

Semantic research and advanced display of large collections of EO data



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Agenda



- Accessing data
 - Acquisition - Where ? When ?
 - Diversity of data providers
 - VTAOIWatcher - A near real-time watchdog
- Processing and displaying data
 - 2D Webmapping
 - 3D Virtual Globes
 - On-the-fly processing
- Discovering and querying data
 - “Mission / Instrument / Mode(s)”
 - “Instrument features”
 - “Data providers” or “Biophysics categories”
- Towards user-knowledge abstractions
 - “Poor” keywords
 - Crossed ontologies

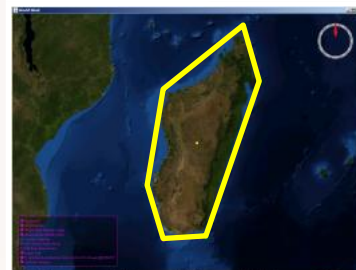
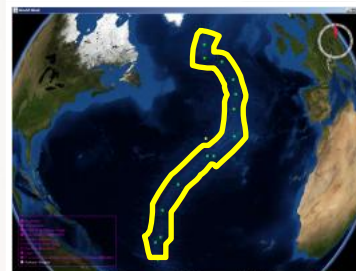
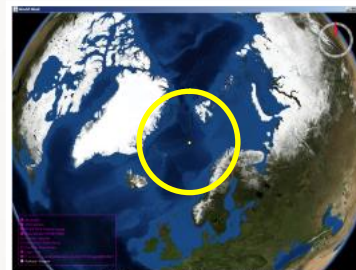
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Accessing data (1)



- Acquisition - Where ?
 - Sophisticated AOIs (Area Of Interest)
 - bounding box
 - disk
 - corridor
 - polygon
 - Implicit AOIs
 - project AOI
 - monitored area
 - current display



Accessing data (2)



- Acquisition - When ?

- Orbit propagators

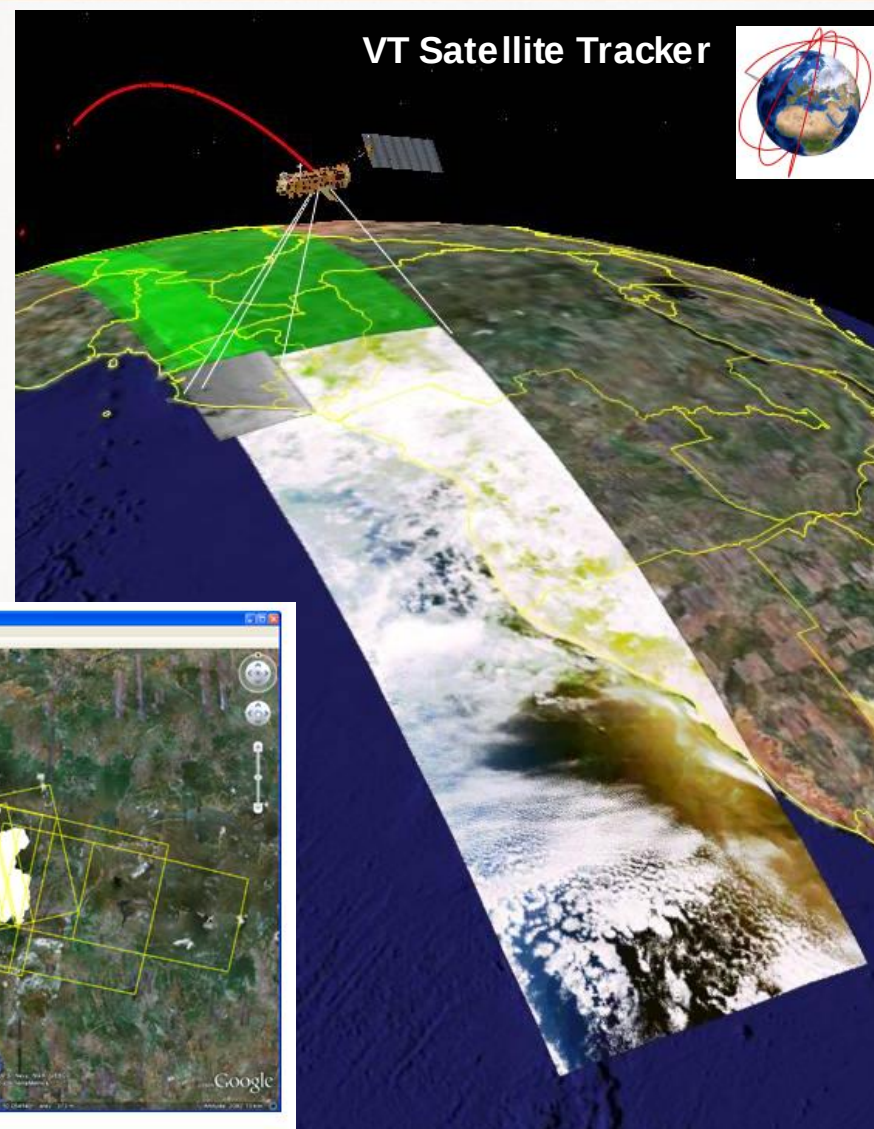
- SGP4

- Nominal

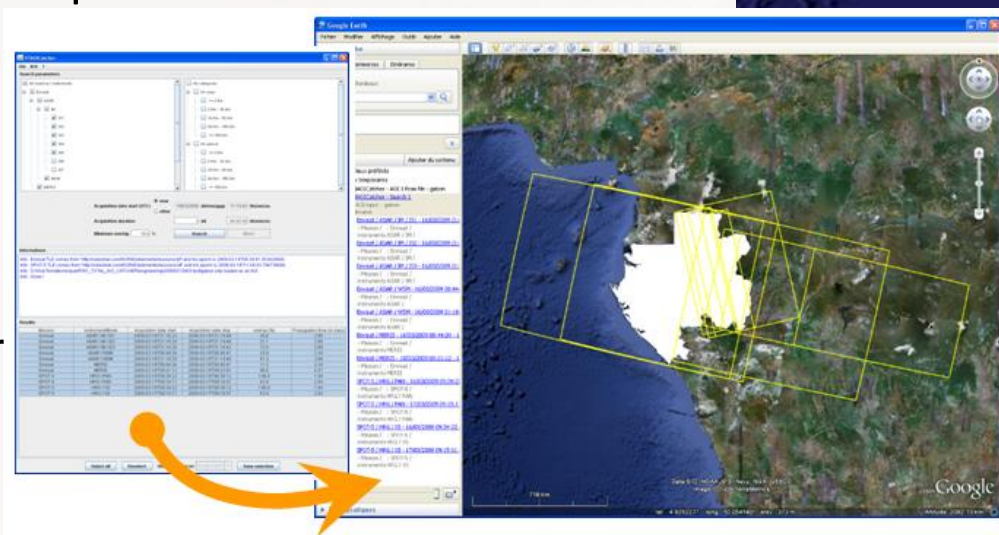
- Viewing geometry

- Optical / Radar

- Acquisition modes



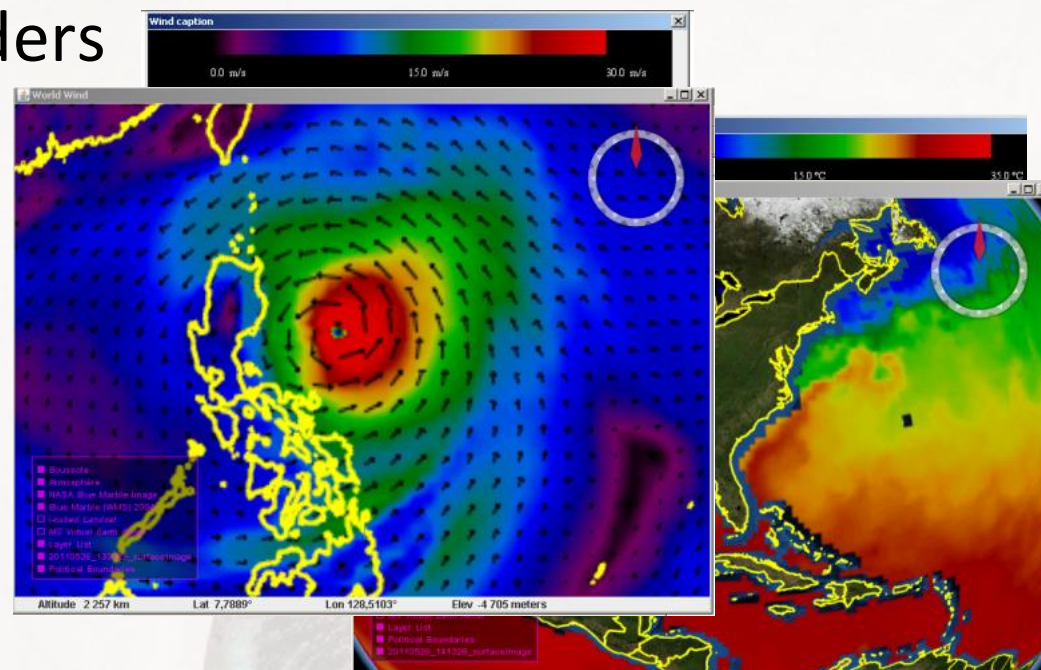
VT AOI Catcher



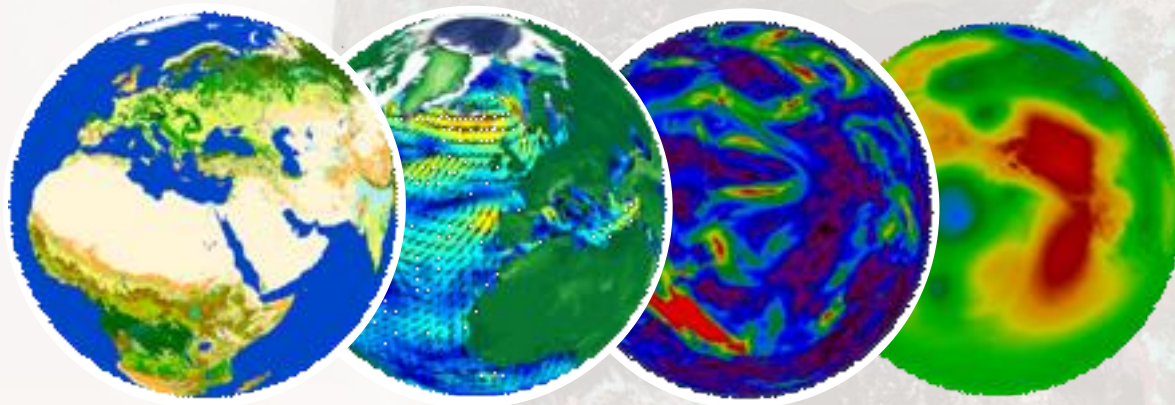
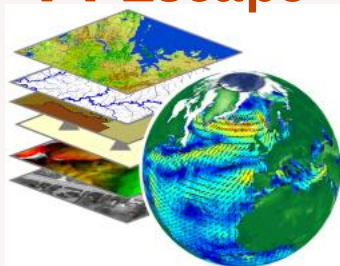
Accessing data (3)



- Diversity of data providers
 - More data providers
 - Free data policy
 - Interoperability
OGC standards
 - Consumers may
produce data



VT Escape



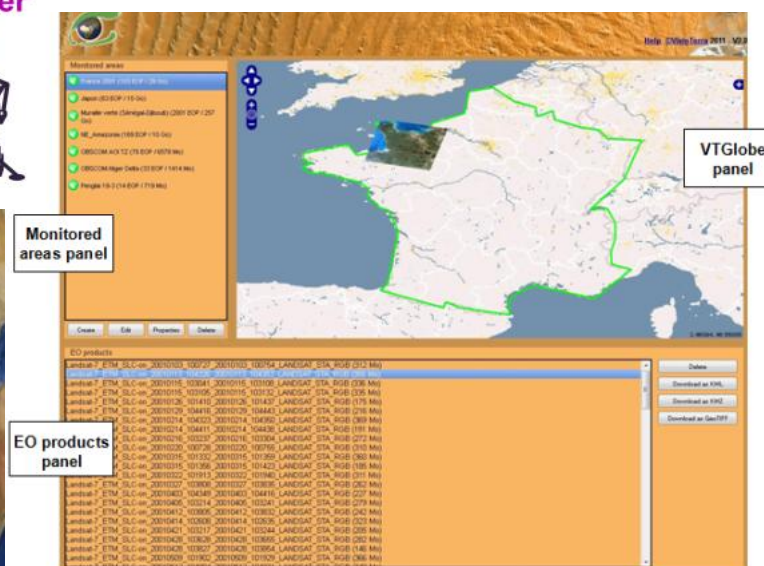
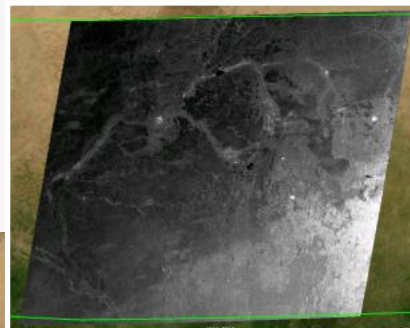
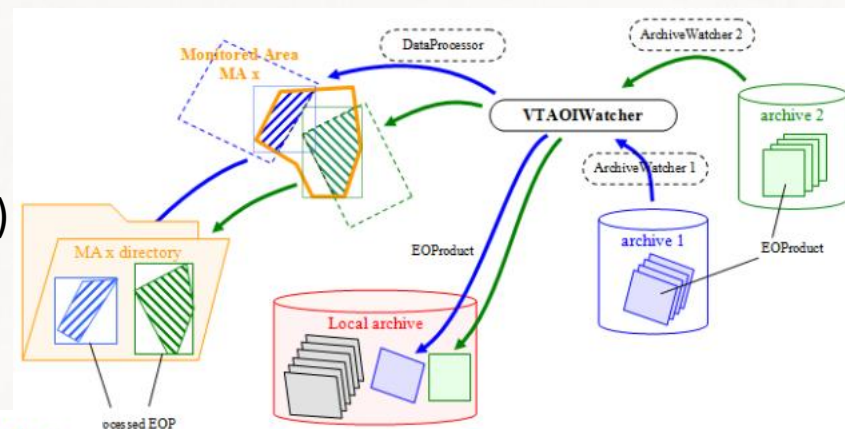
Accessing data (4)



• VTAOIWatcher - A near real-time vigie

– Definition of “Monitored areas”

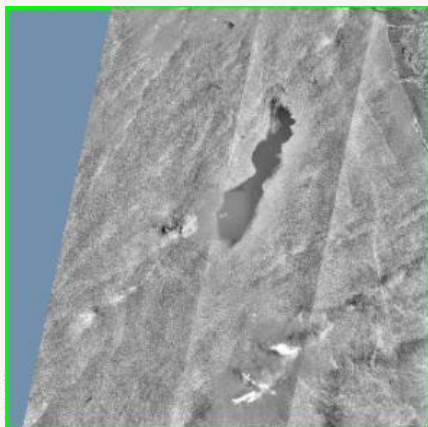
- AOI
- MIM (Mission / Instrument / Mode(s))
- Acquisition interval
- Post-processings



Processing and displaying data (1)



- 2D Webmapping
 - Open Layers
 - Java Script
 - VisioTerra developments
 - Layer stack
 - AOI builder



Monitored areas

- ✗ Muraille verte (Sénégal-Djibouti) (2633 EOP / 348 Go)
- ✓ Méditerranée (226 EOP / 11 Go)
- ✓ Nigeria Shell Bonga (82 EOP / 1748 Mo)
- ✓ OBS_AOI TZ (274 EOP / 23 Go)
- ✗ OBS_BODO (1490 EOP / 20 Mo)
- ✓ OBS_GIN_Beyla (92 EOP / 2220 Mo)
- ✓ OBS_GIN_Faranah (49 EOP / 667 Mo)
- ✓ OBS_GIN_Simandou (162 EOP / 12 Go)
- ✓ OBS_Niger Delta (151 EOP / 6223 Mo)
- ✓ OBS_Oresund (57 EOP / 1814 Mo)
- ✓ OBS_sen (462 EOP / 21 Go)
- ✓ Panglaj 19-3 (33 EOP / 2018 Mo)
- ✓ rca (144 EOP / 3678 Mo)
- ✗ Sud-est - Alpes (7 EOP / 1865 Mo)

EO products

- ENVISAT_ASAR_IMM_1P_20120205_094339_20120205_094615_ENVISAT_ASAR_STL (4021 ko)
- ENVISAT_ASAR_WSM_1P_20111218_094046_20111218_094230_ENVISAT_ASAR_STL (13 Mo)
- ENVISAT_ASAR_WSM_1P_20111221_093054_20111221_093351_ENVISAT_ASAR_STL (14 Mo)
- ENVISAT_ASAR_WSM_1P_20111229_093730_20111229_094110_ENVISAT_ASAR_STL (15 Mo)
- ENVISAT_ASAR_WSM_1P_20120106_094408_20120106_094653_ENVISAT_ASAR_STL (6385 ko)
- ENVISAT_ASAR_WSM_1P_20120109_093416_20120109_093827_ENVISAT_ASAR_STL (15 Mo)
- ENVISAT_ASAR_WSM_1P_20120112_215621_20120112_215931_ENVISAT_ASAR_STL (15 Mo)
- ENVISAT_ASAR_WSM_1P_20120117_094052_20120117_094402_ENVISAT_ASAR_STL (13 Mo)
- ENVISAT_ASAR_WSM_1P_20120120_093100_20120120_093535_ENVISAT_ASAR_STL (14 Mo)
- ENVISAT_ASAR_WSM_1P_20120128_093735_20120128_094116_ENVISAT_ASAR_STL (15 Mo)
- ENVISAT_ASAR_WSM_1P_20120131_220136_20120131_220308_ENVISAT_ASAR_STL (15 Mo)
- ENVISAT_ASAR_WSM_1P_20120208_093419_20120208_093824_ENVISAT_ASAR_STL (15 Mo)
- ENVISAT_ASAR_WSM_1P_20120216_094055_20120216_094405_ENVISAT_ASAR_STL (13 Mo)
- ENVISAT_ASAR_WSM_1P_20120219_093102_20120219_093513_ENVISAT_ASAR_STL (14 Mo)
- ENVISAT_ASAR_WSM_1P_20120227_093738_20120227_094118_ENVISAT_ASAR_STL (15 Mo)
- ENVISAT_ASAR_WSM_1P_20120309_093424_20120309_093758_ENVISAT_ASAR_STL (15 Mo)
- ENVISAT_ASAR_WSM_1P_20120309_220219_20120309_220851_ENVISAT_ASAR_STL (1535 ko)
- ENVISAT_ASAR_WSM_1P_20120312_215628_20120312_215938_ENVISAT_ASAR_STL (15 Mo)
- ENVISAT_ASAR_WSM_1P_20120317_094101_20120317_094334_ENVISAT_ASAR_STL (13 Mo)
- ENVISAT_ASAR_WSM_1P_20120320_093109_20120320_093342_ENVISAT_ASAR_STL (14 Mo)

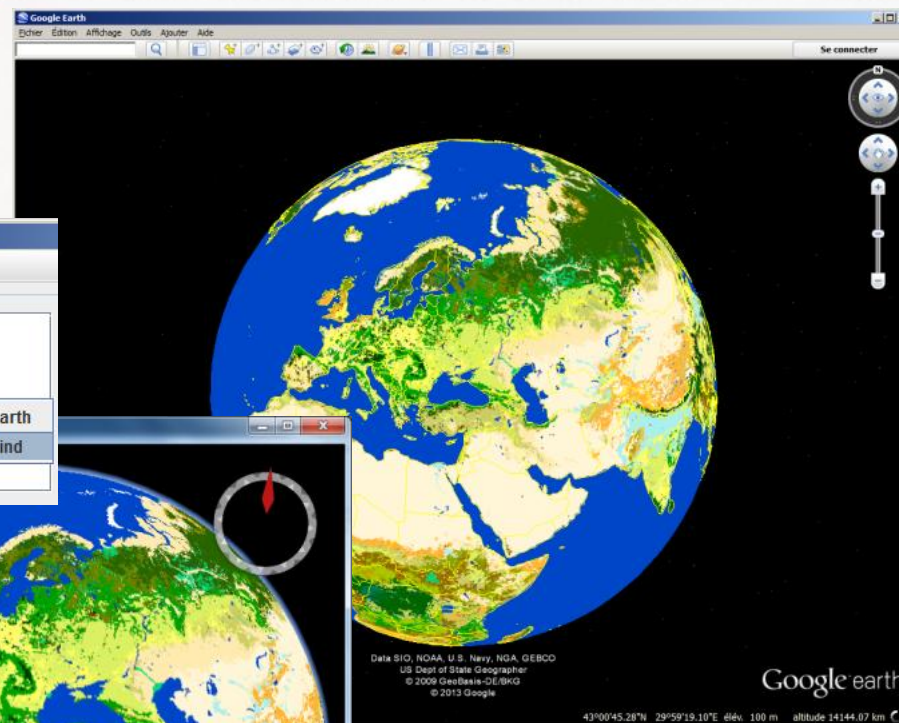
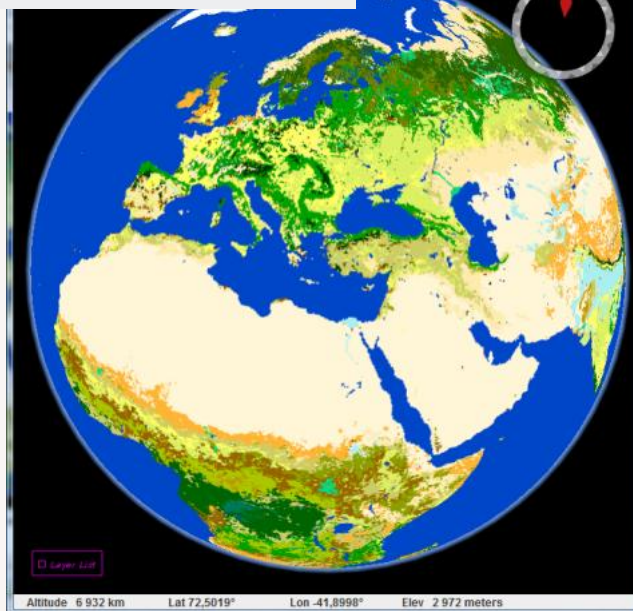
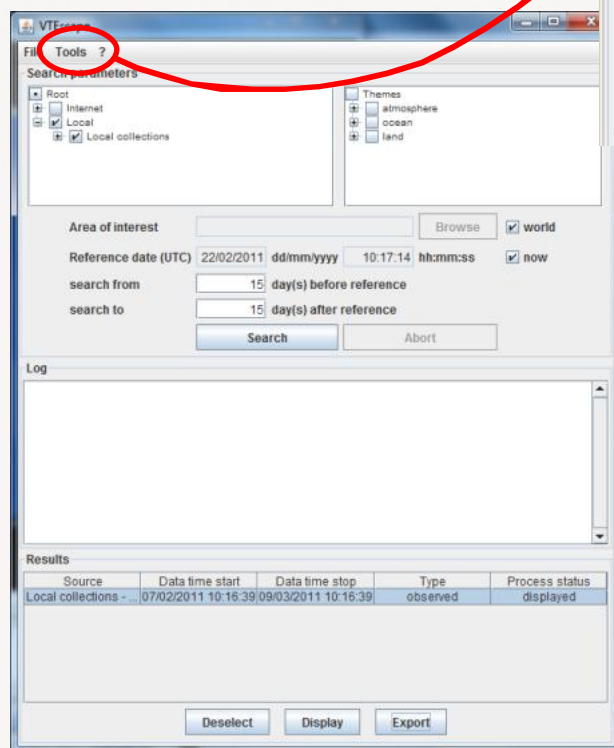
Download as KML
Download as KMZ
Download as GeoTIFF
Download raw data



Processing and displaying data (2)



- 3D Virtual Globes
 - Stand-alone Java
 - Google Earth
 - World Wind



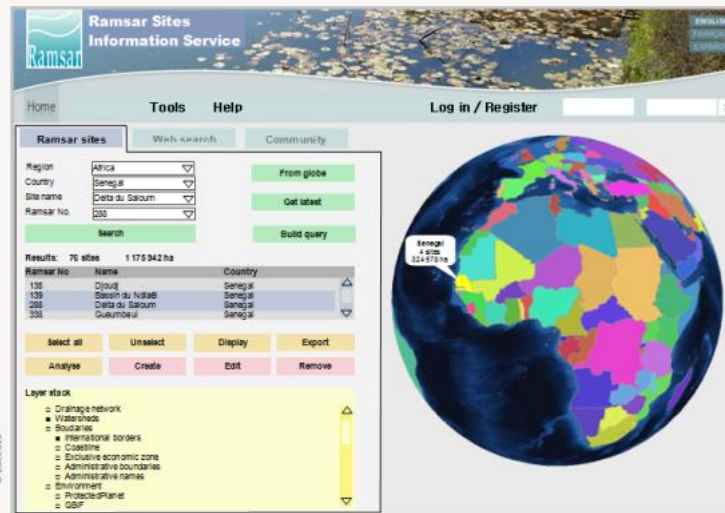
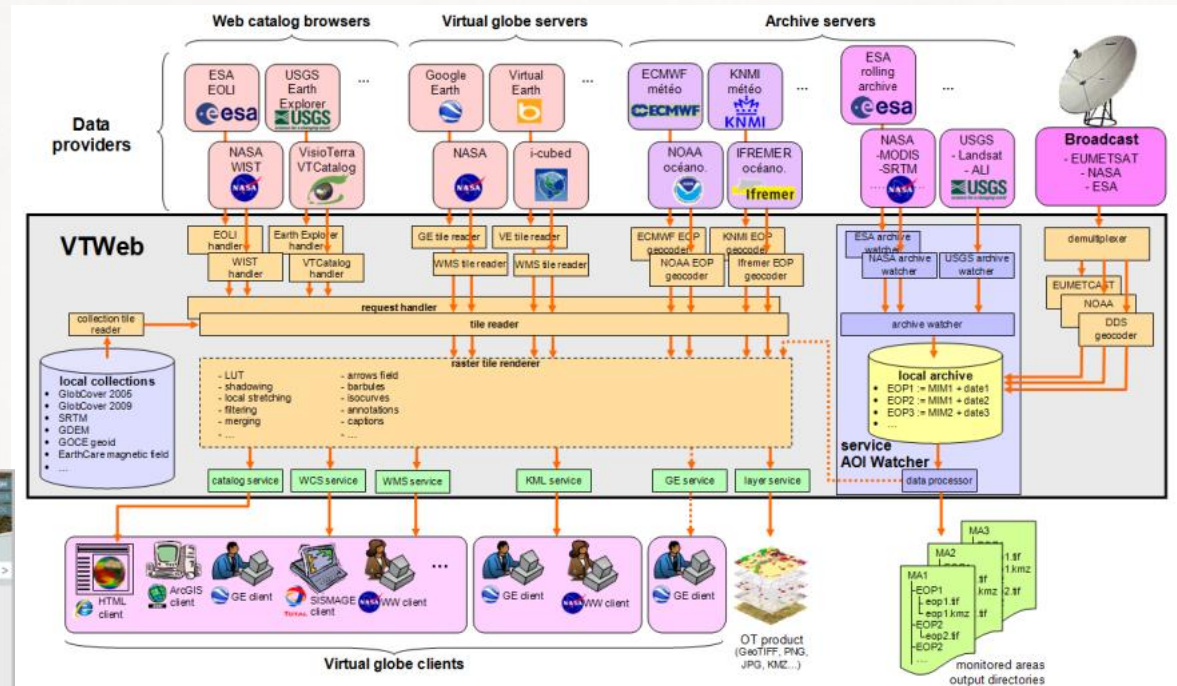
Processing and displaying data (3)



• 3D Virtual Globes (cont'd)

– Client - server

- VTWeb
- GlobWeb (WebGL)

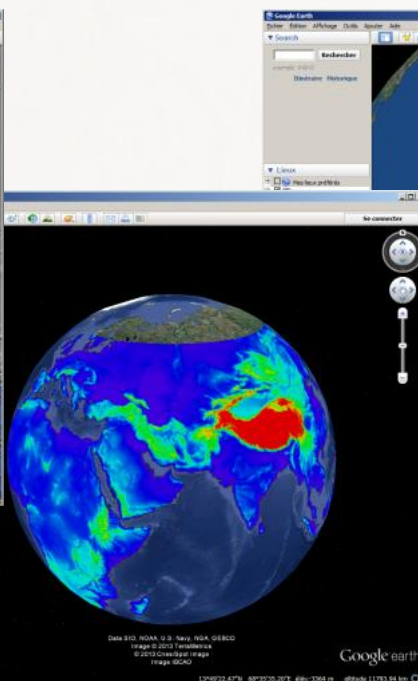
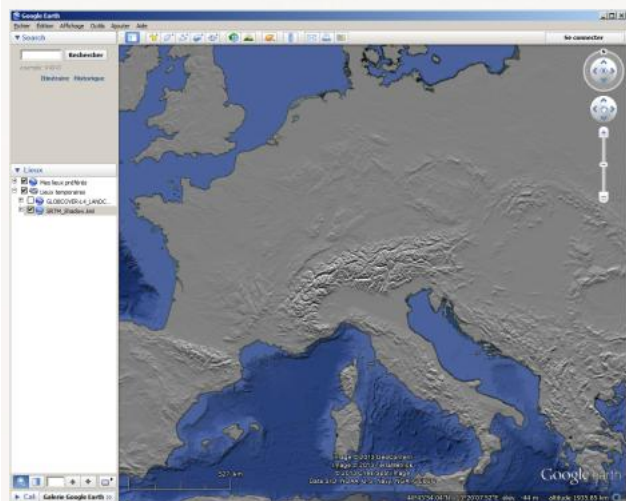
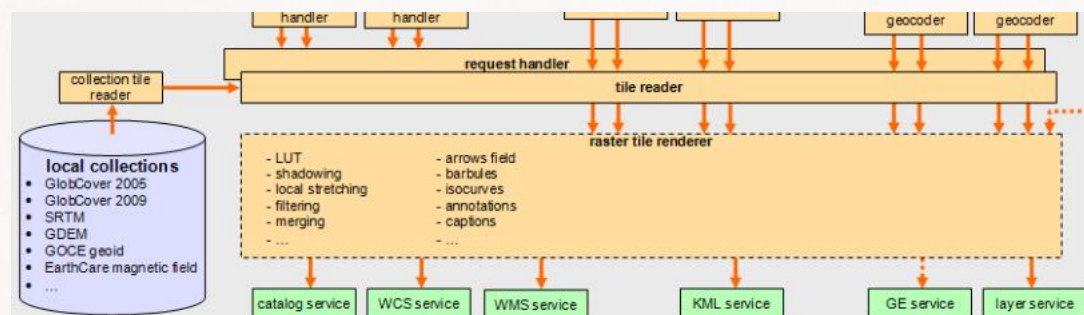


Processing and displaying data (4)



- On-the-fly processing

- [SRTM shadowing](#)
- [SRTM shadow + LUT](#)
- [SRTM flooding 50 m](#)



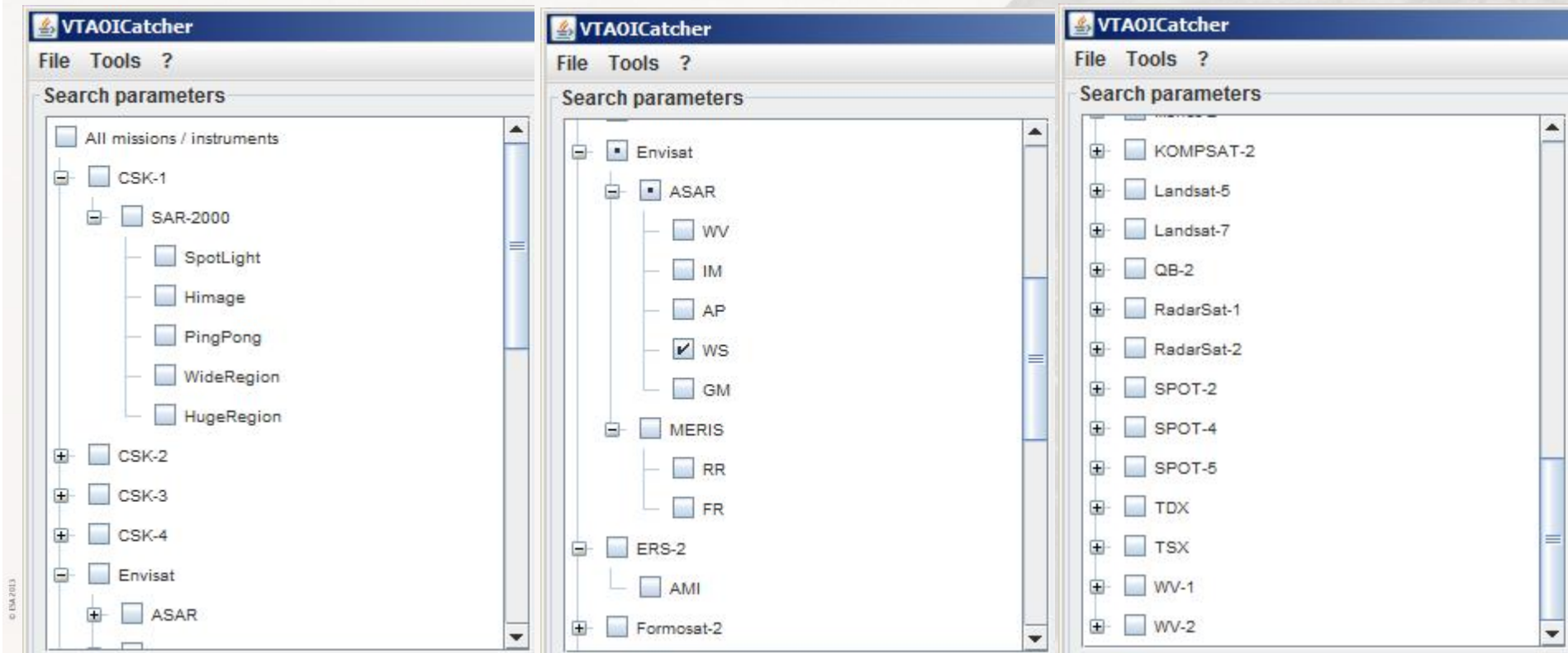
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Discovering and querying data(1)



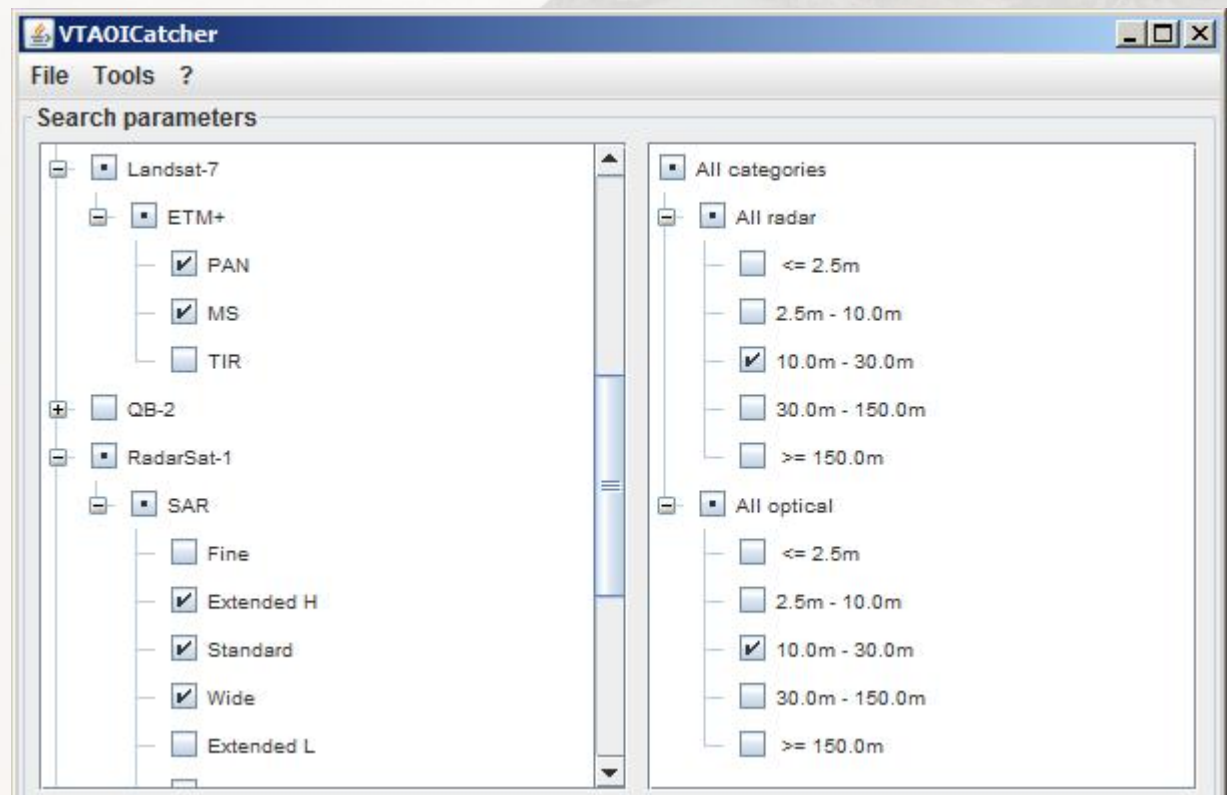
- Mission / Instrument / Mode(s) ← only for satellites and aero ? SML ?
 - Envisat / ASAR / WSM - Envisat / ASAR / IM / IS2 ← mode / sub-mode ?
 - Envisat / MERIS / FR ← on-board or on-ground ?
 - ERS / AMI ← no mode or unic mode ?



Discovering and querying data(2)



- Instrument features ← Which feature(s) ?
 - GSD ← GSD of product or spatial resolution of instrument ? Spatial resolution of Radar ?
 - radar
 - bands (L, C, X, Ku...)
 - polarization(s)
 - ...
 - optical
 - PAN / XS
 - spectral bands
 - multi-spectral
 - super-spectral
 - hyper-spectral
 - central wavelength
 - spectral resolution
 - spectral response width ...



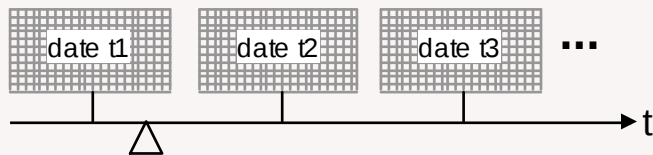
Discovering and querying data(3)



- “Data providers” or ← Frequent changes
- “Biophysics categories” ← No consensus
 - atmosphere
 - wind speeds ← A which altitude ? Along which vertical referential ?
 - pressure ← unit ?
 - temperature
 - ...

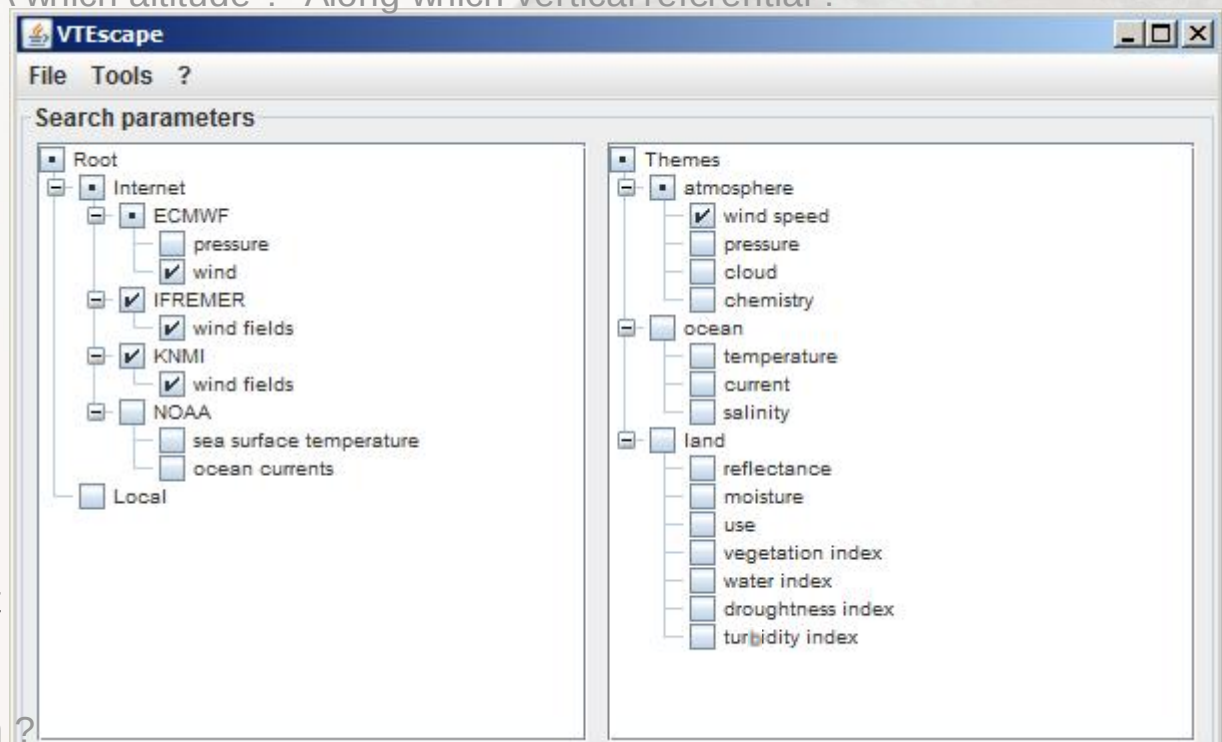
data provider experts

gridded data, synthesis,
re-analysis



How to perform a spatial interpolation ?

How to perform a temporal interpolation ?



-
- Université de Marne-la-Vallée
Institut Gaspard Monge
-
-
- ## Exemple du portail SIRIUS
- Localisation géographique <http://sirius.spotimage.fr/>
- Vérifier la position, les quick-looks et données auxiliaires
-
- ### Critères de recherche :
1. Instrument - Mission / mode
 2. Spatial - Zone géographique
 3. Temporel - Intervalle ou « saisons »
 4. Technique - couvert nuageux – note technique – angle d'incidence...
- ### Résultats de requête
-
- <http://www-igm.univ-mlv.fr/~ria-zano/>
- version 1.19
-
- Sc
Téledétection et SIG
- page 45

Towards user-knowledge abstractions (1)



- “Poor keywords”
 - Metadata
 - Common ontology
 - Common practices in data processing
Ex.: calibration
 - Evolving semantic
Ex.: HR data ?
 - Systematic (re)labelling of data
 - ...



but

much better than nothing !



- Crossed ontologies

- Different levels of abstraction

- language
 - gazetteer
 - links between ontologies
RDF - Resource Description Framework
 - standardization organisms
OGC, ISO, CEOSS
 - ...

« une image en couleur du printemps en Normandie »

“a color image of spring in Normandy”

XS optical
instrument

20 March -
21 June



- There is not only ONE type of user

- user's profiles
 - user's education

Conclusions



- Big data - Scopes
 - More data means better science BUT
 - Scientists should spend their time doing science, not data management
- Useless if no way to access data
 - Free data
 - Sufficient data rates
 - Data broadcast for Africa (“GMES Africa” or “Copernicus Africa” ?)
 - Documented data
 - Interoperability (data and services)
 - horizontal - Cloud service providers can swap computing and storage resources
 - vertical - Users can access and process the data through standard protocols
 - Each client / project / user / server... could be data provider
- User’s education
 - the role of public services
 - national levels
 - European level



Thank you for your attention

Questions ?



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