

Siberian Earth System Science Cluster

R. Gerlach, C. Schmullius, M. Herold, S. Hese

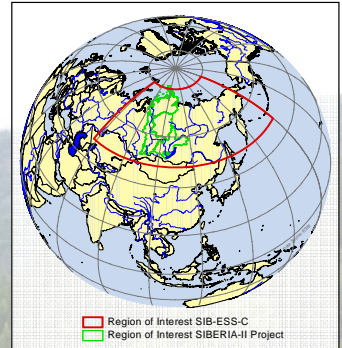
Friedrich-Schiller-University, Department of Earth Observation, Löbdergraben 32, 07737 Jena / Germany

<http://www.sibessc.uni-jena.de>

Introduction

With the recent advancements in information technology especially in the field of spatial data infrastructures new opportunities became available to the earth science community to efficiently share data, results and also applications over the World Wide Web using standards published by the Open Geospatial Consortium (OGC™), the International Organization for Standardization (ISO) or the World Wide Web Consortium (W3C®). Based on such technologies the Siberian Earth System Science Cluster (SIB-ESS-C) will be developed as a spatial data infrastructure for remote sensing product generation, data dissemination and scientific data analysis.

SIB-ESS-C is the follow-on activity to the EU funded SIBERIA-II project (Multi-Sensor Concepts for Greenhouse Gas Accounting of Northern Eurasia, EVG2-2001-00008), which was a joint Russian-European remote sensing project that improved greenhouse gas accounting over a 300 Million ha area in the central Siberian region. This area represents a significant part of the Earth's boreal biome which plays a critical role in global climate change and has been defined as one of IGBP's Boreal transects representing a strong climate change hot spot in Northern Eurasia. The project lifetime was from January 2002 until December 2005. The overall objective of the SIBERIA-II project was to demonstrate the viability of full carbon accounting including greenhouse gases (GHG) on a regional basis using state-of-the-art environmental methods and advanced remote sensing technologies. The tools and systems which have been employed include a selected yet spectrally and temporally diverse set of 15 Earth observation instruments on 8 satellites, detailed GIS databases and some of the worlds most advanced Dynamic Global Vegetation Models (the Lund-Potsdam-Jena LPJ-DGVM and the Sheffield-DGVM) to account for fluxes between land and atmosphere. The results showed that the Russian boreal forest is a carbon sink to increased CO₂ in the atmosphere; however its sink capacity is smaller than earlier publications indicated because of the underestimated impact of land cover disturbances.



Objectives

- Develop a spatial data infrastructure to facilitate Earth system science studies in central Siberia
- Set up a web interface to provide access to the data products created during the SIBERIA-II project
- Continue remote sensing data acquisition and product generation to build up time series
- Integrate additional products from other FSU projects but also external collaborators
- Provide online geo-visualization tools for scientific data analysis

Data Products

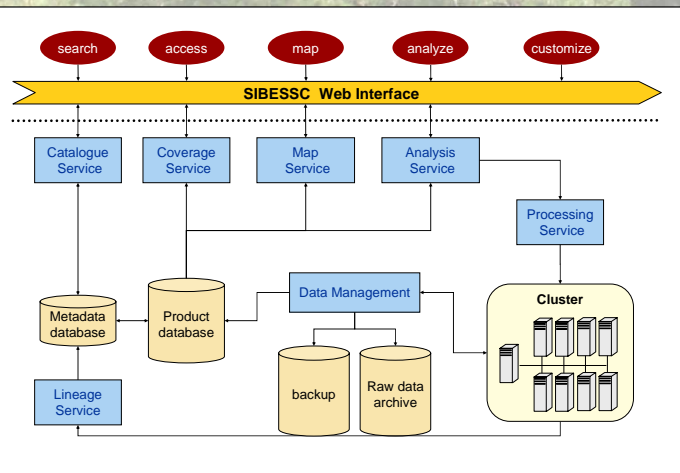
In the initial phase of the SIB-ESS-C project, data sets and value-added products created within the SIBERIA-II project will form the basic set of products to be disseminated. A major goal of SIB-ESS-C is to continue product generation in order to build up time series for environmental monitoring and as input parameters for earth science models. As research is advancing and new algorithms and data products are being developed additional data sets of the region shall be included. In order to provide a comprehensive spectrum of data sets relevant for earth systems research collaboration with other data providers and research organisations to share data sets is highly desired.

Implementation

The technical implementation of SIB-ESS-C will adhere to the following multi-stage concept:

1. Develop an online data repository including a metadata database and a web interface to enable users to search, (pre-) view and download existing datasets.
2. Set up a computing cluster for operational processing of large quantities of remote sensing data ensuring continued product generation. The cluster will also include tools for data archiving, storage management and automatic metadata creation.
3. Extend SIB-ESS-C with comprehensive online geo-visualization tools allowing users to analyse the information content of the data sets provided.
4. Following the principle of interoperability SIB-ESS-C is planned to become part of a distributed network of similar systems where not only data is being distributed and shared, but also applications (e.g. analysis functionalities, processing modules) are being offered and used throughout the network.

EO Product	Source	Temporal coverage	Spatial resolution	Spatial coverage	Partner responsible
Phenology	SPOT-VGT AVHRR	2000-2003 annual	1km & 10km	entire SIBERIA-II Region	Center for the Study of the Biosphere from Space (CESBIO), France
Disturbances	MODIS, AVHRR ATSR-2	1992-2003 on yearly basis	1 km	entire SIBERIA-II Region	Centre for Ecology and Hydrology Monks Wood, UK
Freeze/ Thaw	QuikSCAT	2000-2003	10km	entire SIBERIA-II Region	TU Wien, Institute of Photogrammetry and Remote Sensing (IPF), Austria
Water bodies	ASAR WS	2003/2004	75m	entire SIBERIA-II Region	TU Wien, Institute of Photogrammetry and Remote Sensing (IPF), Austria
Snow Depth	SSM/I	2000-2003	25km	entire SIBERIA-II Region	Center for the Study of the Biosphere from Space (CESBIO), France
Snow Melt	SSM/I	2000-2003	25km	entire SIBERIA-II Region	Center for the Study of the Biosphere from Space (CESBIO), France
Land cover	MODIS	2001-2004 annual	500m	entire SIBERIA-II Region	University of Wales Swansea, UK
Topography	SRTM / GTOPO	2000	3arcsec<60° N 1 km > 60° N	entire SIBERIA-II region	Gamma Remote Sensing, Switzerland



Acknowledgement

The Siberian Earth System Science Cluster is being supported by the Friedrich-Schiller University Jena (Germany) for the period commencing January 2006 until December 2010. Funding is granted for hard- and software as well as labor cost (1 PhD position, 1 Administrator).