

# Felyx

## Resurrection of HR-DDS system : towards merged DDS / MDB / MMDB capabilities

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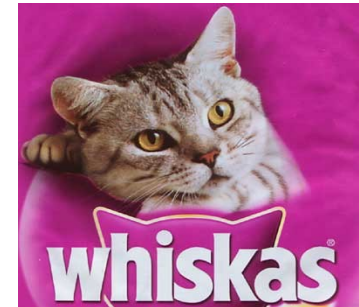


**...is not a new brand of cat food !!**





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**...the project name was forged by an expert team at ESA**





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**No, this is not a glass of wine !!**

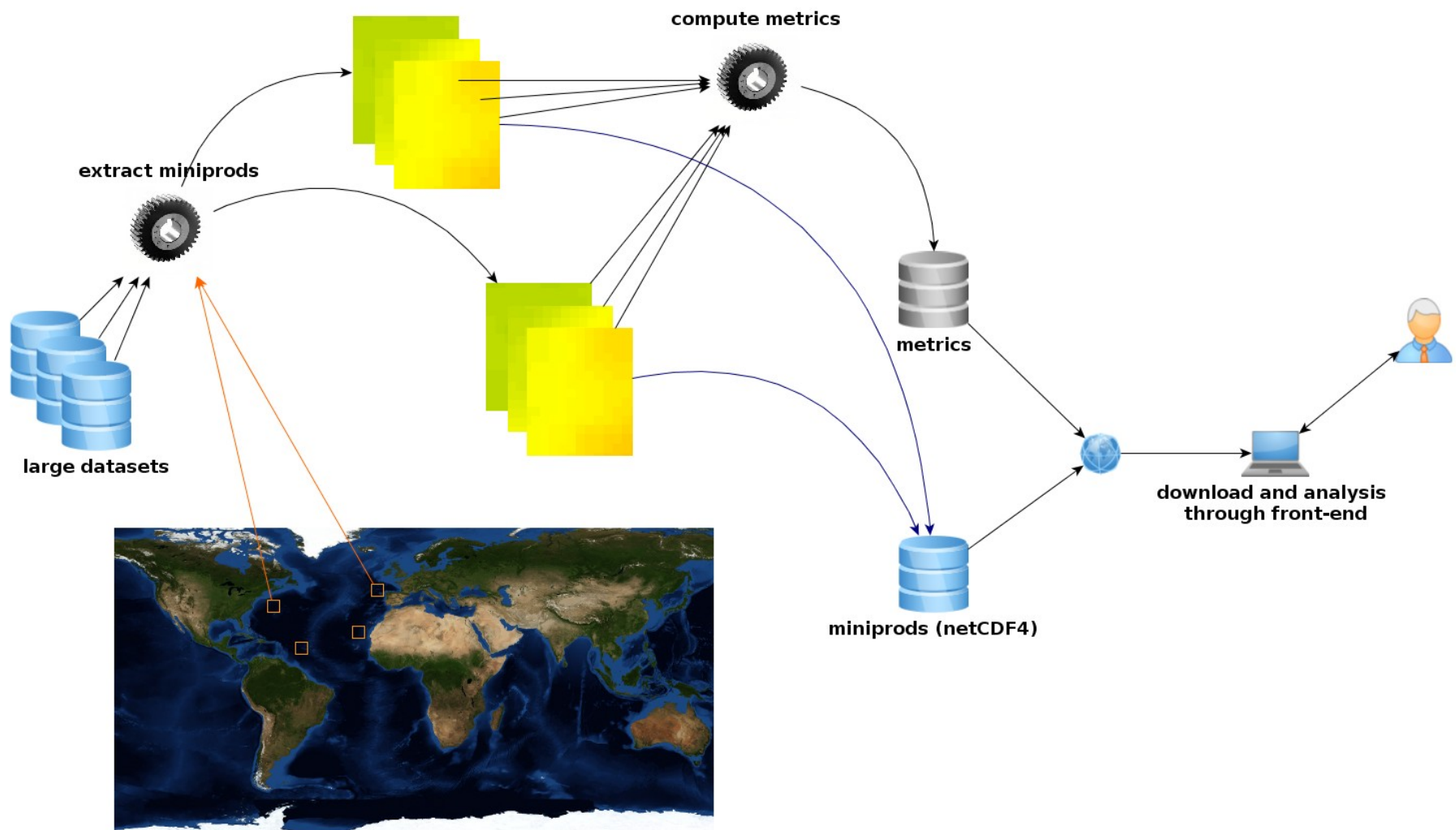


- Felyx is a re-design of former HR-DDS system because :
  - It has been traditionnally re-designed years after years !
  - Need for a working and sustained system – former instances are not online anymore
  - Opportunity to better design and revise existing pieces of code while offering a free and open source solution to the community for common tasks
  - Principle shall apply to a larger audience :
    - The concept of HR-DDS system shall apply to (and is not restricted to) any types of quantities : sea surface temperature, ocean colour, ...
    - Need for cal/val activities of upcoming missions (Sentinel)
    - Avoid multiple system implementation for such activities
    - We want to stick to the very small subset extraction principle, and not duplicate existing global frameworks

To provide a set of tools and resources for :

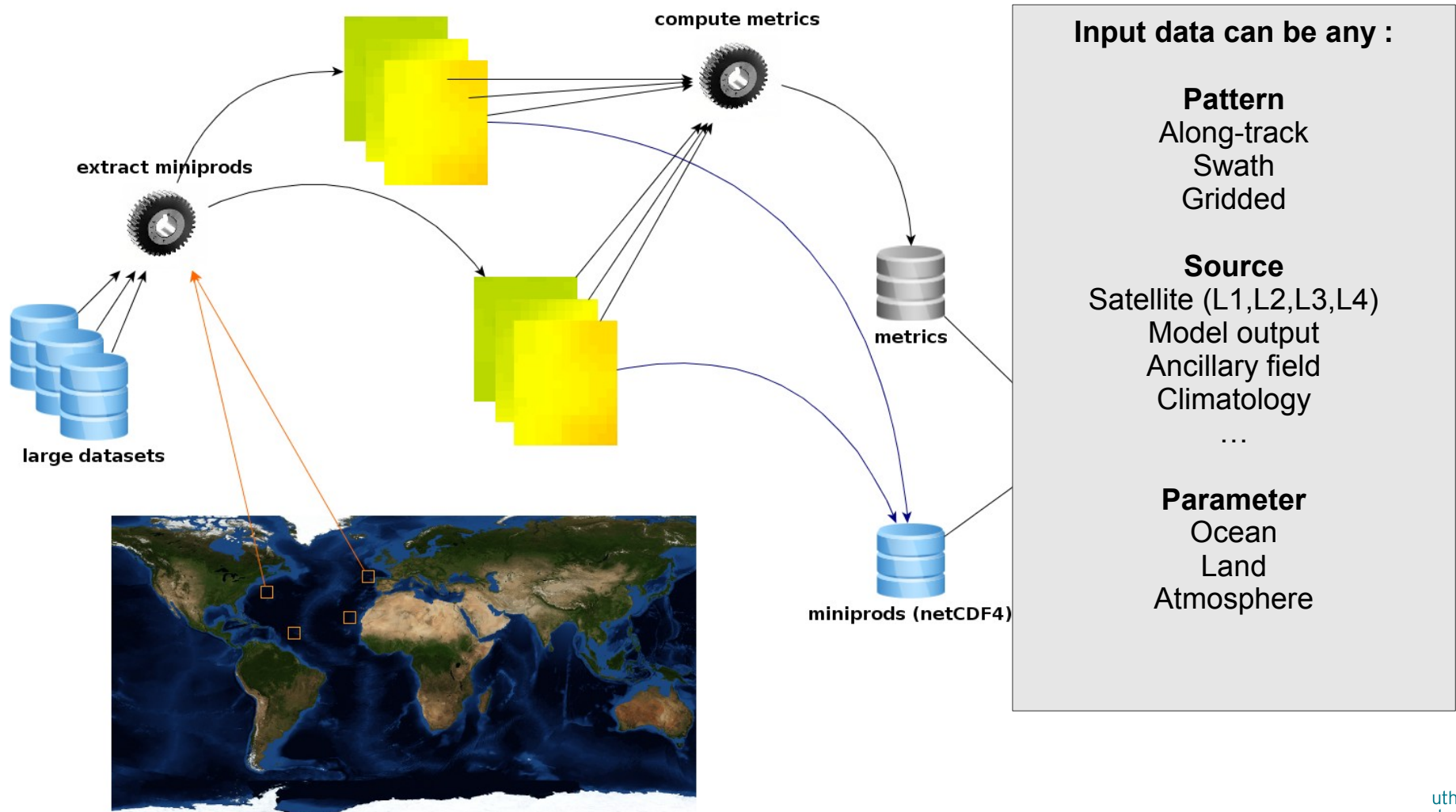
- ✓ Comparison of various processing algorithms (L1, L2)
- ✓ Inter-comparison of various datasets performances
- ✓ Detection and analysis of processing issues
- ✓ Long term survey of parameters, climate application
- ✓ Trend estimation, cross-dependencies of variables over various representative sites
- ✓ Collaborative and educational science

- Subsetting back-end (from larger datasets)
- Analysis and intercomparison front-end

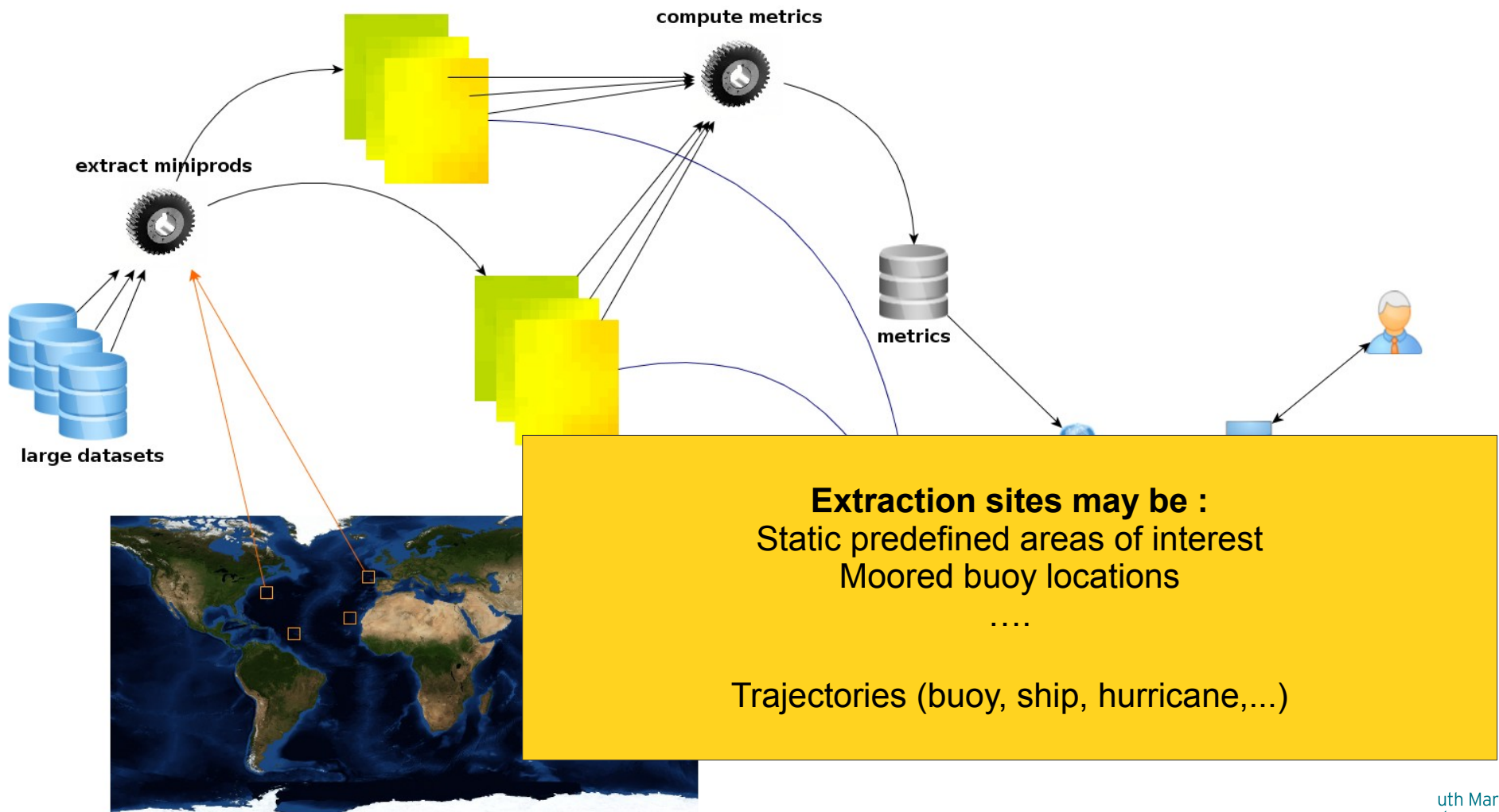




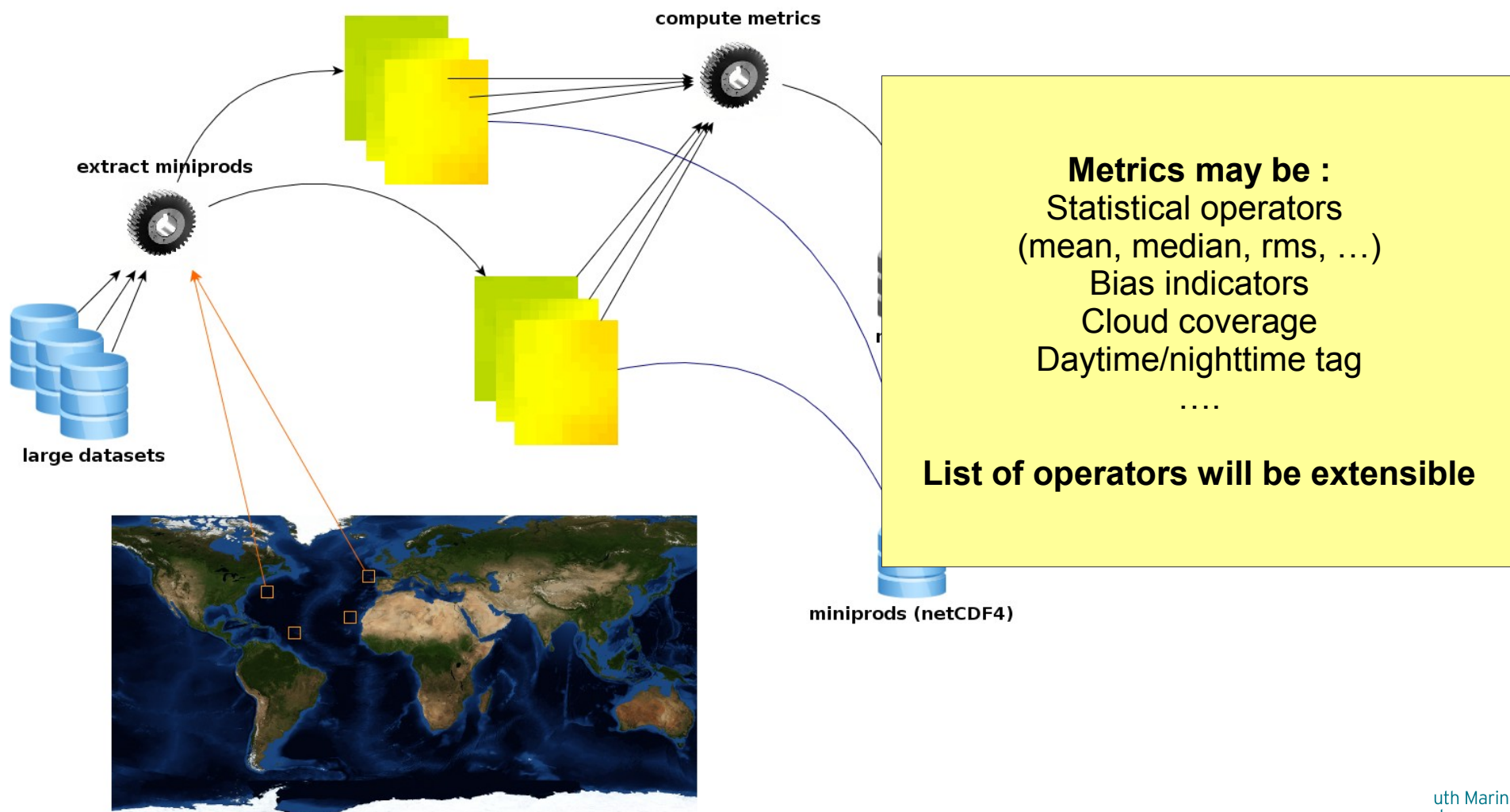
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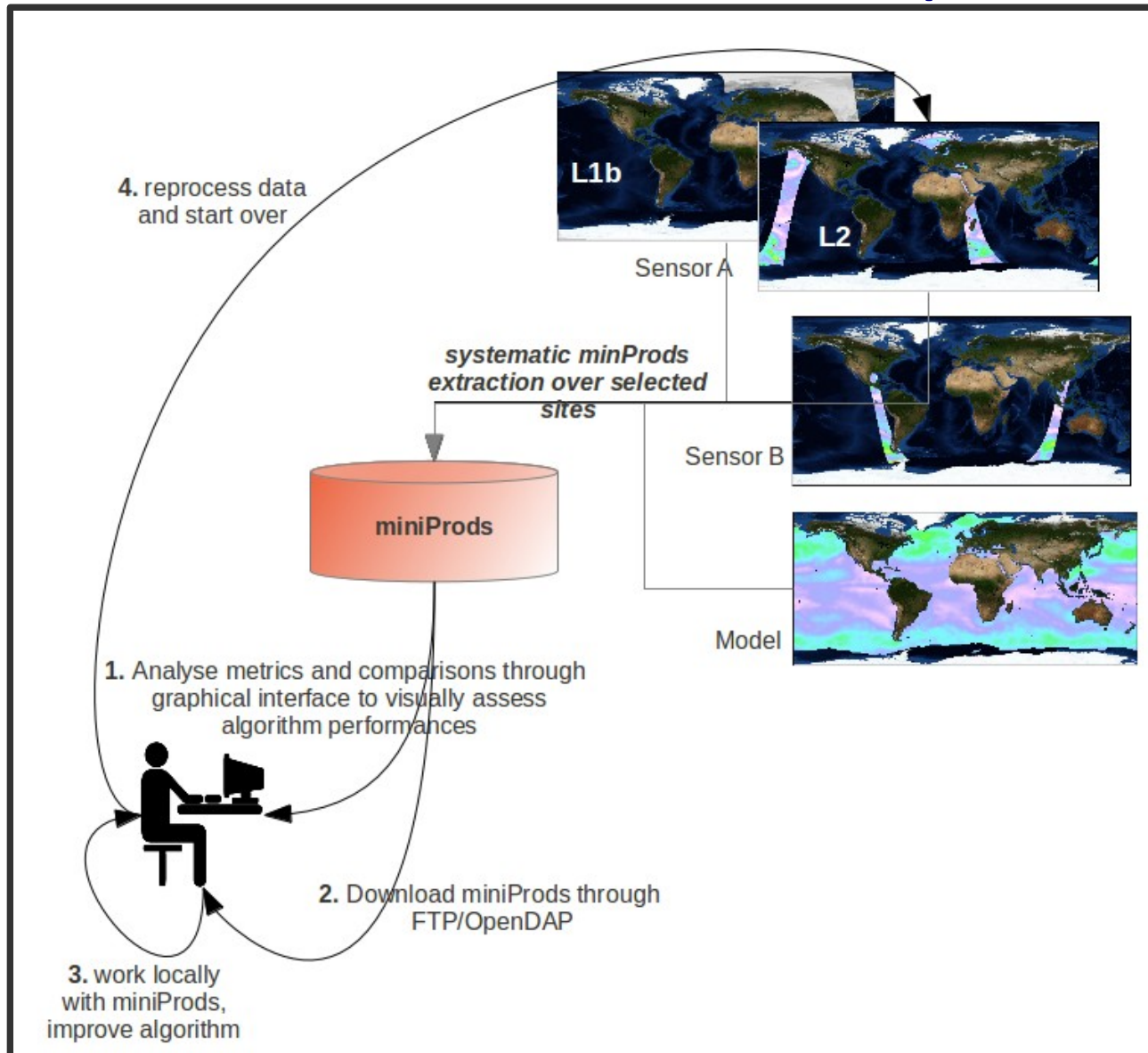
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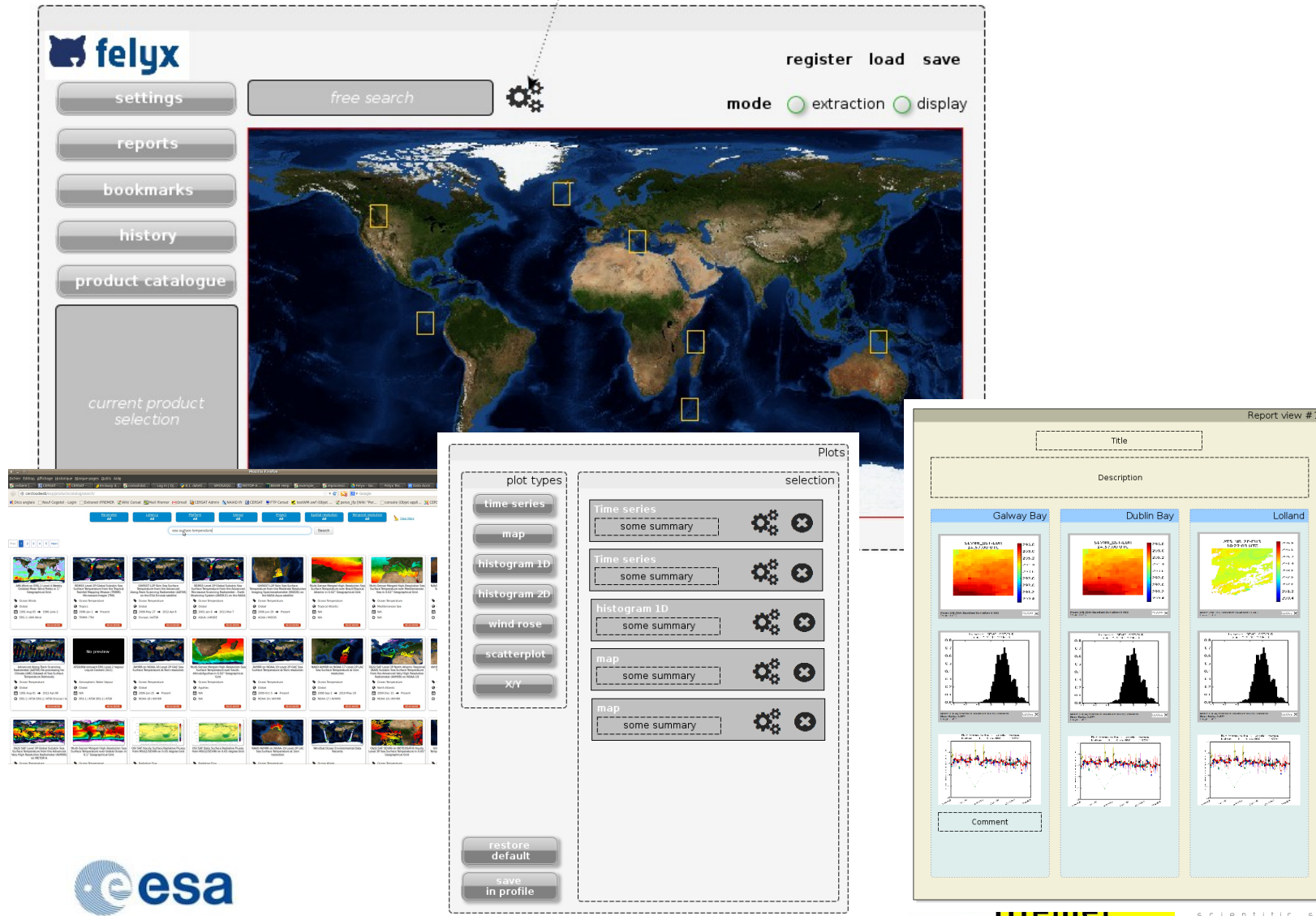
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The front end will allow the data analysis and intercomparison for various kind of applications, all based on a common set of plots



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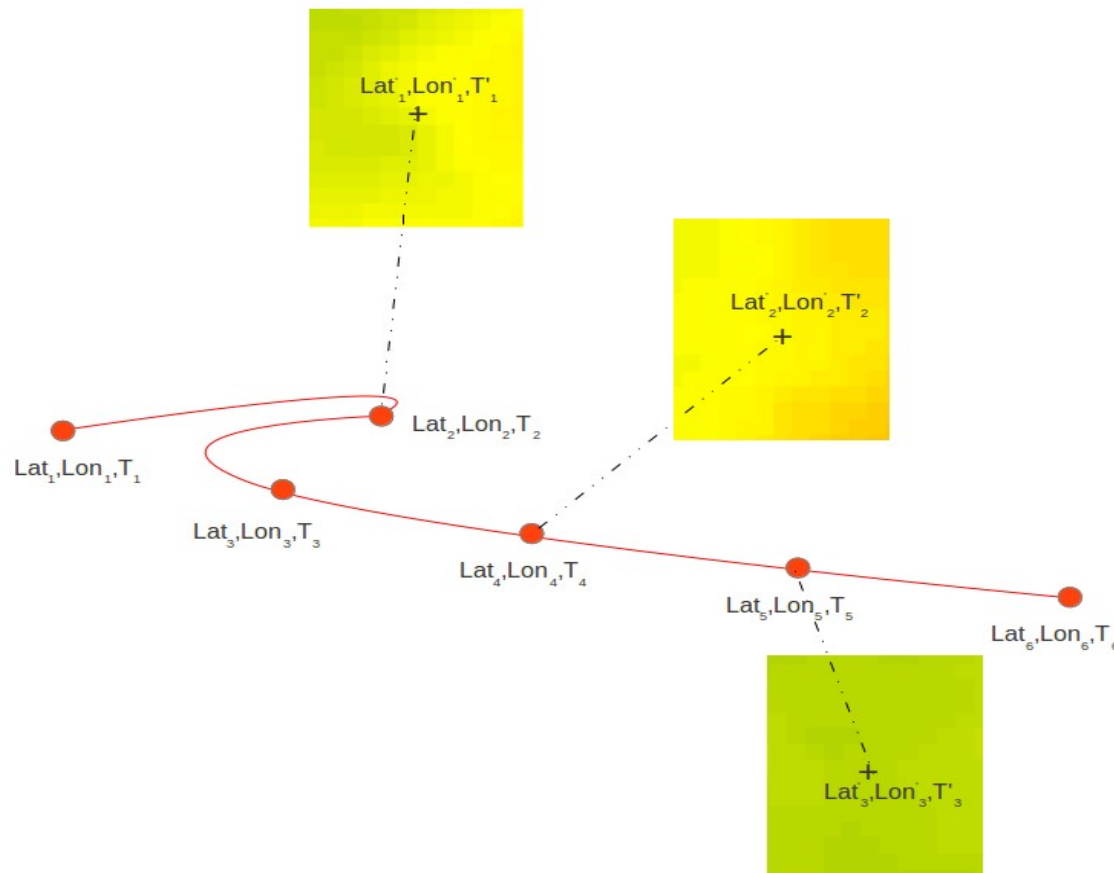
The interface features a top navigation bar with the 'felyx' logo, a 'free search' input field, and buttons for 'register', 'load', and 'save'. A 'mode' selector is set to 'display'. A left sidebar contains navigation options: 'settings', 'reports', 'bookmarks', 'history', and 'product catalogue'. The main area displays a world map with several yellow rectangular markers indicating data collection sites. A 'site filters' tooltip is visible over the map.

Below the map, a 'Plots' configuration panel allows users to select plot types and their placement in a report. The 'plot types' list includes: time series, map, histogram 1D, histogram 2D, wind rose, scatterplot, and X/Y. The 'selection' area shows these types being added to a report layout, each with a 'some summary' text box and a gear icon for configuration.

The report layout, titled 'Report view #1', includes a 'Title' field, a 'Description' field, and three columns for different locations: Galway Bay, Dublin Bay, and Lolland. Each column contains a grid of plots: a heatmap, a histogram, and a time series plot. A 'Comment' field is located at the bottom of the report view.

- Raw data (extracted miniprods and metrics) accessible through :
  - FTP / OpenDAP
  - Query through web interface (tar file or values) for more advanced selection criteria
  - Netcdf format for miniprods
  - Csv, netcdf, json for metrics
- Reporting
  - Any relevant set of plots displayed during a work session can be saved, emailed or exported in a single report
  - Report content can be automated for periodic generation over the latest data

- Shall manage **trajectories**
  - Extraction along the path of buoys, cruise or hurricane
- Extract miniprods centered on trajectory locations closest in time, within a time limit => **match-up database processing**



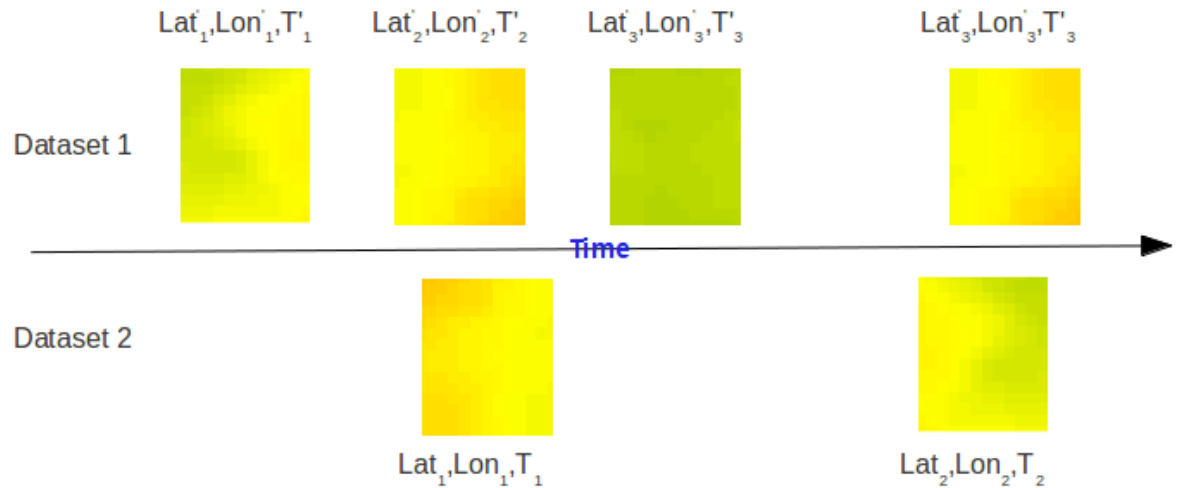
Multiple datasets will be extracted at the same location (static sites) or along the same trajectory

It shall be possible from this base of miniprods to apply additional filtering allowing for a multi-sensor matchup capability, selected miniprods close enough from each other.

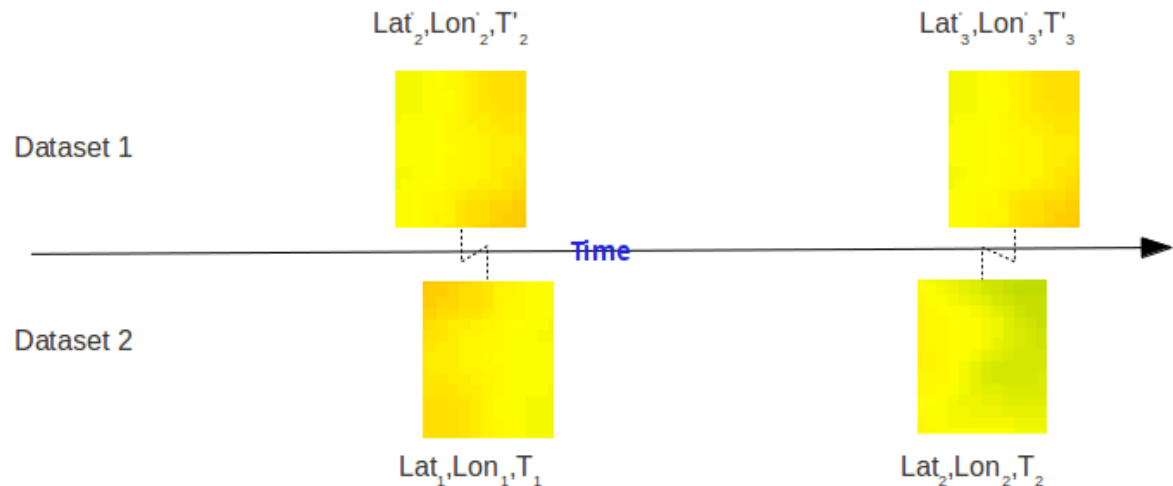
Colocation rules to consider work done by CDR-TAG, SST CCI, ....

MMDB behavior shall be a special kind of query

## 1. HR-DDS Simple Access



## 2. MMDB Access

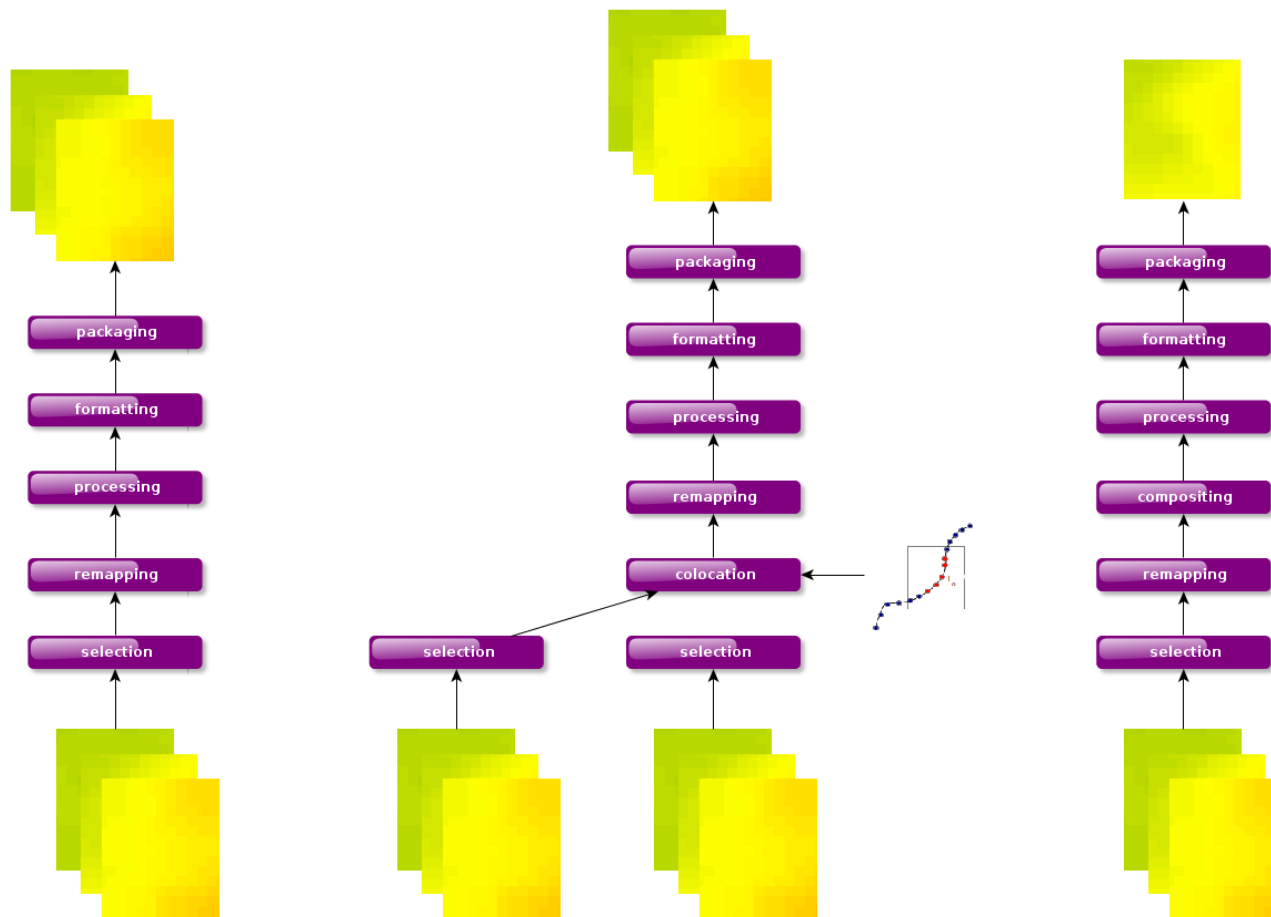




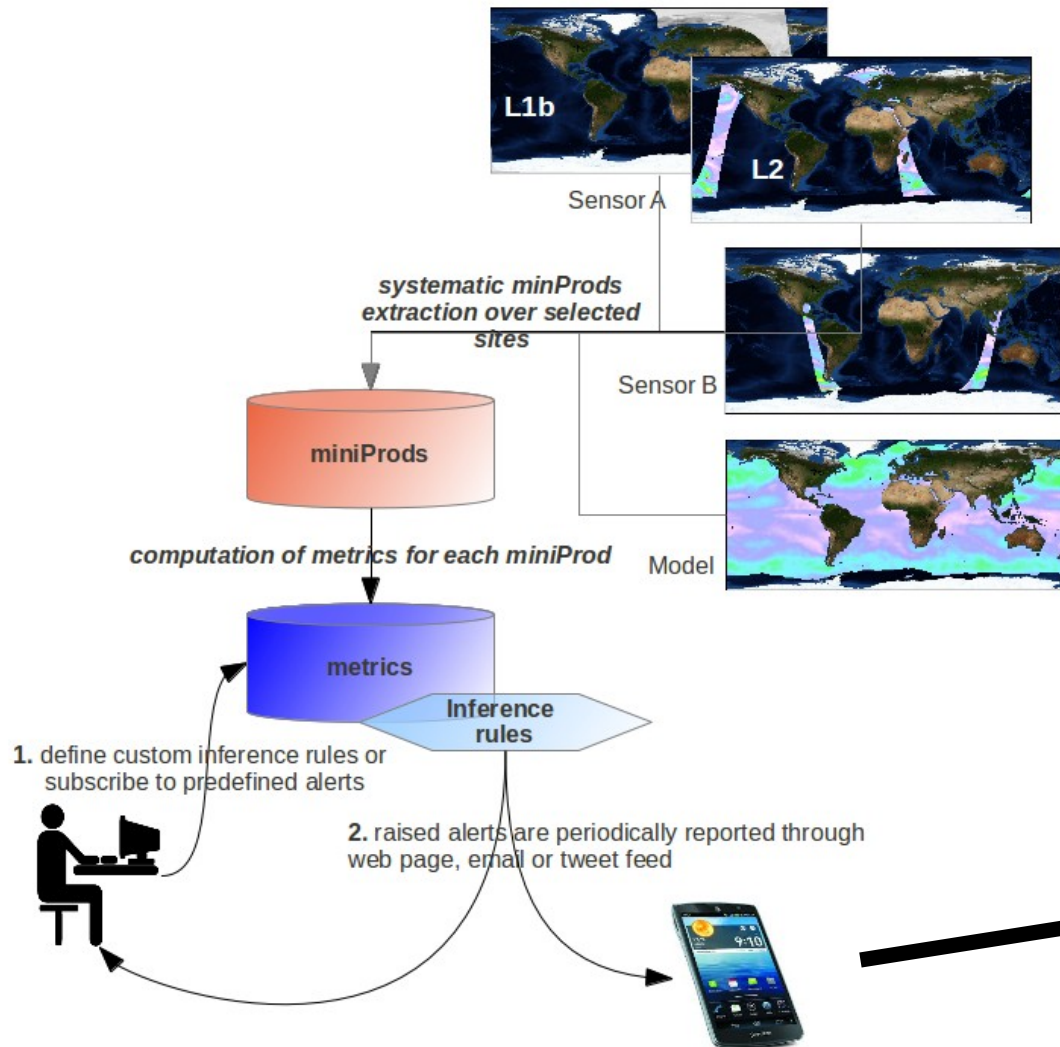
Felyx is designed to be able to generate match-ups :

- ✓ Satellite to in situ (MDB)
  - ✓ In situ data provided as trajectories (x,y,t) or fix locations
  - ✓ Extract subsets and metrics at each location
  - ✓ Flexible time colocation criteria
  - ✓ Ability to batch process complete data collection, distributed on several nodes
- ✓ Satellite to satellite (MMDB)
  - ✓ Based on extraction at the same trajectory locations
  - ✓ Pairing of multi-sensor data using one sensor as reference. Several methods or flexible criteria can be proposed to user.
  - ✓ Rejection of duplicated records too
  - ✓ Additional processing (remapping, alignment of colocated subsets,...) can be done client side or using/extending felyx workflow mechanism
- ✓ Methodology to generate complete MMDB datasets to be proposed and circulated to interested community (contact me)

Felyx comes with a workflow mechanism, fully extensible (managed through plugins)



- Alert generation

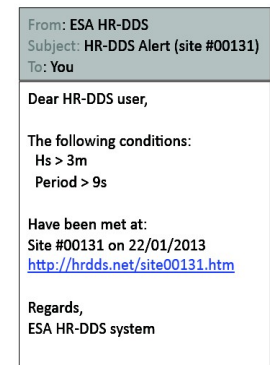


Automatic detection of anomalies based on simple indicator combination (user defined)

Broadcasting to the user



Example of how HR-DDS alert tweets could appear on a phone twitter application.

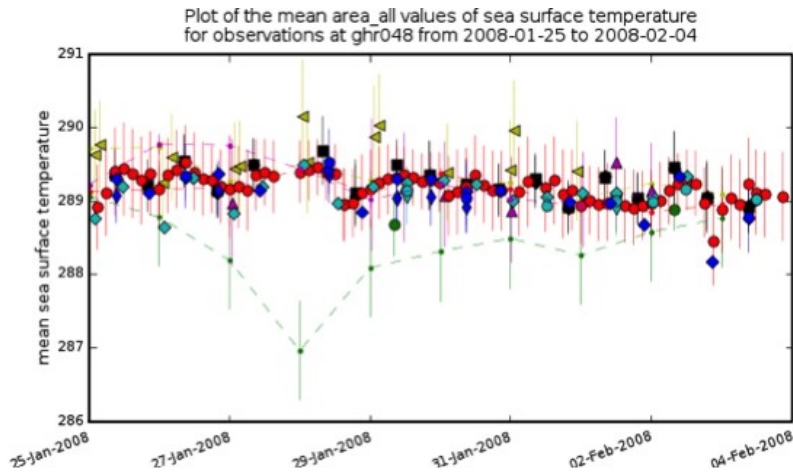


Example of how an HR-DDS email alert might look.

- Collaborative science

Share interesting cases (plots)  
=> email, social tool

Bookmark typical cases  
(educational / academic /  
research interest) => longer  
term registration and log book

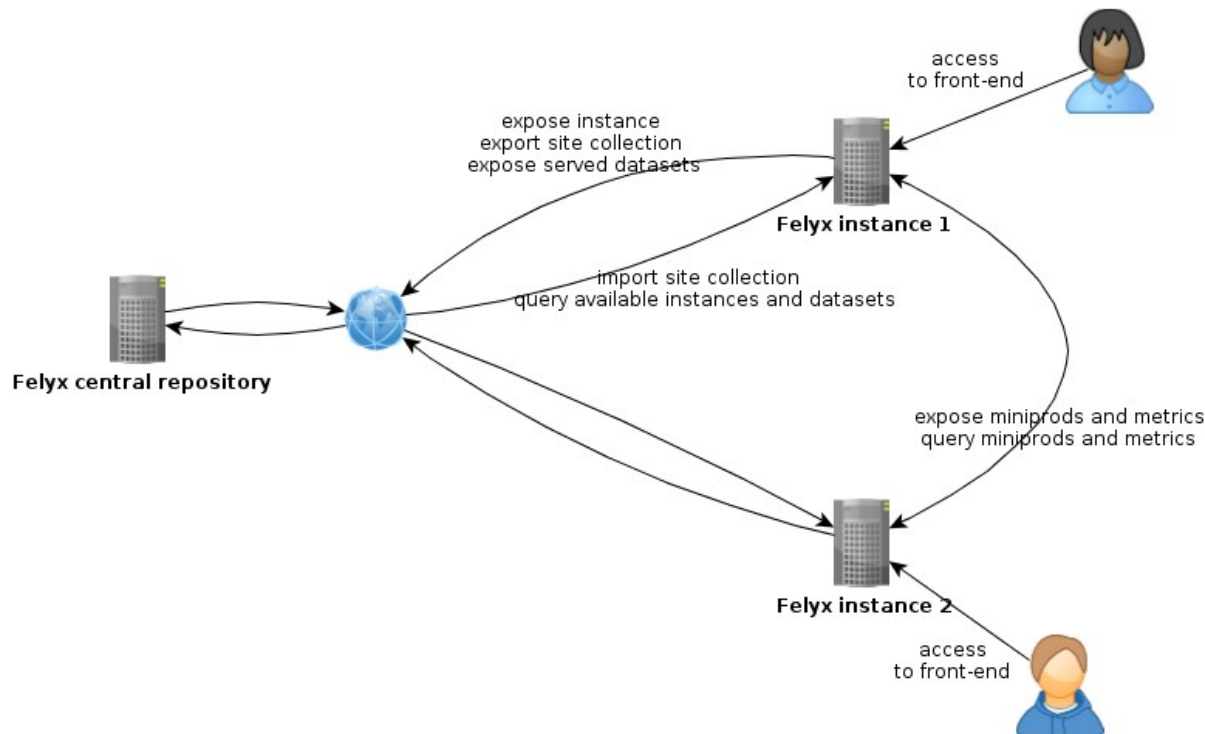


Title	Description	Site code	Delete
<a href="#">Time series example of gross METOP errors</a>	There are extremely large deviations in SST over the course of 12 hours, up to 10 K	ghr020	<a href="#">Delete this MyDDSette</a>
<a href="#">Example very cold METOP</a>	METOP 6AM is 10K colder than METOP 6PM. AVHRR17 and AVHRR18 agree with the warmer METOP	ghr020	<a href="#">Delete this MyDDSette</a>
<a href="#">Very cold METOP</a>	Look at the last 4 histograms. They show the distribution of SST from the warmer METOP.	ghr020	<a href="#">Delete this MyDDSette</a>
<a href="#">High Coverage Morning 6AM</a>	Really good example	ghr020	<a href="#">Delete this MyDDSette</a>
<a href="#">Atlantic day night issue</a>	Same as pacific, but opposite times	ghr063	<a href="#">Delete this MyDDSette</a>
<a href="#">Atlantic example evening cooling</a>	This one is made spurious by gridding issues, but still provides some insight.	ghr063	<a href="#">Delete this MyDDSette</a>
<a href="#">Example north of Russia</a>	Cold evening METOP observations, not as pronounced by this example has NAR, NAVO and AATSR obs.	ghr066	<a href="#">Delete this MyDDSette</a>
<a href="#">Example o everything working just right</a>		ghr121	<a href="#">Delete this MyDDSette</a>
<a href="#">This one is just plain wierd!</a>	Might already be marked, not sure.	ghr020	<a href="#">Delete this MyDDSette</a>
<a href="#">AATSR cold compared to METOP</a>	AATSR one degree colder compared to METOP in Antarctic, and swath times only 10 minutes apart.	nmi070	<a href="#">Delete this MyDDSette</a>

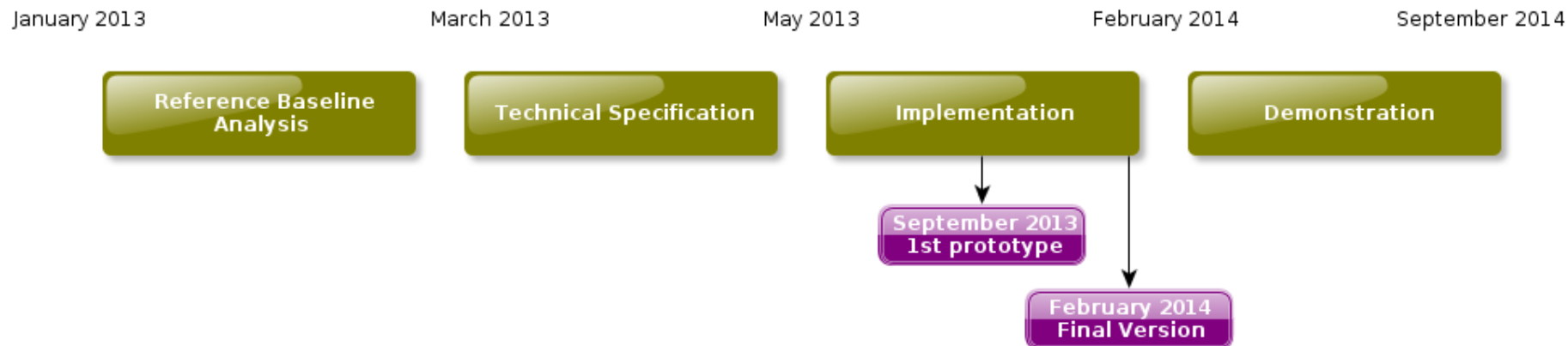
- Network of *felyx* instances

Mixing datasets hosted and processed at various places

Intercomparisons of various parameters (e.g. SST with Ocean Colour)



- Objectives :
  - It shall be easy for users to build their own applications querying from existing Felyx instances through **RESTful web services** => documented query API
  - It shall be easy for users to deploy their own instance => configure it on their local datasets
  - It shall be possible and easy to tailor the system to each user need : parameter, datasets, metrics, front-end, ....
- Therefore : **Felyx shall be free and open source, fully documented, for uptake by the user community**
- Felyx will be available with (likely) GPL v3 licensing
  - Users can modify source code
  - Users can make commercial usage of the system
  - Providing source code modifications is not mandatory (but encouraged)
- Felyx will be written in **python** and javascript, using third party components compatible with above licensing



Two instances of Felyx will be operated from February 2014 for a 6-month demonstration :

- => **IFREMER** : Sea surface temperature and Ocean Waves
- => **PML** : Ocean colour

Requirements baseline, technical specification, interfaces and initial are datasets available on felyx web site.

Dataset	Provider	Temporal coverage	Level
L2P MODIS on AQUA	PODAAC	2006-Present	L2P
L2P METOP	O&SI SAF	2007-Present	L2P
L2P METOP	Navoceano	TBC	L2P
L2P AATSR	ESA	2002-2010	L2P
L2P AMSRE	REMSS	2002-2010	L2P
L2P AMSRE	JAXA	2002-2010	L2P
L2P TMI	REMSS	1998-Present	L2P
L2P AVHRR LAC NOAA-17,18,19	Navoceano	2006-Present	L2P
L2P AVHRR GAC NOAA-17,18,19	Navoceano	2006-Present	L2P
L3P SEVIRI	O&SI SAF	2004-Present	L3
L3P GOES13	O&SI SAF	2001-Present	L3
L3P METOP GLOB	O&SI SAF	2007-Present	L3
L3P NAR19, NAR18, NAR17, NAR16, METOP	O&SI SAF	2005-Present	L3
L3P GOES-11	OSDPD	2006-Present	L3
L3P GOES-12	OSDPD	2006-Present	L3
L3P MTSAT-1	OSDPD	2009-2010	L3
L3P MTSAT-2	OSDPD	2011-Present	L3
AVHRR Pathfinder v5.2	NODC	1981-2010	L3
L4 OSTIA	UKMet	2007-Present	L4
L4 ODYSSEA Global and Regional	Ifremer/ Medspiration	2006-Present	L4
L4 MyOcean Arctic,Baltic,North-Western Shelves, Mediterranean Sea	MyOcean	2009-Present	L4
Reynolds NCDC 1°	NCDC	TBC	L4
Reynolds AVHRR 0.25°	NCDC	TBC	L4
Reynolds AVHRR/AMSRE 0.25°	NCDC	TBC	L4
Envisat AATSR L1	ESA	2002-2011	L1
ERS-1/ERS2 ATSR L1	ESA	1991-2010	L1
ESA CCI Reprocessed archive (Envisat, ERS-1,ERS-2)	ESA CCI Project	1991-2011	L1



- <http://www.felyx.org>
- Contact me : [jfpiolle@ifremer.fr](mailto:jfpiolle@ifremer.fr)
- Following the progress :
  - Technical documentation and blog area, open to review, criticisms and comments
  - Providing recommendations, e.g. colocation and MMDB rules
  - Can be involved in early testing and use cases
  - Registration to email list to keep informed