HR-DDS

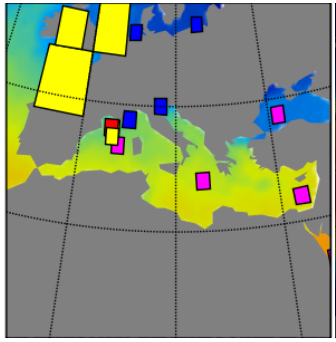
High Resolution Diagnostic Data Set

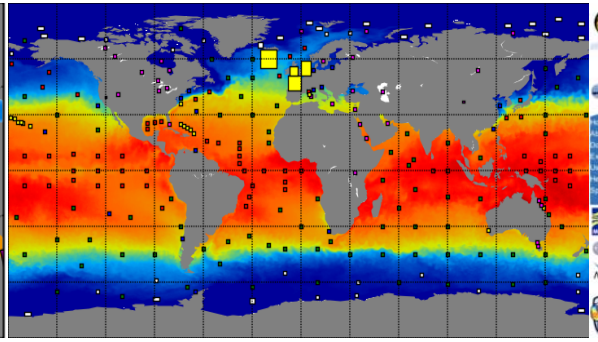
Final Report for the HR-DDS

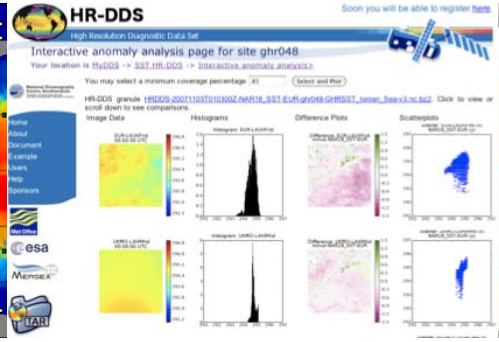
David J. S. Poulter, National Oceanography Centre, UK

Ian S. Robinson, National Oceanography Centre, UK

Craig Donlon, ESA/ESTEC, The Netherlands







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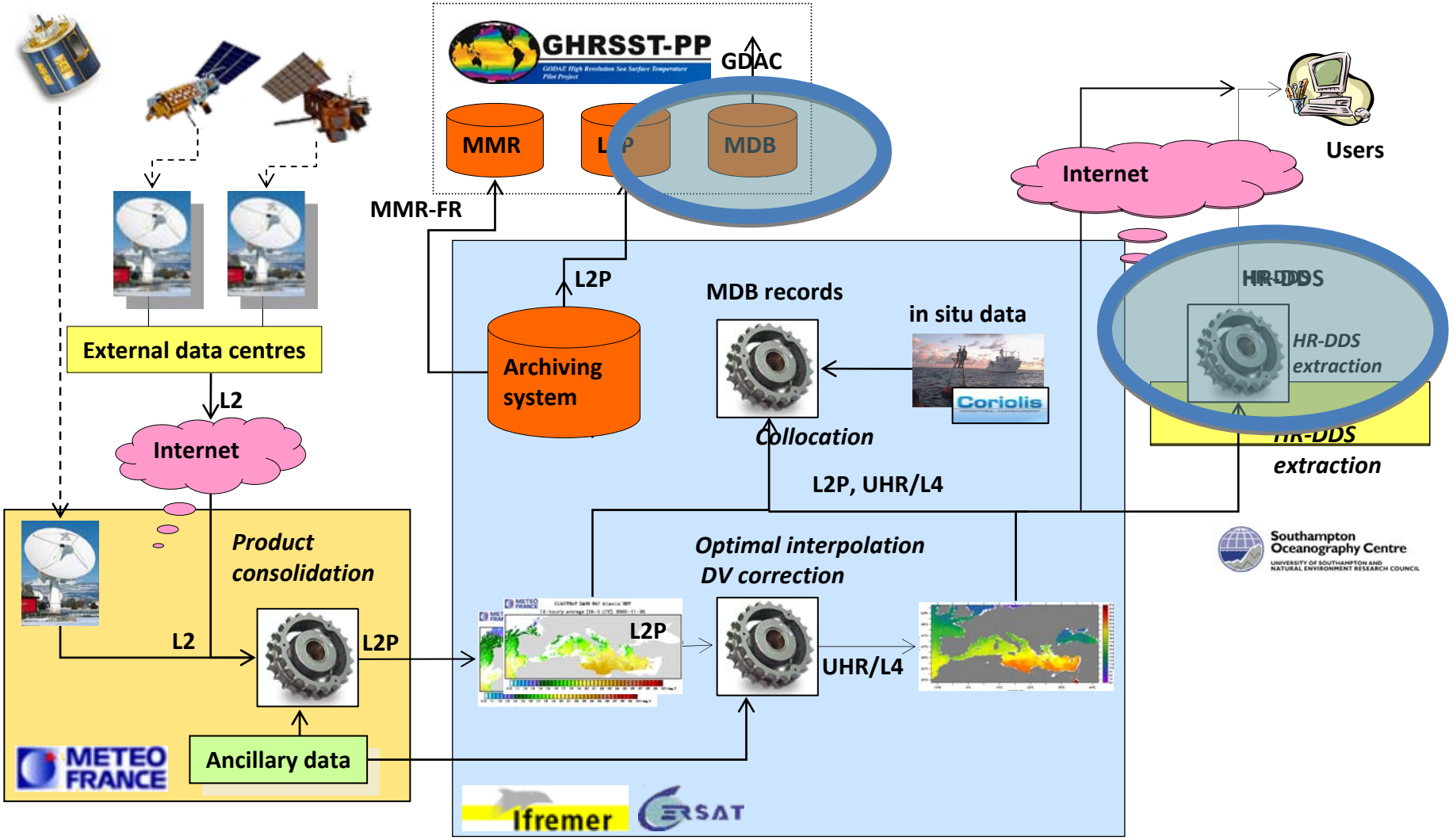
The Medspiration / GHRSST System (Original Design)



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Improvements to the original design

The HR-DDS has moved beyond the original scope of the project:

- L2 / L2P Satellite SSTs (Intended)
- L4 analysis products (Intended)
- Model SST fields
- Climatologies
- In situ observations
- Interactive searching
- Interactive analysis
- Unique dynamic analysis
- Database access

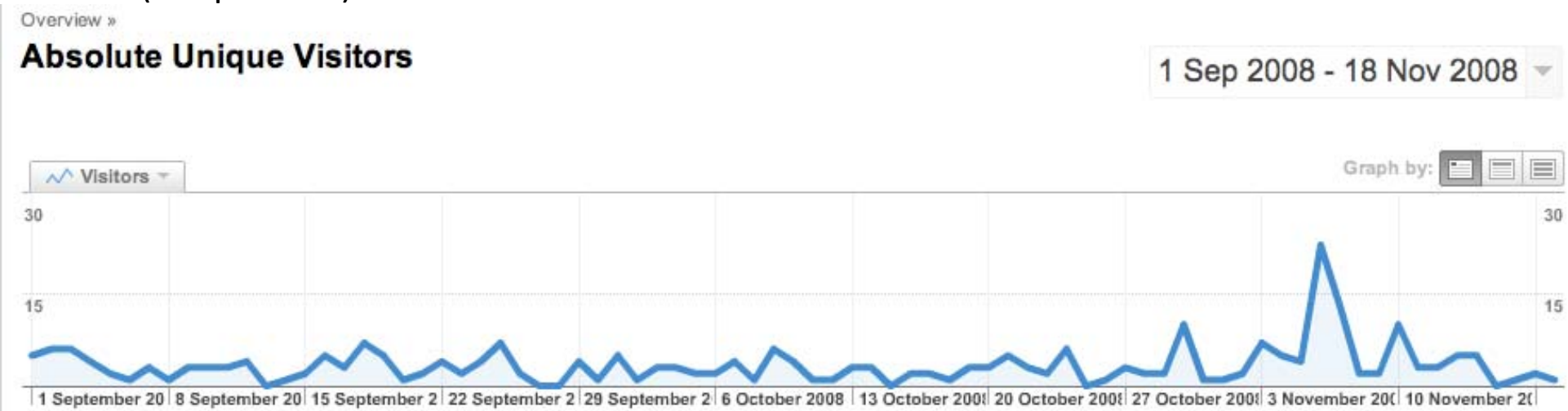
Some user statistics

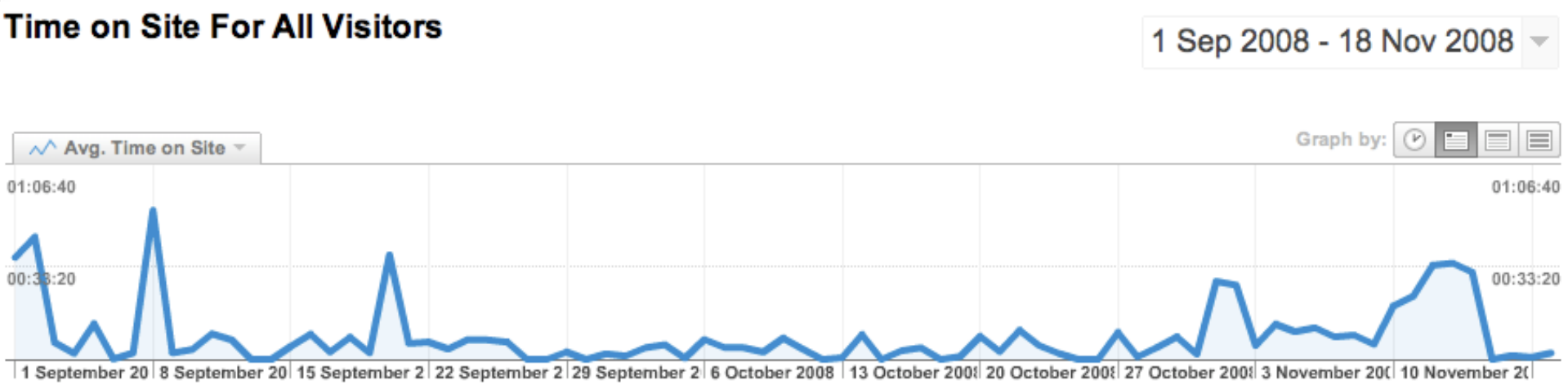
User (unique user) locations in the last 9 weeks :

http://www.hrdds.net

Some user statistics

User (unique user) locations and habits in the last 9 weeks :





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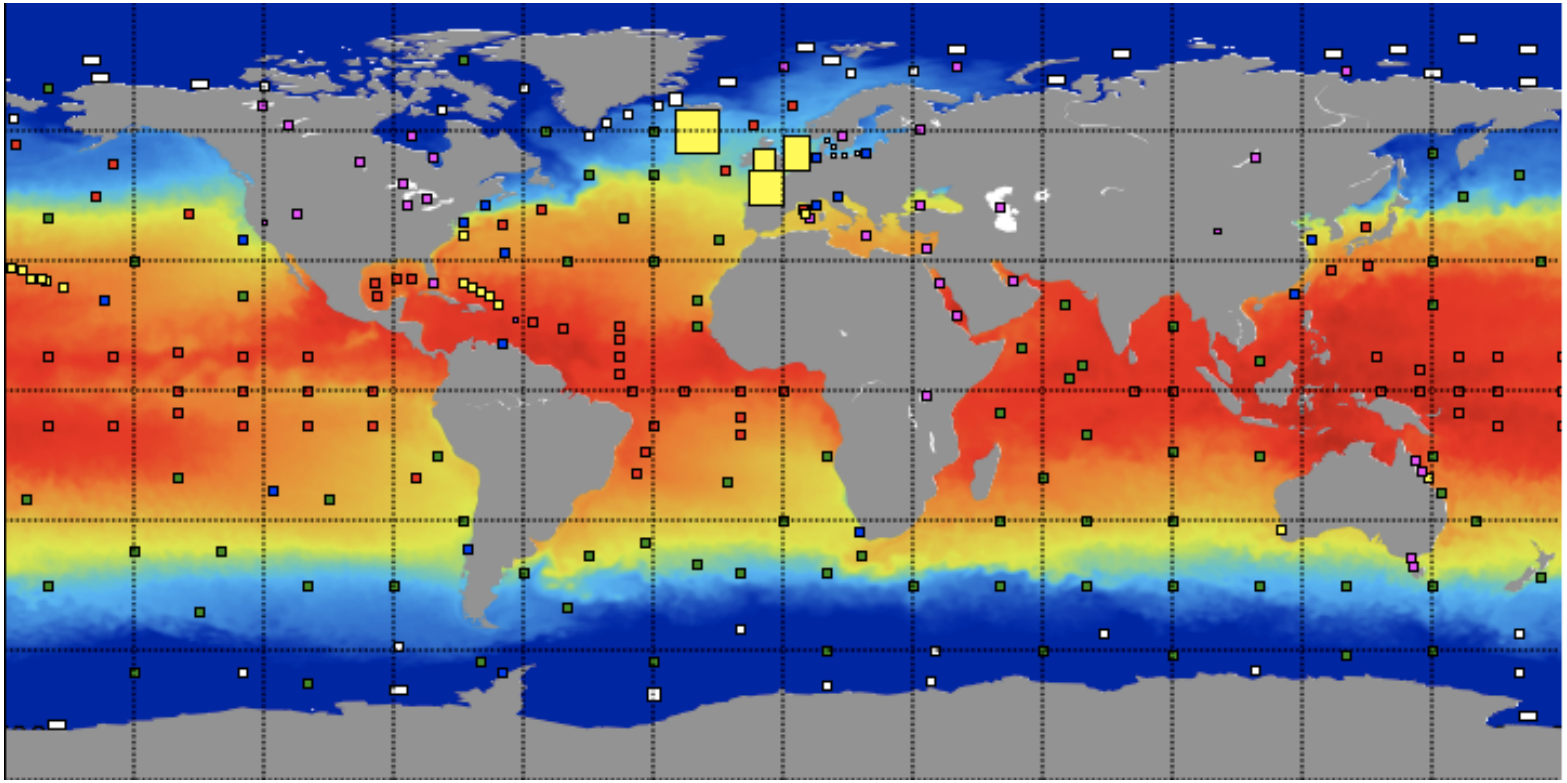
Interactive selection of data on portal

At many sites in the global ocean a subset is produced every observation made in any of approximately 40 input data streams.

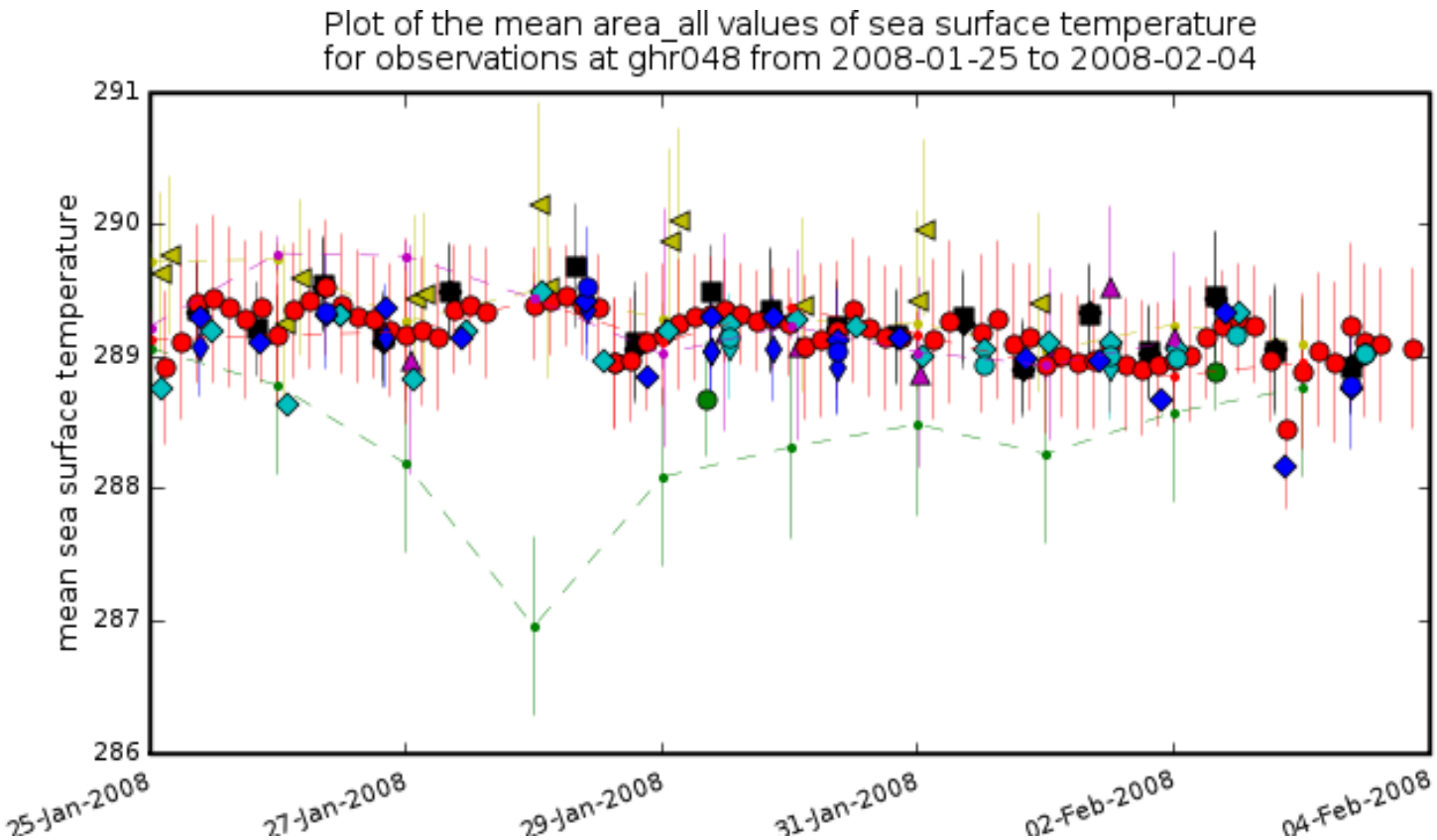
These are all available for interactive analysis at the HR-DDS website



http://www.hrdds.net

Analysis with the HR-DDS

A large database holds a statistical representation of all data within the HR-DDS archive. This is instantaneously available to the web portal and hence to the user.



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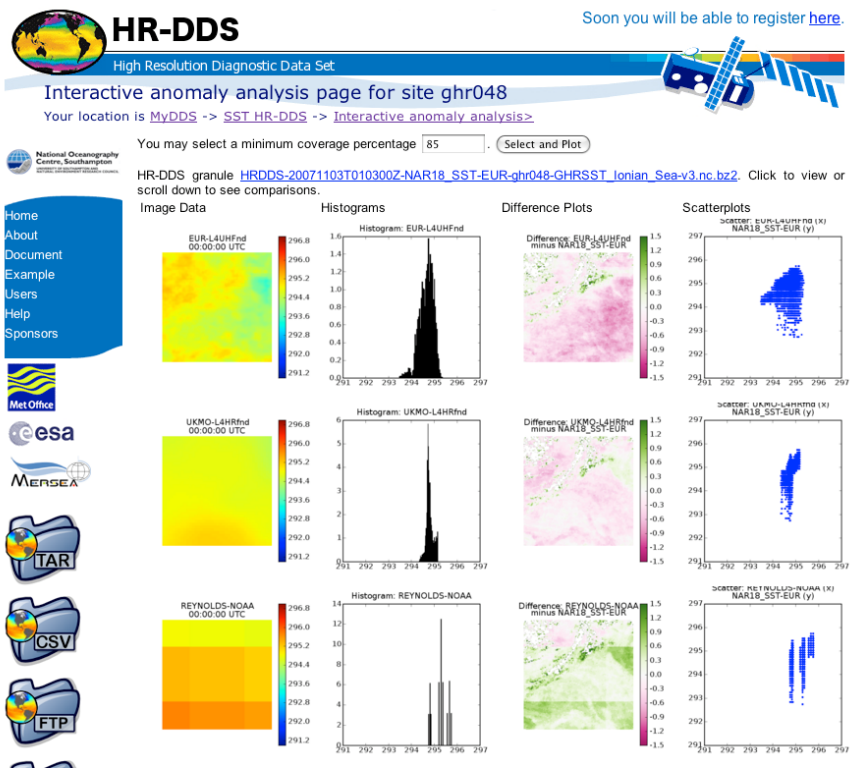
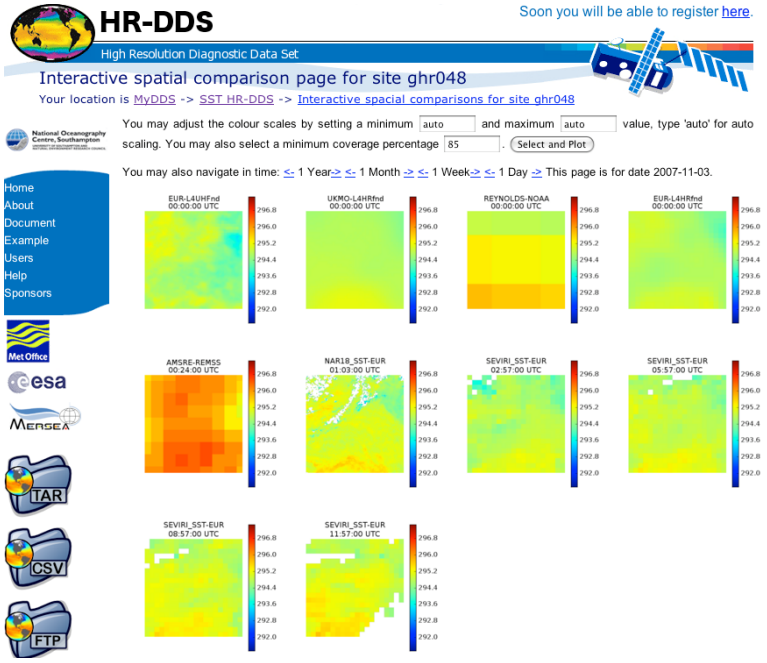
Product comparison example

Individual observations may be interactively compared to identify any problems with that file.





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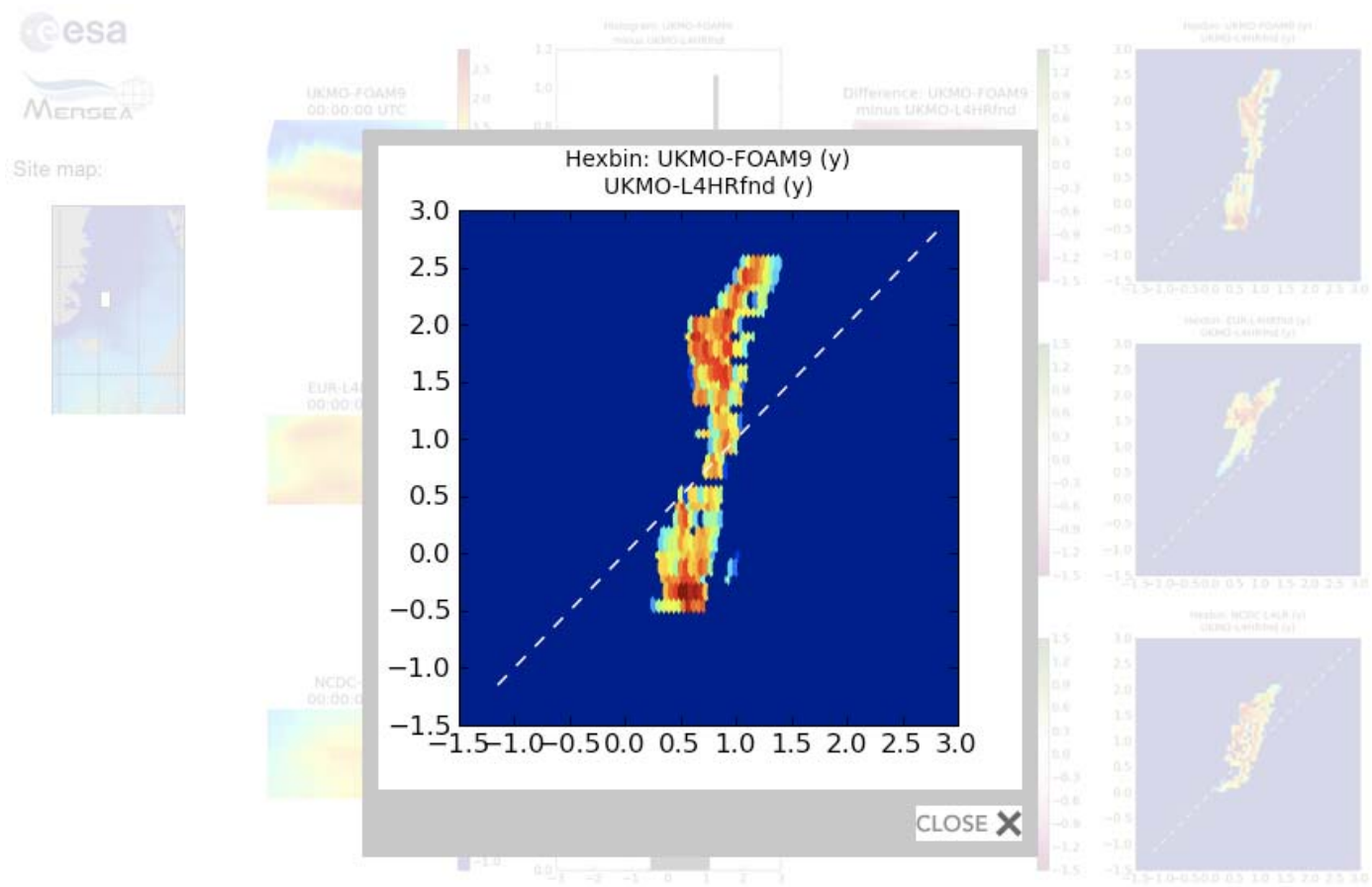
Product comparison example

We now provide 'Hexbin' plots for comparisons instead of x-y scatter.



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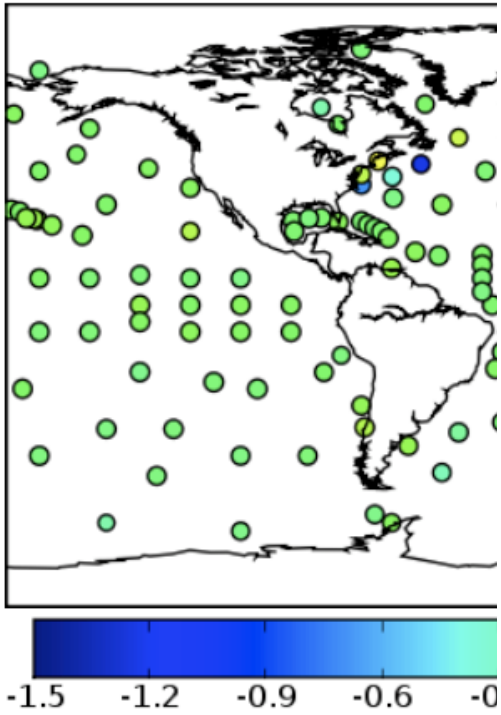
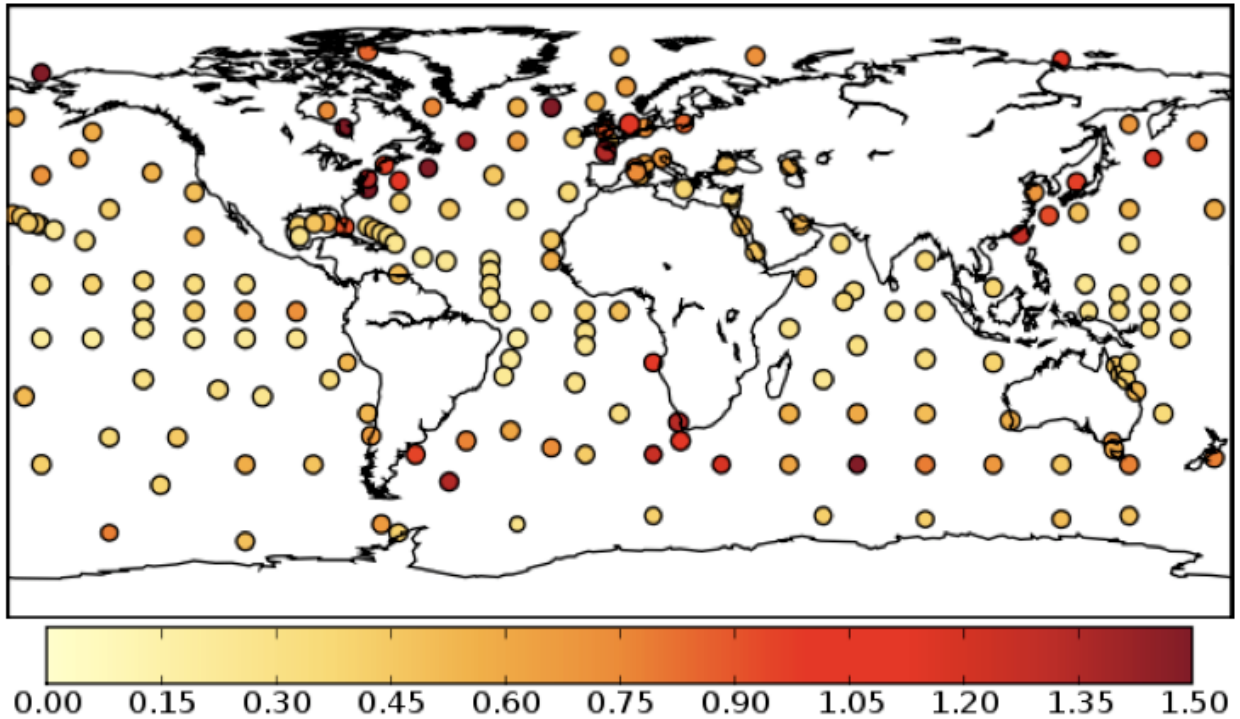
Analysis of L4 products.

A detailed inter-comparison of L4 products was undertaken. The HR-DDS allowed for easy analysis of general trends and behavior.



Mean Bias of OSTIA to AATSR (0.01 K)



Standard deviation of OSTIA to AATSR (0.25 K)

Analysis of NCDC AVHRR L4 products.

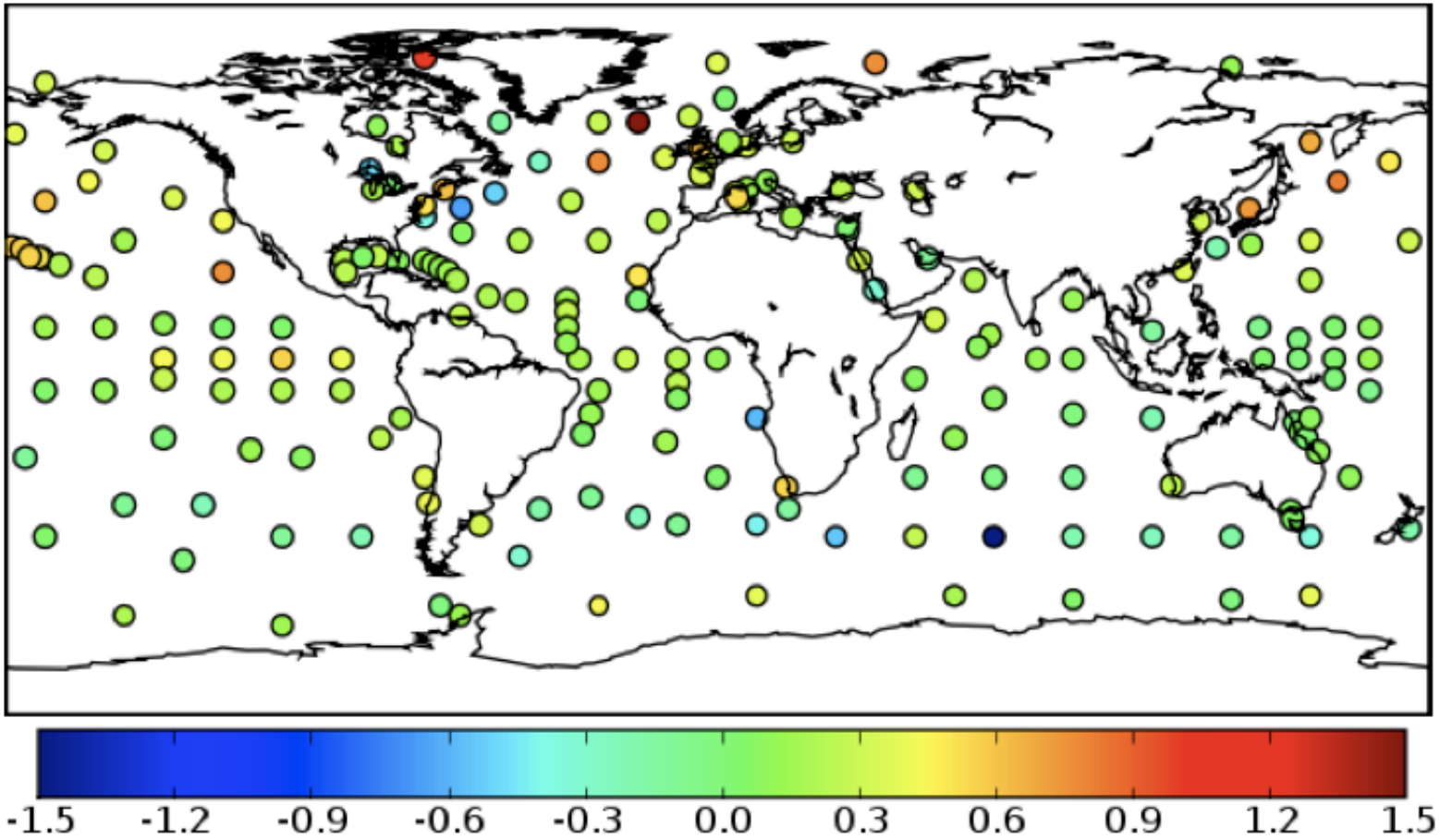


Figure 38 Global distribution of mean NCDC AVHRR OI bias with respect to AATSR. Mean global bias: 0.16 K

Analysis of NCDC AVHRR L4 products.

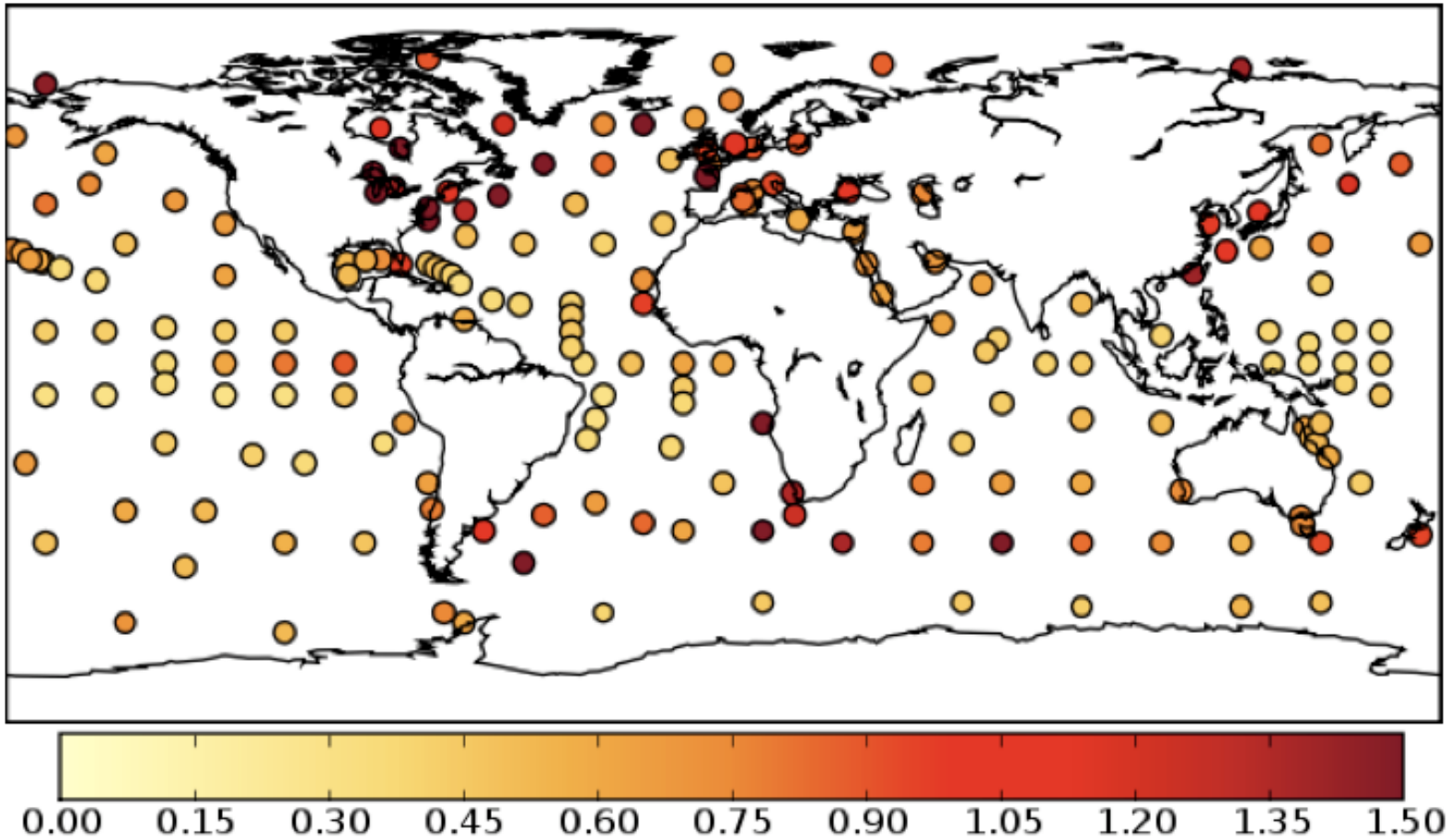
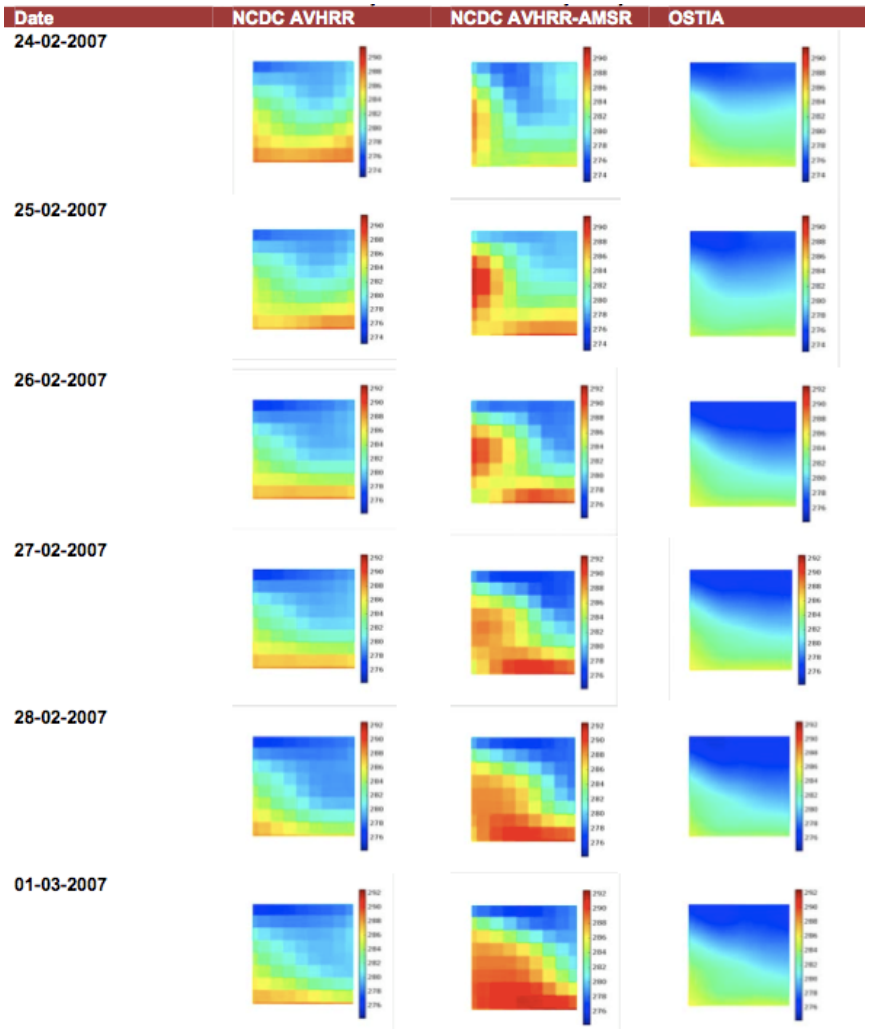


Figure 39 Geographical distribution of standard deviation of NCDC AVHRR OI / AATSR matchups. Global standard deviation: 0.35 K

Further Analysis of L4



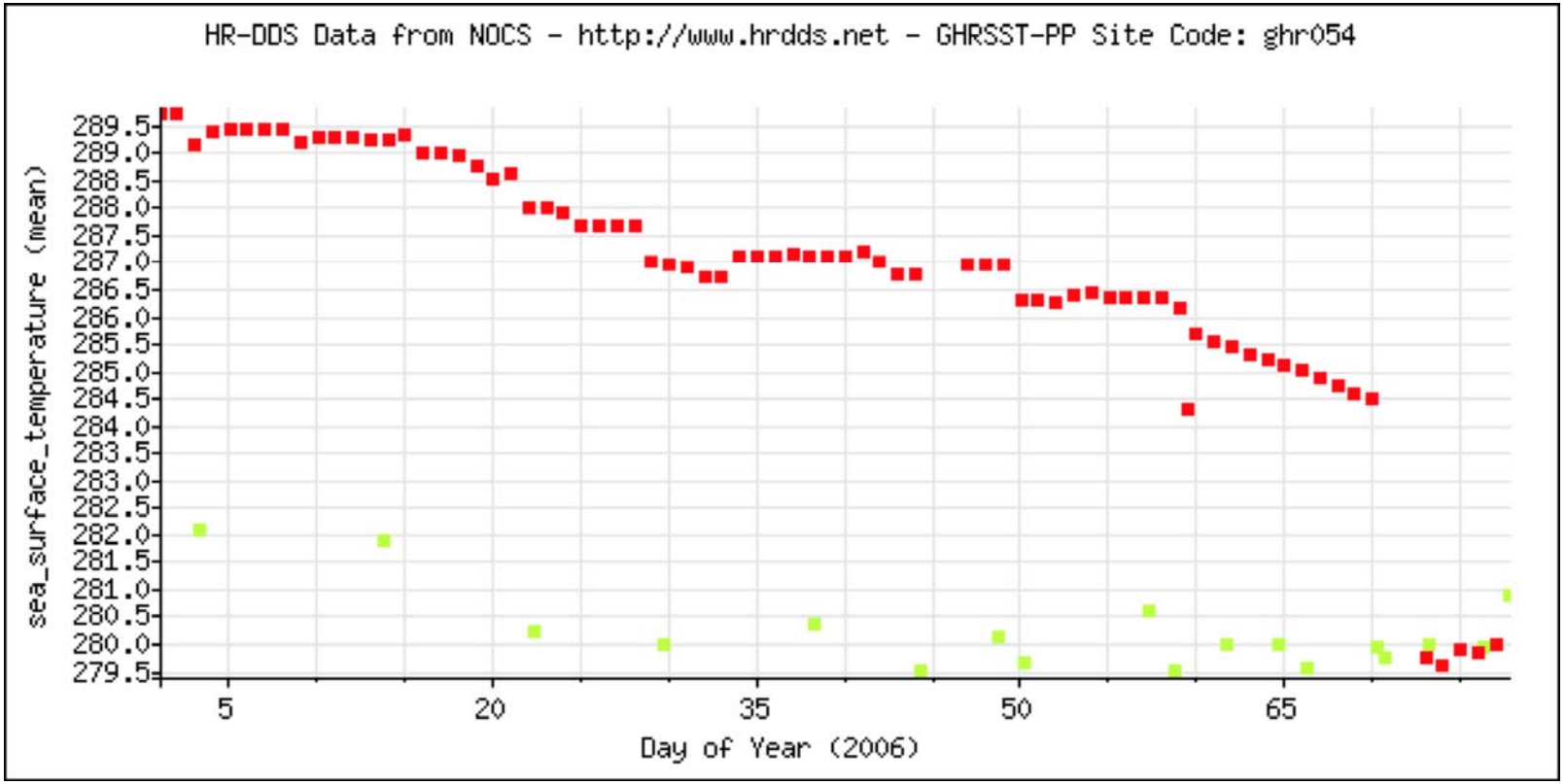
Identification of the causes of biases in specific regions with specific analysis is greatly improved by looking at detailed high resolution imagery.

The HR-DDS (as part of the GHRSST project) is developing new tools for the analysis of L4 products, including a dedicated L4 portal, as a contribution to the **GEO** (Group on Earth Observations) **Action DA-06-03**.

http://www.hrdds.net

Further Analysis of L4

Identified a failure of OSTIA to assimilate any data in the Caspian Sea until AATSR values had reduced to within 5 K of Levitus climatology. In this case Levitus was extremely warm biased.



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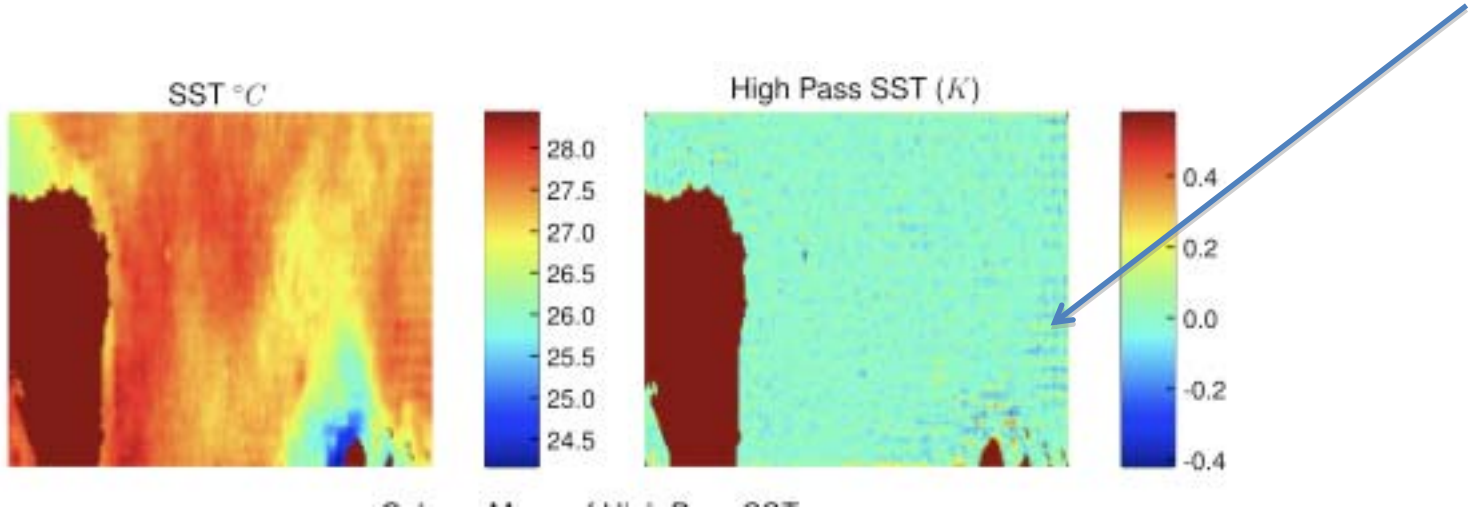
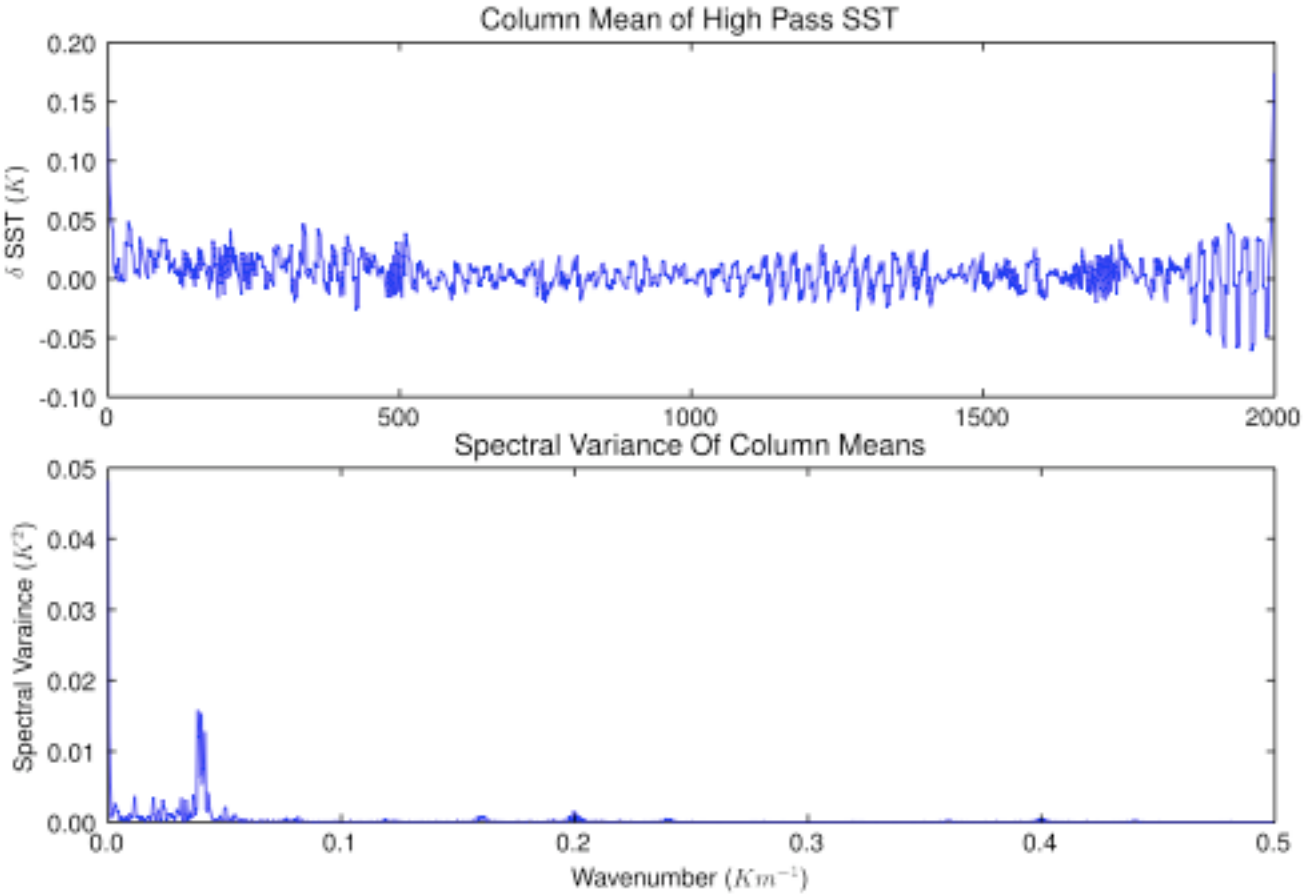
Further Analysis of L4

Using the HR-DDS NOCS identified a spatial anomaly in early OSTIA SSTs



Further Analysis of L4

This manifested itself as a power anomaly at 25 km wavelengths – was later traced to a bad ingestion operator for TMI data from Medspiration.



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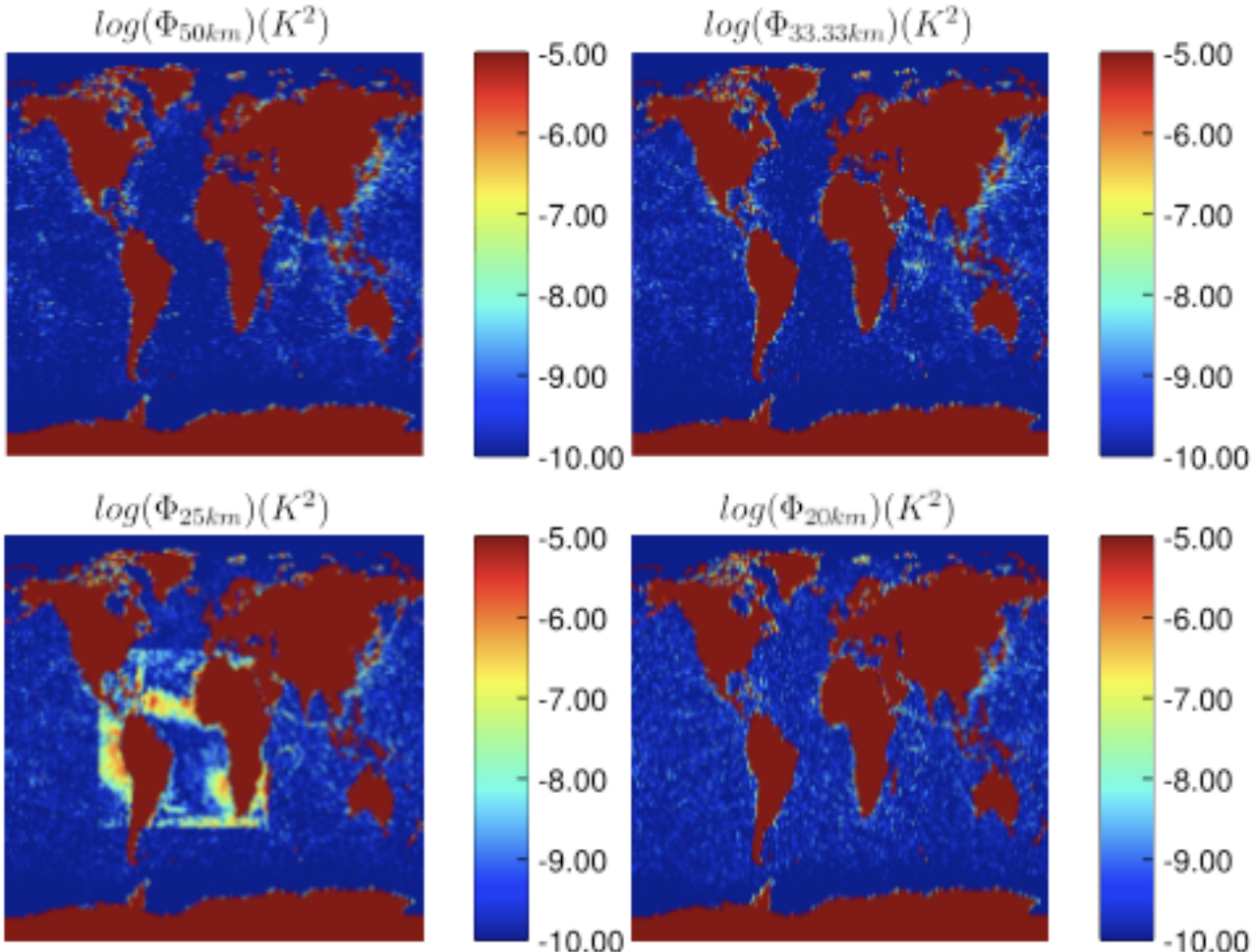

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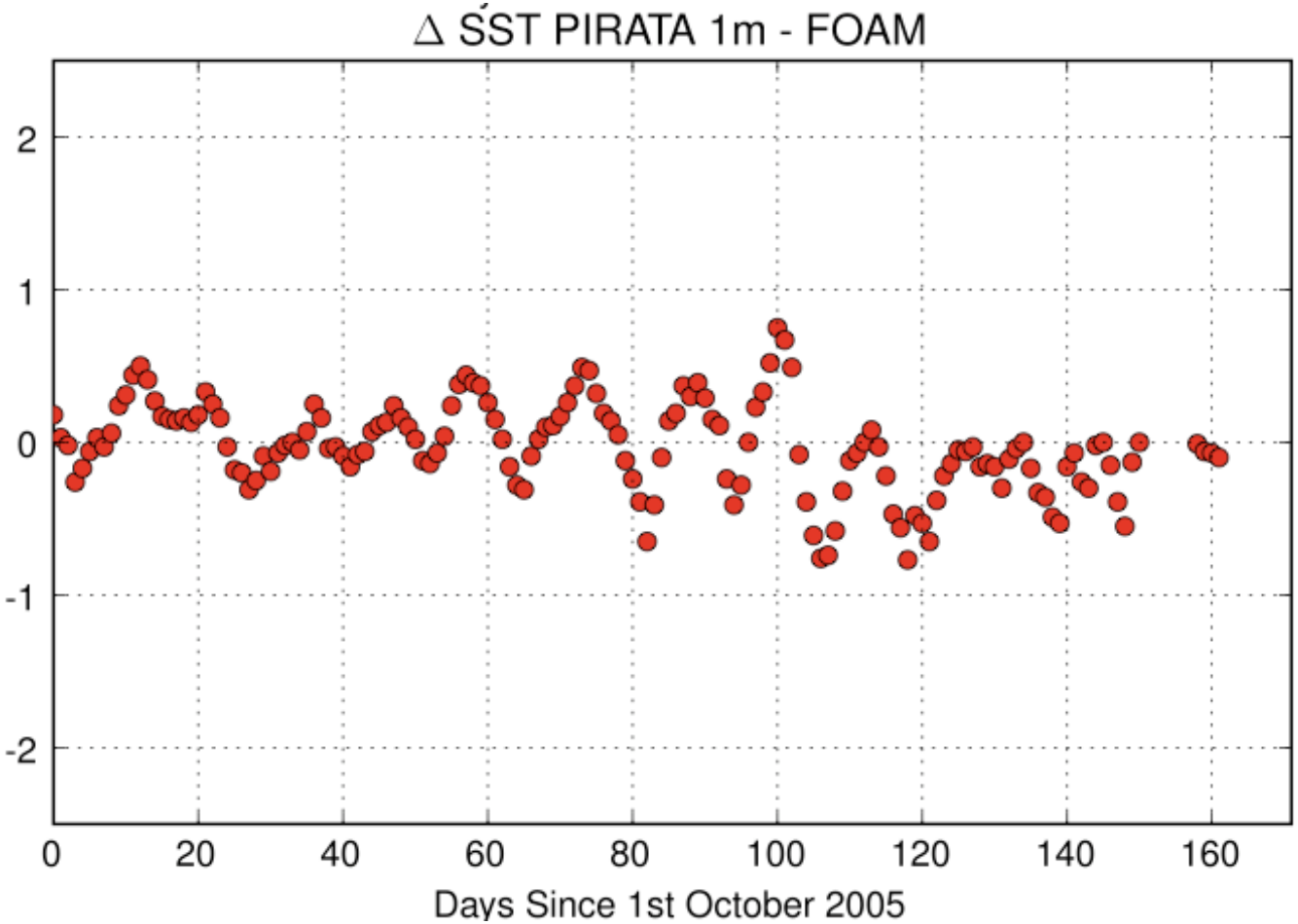
Behavior of FOAM SST

The HR-DDS identified 14 day cycle in FOAM SST bias when compared to PIRATA SST..



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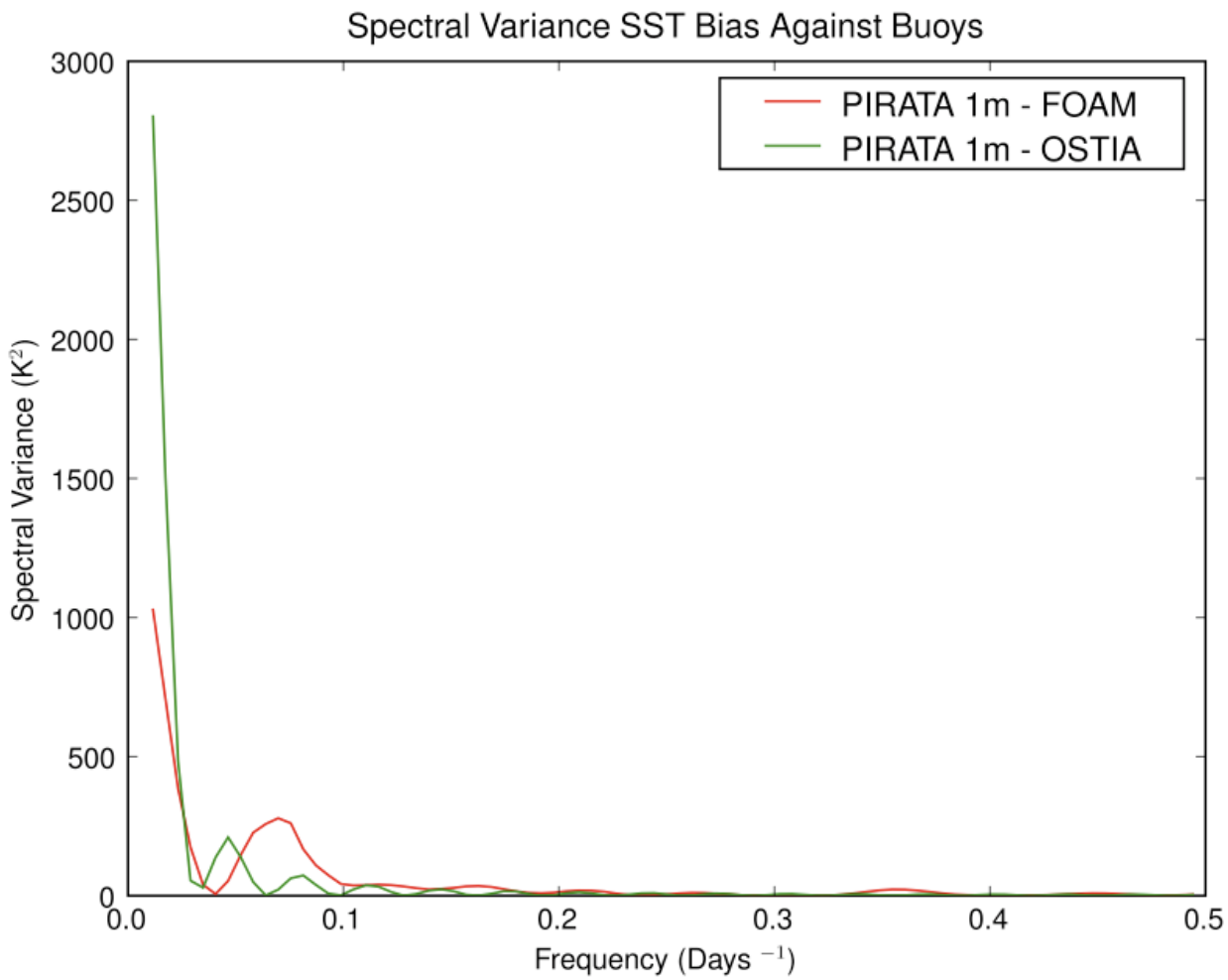

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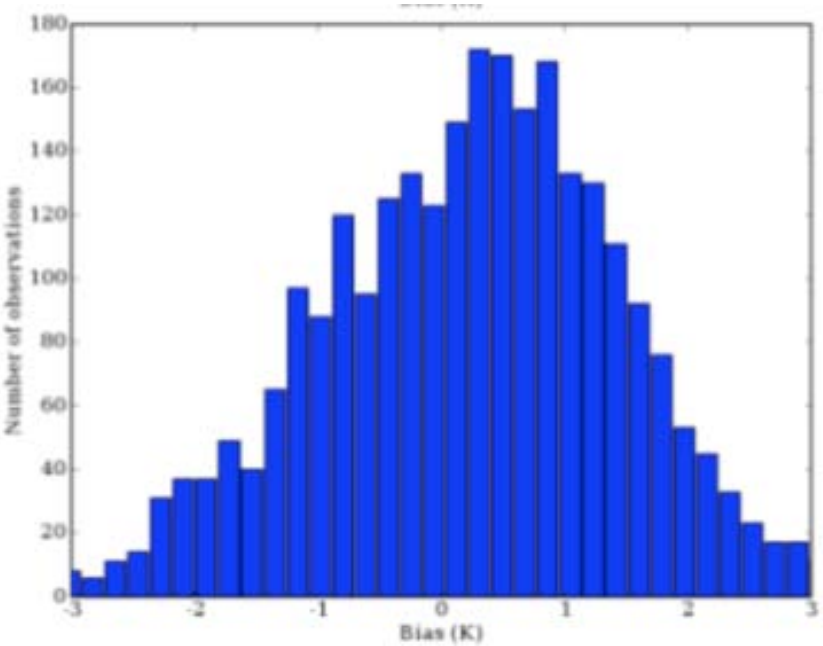
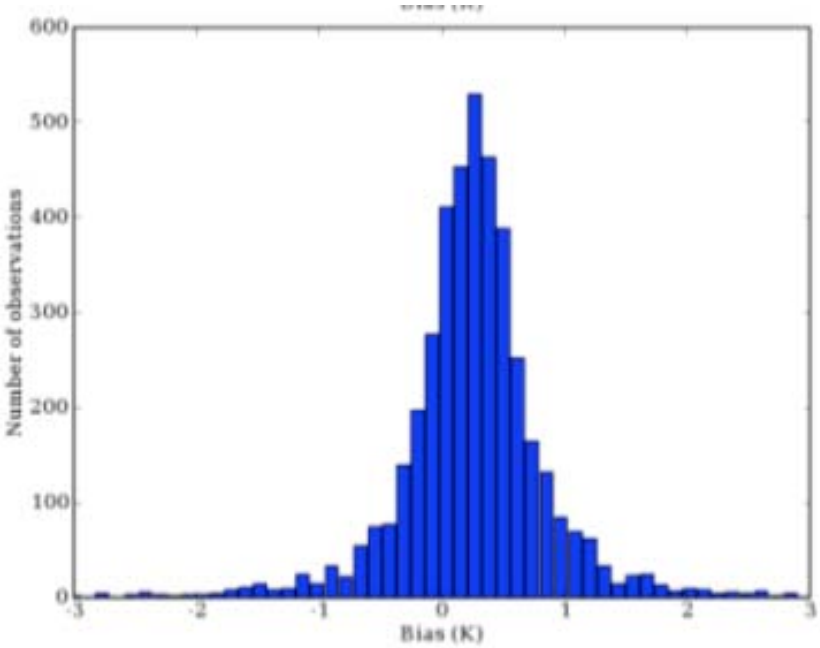
Analysis of L2P files





The HR-DDS is particularly useful in establishing the errors introduced introduced by processing data in different ways.

These two graphs show the bias from AATSR of two versions of NOAA-17 AVHRR data. The observations used are the same

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Examples of L2P product validation.

The HR-DDS allow for both *upstream* and *downstream* users to assess each product. For example, the availability of ancillary data can easily be shown:

Month	AOD	SSI	Wind Speed
January	63.268	90.46	82.609
February	79.669	93.063	91.542
March	93.063	93.433	94.066
April	95.427	95.427	94.775
May	96.022	96.022	97.679
June	98.247	98.247	98.806
July	98.275	98.275	98.814
August	98.564	98.564	98.86
September	98.605	98.605	98.973
October	98.624	98.624	99.106
November	98.785	98.785	99.126
December	99.104	99.104	99.306

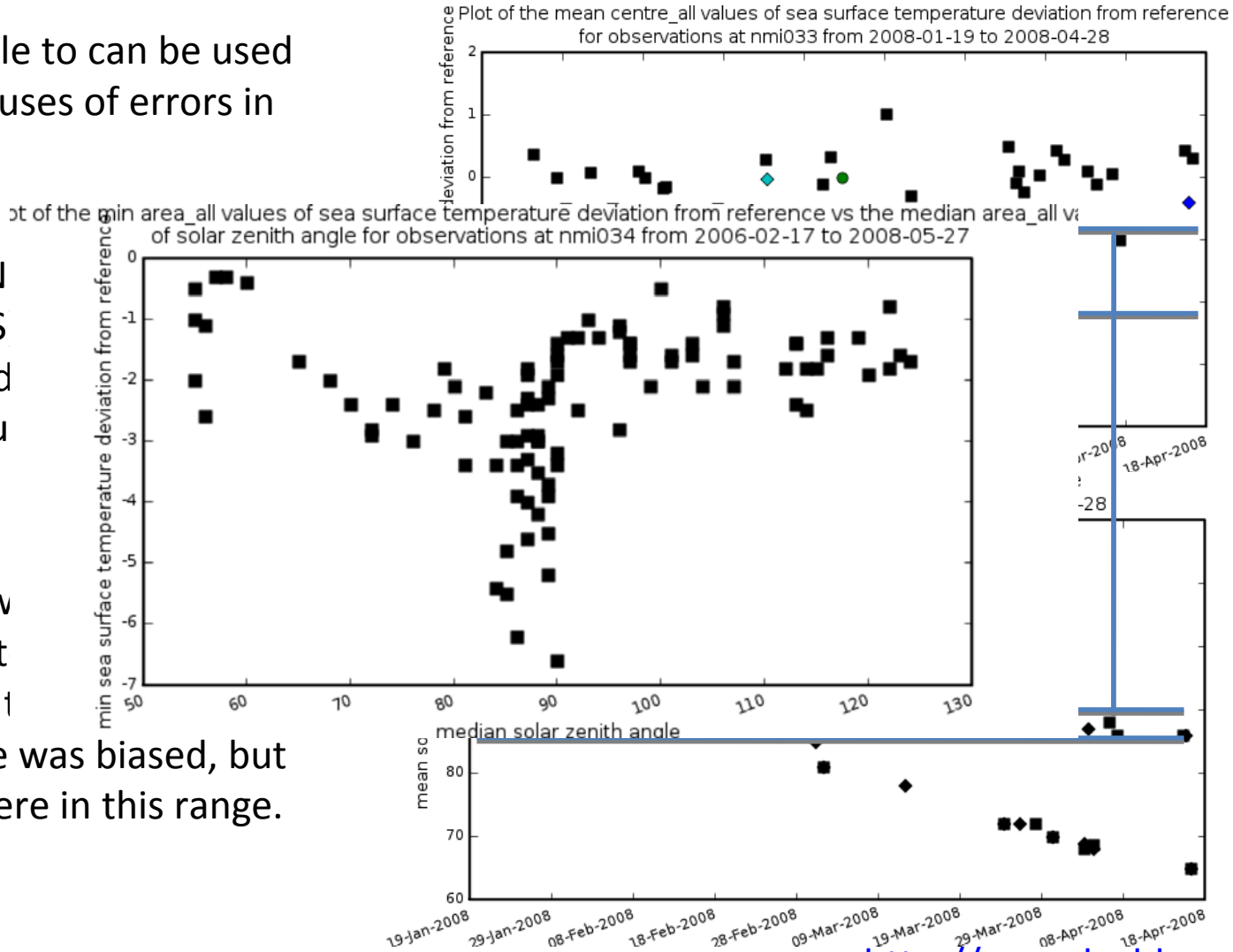
Aerosol Optical Depth and Surface Solar Irradiance for AATSR L2P products in 2007. Note a general improvement in performance.

Examples of error detection and classification

The HR-DDS is able to can be used to identify the causes of errors in SSTs.

During a recent N
(Met.no and CMS
HR-DDS identified
METOP-A SSTs du
conditions.

The HR-DDS allow
link with a discret
zenith angles, 85 t
pixel in this range was biased, but all bias pixels where in this range.



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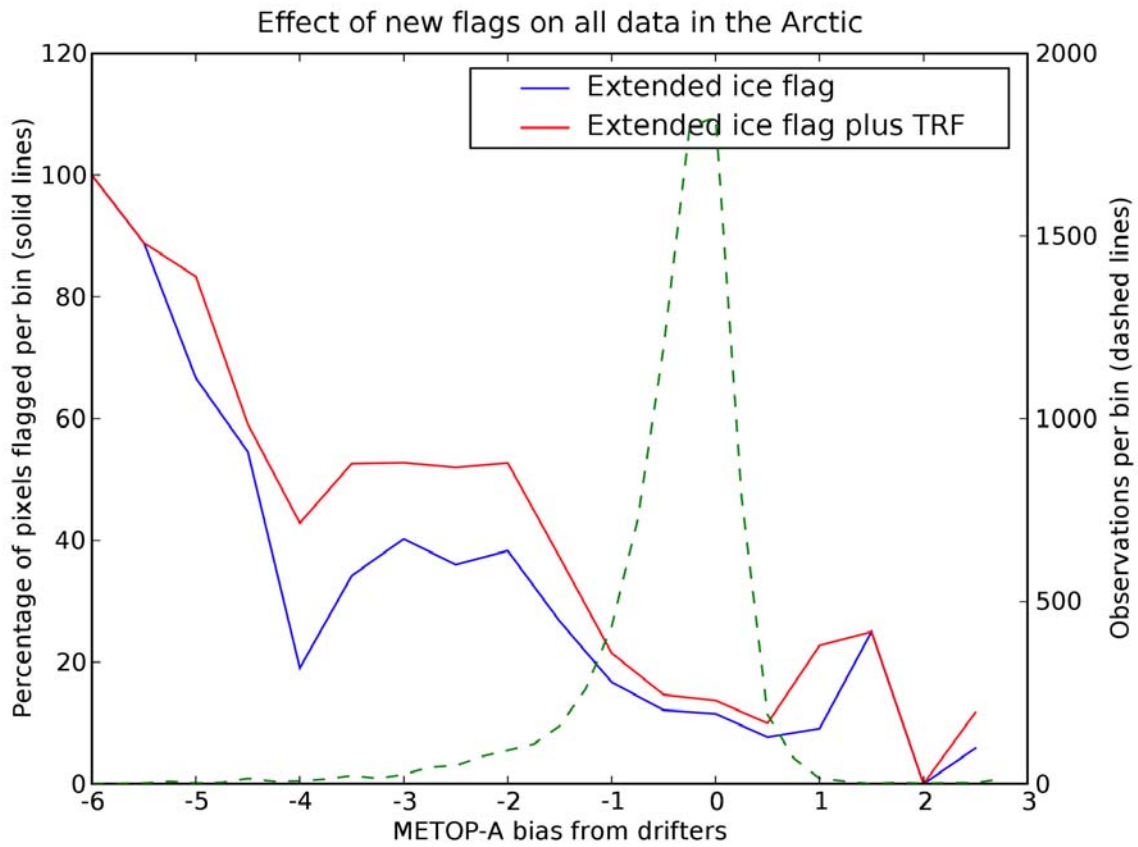
Examples of error detection and classification

In this case we where able to propose a a correction which removes a significant proportion of these errors



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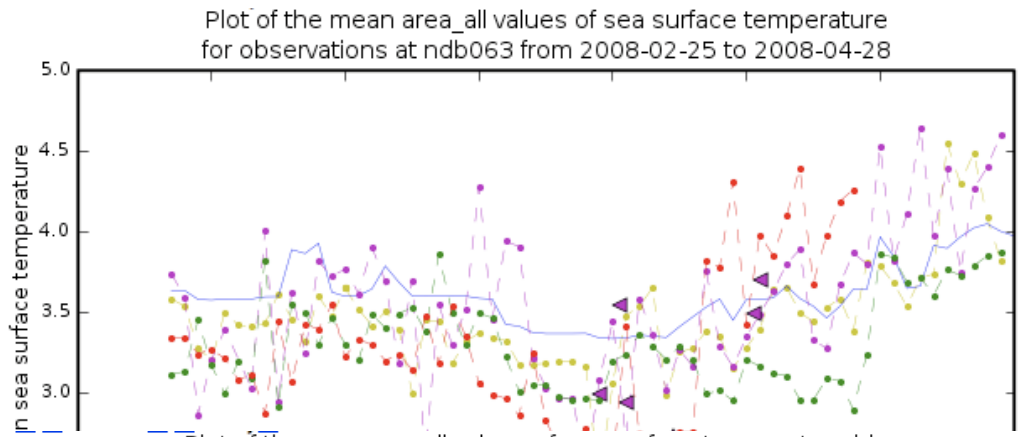
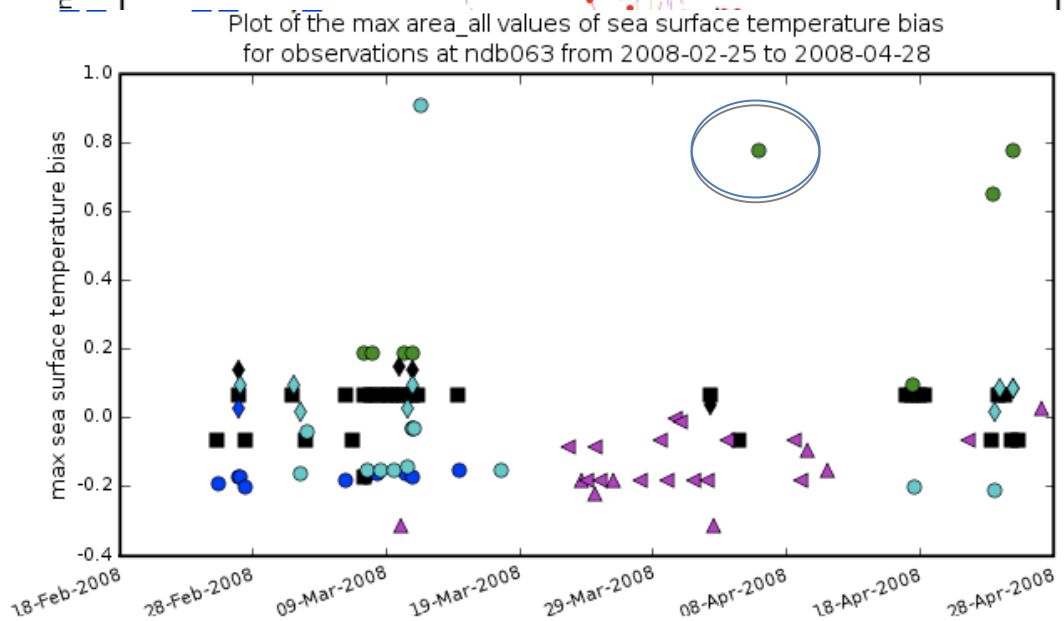
Examples of error detection and classification

Recently the Met Office suspected an introduced warm bias in an analysis product.

The HR-DDS was able to confirm the introduced bias…

…and the suspected cause of this bias.





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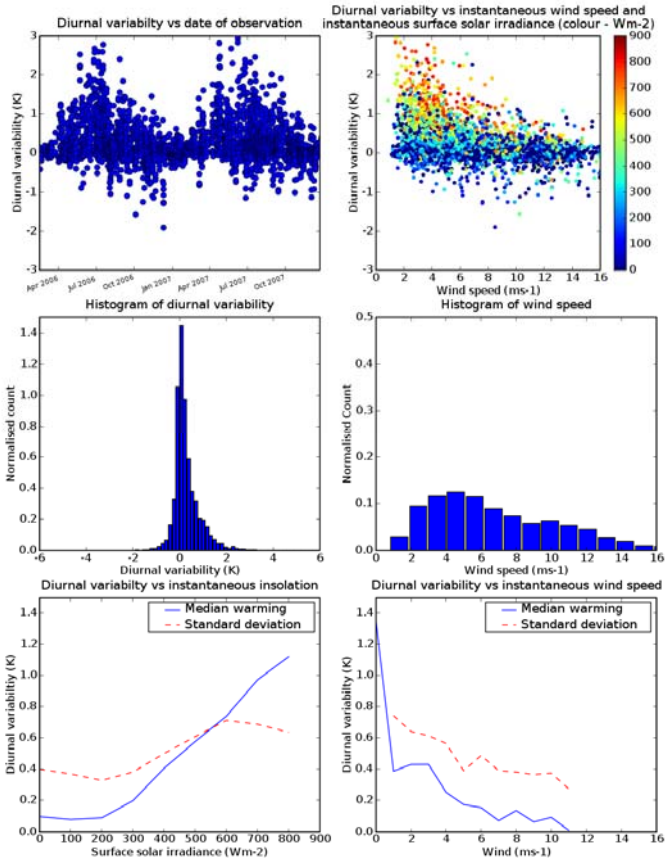
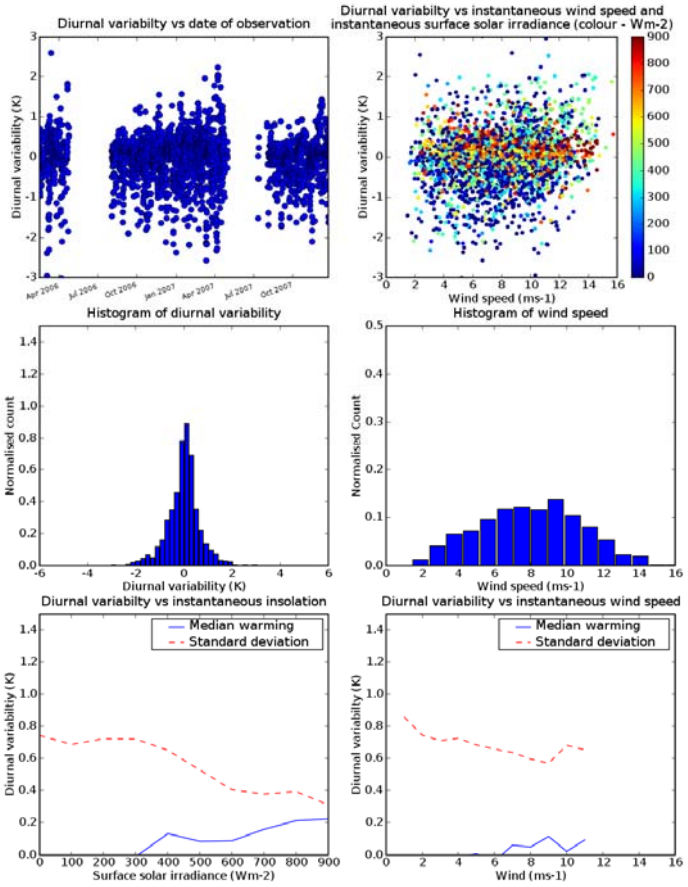
Role in diurnal variability studies

The HR-DDS is also being used to study distribution of diurnal variability.

Allowing us to identify area where DV may be predictable…

…and where it isn't.





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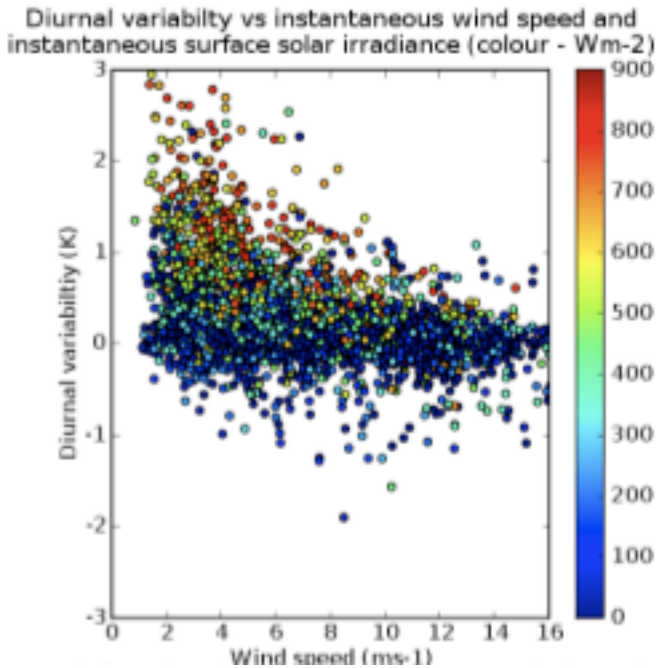
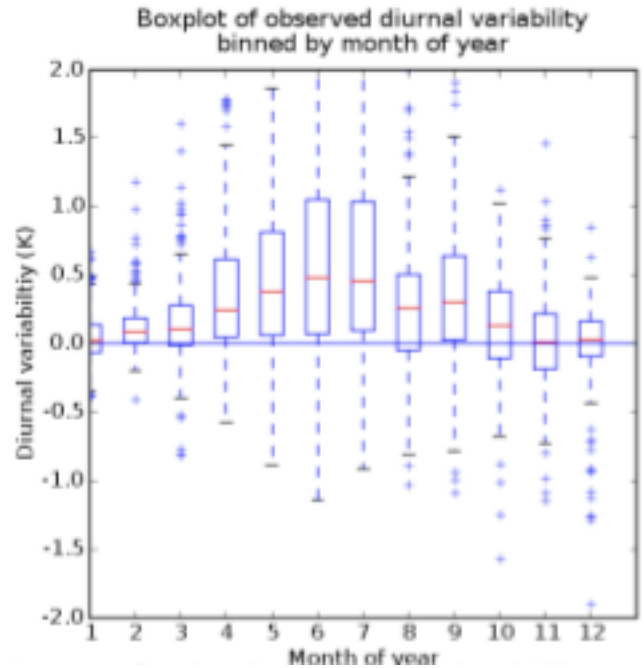
Diurnal effect correction

This plot shows the observed diurnal warming events for approximately 3 years in one site of the Mediterranean.





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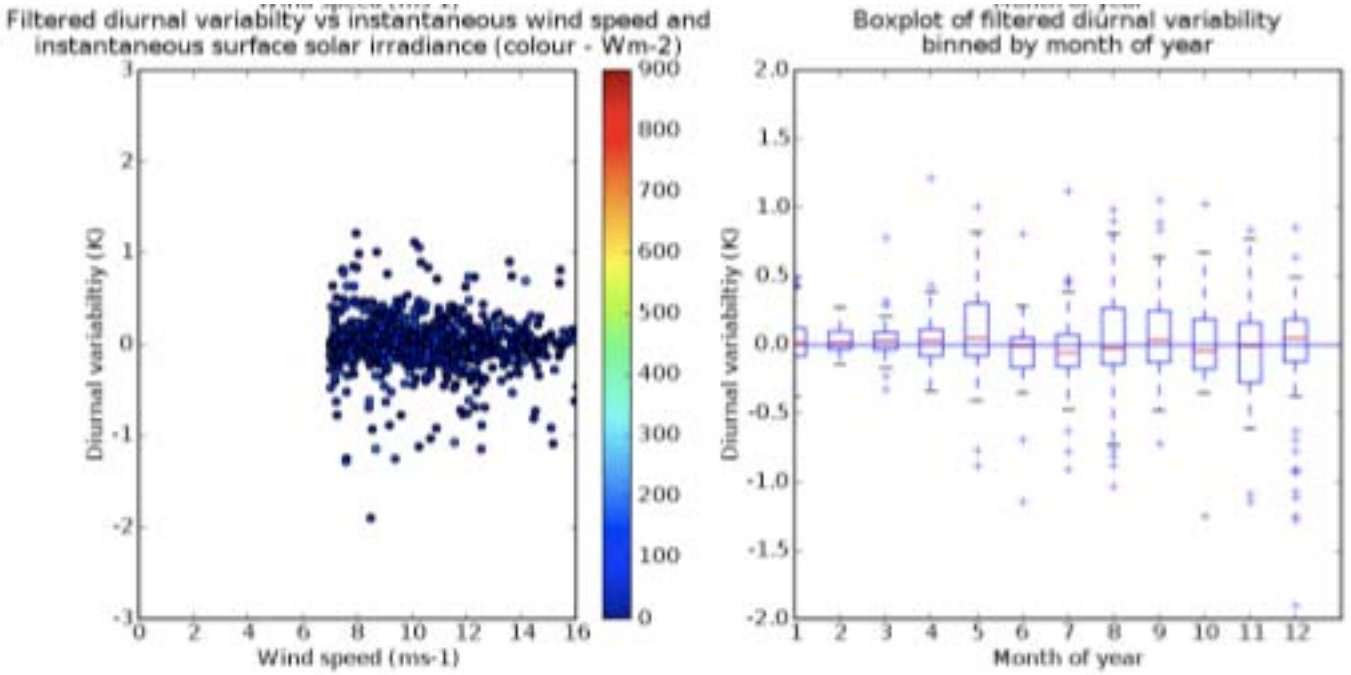
Diurnal effect correction

This plot shows the data remaining after application of the present OSTIA filtering.



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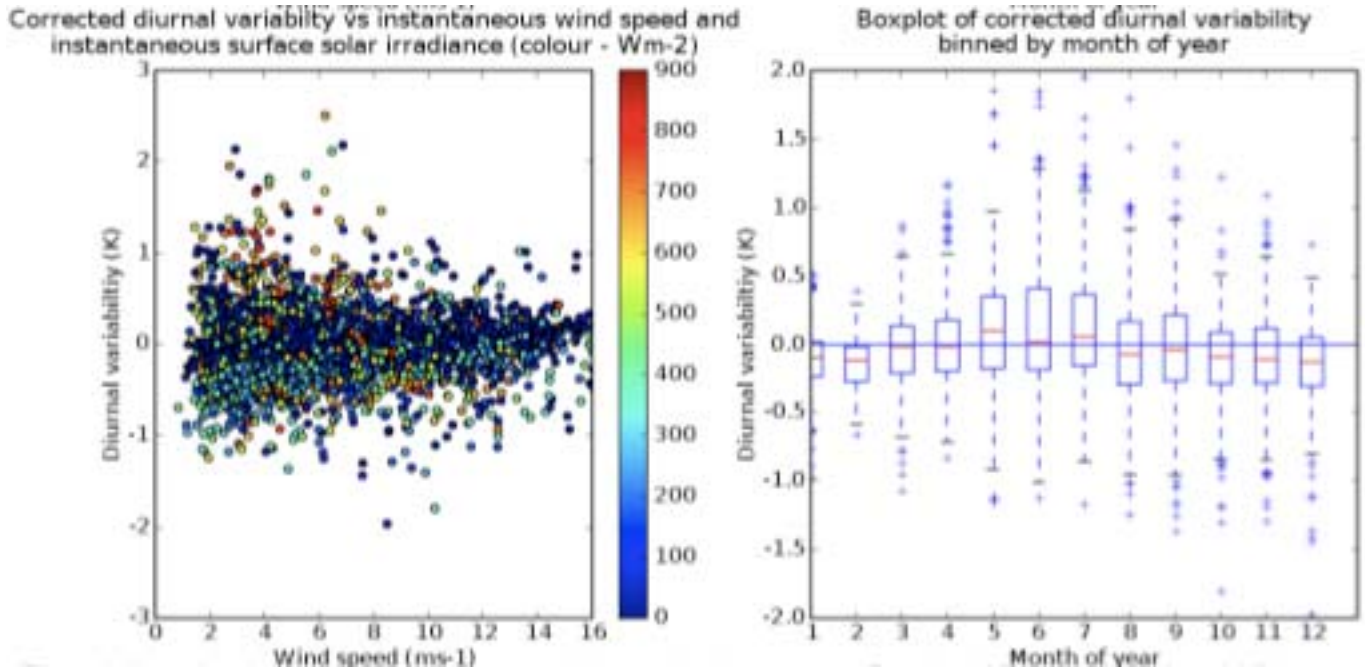
Diurnal effect correction

This shows the effect of an experimental correction derived from analysis of the HR-DDS database.

The HR-DDS indicates that 99.5% of SEVIRI obs over the PIRATA locations are filtered out by the present OSTIA DV scheme.



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User services (now)

The HR-DDS system allows users to register, gaining access to further services:

- User configured plots and analysis tools
- User defined search parameters
- Record interactive bookmarks
- Collaborative pages (i.e. There is a page for the OSI SAF, focusing on METOP-A validation)

Collaborative Groups

Your last views

Please click to view the last time series, spatial comparison or anomaly analysis page you viewed.

Your time series settings

Plot no bias estimate Plot no error estimate Include all area and all quality

Number of days to plot: 100 Minimum SST percentage: 20 Change and store

MyDDSettes

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

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User services (MyOcean and others)

Within the context of Kopernicus, and the UK NCOF partnership:

- Automatic reporting of “events” to registered users
- Ingestion of Wave and Chlorophyll observations (in fact both included pre-operationally)
- Inclusion of *in situ* observations
    - Coriolis
    - MyOcean MDB
    - Dynamic linking to MDB frontend
- Further collaborative features (Facebook style messages, walls and groups)

Many others in the context of GHRSST and GEO.

Thanks!

Much of the development shown today was made possible through funding and support from the NCOF partnership in the UK.

Specific thanks must go to the *Met Office* for their continuing support (Craig Donlon, Adrian Hines, Mike Bell).

The HR-DDS was originally developed as part of the *ESA* Medspiration project.

Some additional support has been received from the UK government through *BNSC* and *DEFRA*.

This talk has shown work undertaken in collaboration with John Stark (ex *Met Office*) and Steinar Eastwood (*Met.no).*

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