ESA – DUP – KyotoInv (Nov. 2002 –2003)

The project KyotoInv: Kyoto inventory services implementation project under the lead of INTECS, Italy, intends to build several nation-wide services of specific benefit to actors involved in the reporting for the Kyoto Protocol or in trading resulting from the Protocol. GAMMA is involved in the project as SAR specialist concerning forest and land use monitoring.

ESA – DUP – SLAM II (2003 –2005)

The objective of the SLAM II project is to develop EO based services and products as landslide motion survey, landslide displacement monitoring, and landslide susceptibility mapping, that can help operational activities of those institutions that are in charge of hydrogeological risk management. The project is coordinated by Planetek, Italy. Partners involved include TRE, Italy, University of Florence, Italy, Spacebel, Belgium, GEOTEST, Switzerland, and GAMMA, Switzerland.

PRODUCTS AND SERVICES

Landcover/Landuse and Change/Hazard Products

In 2003 landuse/landcover maps based on SAR data (backscattering, Tandem coherence, long-term coherence, temporal variability) were generated. Becoming available through a cooperation with University of Trento, an improved classification methodology, Radial Basis Functions Neural Networks Approach, could be used. Products were used in the Kyoto inventory and humanitarian contexts.

DEMs and Deformation Maps

Interferometric DEMs and land surface deformation maps were generated using ERS, JERS, and Radarsat interferometry. In 2003 the main development of the Interferometric Point Target Analysis (IPTA) was finished, so that related products (linear deformation, non-linear deformation history, point heights, path delay maps), could be generated in a pre-operational manner.

Development of DEM generation with radargrammetry was continued in expectation of the increasing availability of adequate data from ENVISAT ASAR.

Consulting

GAMMA's consulting activity included SAR and interferometric processing related aspects, application development support, and radar system engineering. In 2003 training courses for SAR and interferometry took place in Europe and USA.

GAMMA SOFTWARE

In 2003 GAMMA continued to provide licenses for its user-friendly and high quality software to support the entire processing from SAR raw data to products such as digital elevation models, deformation, and landuse maps. The software consists of the Modular SAR Processor (MSP), Interferometric SAR Processor (ISP), Differential Interferometry and Geocoding (DIFF&GEO), and Land Application Tools (LAT), complemented by the new stand-alone module for Geocoding and image registration (GEO). In summer 2003 a new package for Interferometric Point Target Analysis (IPTA) was added. Upgrades included ENVISAT ASAR image mode raw data processing. Furthermore, before the end of the year an upgrade for SAR and interferometric processing with along track Doppler updating can be expected.

License sales activities were continued with new licenses sold in Europe, North America, and Asia. User contacts indicate that our competent support is an important feature of our software. This is also confirmed by an increasing number of running maintenance contracts. On several occasions the software was presented to potential customers.

VARIA

GAMMA has ongoing projects selected through Announcements of Opportunity to conduct ERS,

ENVISAT, JERS, and ALOS, research and development projects.

PUBLICATIONS

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