

SST

Peter
Cornillon

The
Problem

Use Case

Sea Surface Temperature (SST) Use Case

Peter Cornillon

Graduate School of Oceanography/University of Rhode Island

REAP Workshop
24-27 July 2007

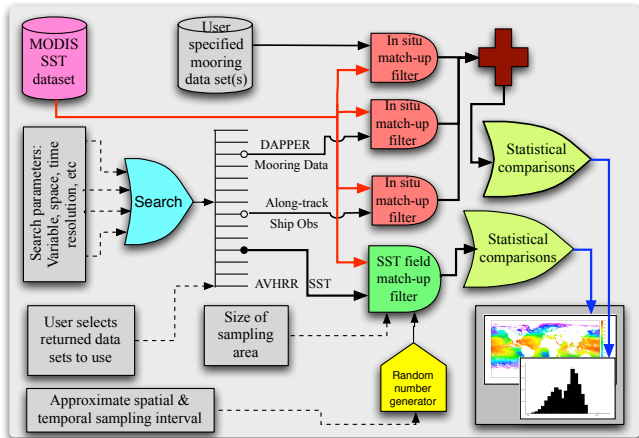
An Oceanographic Use Case

SST

Peter
Cornillon

The
Problem

Use Case



SST

Peter
Cornillon

The
Problem

Use Case

1 The Problem

2 Use Case

The Problem

SST

Peter
Cornillon

The
Problem

Use Case

- Today there exists a large number of 2D and 3D sea surface temperature (SST) data sets.
 - Of differing resolution in space and time,
 - Of differing quality.

Making discovery and selection of SST data sets difficult at best.

- But why are there so many different 2 and 3D SST data sets?

Why doesn't the community simply agree on the "best" one?

Because:

- It's hard to get the community to agree on anything,
- There are so many different sources,
 - NOAA (operational and historical Sea Surface Temperature)
 - European Space Agency (ERSSTv2)
 - Japanese JRA50
- There are so many different applications making use of these data.

- Today there exists a large number of 2D and 3D sea surface temperature (SST) data sets.
 - Of differing resolution in space and time,
 - Of differing quality.

Making discovery and selection of SST data sets difficult at best.

- But why are there so many different 2 and 3D SST data sets?

Why doesn't the community simply agree on the "best" one?

Because:

- It's hard to get the community to agree on anything,
- There are so many different sources,

Specifically:

- Ship observations dating back to Ben Franklin's time,
- Satellites since the mid-1970s, and
- Numerical models.
- There are so many different applications making use of these data.

- Today there exists a large number of 2D and 3D sea surface temperature (SST) data sets.
 - Of differing resolution in space and time,
 - Of differing quality.

Making discovery and selection of SST data sets difficult at best.

- But why are there so many different 2 and 3D SST data sets?
Why doesn't the community simply agree on the "best" one?

Because:

- It's hard to get the community to agree on anything,
- There are so many different sources,

Specifically:

- Ship observations dating back to Ben Franklin's time,
- Satellites since the mid-1970s, and
- Numerical models.
- There are so many different applications making use of these data.

- Today there exists a large number of 2D and 3D sea surface temperature (SST) data sets.
 - Of differing resolution in space and time,
 - Of differing quality.

Making discovery and selection of SST data sets difficult at best.

- But why are there so many different 2 and 3D SST data sets? Why doesn't the community simply agree on the "best" one? Because:

- It's hard to get the community to agree on anything,
- There are so many different sources,

Specifically:

- Ship observations dating back to Ben Franklin's time,
- Satellites since the mid-1970s, and
- Numerical models.
- There are so many different applications making use of these data.

- Today there exists a large number of 2D and 3D sea surface temperature (SST) data sets.
 - Of differing resolution in space and time,
 - Of differing quality.

Making discovery and selection of SST data sets difficult at best.

- But why are there so many different 2 and 3D SST data sets? Why doesn't the community simply agree on the "best" one? Because:

- It's hard to get the community to agree on anything,
- There are so many different sources,

Specifically:

- Ship observations dating back to Ben Franklin's time,
- Satellites since the mid-1970s, and
- Numerical models.
- There are so many different applications making use of these data.

- Today there exists a large number of 2D and 3D sea surface temperature (SST) data sets.
 - Of differing resolution in space and time,
 - Of differing quality.

Making discovery and selection of SST data sets difficult at best.

- But why are there so many different 2 and 3D SST data sets? Why doesn't the community simply agree on the "best" one? Because:

- It's hard to get the community to agree on anything,
- There are so many different sources,

Specifically:

- Ship observations dating back to Ben Franklin's time,
- Satellites since the mid-1970s, and
- Numerical models.
- There are so many different applications making use of these data.

- Today there exists a large number of 2D and 3D sea surface temperature (SST) data sets.
 - Of differing resolution in space and time,
 - Of differing quality.

Making discovery and selection of SST data sets difficult at best.

- But why are there so many different 2 and 3D SST data sets? Why doesn't the community simply agree on the "best" one? Because:
 - It's hard to get the community to agree on anything,
 - There are so many different sources,
Specifically:
 - Ship observations dating back to Ben Franklin's time,
 - Satellites since the mid-1970s, and
 - Numerical models.
 - There are so many different applications making use of these data.

- Today there exists a large number of 2D and 3D sea surface temperature (SST) data sets.
 - Of differing resolution in space and time,
 - Of differing quality.

Making discovery and selection of SST data sets difficult at best.

- But why are there so many different 2 and 3D SST data sets? Why doesn't the community simply agree on the "best" one? Because:
 - It's hard to get the community to agree on anything,
 - There are so many different sources,
Specifically:
 - Ship observations dating back to Ben Franklin's time,
 - Satellites since the mid-1970s, and
 - Numerical models.
 - There are so many different applications making use of these data.

- Today there exists a large number of 2D and 3D sea surface temperature (SST) data sets.
 - Of differing resolution in space and time,
 - Of differing quality.

Making discovery and selection of SST data sets difficult at best.

- But why are there so many different 2 and 3D SST data sets? Why doesn't the community simply agree on the "best" one? Because:
 - It's hard to get the community to agree on anything,
 - There are so many different sources,
Specifically:
 - Ship observations dating back to Ben Franklin's time,
 - Satellites since the mid-1970s, and
 - Numerical models.
 - There are so many different applications making use of these data.

- Today there exists a large number of 2D and 3D sea surface temperature (SST) data sets.
 - Of differing resolution in space and time,
 - Of differing quality.

Making discovery and selection of SST data sets difficult at best.

- But why are there so many different 2 and 3D SST data sets? Why doesn't the community simply agree on the "best" one? Because:
 - It's hard to get the community to agree on anything,
 - There are so many different sources,
Specifically:
 - Ship observations dating back to Ben Franklin's time,
 - Satellites since the mid-1970s, and
 - Numerical models.
- There are so many different applications making use of these data.

- Today there exists a large number of 2D and 3D sea surface temperature (SST) data sets.
 - Of differing resolution in space and time,
 - Of differing quality.

Making discovery and selection of SST data sets difficult at best.

- But why are there so many different 2 and 3D SST data sets? Why doesn't the community simply agree on the "best" one? Because:
 - It's hard to get the community to agree on anything,
 - There are so many different sources,
Specifically:
 - Ship observations dating back to Ben Franklin's time,
 - Satellites since the mid-1970s, and
 - Numerical models.
 - There are so many different applications making use of these data.

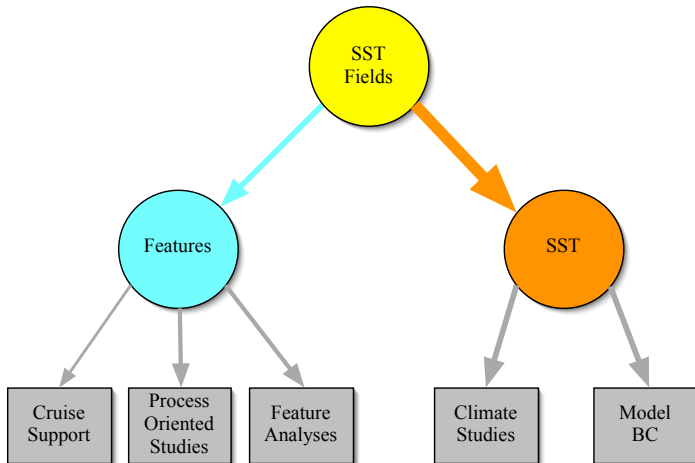
Use of SST fields falls into two general groups

SST

Peter
Cornillon

The
Problem

Use Case



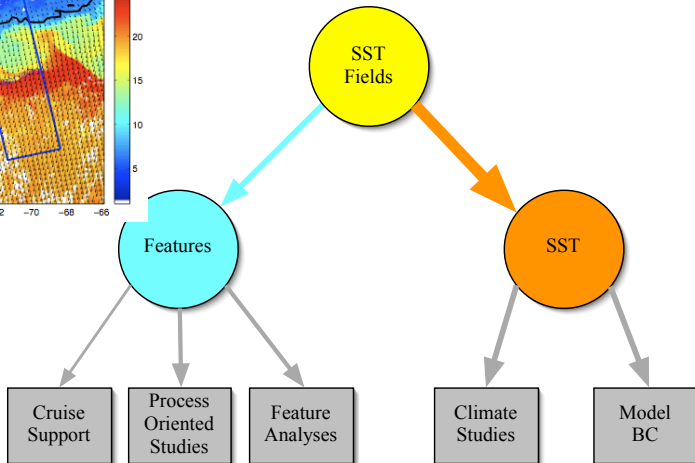
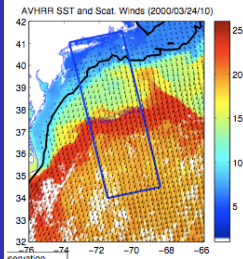
Use of SST fields falls into two general groups

SST

Peter
Cornillon

The
Problem

Use Case



Data Set Characteristics by Study Type

SST

Peter
Cornillon

The
Problem

Use Case

Feature Related Studies

- Relatively small areas
 - Coastal
 - Mesoscale
 - Sub basin
- Fine spatial resolution
- Fine temporal resolution
- Medium to small volumes
- **Relative** SST accuracy – Critical
- Cloud screening focussed on preserving features

SST Related Studies

- Relatively large areas
 - Basin wide
 - Global
- Coarse spatial resolution
- Coarse temporal resolution
- Large volumes
- **Absolute** SST accuracy – Critical
- Cloud screening focussed on preserving SST quality

The needs of users undertaking studies at these two extremes differ significantly over a broad range of parameters.

Feature Related Studies

- Relatively small areas
 - Coastal
 - Mesoscale
 - Sub basin
- Fine spatial resolution
- Fine temporal resolution
- Medium to small volumes
- **Relative** SST accuracy – Critical
- Cloud screening focussed on preserving features

SST Related Studies

- Relatively large areas
 - Basin scale
 - Global
- Coarse spatial resolution
- Coarse temporal resolution
- Large volumes
- **Absolute** SST accuracy – Critical
- Cloud screening focussed on preserving SST quality

The needs of users undertaking studies at these two extremes differ significantly over a broad range of parameters.

Feature Related Studies

- Relatively small areas
 - Coastal
 - Mesoscale
 - Sub basin
- Fine spatial resolution
- Fine temporal resolution
- Medium to small volumes
- **Relative** SST accuracy – Critical
- Cloud screening focussed on preserving features

SST Related Studies

- Relatively large areas
 - Large basins
 - Global
- Coarse spatial resolution
- Coarse temporal resolution
- Large volumes
- **Absolute** SST accuracy – Critical
- Cloud screening focussed on preserving SST quality

The needs of users undertaking studies at these two extremes differ significantly over a broad range of parameters.

Data Set Characteristics by Study Type

SST

Peter
Cornillon

The
Problem

Use Case

Feature Related Studies

- Relatively small areas
 - Coastal
 - Mesoscale
 - Sub basin
- Fine spatial resolution
- Fine temporal resolution
- Medium to small volumes
- **Relative** SST accuracy – Critical
- Cloud screening focussed on preserving features

SST Related Studies

- Relatively large areas
 - Global
 - Basin
 - Coastal
- Coarse spatial resolution
- Coarse temporal resolution
- Large volumes
- **Absolute** SST accuracy – Critical
- Cloud screening focussed on preserving SST quality

The needs of users undertaking studies at these two extremes differ significantly over a broad range of parameters.

Data Set Characteristics by Study Type

SST

Peter
Cornillon

The
Problem

Use Case

Feature Related Studies

- Relatively small areas
 - Coastal
 - Mesoscale
 - Sub basin
- Fine spatial resolution
- Fine temporal resolution
- Medium to small volumes
- **Relative** SST accuracy – Critical
- Cloud screening focussed on preserving features

SST Related Studies

- Relatively large areas
 - Large basins
 - Global
- Coarse spatial resolution
- Coarse temporal resolution
- Large volumes
- **Absolute** SST accuracy – Critical
- Cloud screening focussed on preserving SST quality

The needs of users undertaking studies at these two extremes differ significantly over a broad range of parameters.

Data Set Characteristics by Study Type

SST

Peter
Cornillon

The
Problem

Use Case

Feature Related Studies

- Relatively small areas
 - Coastal
 - Mesoscale
 - Sub basin
- Fine spatial resolution
- Fine temporal resolution
- Medium to small volumes
- **Relative** SST accuracy – Critical
- Cloud screening focussed on preserving features

SST Related Studies

- Relatively large areas
 - Large basins
 - Global
- Coarse spatial resolution
- Coarse temporal resolution
- Large volumes
- **Absolute** SST accuracy – Critical
- Cloud screening focussed on preserving SST quality

The needs of users undertaking studies at these two extremes differ significantly over a broad range of parameters.

Feature Related Studies

- Relatively small areas
 - Coastal
 - Mesoscale
 - Sub basin
- Fine spatial resolution
- Fine temporal resolution
- Medium to small volumes
- **Relative** SST accuracy – Critical
- Cloud screening focussed on preserving features

SST Related Studies

- Relatively large areas
 - Large basins
 - Global
- Coarse spatial resolution
- Coarse temporal resolution
- Large volumes
- **Absolute** SST accuracy – Critical
- Cloud screening focussed on preserving SST quality

The needs of users undertaking studies at these two extremes differ significantly over a broad range of parameters.

Feature Related Studies

- Relatively small areas
 - Coastal
 - Mesoscale
 - Sub basin
- Fine spatial resolution
- Fine temporal resolution
- Medium to small volumes
- **Relative SST accuracy – Critical**
- Cloud screening focussed on preserving features

SST Related Studies

- Relatively large areas
 - Large basins
 - Global
- Coarse spatial resolution
- Coarse temporal resolution
- Large volumes
- **Absolute SST accuracy – Critical**
- Cloud screening focussed on preserving SST quality

The needs of users undertaking studies at these two extremes differ significantly over a broad range of parameters.

Feature Related Studies

- Relatively small areas
 - Coastal
 - Mesoscale
 - Sub basin
- Fine spatial resolution
- Fine temporal resolution
- Medium to small volumes
- **Relative SST accuracy – Critical**
- Cloud screening focussed on preserving features

SST Related Studies

- Relatively large areas
 - Large basins
 - Global
- Coarse spatial resolution
- Coarse temporal resolution
- Large volumes
- **Absolute SST accuracy – Critical**
- Cloud screening focussed on preserving SST quality

The needs of users undertaking studies at these two extremes differ significantly over a broad range of parameters.

Data Set Characteristics by Study Type

SST

Peter
Cornillon

The
Problem

Use Case

Feature Related Studies

- Relatively small areas
 - Coastal
 - Mesoscale
 - Sub basin
- Fine spatial resolution
- Fine temporal resolution
- Medium to small volumes
- **Relative SST accuracy – Critical**
- **Cloud screening focussed on preserving features**

SST Related Studies

- Relatively large areas
 - Large basins
 - Global
- Coarse spatial resolution
- Coarse temporal resolution
- Large volumes
- **Absolute SST accuracy – Critical**
- Cloud screening focussed on preserving SST quality

The needs of users undertaking studies at these two extremes differ significantly over a broad range of parameters.

Data Set Characteristics by Study Type

SST

Peter
Cornillon

The
Problem

Use Case

Feature Related Studies

- Relatively small areas
 - Coastal
 - Mesoscale
 - Sub basin
- Fine spatial resolution
- Fine temporal resolution
- Medium to small volumes
- **Relative** SST accuracy – Critical
- Cloud screening focussed on preserving features

SST Related Studies

- Relatively large areas
 - Basin wide
 - Global
- Coarse spatial resolution
- Coarse temporal resolution
- Large volumes
- **Absolute** SST accuracy – Critical
- Cloud screening focussed on preserving SST quality

The needs of users undertaking studies at these two extremes differ significantly over a broad range of parameters.

Data Set Characteristics by Study Type

SST

Peter
Cornillon

The
Problem

Use Case

Feature Related Studies

- Relatively small areas
 - Coastal
 - Mesoscale
 - Sub basin
- Fine spatial resolution
- Fine temporal resolution
- Medium to small volumes
- **Relative SST accuracy – Critical**
- **Cloud screening focussed on preserving features**

SST Related Studies

- Relatively large areas
 - Basin wide
 - Global
- Coarse spatial resolution
- Coarse temporal resolution
- Large volumes
- **Absolute SST accuracy – Critical**
- **Cloud screening focussed on preserving SST quality**

The needs of users undertaking studies at these two extremes differ significantly over a broad range of parameters.

Data Set Characteristics by Study Type

SST

Peter
Cornillon

The
Problem

Use Case

Feature Related Studies

- Relatively small areas
 - Coastal
 - Mesoscale
 - Sub basin
- Fine spatial resolution
- Fine temporal resolution
- Medium to small volumes
- **Relative SST accuracy – Critical**
- **Cloud screening focussed on preserving features**

SST Related Studies

- Relatively large areas
 - Basin wide
 - Global
- Coarse spatial resolution
- Coarse temporal resolution
- Large volumes
- **Absolute SST accuracy – Critical**
- **Cloud screening focussed on preserving SST quality**

The needs of users undertaking studies at these two extremes differ significantly over a broad range of parameters.

Data Set Characteristics by Study Type

SST

Peter
Cornillon

The
Problem

Use Case

Feature Related Studies

- Relatively small areas
 - Coastal
 - Mesoscale
 - Sub basin
- Fine spatial resolution
- Fine temporal resolution
- Medium to small volumes
- **Relative SST accuracy – Critical**
- **Cloud screening focussed on preserving features**

SST Related Studies

- Relatively large areas
 - Basin wide
 - Global
- Coarse spatial resolution
- Coarse temporal resolution
- Large volumes
- **Absolute SST accuracy – Critical**
- Cloud screening focussed on preserving SST quality

The needs of users undertaking studies at these two extremes differ significantly over a broad range of parameters.

Data Set Characteristics by Study Type

SST

Peter
Cornillon

The
Problem

Use Case

Feature Related Studies

- Relatively small areas
 - Coastal
 - Mesoscale
 - Sub basin
- Fine spatial resolution
- Fine temporal resolution
- Medium to small volumes
- **Relative SST accuracy – Critical**
- **Cloud screening focussed on preserving features**

SST Related Studies

- Relatively large areas
 - Basin wide
 - Global
- Coarse spatial resolution
- Coarse temporal resolution
- Large volumes
- **Absolute SST accuracy – Critical**
- Cloud screening focussed on preserving SST quality

The needs of users undertaking studies at these two extremes differ significantly over a broad range of parameters.

Data Set Characteristics by Study Type

SST

Peter
Cornillon

The
Problem

Use Case

Feature Related Studies

- Relatively small areas
 - Coastal
 - Mesoscale
 - Sub basin
- Fine spatial resolution
- Fine temporal resolution
- Medium to small volumes
- **Relative SST accuracy – Critical**
- **Cloud screening focussed on preserving features**

SST Related Studies

- Relatively large areas
 - Basin wide
 - Global
- Coarse spatial resolution
- Coarse temporal resolution
- Large volumes
- **Absolute SST accuracy – Critical**
- Cloud screening focussed on preserving SST quality

The needs of users undertaking studies at these two extremes differ significantly over a broad range of parameters.

Data Set Characteristics by Study Type

SST

Peter
Cornillon

The
Problem

Use Case

Feature Related Studies

- Relatively small areas
 - Coastal
 - Mesoscale
 - Sub basin
- Fine spatial resolution
- Fine temporal resolution
- Medium to small volumes
- **Relative SST accuracy – Critical**
- **Cloud screening focussed on preserving features**

SST Related Studies

- Relatively large areas
 - Basin wide
 - Global
- Coarse spatial resolution
- Coarse temporal resolution
- Large volumes
- **Absolute SST accuracy – Critical**
- Cloud screening focussed on preserving SST quality

The needs of users undertaking studies at these two extremes differ significantly over a broad range of parameters.

Data Set Characteristics by Study Type

SST

Peter
Cornillon

The
Problem

Use Case

Feature Related Studies

- Relatively small areas
 - Coastal
 - Mesoscale
 - Sub basin
- Fine spatial resolution
- Fine temporal resolution
- Medium to small volumes
- **Relative** SST accuracy – Critical
- Cloud screening focussed on preserving features

SST Related Studies

- Relatively large areas
 - Basin wide
 - Global
- Coarse spatial resolution
- Coarse temporal resolution
- Large volumes
- **Absolute** SST accuracy – Critical
- Cloud screening focussed on preserving SST quality

The needs of users undertaking studies at these two extremes differ significantly over a broad range of parameters.

Data Set Characteristics by Study Type

SST

Peter
Cornillon

The
Problem

Use Case

Feature Related Studies

- Relatively small areas
 - Coastal
 - Mesoscale
 - Sub basin
- Fine spatial resolution
- Fine temporal resolution
- Medium to small volumes
- **Relative** SST accuracy – Critical
- Cloud screening focussed on preserving features

SST Related Studies

- Relatively large areas
 - Basin wide
 - Global
- Coarse spatial resolution
- Coarse temporal resolution
- Large volumes
- **Absolute** SST accuracy – Critical
- Cloud screening focussed on preserving SST quality

The needs of users undertaking studies at these two extremes differ significantly over a broad range of parameters.

Data Set Characteristics by Study Type

SST

Peter
Cornillon

The
Problem

Use Case

Feature Related Studies

- Relatively small areas
 - Coastal
 - Mesoscale
 - Sub basin
- Fine spatial resolution
- Fine temporal resolution
- Medium to small volumes
- **Relative** SST accuracy – Critical
- Cloud screening focussed on preserving features

SST Related Studies

- Relatively large areas
 - Basin wide
 - Global
- Coarse spatial resolution
- Coarse temporal resolution
- Large volumes
- **Absolute** SST accuracy – Critical
- Cloud screening focussed on preserving SST quality

The needs of users undertaking studies at these two extremes differ significantly over a broad range of parameters.

The Problem

SST

Peter
Cornillon

The
Problem

Use Case

There exists a large number of 2 and 3D SST data sets,
making **discovery and selection of SST data sets difficult at best.**

The Problem

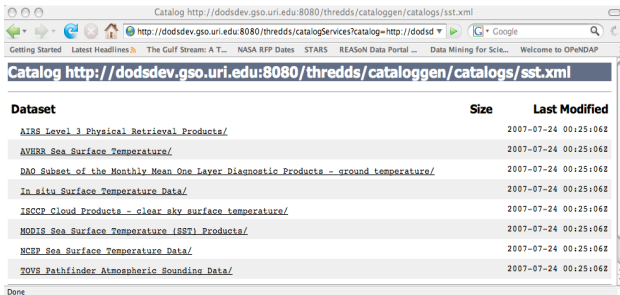
SST

Peter
Cornillon

The
Problem

Use Case

There exists a large number of 2 and 3D SST data sets,
making **discovery and selection of SST data sets difficult at best.**



The screenshot shows a web browser window with the address bar displaying the URL: `http://dodsdev.gso.uri.edu:8080/thredds/catalogServices?catalog=http://dodsdev.gso.uri.edu:8080/thredds/cataloggen/catalogs/sst.xml`. The browser's address bar also shows the text "Catalog http://dodsdev.gso.uri.edu:8080/thredds/cataloggen/catalogs/sst.xml". The browser's search bar contains the text "Google". The browser's tabs show "Getting Started", "Latest Headlines", "The Gulf Stream: A T...", "NASA RFP Dates", "STARs", "REASoN Data Portal", "Data Mining for Scie...", and "Welcome to OPeNDAP". The main content area displays a table with the following data:

Dataset	Size	Last Modified
AIRS Level 3 Physical Retrieval Products/		2007-07-24 00:25:06Z
AVHRR Sea Surface Temperature/		2007-07-24 00:25:06Z
DAO Subset of the Monthly Mean One Layer Diagnostic Products - ground temperature/		2007-07-24 00:25:06Z
In situ Surface Temperature Data/		2007-07-24 00:25:06Z
ISCCP Cloud Products - clear sky surface temperature/		2007-07-24 00:25:06Z
MODIS Sea Surface Temperature (SST) Products/		2007-07-24 00:25:06Z
NCEP Sea Surface Temperature Data/		2007-07-24 00:25:06Z
TOVS Pathfinder Atmospheric Sounding Data/		2007-07-24 00:25:06Z

The status bar at the bottom of the browser window shows "Done".

The Problem

SST

Peter
Cornillon

The
Problem

Use Case

There exists a large number of 2 and 3D SST data sets,
making **discovery and selection of SST data sets** difficult at best.



The Problem

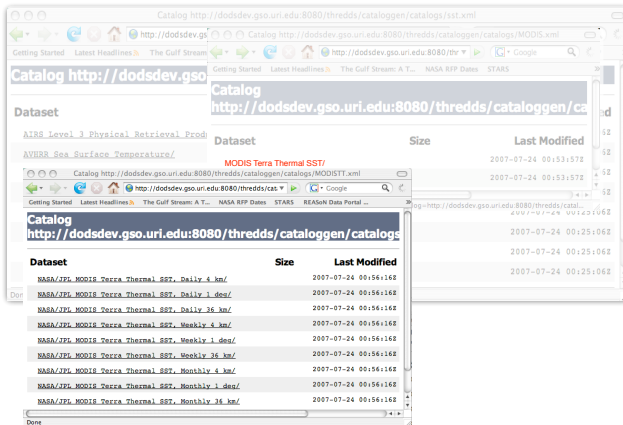
SST

Peter
Cornillon

The
Problem

Use Case

There exists a large number of 2 and 3D SST data sets,
making **discovery and selection of SST data sets difficult at best.**



SST

Peter
Cornillon

The
Problem

Use Case

1 The Problem

2 Use Case

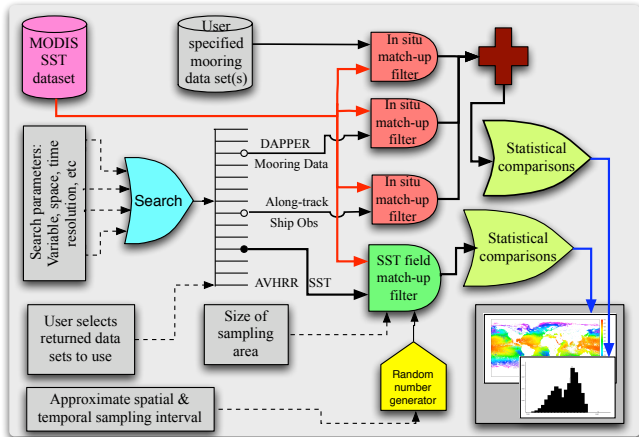
The Default Use Case

SST

Peter
Cornillon

The
Problem

Use Case



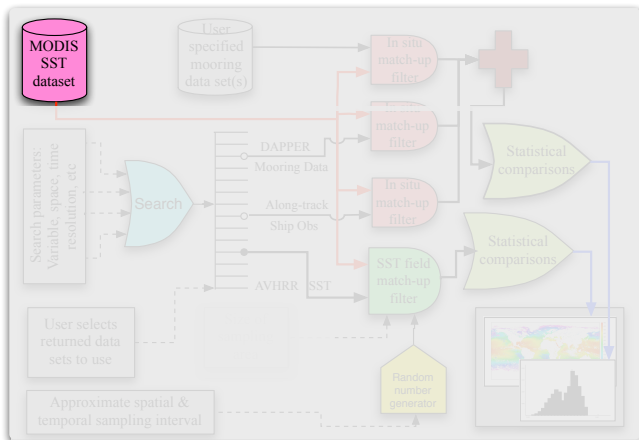
The Default Use Case

SST

Peter
Cornillon

The
Problem

Use Case



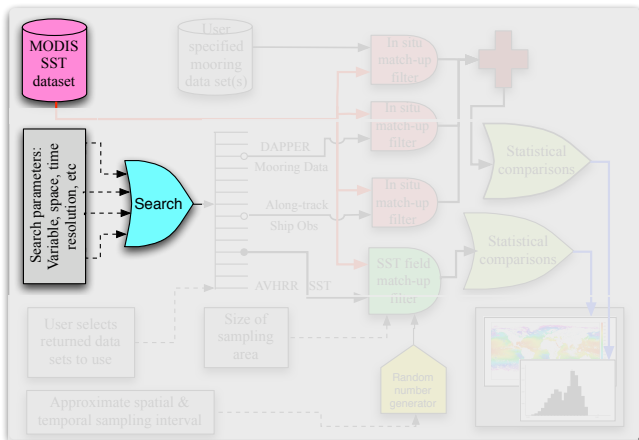
The Default Use Case

SST

Peter
Cornillon

The
Problem

Use Case



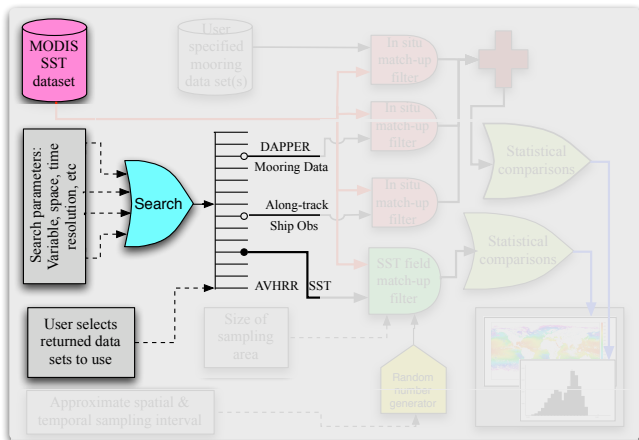
The Default Use Case

SST

Peter
Cornillon

The
Problem

Use Case



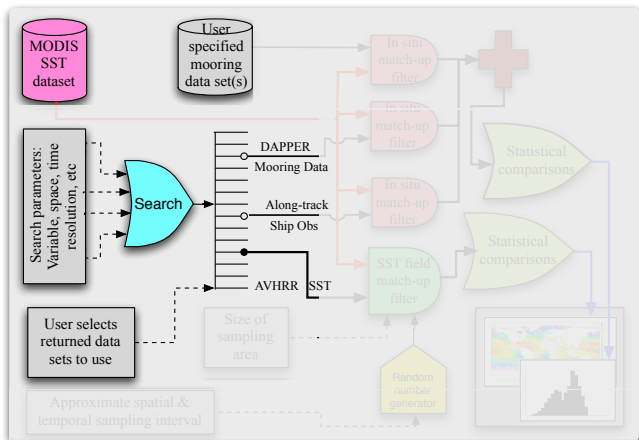
The Default Use Case

SST

Peter
Cornillon

The
Problem

Use Case



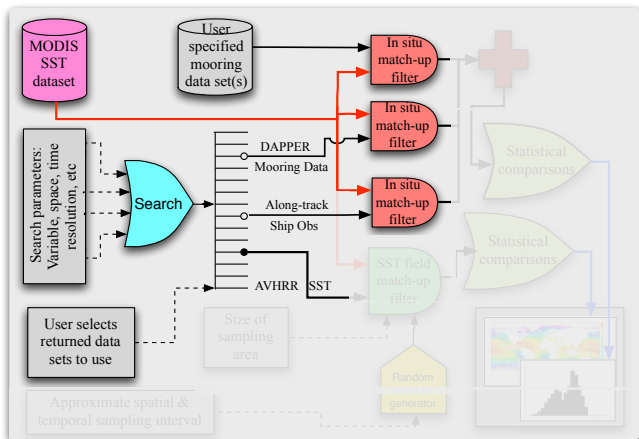
The Default Use Case

SST

Peter
Cornillon

The
Problem

Use Case



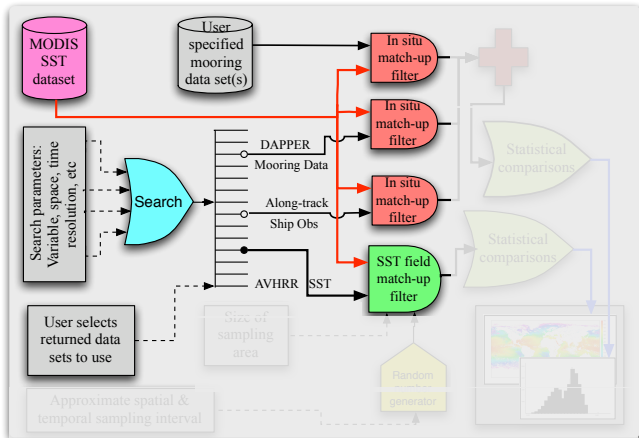
The Default Use Case

SST

Peter
Cornillon

The
Problem

Use Case



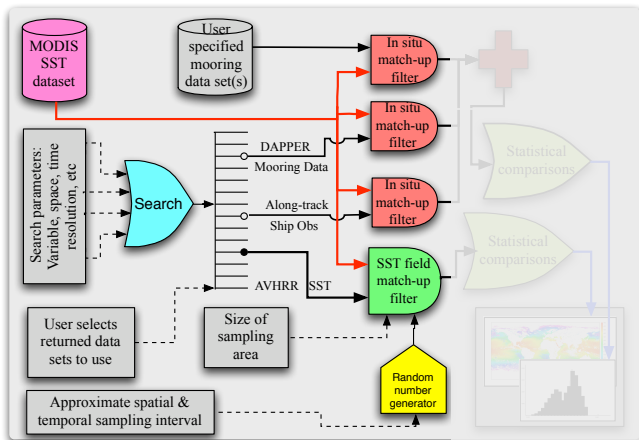
The Default Use Case

SST

Peter
Cornillon

The
Problem

Use Case



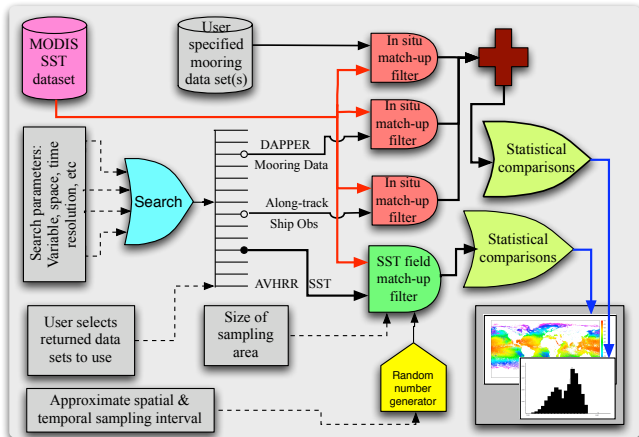
The Default Use Case

SST

Peter
Cornillon

The
Problem

Use Case



The SST evaluation use case is just one possibility:

- Are there other cases that you would prefer to address?
- Does this use case represent sufficiently general functions to be of use in a broad range of applications?

The SST evaluation use case is just one possibility:

- Are there other cases that you would prefer to address?
- Does this use case represent sufficiently general functions to be of use in a broad range of applications?

SST

Peter
Cornillon

The
Problem

Use Case

The End