It's Activities and Directions

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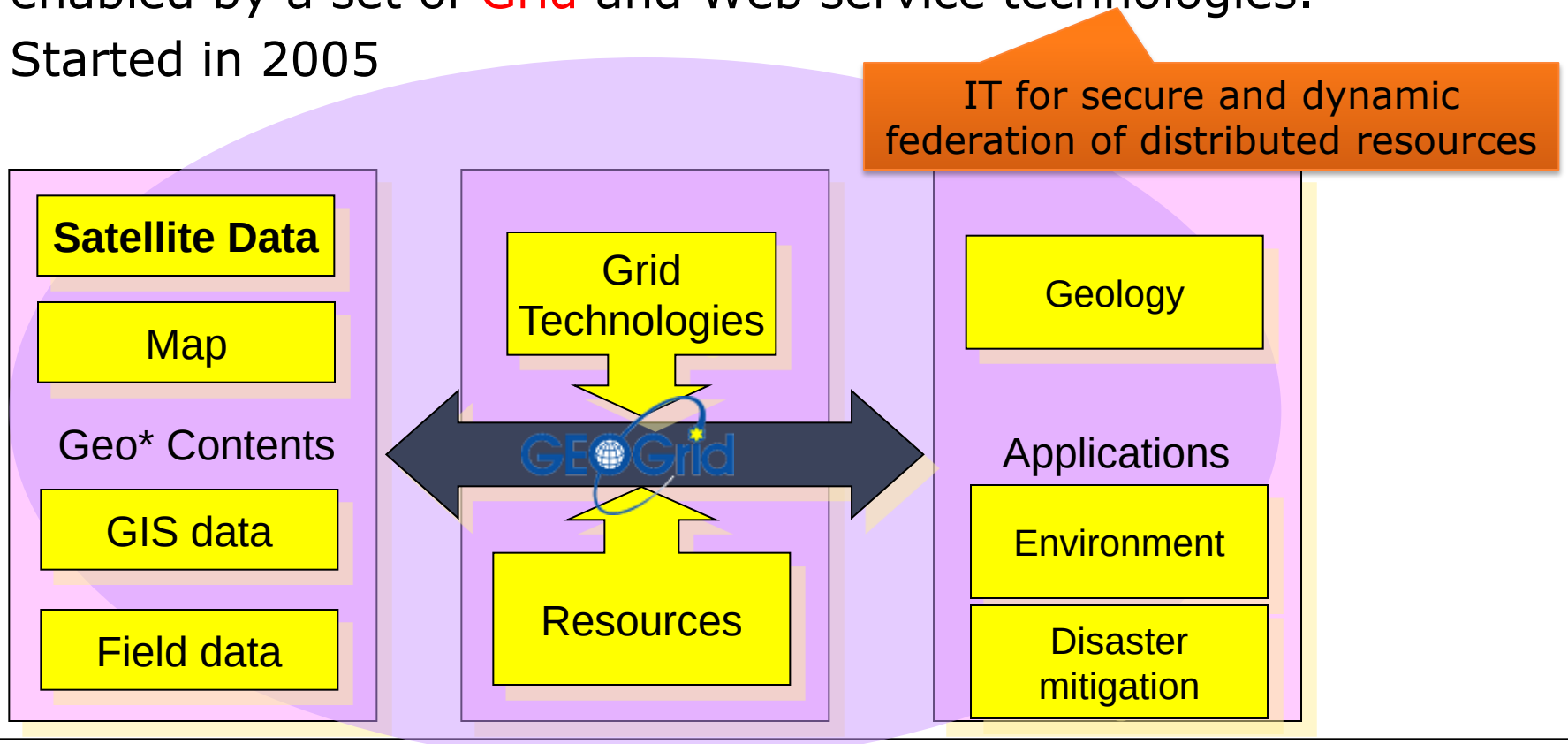
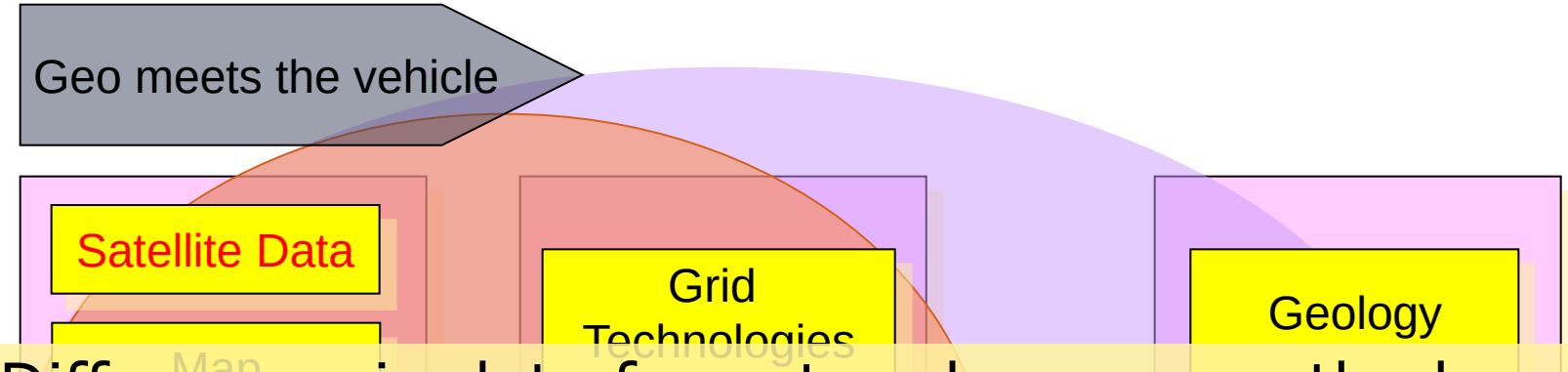
What is the GEO Grid ?

- The GEO (Global Earth Observation) Grid is aiming at providing an *E-Science Infrastructure* for worldwide Earth Sciences communities to accelerate GEO sciences based on the concept that relevant data and computation are *virtually integrated* with a certain *access control* and ease-of-use interface those are enabled by a set of Grid and Web service technologies.
- Started in 2005



It is a little story of the GEO Grid

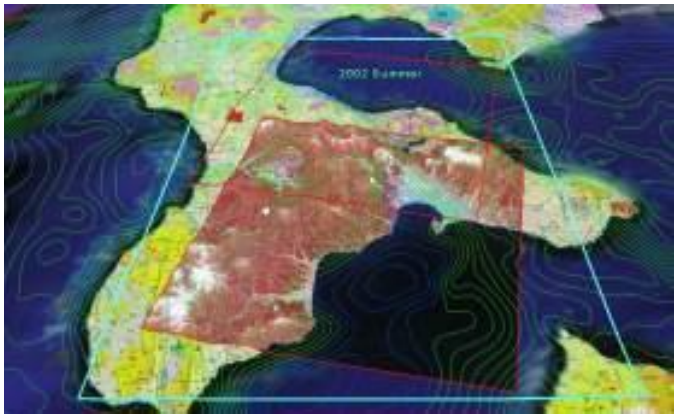


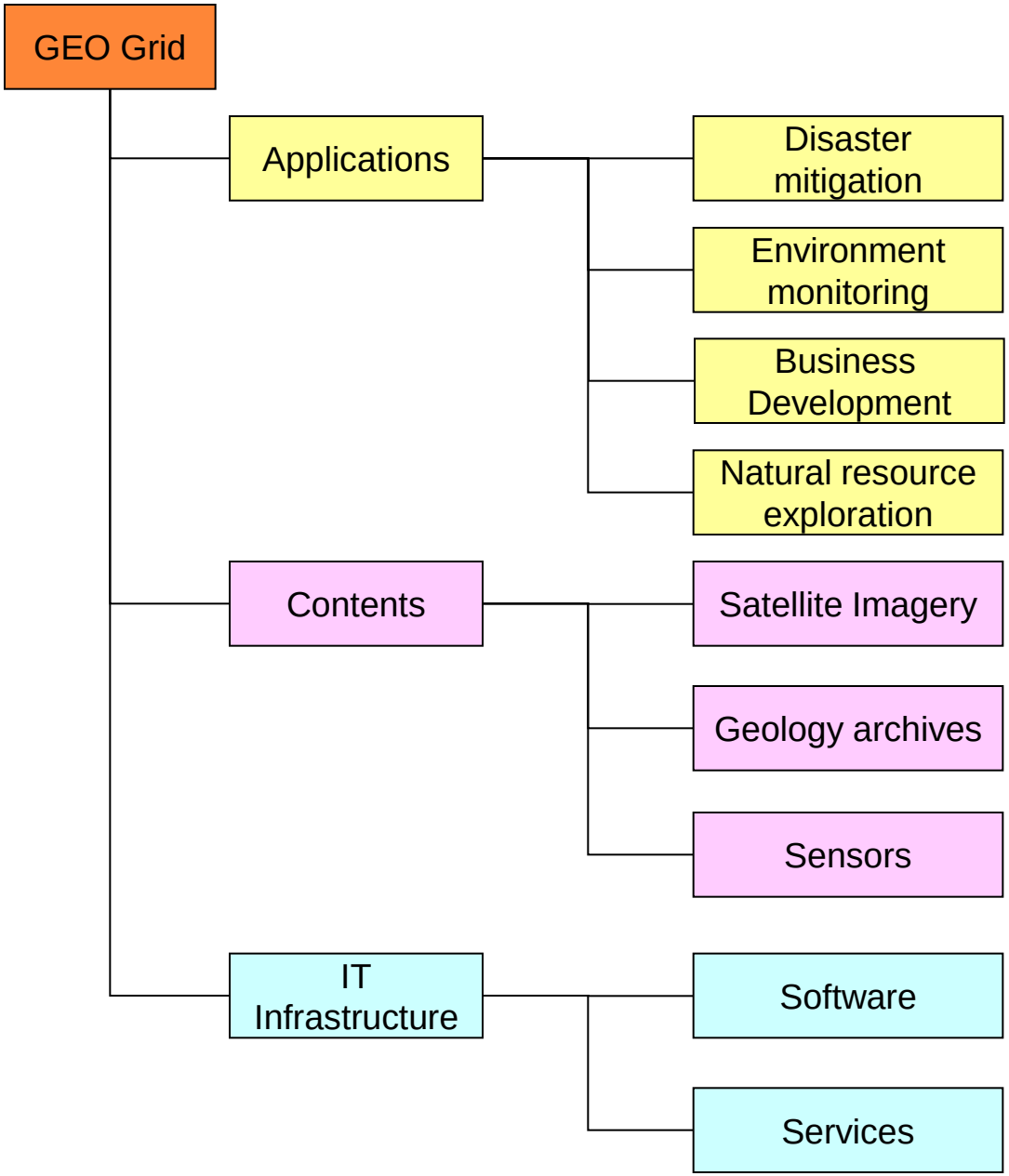
- Differences in data format and access method
  - Geographical distribution and ownership issues
- Ensure the security of resources and data
  - Over incoherent security policies
- Complex workflow and capacity of resources
  - Computing heterogeneity and Networking unreliability
  - Scalability for larger capacity

etc.

Objectives of the GEO Grid

- Help Geo-* scientists to understand
  - Global warming, inventory of carbon dioxide
    - Kyoto protocol, environmental burden
  - Alternate energy
    - Biomass
    - Wind-power generator network
  - Harvest yield prediction/estimation
    - Weather, Soil, temperature, humidity, sunshine, etc.
- Help decision makers to plan
  - Hazard mitigation
    - Earthquake, Landslide, Flood, Volcano eruption, Tsunami
  - Exploration of natural resources
    - Oil, natural gas, mineral
- Unbeknown applications
  - Games, Amusements, Personal geo-record/history, etc.
  - Social science apps





Examples

Land slides, flood, Geo hazard, etc.

Global warming, CO_2 flux estimation

SIM service, Tourism, Consulting

Oil, Gas, Rare metal, Rare earth, etc

Full ASTER on disk
MODIS on disk (East Asia)

Digital Elevation Model

Japan, SE Asia, OneGeology

PEN, Asia Flux, Field server

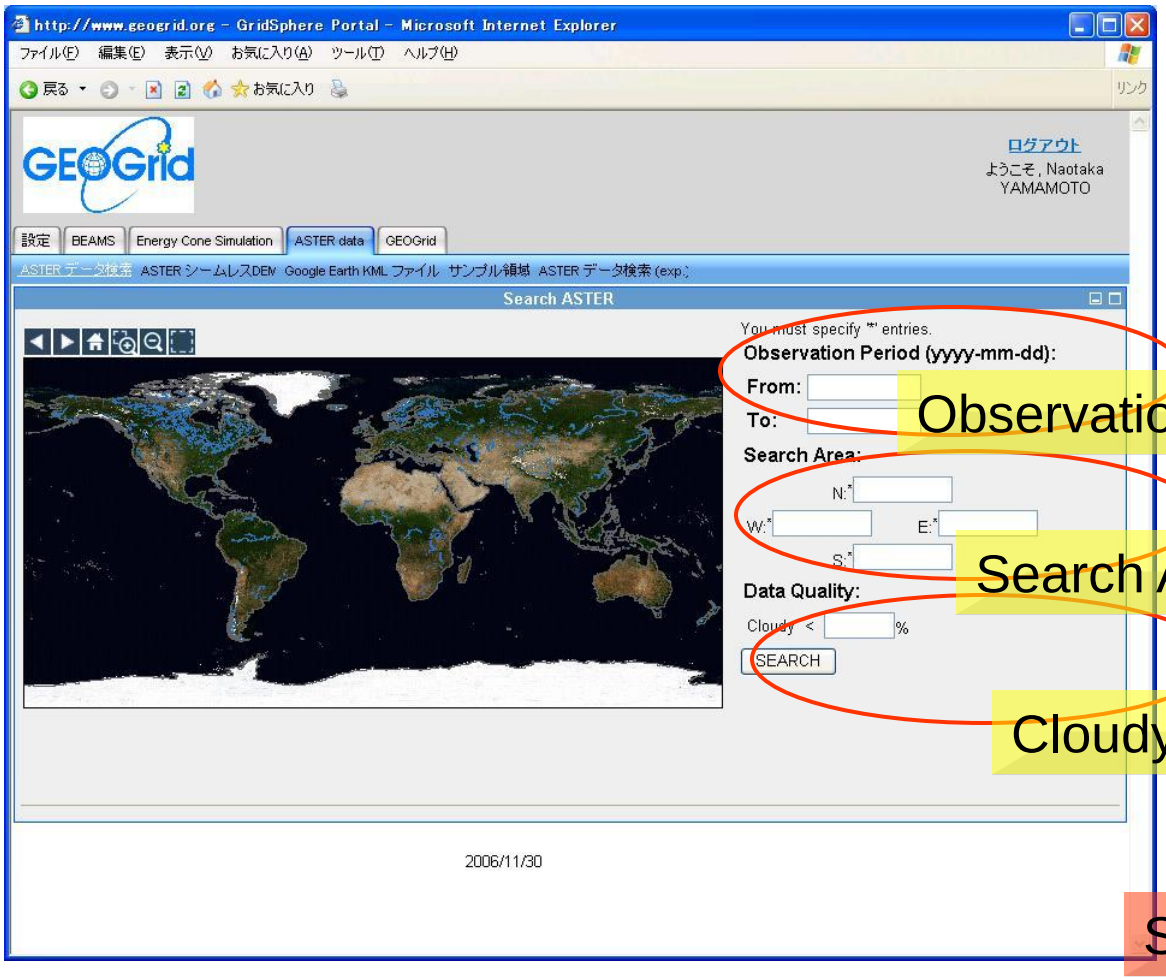
Security, data integration, service registry, resource mgmt, Web GIS, Workflow, U/I Portal, etc.

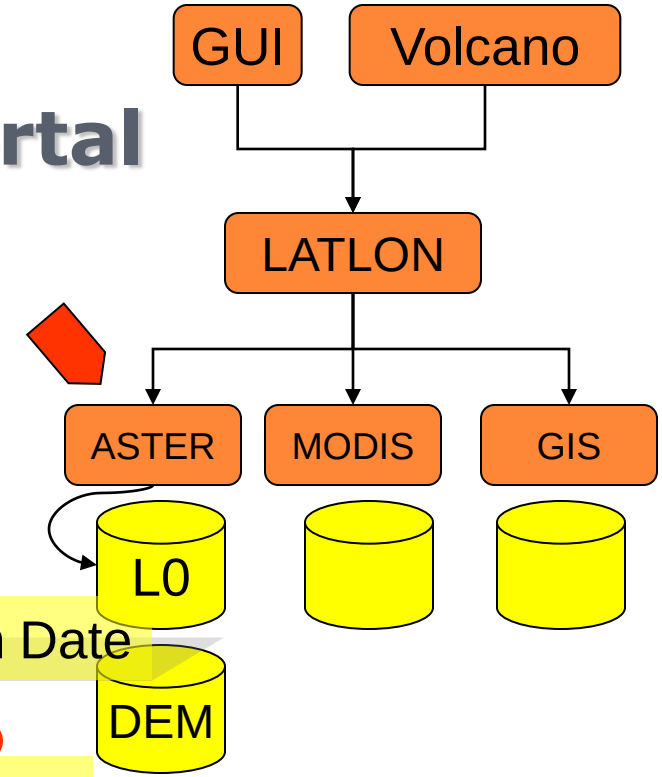
Storage, Servers
Cluster computers

GEO Grid Service Examples

- Satellite data archive and processing
  - ASTER, PALSAR, MODIS, etc.
- Satellite data application
  - Application of Satellite-Field data Integrator (SFI) for aerosol monitoring Description http://fon.geogrid.org/aerosol/
  - SDCP (Science Degree Confluence Project) – Community validation tool for global land-cover & digital elevation models http://eco.geogrid.org/sdcp/
- Hazard information
  - QuiQuake (Quick Estimation System for Earthquake Maps Triggered by Observation Records) http://qq.ghz.geogrid.org/QuakeMap/index.en.html
  - Volcanic Gravity Flow Simulations on Volcanic Area http://volcano.geogrid.org/applications/EnergyCone/
- Geoscience data
  - Geological maps, Active fault data, etc.

GEO Grid Basic Service: ASTER data search Web Portal



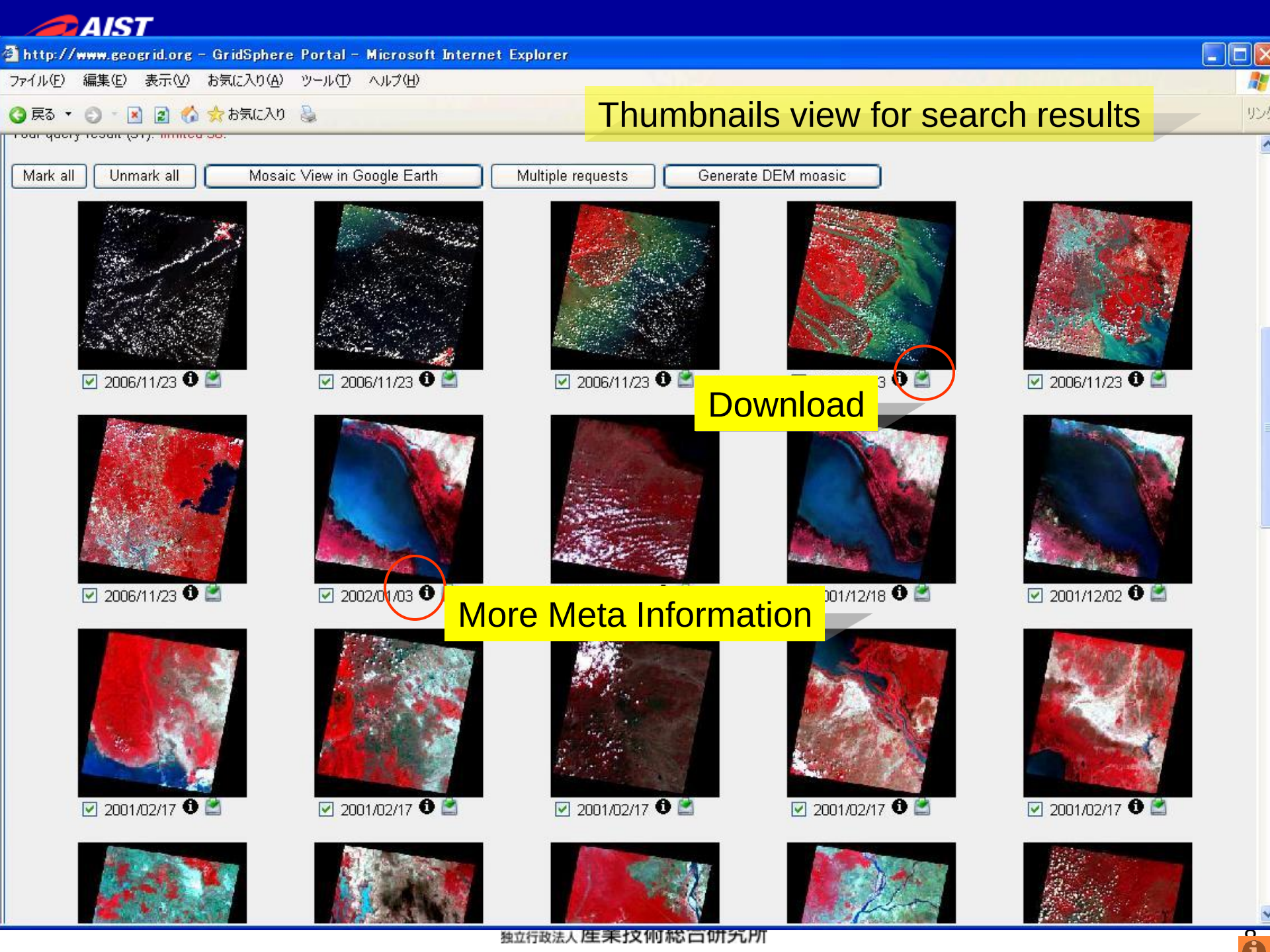


Observation Date

Search Area

Cloudy....

Specify around Vietnam


AIST
http://www.geogrid.org - GridSphere Portal - Microsoft Internet Explorer
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戻る お気に入り
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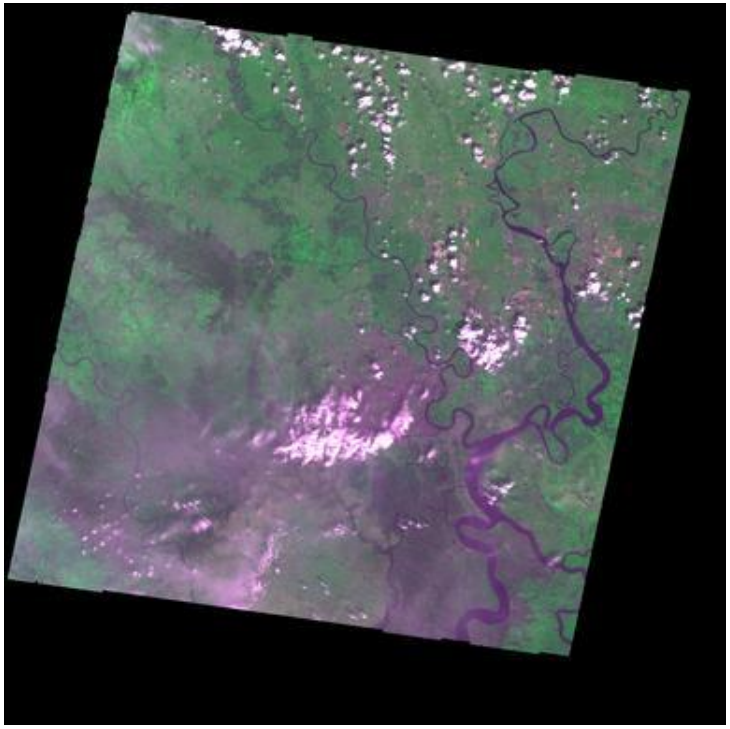
独立行政法人 産業技術総合研究所

Ho Chi Minh city area observed by ASTER / Terra

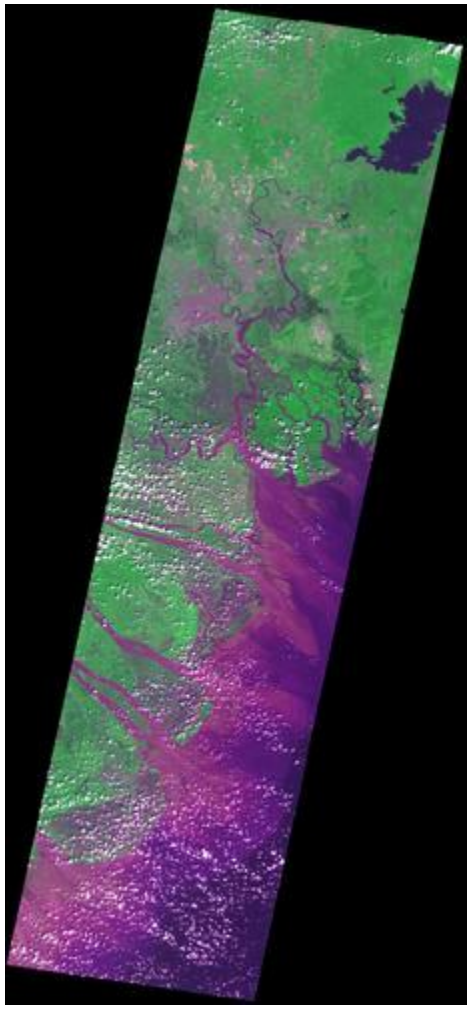


60 km / 4000 px

60 km
/ 4000 px

- Captured on Feb. 3, 2001.
  - spatial resolution 15m
  - Useful to detect the environmental change locally

Mekong Delta area observed by ASTER / Terra



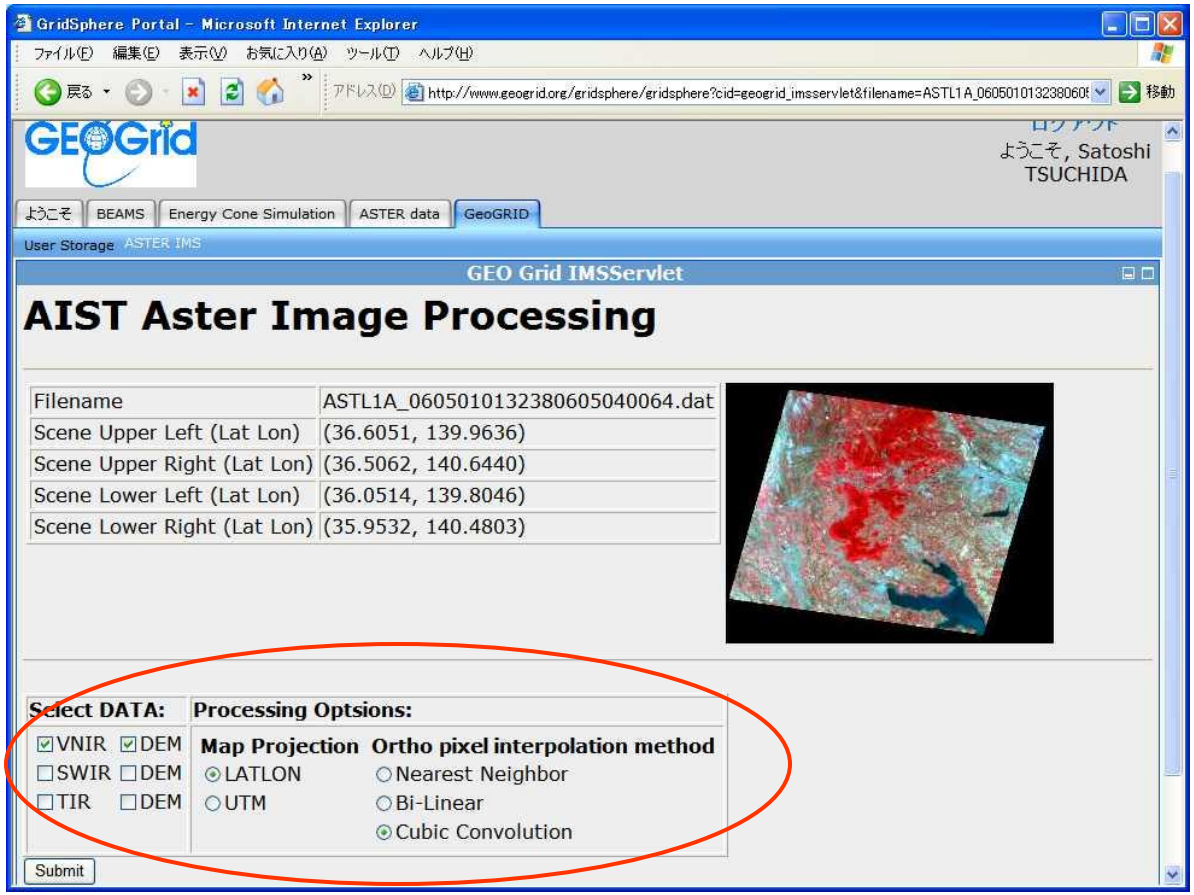
250 km
/ 16666 px

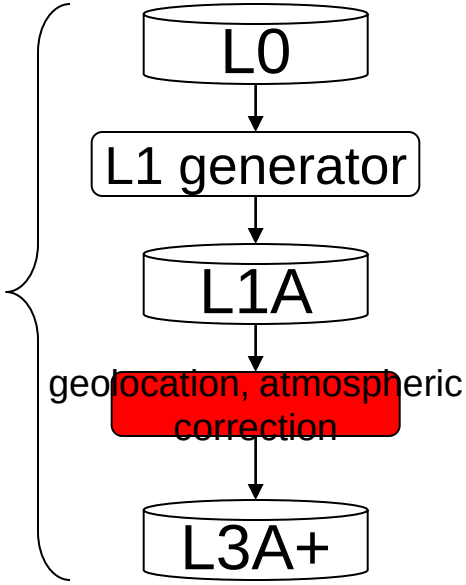
116 km / 7714 px

- Captured on Nov. 23 , 2006. (recent)
  - spatial resolution 15m
  - mosaic image using 4 ASTER scenes

On Demand Image Processing

Confirm / Parameter Window





10-20 min. for each scene

Specify Sensor, Map Projection, Interpolation

to be applied
Grid Web Service technology

Must be good idea to combine Satellite RS & Ground-observed (in-situ) data

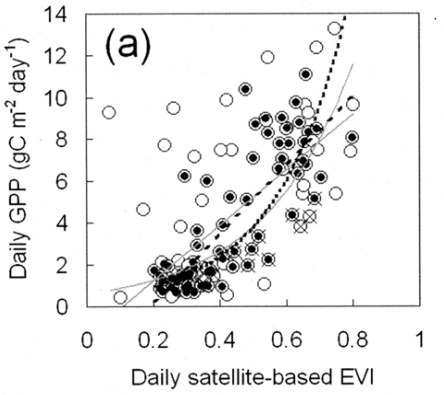
- Benefit of satellite RS:
  - Wide spatial coverage with cheaper cost
  - Regional coverage and broadly spectral resolution
  - Continuous acquisition of data
  - Archive of historical data

- Limitation of satellite RS:
  - Interference of atmospheric gaseous and particles
    - Absorbing (H20, O3 etc.) and Scattering (mainly by aerosol particles such as dust, ash and smoke)
  - Not direct sample of the phenomenon

- Ground-based observation:
  - Direct or similar sample of the phenomenon
  - Real-time or Near Real-time observation
  - High temporal resolution
  - Expensive for wide area observation

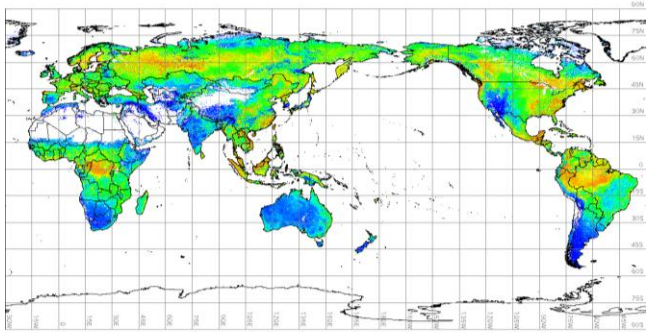
Comining CO_2 Flux data and Satellite data

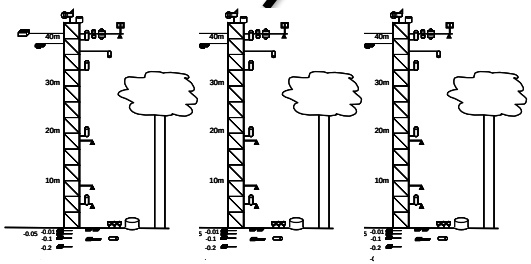
Calibration of Satellite Data
using In-situ Observation Data



Apply to the similar
vegetation area

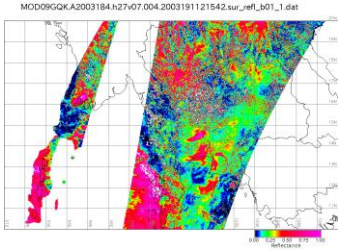
Global CO_2 Map generated from In-situ data and Satellite data





Flux Tower

Digital Camera



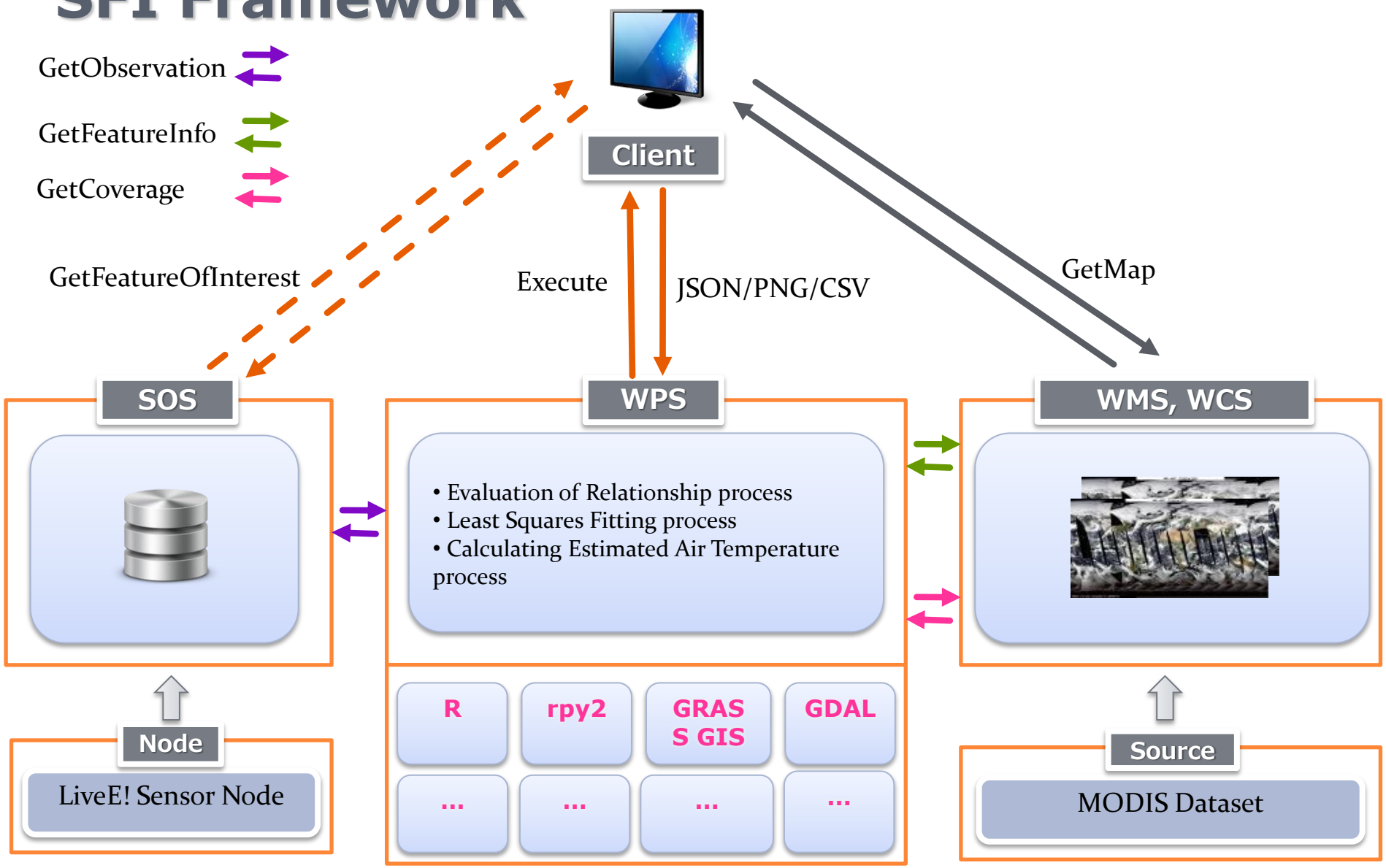
Satellite data

Research Issues and approach

(1) Development of IT infrastructure which federates distributed and heterogeneous Earth observation data.
Approach: Integration of Grid and OGC standards

(2) Establishment of multi-disciplinary and cross boundary scientific community
Approach: Linking IT and application networks

SFI Framework

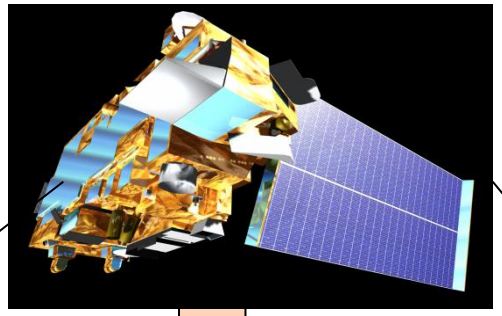


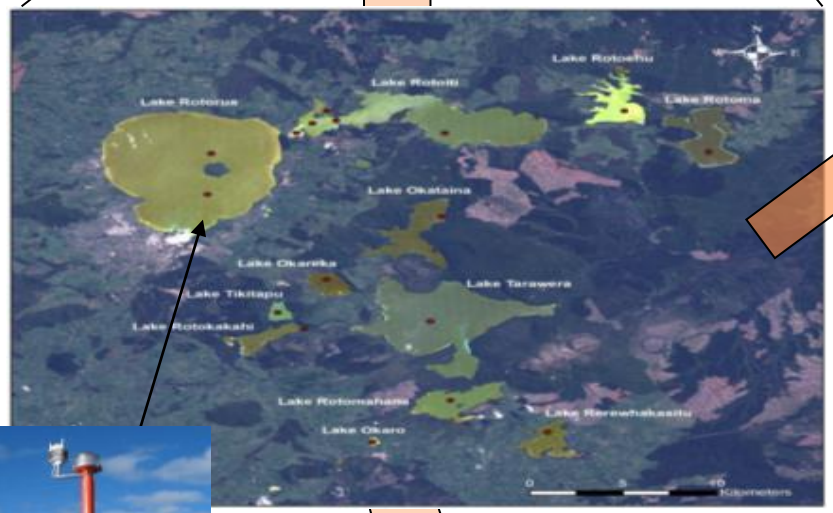
Satellite Field Integrator (SFI)

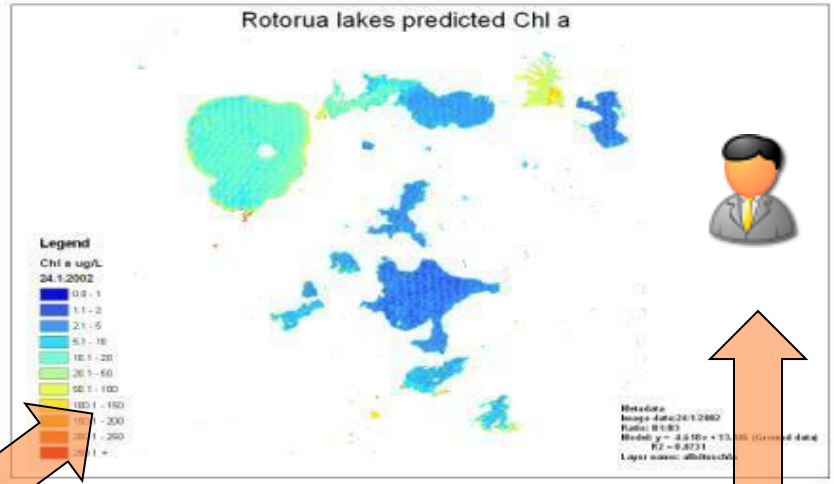
- The SFI framework is designed to reduce the onerous tasks of data gathering, manipulating, and processing
  - Supports heterogeneous data formats in both remote sensing and sensor observation data
  - Scalability to handle the increasing number of datasets currently available.
  - Offers a robust, on-demand processing service

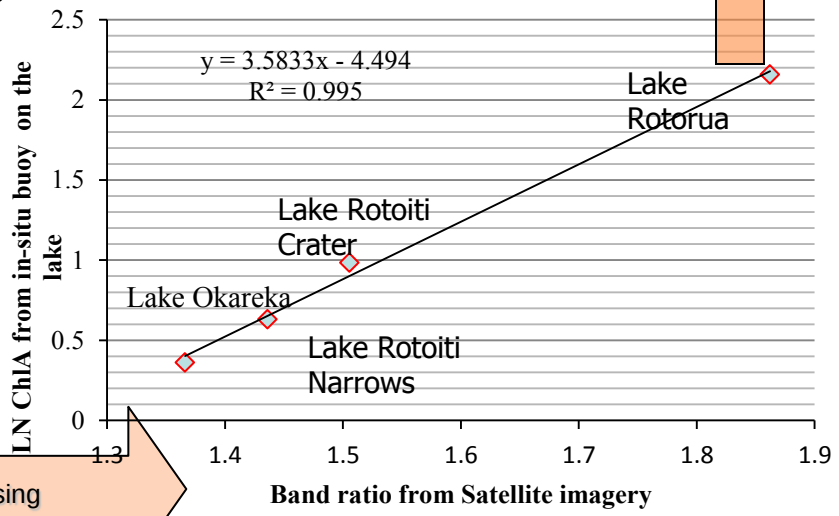
- The development is based on various open standards of OGC Web Service specifications such as
  - Web Mapping Service (WMS)
  - Web Coverage Service (WCS)
  - Sensor Observation Service (SOS)
  - Web Processing Service (WPS)

Combining satellite and in-situ data







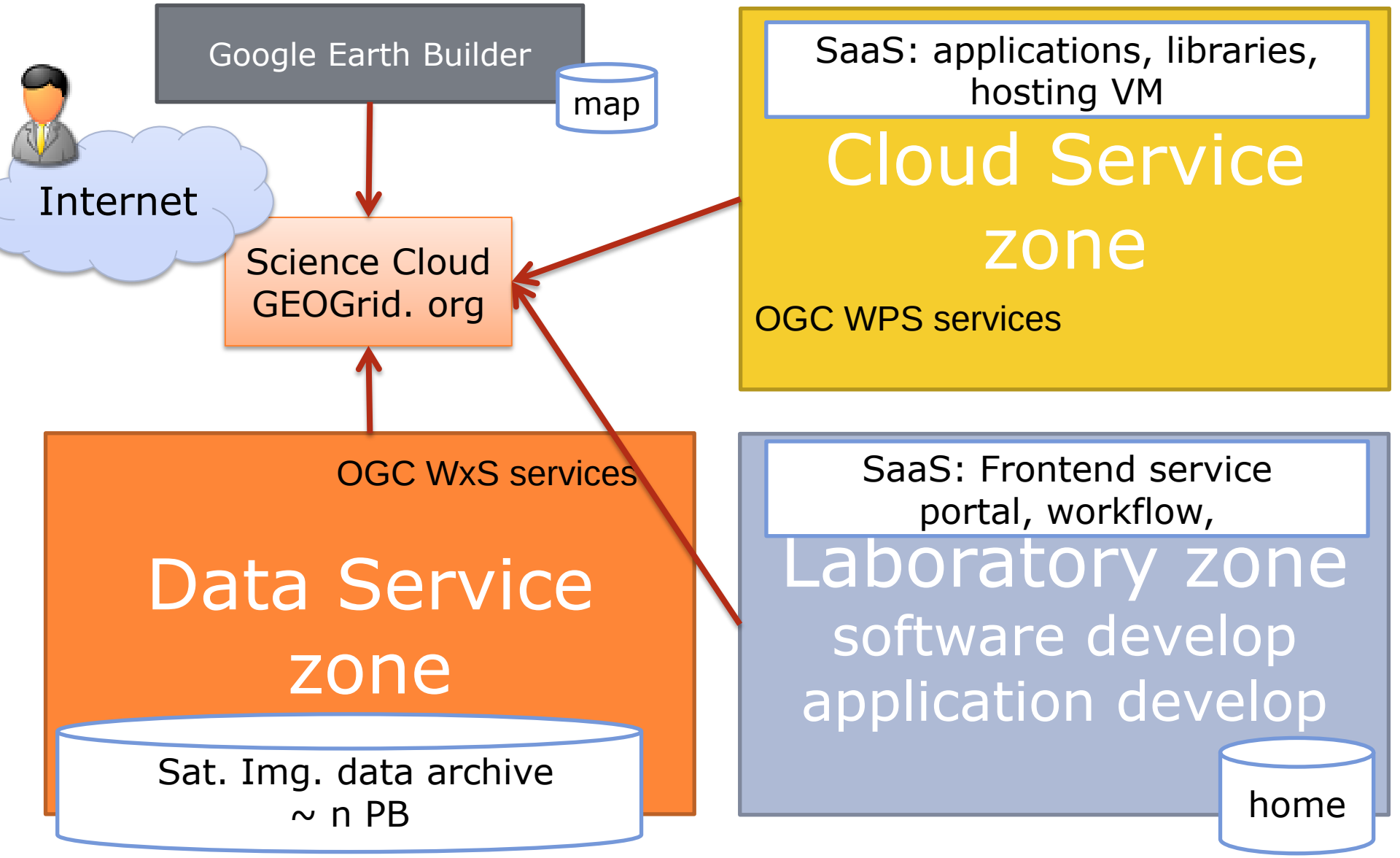


SOS=Sensor Net

WPS= Satellite data processing

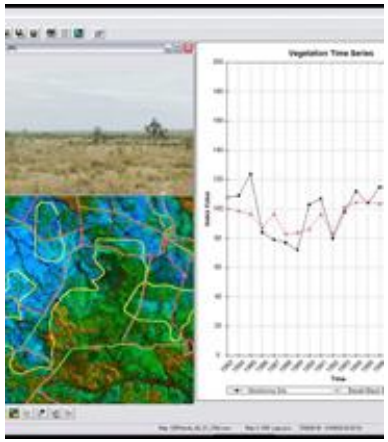
Accurate water quality map production with GLEON

GEO Grid System Zones

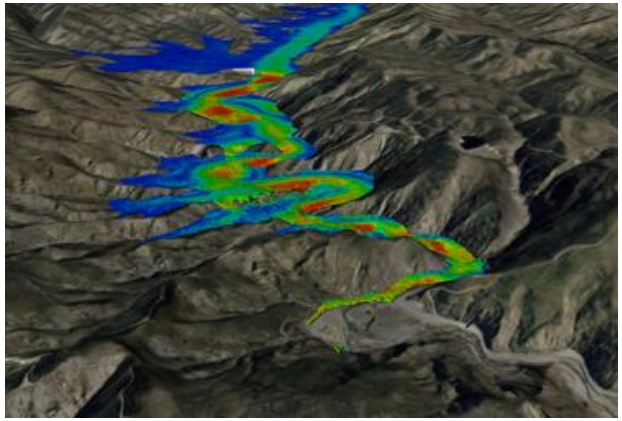


More opportunities to collaborate

- Explore possibility of extent to other partners



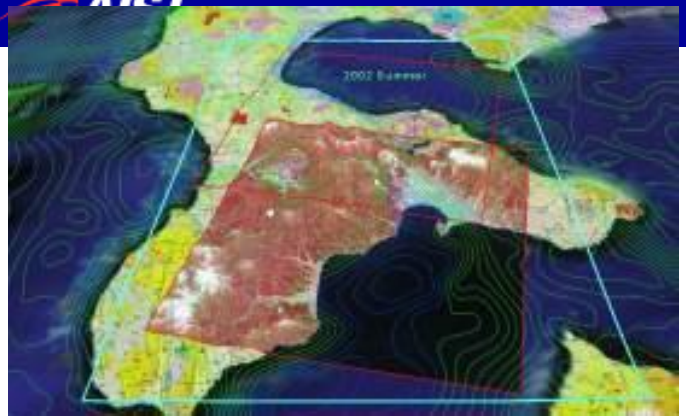
Property-scale solution for environmental monitoring and land management

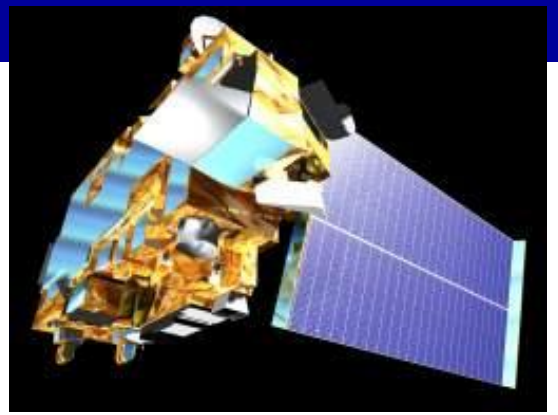


Modelling dam breaks, tsunamis and other geophysical events

- And much more in ICT and Services
  - Data Deluge
    - E-research, Cloud computing, sensor networks, environmental informatics, etc.
  - National Challenges
    - Clever environmental management, smart energy, e-health innovation, Green IT, Cyber security, sustainable cities, etc.
  - People and Businesses
    - Innovation for the service sector, agriculture,

Images by courtesy of CSIRO





Thank you very much for your attention !

GEOGrid

Global Earth Observation Grid

http://www.geogrid.org/