

# BEAM/SeaDAS Demo

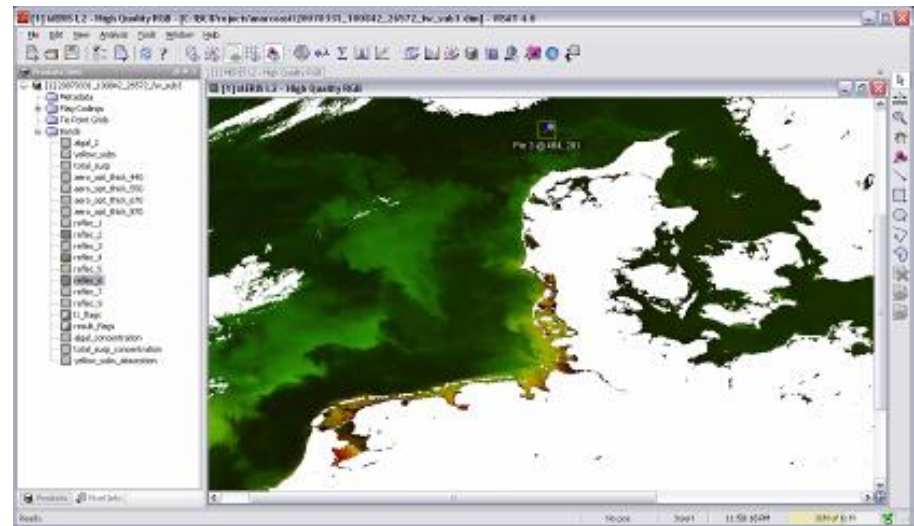
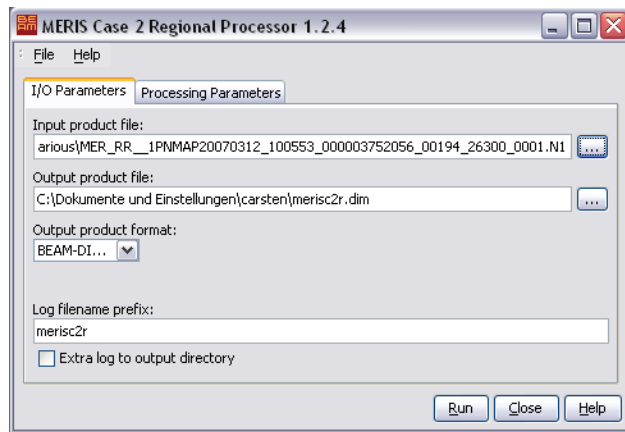


**Brockmann Consult GmbH**

Esrin, 19.10.2012

# BEAM in a Nutshell

- BEAM is an advanced tool for the exploitation of optical data
  - VISAT Visualisation and Analysis Tool
  - Data Processors



- BEAM is an open source Java platform for the development of remote sensing applications
  - Java API, Graph Processing Framework
  - User support: Plug-Ins, Issue tracker, Community Wiki
- Free available from
  - [envisat.esa.int](http://envisat.esa.int) or [www.brockmann-consult.de/beam](http://www.brockmann-consult.de/beam)

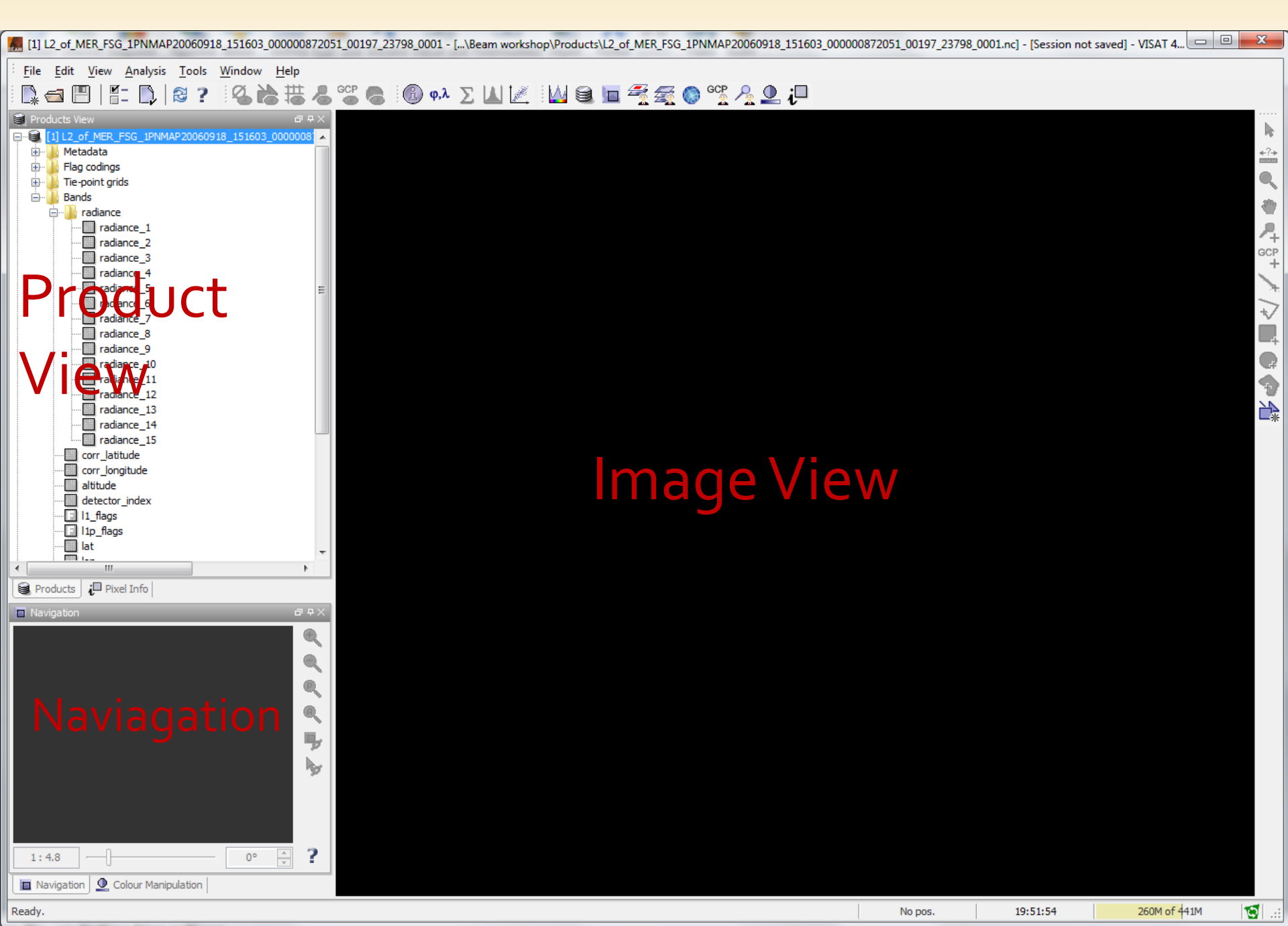
# Supported Formats

	<u>Instrument</u>	<u>Platform</u>	<u>Format</u>
Sensor specific formats	MERIS	Envisat	Envisat N1
	MERIS Binned Level-3	Envisat	netCDF
	AATSR	Envisat	Envisat N1
	ASAR	Envisat	Envisat N1
	ATSR	ERS	ERS
	ATSR	ERS	Envisat N1
	SAR	ERS	Envisat N1
	Chris	Proba	HDF4
	AVNIR-2	ALOS	CEOS
	PRISM	ALOS	CEOS
	MODIS	Aqua, Terra	HDF
	AVHRR/3	NOAA-KLM	NOAA METOP
	TM Thematic Mapper	Landsat 5	Fast Format, GeoTIFF
	NASA Ocean Color (OBPG)	MODIS A/T, SeaWiFS, OCTS, CZCS	HDF
	GETASSE DEM	N/A	
Generic formats	SPOT VEGETATION	SPOT	HDF
	Generic NetCDF/CF-products	N/A	NetCDF/CF
	HDF-EOS gridded products	N/A	HDF
	Generic GeoTIFF-products	N/A	GeoTIFF

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# VISUALISATION

- **Opening Bands**
- **Colour manipulation**
- **Pixel Info View**
- **Mask Manager**
- **Layer Manager**
- **Supported Formats**



Product View

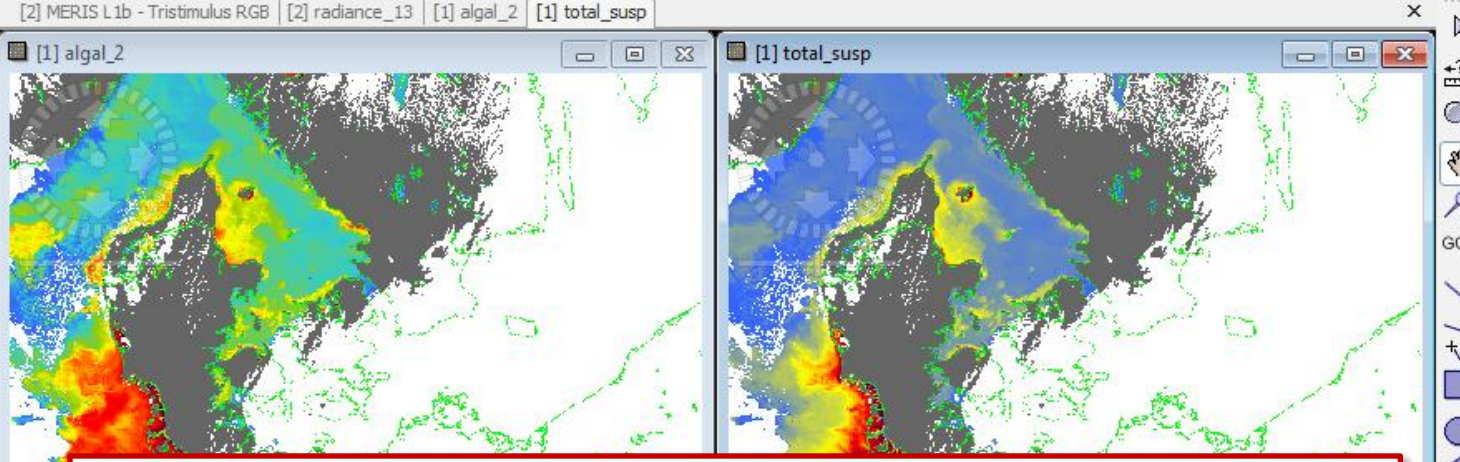
Image View

Naviagation



Products View

- [1] MER\_RR\_2PNUMAP20120407\_095350
- Metadata
- Flag codings
- Tie-point grids
- Vector data
- Bands
  - reflec
  - water\_vapour
  - algal\_1
  - algal\_2
  - yellow\_subs
  - total\_susp**
  - photosyn\_rad
  - toa\_veg
  - boa\_veg
  - rect\_refl\_red
  - rect\_refl\_nir
  - surf\_press
  - aero\_alpha
  - aero\_opt\_thick\_443
  - aero\_opt\_thick\_550
  - aero\_opt\_thick\_865
  - cloud\_albedo
  - cloud\_opt\_thick
  - cloud\_top\_press



- Open single bands and RGB images
- Colour Manipulation
- Linking displays/views
- Overlaying masks

Products Pixel Info

Colour Manipulation - [1] total\_susp

Editor: Sliders Table

Name: total\_susp  
Unit: g/m<sup>3</sup>  
Min: 0.03  
Max: 53.986  
Rough statistics!

Navigation Colour Manipulation

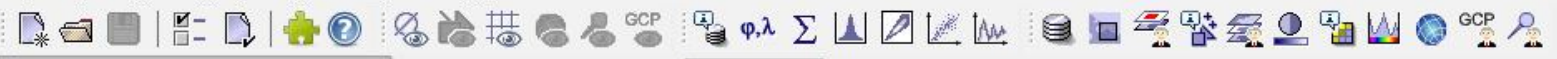
Mask Manager - [2] radiance\_13

Manage binary data masks and ROIs.

Name	Type	Value	Description
<input checked="" type="checkbox"/> coastline	Maths	0, ...	0 Pixel is part of a coastline
<input checked="" type="checkbox"/> land	Maths	51...	0.75 Pixel is over land, not ocean
<input type="checkbox"/> water	Maths	15...	0.75 Not Pixel is over land, not ocean
<input type="checkbox"/> cosmetic	Maths	20...	0.5 Pixel is cosmetic
<input type="checkbox"/> duplicated	Maths	25...	0.5 Pixel has been duplicated (filled in)
<input type="checkbox"/> glint_risk	Maths	25...	0.5 Pixel has glint risk
<input type="checkbox"/> suspect	Maths	20...	0.5 Pixel is suspect
<input checked="" type="checkbox"/> bright	Maths	25...	0.5 Pixel is bright
<input type="checkbox"/> invalid	Maths	25...	0 Pixel is invalid



File Edit View Analysis Tools Window Help

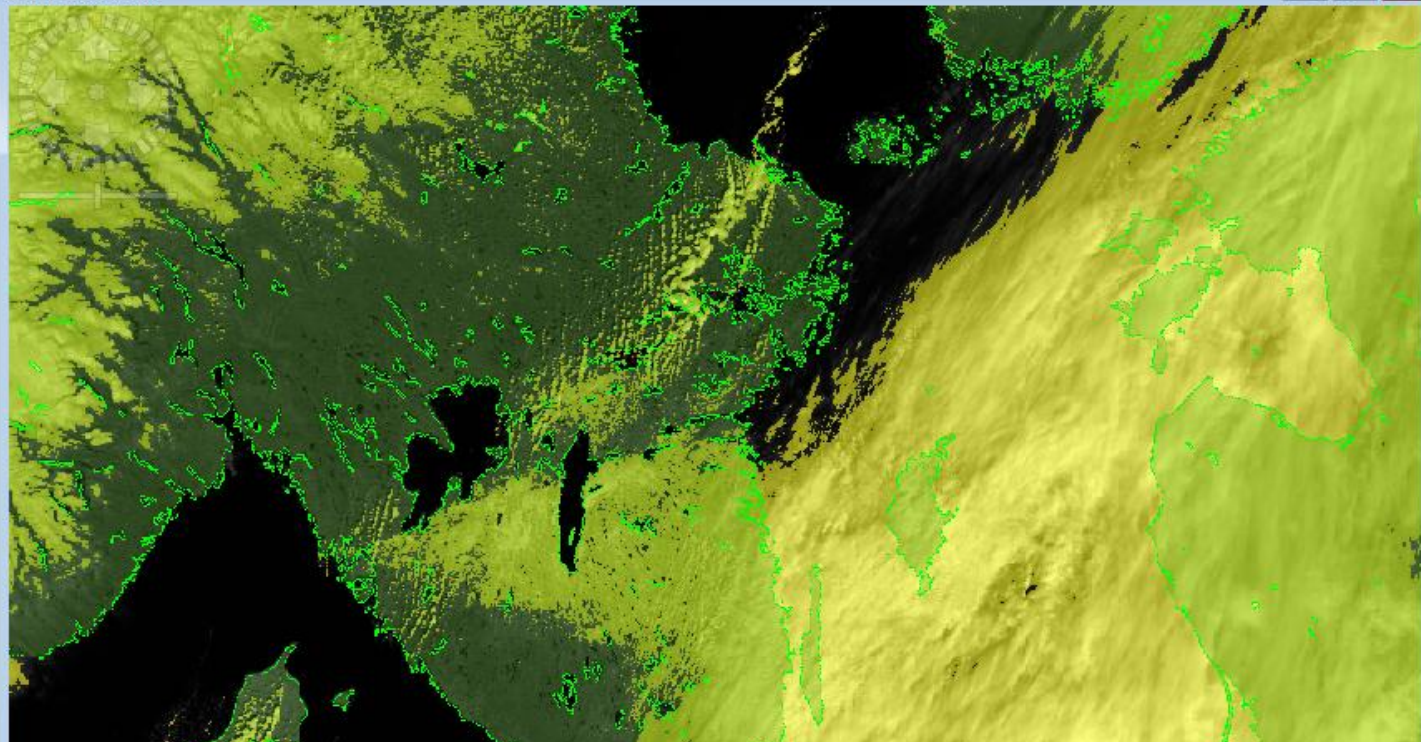


Products View [1] MER\_RR\_2P\NMAP20120407\_095

- Metadata
- Flag codings
- Tie-point grids
- Vector data
- Bands
  - reflec
  - water\_vapour
  - algal\_1
  - algal\_2
  - yellow\_subs
  - total\_susp
  - photosyn\_rad
  - toa\_veg
  - boa\_veg
  - rect\_refl\_red
  - rect\_refl\_nir
  - surf\_press
  - aero\_alpha
  - aero\_opt\_thick\_443
  - aero\_opt\_thick\_550
  - aero\_opt\_thick\_865
  - cloud\_albedo
  - cloud\_opt\_thick
  - cloud\_top\_press

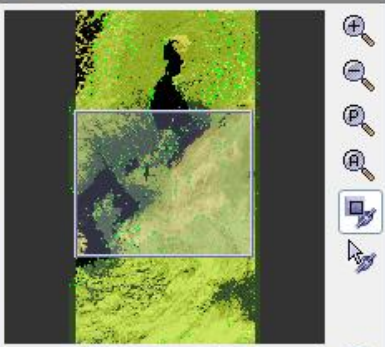
[2] MERIS L1b - Tristimulus RGB [2] radiance\_13 [1] algal\_2 [1] total\_susp

[2] radiance\_13



Products Pixel Info

Navigation



1 : 1.2 0°

Navigation Colour Manipulation

[2] radiance\_13 - Satellite coordinates

Mask Manager - [2] radiance\_13

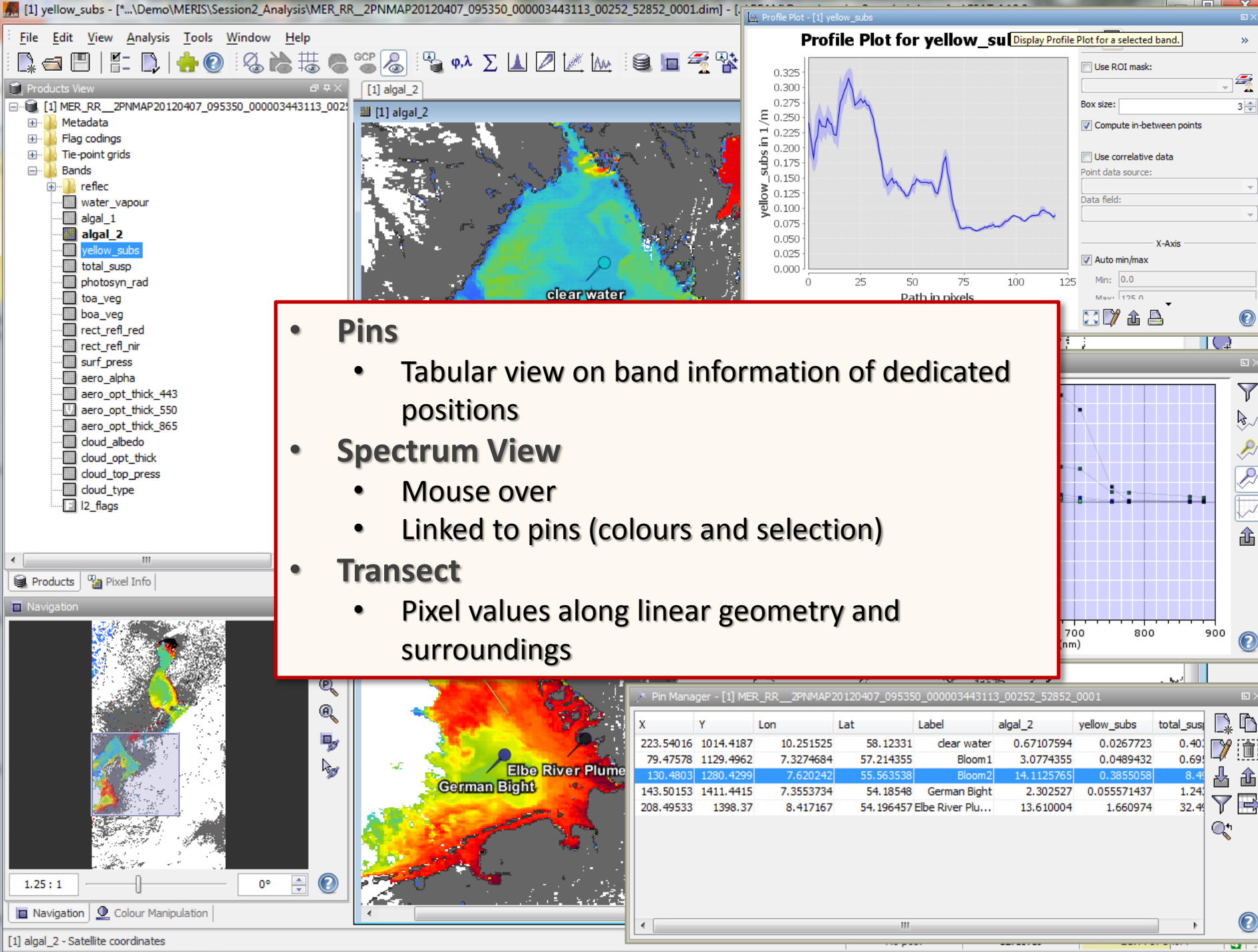
Eye	Name	Type	Value	Description
<input checked="" type="checkbox"/>	coastline	Maths	0, ...	0 Pixel is part of a coastline
<input checked="" type="checkbox"/>	land	Maths	51...	0.75 Pixel is over land, not ocean
<input type="checkbox"/>	water	Maths	15...	0.75 Not Pixel is over land, not ocean
<input type="checkbox"/>	cosmetic	Maths	20...	0.5 Pixel is cosmetic
<input type="checkbox"/>	duplicated	Maths	25...	0.5 Pixel has been duplicated (filled in)
<input type="checkbox"/>	glint_risk	Maths	25...	0.5 Pixel has glint risk
<input type="checkbox"/>	suspect	Maths	20...	0.5 Pixel is suspect
<input checked="" type="checkbox"/>	bright	Maths	25...	0.5 Pixel is bright
<input type="checkbox"/>	invalid	Maths	25...	0 Pixel is invalid

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# ANALYSIS TOOLS

- Pins
- Spectrum View
- Transects
- Statistics
- Mask concept
- Importing vector data (in-situ)
- Correlative Plot





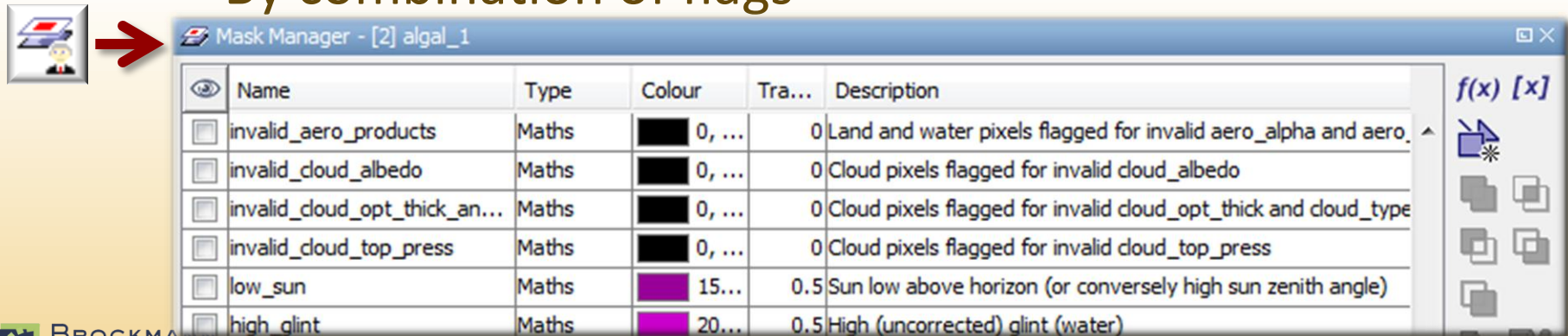
- **Pins**
  - Tabular view on band information of dedicated positions
- **Spectrum View**
  - Mouse over
  - Linked to pins (colours and selection)
- **Transect**
  - Pixel values along linear geometry and surroundings

Pin Manager - [1] MER\_RR\_\_2PNMAP20120407\_095350\_000003443113\_00252\_52852\_0001

X	Y	Lon	Lat	Label	algal_2	yellow_subs	total_sus
223.54016	1014.4187	10.251525	58.12331	clear water	0.67107594	0.0267723	0.40
79.47578	1129.4962	7.3274684	57.214355	Bloom1	3.0774355	0.0489432	0.69
130.4803	1280.4299	7.620242	55.563538	Bloom2	14.1125765	0.3855058	8.4
143.50153	1411.4415	7.3553734	54.18548	German Bight	2.302527	0.055571437	1.24
208.49533	1398.37	8.417167	54.196457	Elbe River Plu...	13.610004	1.660974	32.4

# Masks in BEAM VISAT

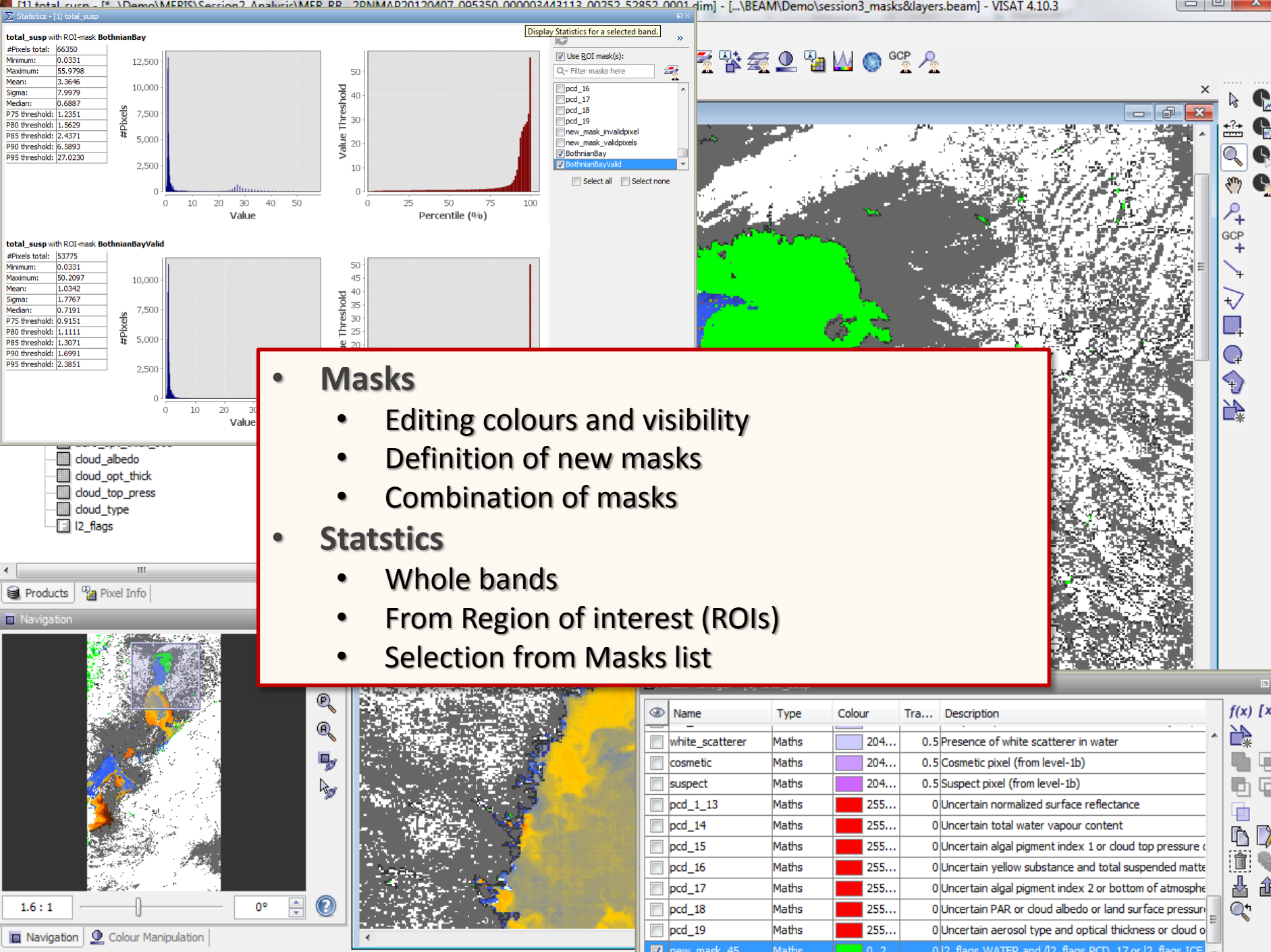
- **Flags** of ENVISAT standard products are automatically included as masks
- All geometries, pins and imported vector data are included as masks
- Own masks can be generated
  - from flags, geometries, band math expression
  - By combination of flags



<input type="checkbox"/>	Name	Type	Colour	Tra...	Description
<input type="checkbox"/>	invalid_aero_products	Maths	0, ...	0	Land and water pixels flagged for invalid aero_alpha and aero...
<input type="checkbox"/>	invalid_cloud_albedo	Maths	0, ...	0	Cloud pixels flagged for invalid cloud_albedo
<input type="checkbox"/>	invalid_cloud_opt_thick_an...	Maths	0, ...	0	Cloud pixels flagged for invalid cloud_opt_thick and cloud_type
<input type="checkbox"/>	invalid_cloud_top_press	Maths	0, ...	0	Cloud pixels flagged for invalid cloud_top_press
<input type="checkbox"/>	low_sun	Maths	15...	0.5	Sun low above horizon (or conversely high sun zenith angle)
<input type="checkbox"/>	high_glint	Maths	20...	0.5	High (uncorrected) glint (water)

# Concept Definitions

- Geometry
  - A geometric shape (point, line, polyline or polygon).
  - Geometries can be drawn on a product view or imported from external files.
- Mask
  - Masks a regions of raster dataset.
  - Masks can be derived from an expression, a value range, a geometry or from combinations of different masks.
- ROI
  - Statistical computation and Analysis Tools can be performed on ROIs.
  - Masks are always and automatically applicable ROIs (→ ROIs are a role of Masks).
- Layer
  - Views in BEAM are composed of multiple, configurable layers
  - A layer is used to visualise a certain data source
  - Vector data, raster data and masks and represented by special layer types



total\_susp with ROI-mask BothnianBay

#Pixels total:	66350
Minimum:	0.0331
Maximum:	55.9798
Mean:	3.3646
Sigma:	7.9979
Median:	0.6887
P75 threshold:	1.2351
P80 threshold:	1.5629
P85 threshold:	2.4371
P90 threshold:	6.5893
P95 threshold:	27.0230

total\_susp with ROI-mask BothnianBayValid

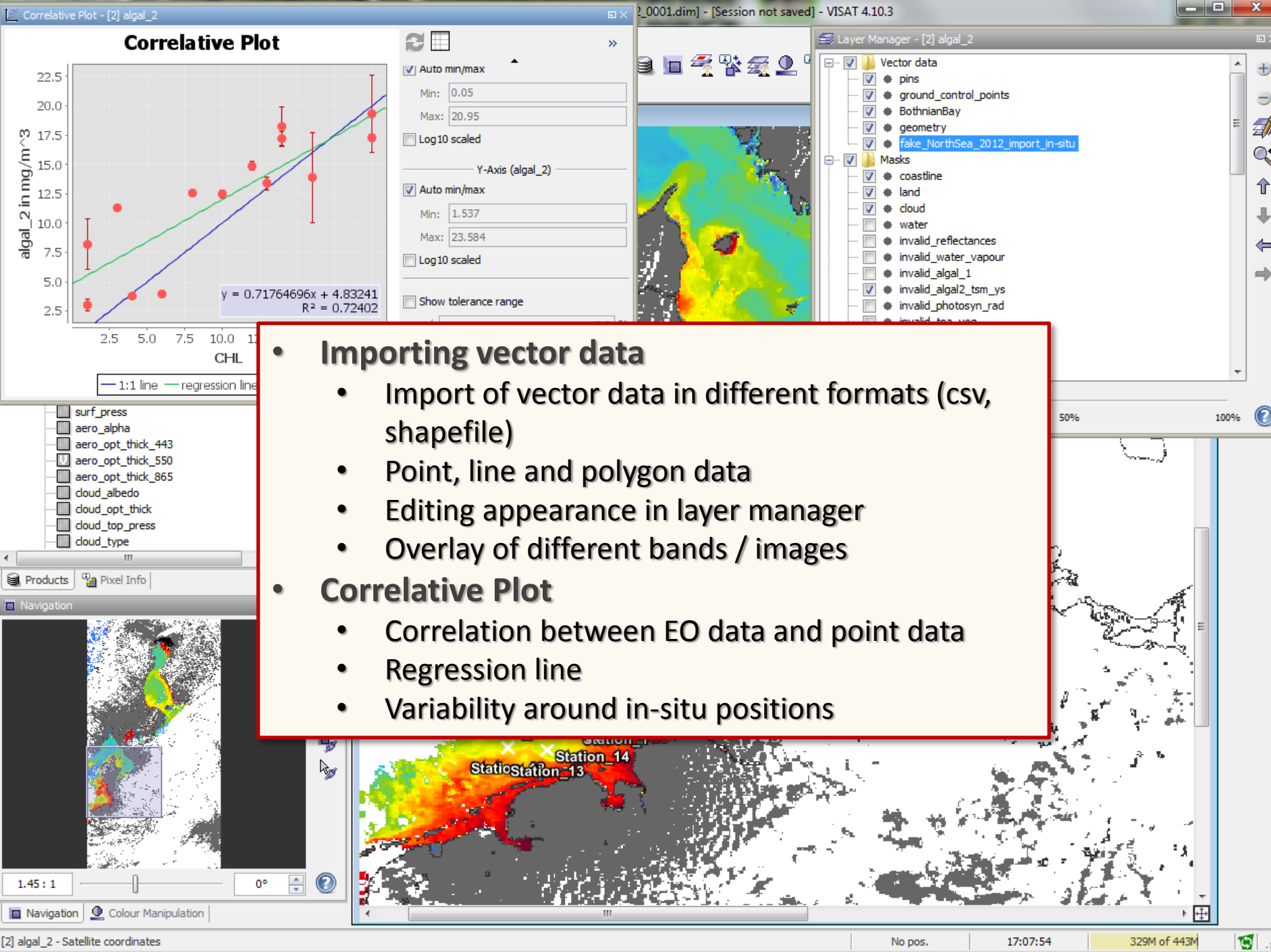
#Pixels total:	53775
Minimum:	0.0331
Maximum:	50.2097
Mean:	1.0342
Sigma:	1.7767
Median:	0.7191
P75 threshold:	0.9151
P80 threshold:	1.1111
P85 threshold:	1.3071
P90 threshold:	1.6991
P95 threshold:	2.3851

- Display Statistics for a selected band.
- Use ROI mask(s):
- Q- Filter masks here
- pcd\_16
  - pcd\_17
  - pcd\_18
  - pcd\_19
  - new\_mask\_invalidpixel
  - new\_mask\_valdipixels
  - BothnianBay
  - BothnianBayValid
- Select all  Select none

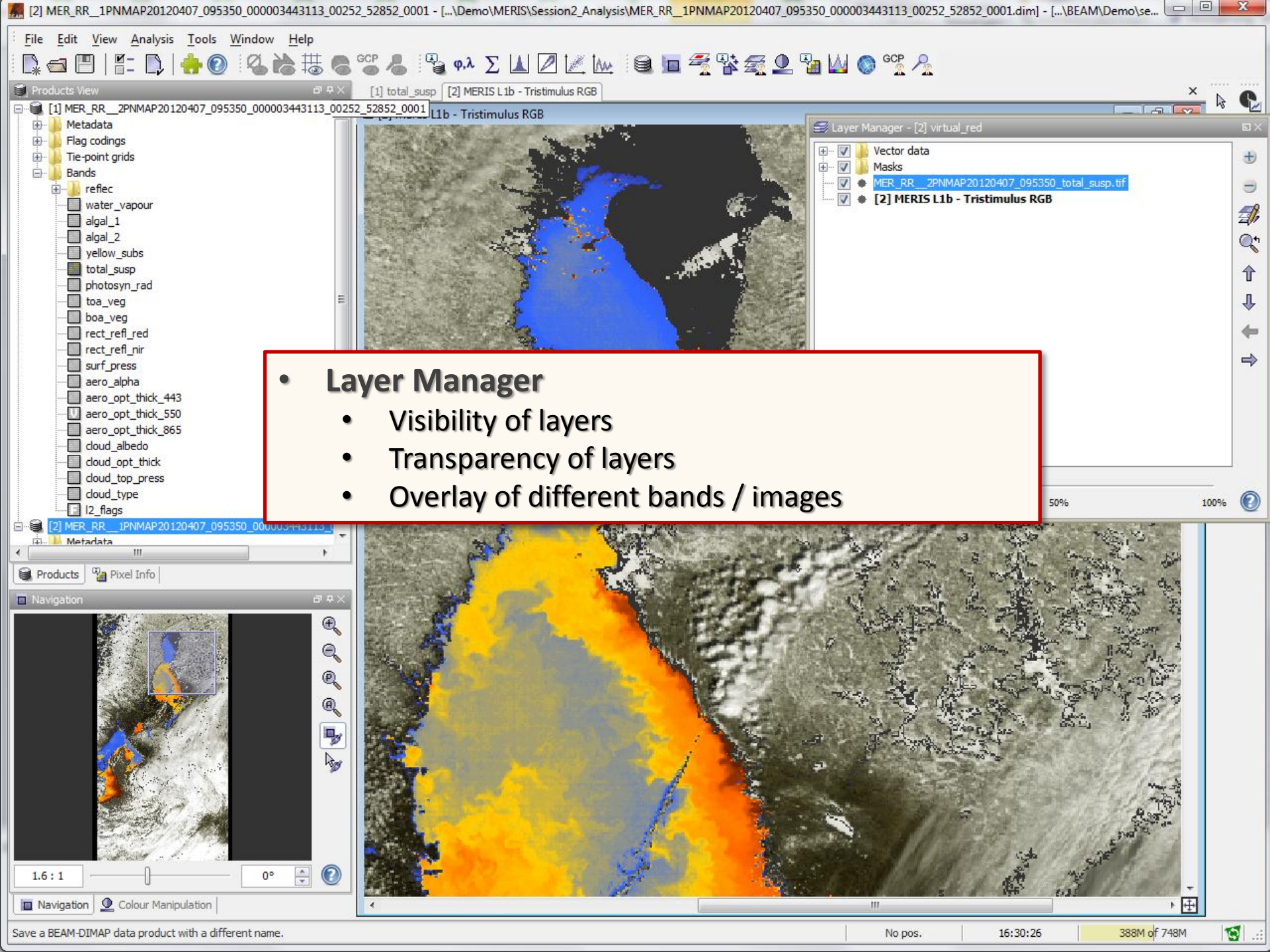
- **Masks**
  - Editing colours and visibility
  - Definition of new masks
  - Combination of masks
- **Statistics**
  - Whole bands
  - From Region of interest (ROIs)
  - Selection from Masks list

Name	Type	Colour	Tra...	Description
<input type="checkbox"/> white_scatterer	Maths	204...	0.5	Presence of white scatterer in water
<input type="checkbox"/> cosmetic	Maths	204...	0.5	Cosmetic pixel (from level-1b)
<input type="checkbox"/> suspect	Maths	204...	0.5	Suspect pixel (from level-1b)
<input type="checkbox"/> pcd_1_13	Maths	255...	0	Uncertain normalized surface reflectance
<input type="checkbox"/> pcd_14	Maths	255...	0	Uncertain total water vapour content
<input type="checkbox"/> pcd_15	Maths	255...	0	Uncertain algal pigment index 1 or cloud top pressure
<input type="checkbox"/> pcd_16	Maths	255...	0	Uncertain yellow substance and total suspended matte
<input type="checkbox"/> pcd_17	Maths	255...	0	Uncertain algal pigment index 2 or bottom of atmosphe
<input type="checkbox"/> pcd_18	Maths	255...	0	Uncertain PAR or cloud albedo or land surface pressur
<input type="checkbox"/> pcd_19	Maths	255...	0	Uncertain aerosol type and optical thickness or cloud
<input checked="" type="checkbox"/> new_mask_45	Maths	0, 2...	0	I2_flags.WATER and I2_flags.PCD_17 or I2_flags.ICE





- **Importing vector data**
  - Import of vector data in different formats (csv, shapefile)
  - Point, line and polygon data
  - Editing appearance in layer manager
  - Overlay of different bands / images
- **Correlative Plot**
  - Correlation between EO data and point data
  - Regression line
  - Variability around in-situ positions



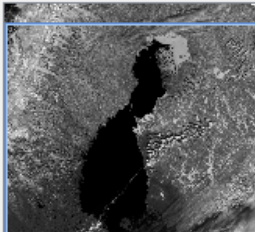
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# TOOLS & PROCESSORS



Specify Product Subset

Spatial Subset | Band Subset | Metadata Subset



Pixel Coordinates | Geo Coordinates

Scene start X:

Scene start Y:

Scene end X:

Scene end Y:

Scene step X:

Scene step Y:

Subset scene width:

Subset scene height:

Source scene width:

Collocation

File Help

Source Products

Master (pixel value): [1] MER\_RR\_1

Slave (pixel value):

Case-2 Regional Processor (MERIS)... - v1.5.7

File Help

I/O Parameters | Processing Parameters

Perform atmospheric correction

Alternative atm. corr. neural net (optional):

Perform SMILE correction

Output TOSA reflectance

Output water leaving reflectance

Output water leaving reflectance as: RADIANCE\_REFLECTANCES

Output path reflectance

Output transmittance

Output normalised bidirectional reflectances

Output cloud top pressure

Land detection expression: toa\_reflec\_10 > toa\_reflec\_6 AND toa\_reflec\_13 > 0.0475

Cloud/Ice detection expression: toa\_reflec\_14 > 0.2

Water algorithm: REGIONAL

Tsm conversion exponent: 1.0

Tsm conversion factor: 1.73

Chl conversion exponent: 1.04

Chl conversion factor: 21.0

Spectrum out of scope threshold: 4.0

Invalid pixel expression: I1\_flags.INVALID

Alternative inverse water neural net (optional):

Alternative forward water neural net (optional):

Run Close Help

Tools Window Help

Create Band by Band Maths...

Create DEM-related Bands...

Create NIRS Bands (ACAP)

Pixel Extraction

Input/Output Parameters

Coordinates:

Name	Latitude	Longit...	DateTime
Station_1	54.0632	8.4331	
Station_2	54.2703	8.2485	
Station_3	54.4937	8.1007	
Station_4	54.6679	7.9993	
Station_5	54.9460	8.0172	
Station_6	55.2841	8.0734	

Allowed time difference:  Use time difference constrain

Export:  Bands  Tie-point grids  Masks

Window size:

Expression:  Use expression

not I1\_flags.INVALID

Note: The expression might not be applicable to the selected data

Use expression as filter  Export expression

Sub-scenes:  Enable export Border size:

KMZ coordinates:  Export found coordinates in Google KMZ format

Extract Close Help

2\_52852\_0001


Conditions

Projection Parameters...

Select...

30.0 Pixel size X: 0.05

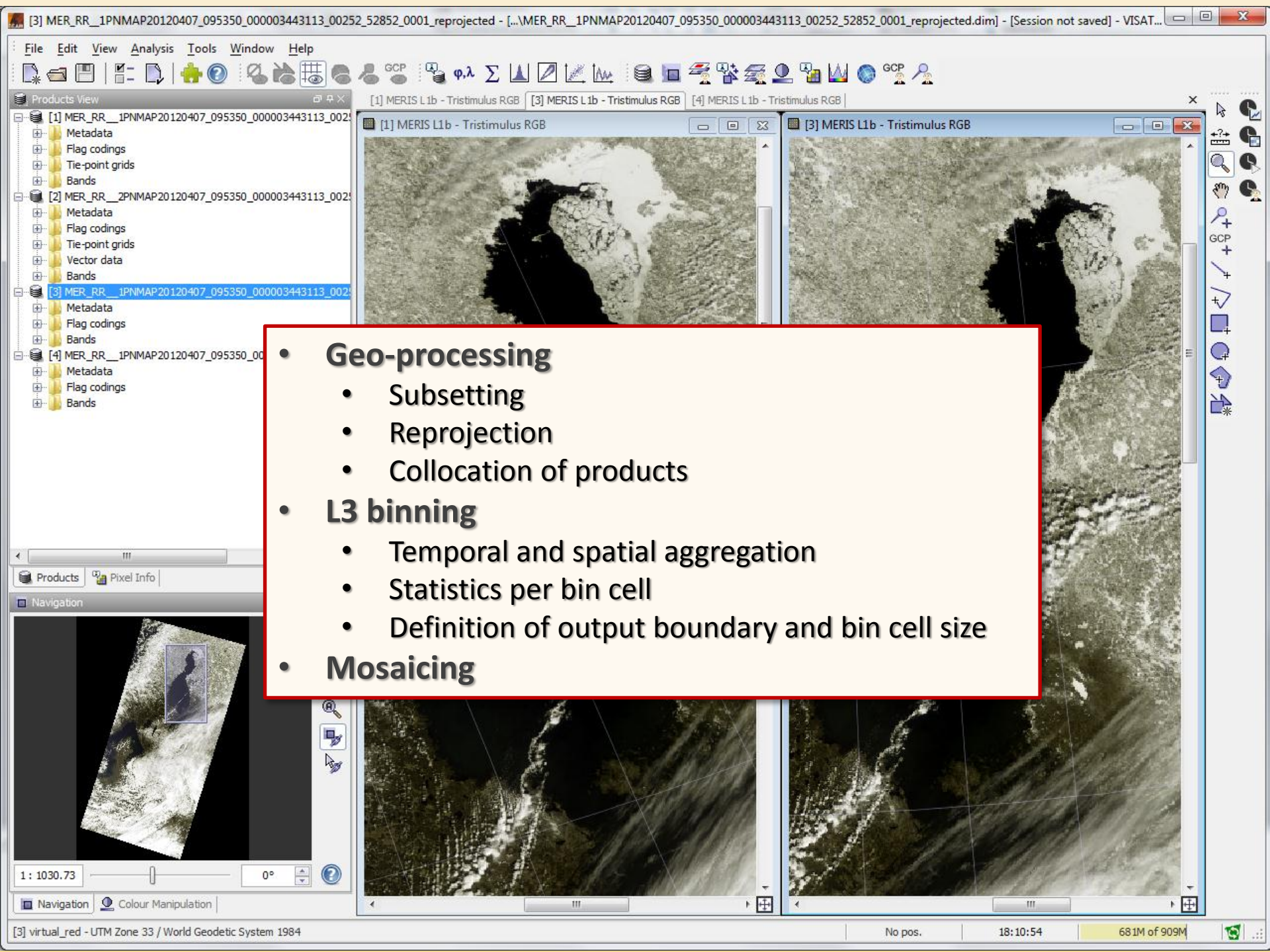
35.0 Pixel size Y: 0.05



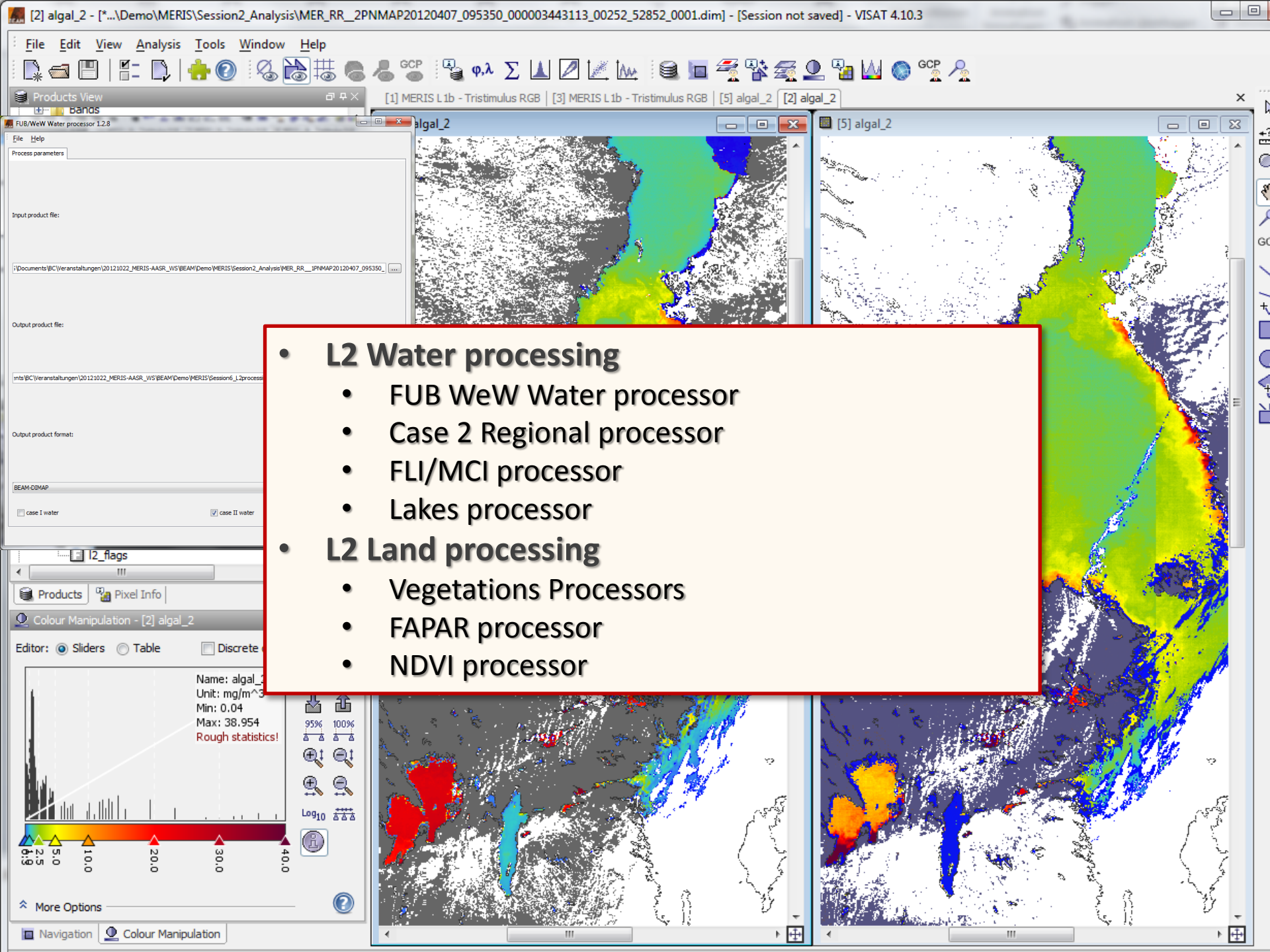
Display source products

Run Close





- **Geo-processing**
  - Subsetting
  - Reprojection
  - Collocation of products
- **L3 binning**
  - Temporal and spatial aggregation
  - Statistics per bin cell
  - Definition of output boundary and bin cell size
- **Mosaicing**



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# SENTINEL



# Sentinel-3 Reader available

The screenshot displays the VISAT 4.10.4-SNAPSHOT software interface. The main window is titled "[1] SDR\_4\_CAM1 - [\*...]manifest.safe - [Session not saved] - VISAT 4.10.4-SNAPSHOT". The interface includes a menu bar (File, Edit, View, Analysis, Tools, Window, Help) and a toolbar with various icons for file operations, navigation, and analysis.

The left sidebar shows a "Products View" tree structure with the following items:

- longitude\_CAM1
- longitude\_CAM2
- longitude\_CAM3
- longitude\_CAM4
- longitude\_CAM5
- SDR\_1
  - SDR\_1\_CAM1
  - SDR\_1\_CAM2
  - SDR\_1\_CAM3
  - SDR\_1\_CAM4
  - SDR\_1\_CAM5
- SDR\_1\_er
- SDR\_2
  - SDR\_2\_CAM1
  - SDR\_2\_CAM2
  - SDR\_2\_CAM3
  - SDR\_2\_CAM4
  - SDR\_2\_CAM5
- SDR\_2\_er
- SDR\_3
  - SDR\_3\_CAM1
  - SDR\_3\_CAM2
  - SDR\_3\_CAM3
  - SDR\_3\_CAM4
  - SDR\_3\_CAM5
- SDR\_3\_er
- SDR\_4
  - SDR\_4\_CAM1**
  - SDR\_4\_CAM2
  - SDR\_4\_CAM3
  - SDR\_4\_CAM4

The main workspace is divided into two panels. The left panel, titled "[1] SDR\_4\_CAM1", shows a vertical strip of data with a white mask overlaying a dark background. The right panel, titled "[2] B2", shows a satellite image of a coastal region with a white mask overlaying a dark background. A compass rose is visible in the top-left corner of the right panel.

At the bottom, there is a "Colour Manipulation - [1] SDR\_4\_CAM1" panel with the following details:

- Editor:  Sliders  Table  Discrete colors
- Name: SDR\_4\_CAM1
- Unit: null
- Min: 0.0
- Max: 0.044
- Rough statistics!

The bottom status bar shows the following information:

- [1] SDR\_4\_CAM1 - Satellite coordinates
- [1] 457,2697 (L1)
- 19:04:53
- 554M of 910M



# Sentinel Product Reader Plugins

- Sentinel-3 (BEAM)
  - OLCI Products
    - Level 1b & Level 2 Marine and Land
  - SLSTR Products
    - Level 1b & Level 2 SST and LST
  - Synergy Products
    - Level 2 Surface Reflectances & Aerosols over Land
    - SPOT VEGETATION P, S1, S10 Continuation
- Sentinel-2 (BEAM)
- Sentinel-1 (NEST)

→ *ESA's Sentinel Exploitation Tools,  
Poster Session I, Tuesday 16:50-19:00*

# SEADAS 7.0



# SeaDAS 7.0

- Objective
  - Renewal of the „outdated“ SeaDAS 6 user interface
  - Away from commercial IDL to an open-source approach
  - Simplify configuration and launching of SeaDAS L1, L2 and L3 data processors
- Collaboration
  - Joint effort of NASA Ocean Biology Processing Group (OBPG) and the BEAM development team
  - Informal meeting at NASA GSFC in May, 2010
    - *New SeaDAS 7 will be using the BEAM Development Platform*
    - *Poster Session I, Tuesday 16:50-19:00*
  - Bilateral collaboration started in June, 2011

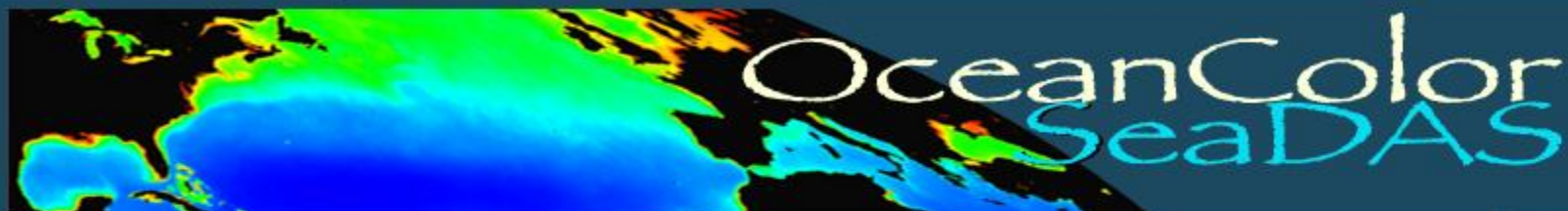
# SeaDAS 7.0 Features

- Exchange of the IDL-based SeaDAS GUI by a frontend based on BEAM **VISAT** “Rich Client Platform”
- Add BEAM support for OPBP maintained data products
  - **MERIS, MODIS, VIIRS, OCM-2, SeaWiFS, CZCS, OCTS, Aquarius**
- Integrate SeaDAS’ robust and fast **data processing suite**
  - NASA operational OC processors used for production
  - greatly simplified usage of SeaDAS data processors  
**l1bgen, l1mapgen, l1brsngen**  
**l2gen, l2mapgen, l2brsngen,**  
**l2bin, l3bin, smigen**
  - sensor-independent approach
  - data processor user interfaces dynamically created from XML
  - Linux only, use virtual machine on other platforms



# SeaDAS 7.0 Objectives (cont.)

- Improve SeaDAS/BEAM w.r.t. **validation activities**
  - → *BEAM Interactive Tutorial, Wednesday 9:30-13:30*
- Improve SeaDAS/BEAM **point and vector data** support
- Add a global, high resolution **land-water mask**
- Add a global, accurate **bathymetry map**
- Add **auxiliary data management** (versioning, download, ...)
- Odds and ends
  - Add an easy colour manipulation mode
  - Add a layer for legends in image views



## SeaDAS Web

### Support

[Ocean Color Web](#)  
[Ocean Color Forum](#)  
[Ocean Mailing Lists](#)

### Download and Installation

Linux and Mac:

- [Online Auto-Installation](#)
- [Manual Download](#)
- [Manual Installation](#)

Windows:

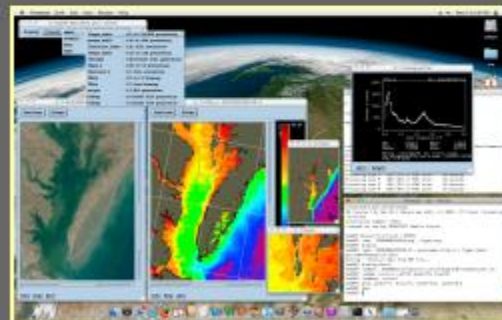
- [SeaDAS Virtual Appliance](#)

### Satellite Data Info

[Data Product Specifications](#)

## What is SeaDAS

The SeaWiFS Data Analysis System (SeaDAS) is a comprehensive image analysis package for the processing, display, analysis, and quality control of ocean color data.



Supported satellite sensors are MODIS, SeaWiFS, MERIS, OCTS, and CZCS.

- [Features](#)
- [Requirements](#)
- [Online Help](#)

## What's New

### SeaDAS 6.4 Released

- Includes support for the latest MODIS Aqua reprocessing (V2012.0)
- Includes several bug fixes for both the GUI and processing code
- Drops support for OSX10.5 (rigger) Mac systems

### SeaDAS 7.0-beta Released

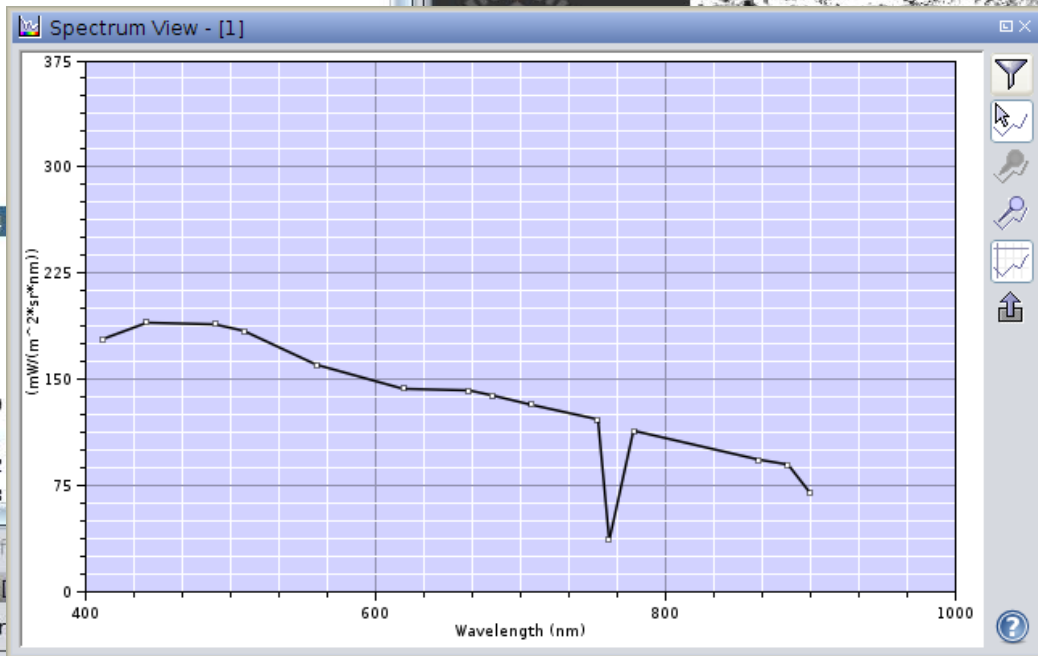
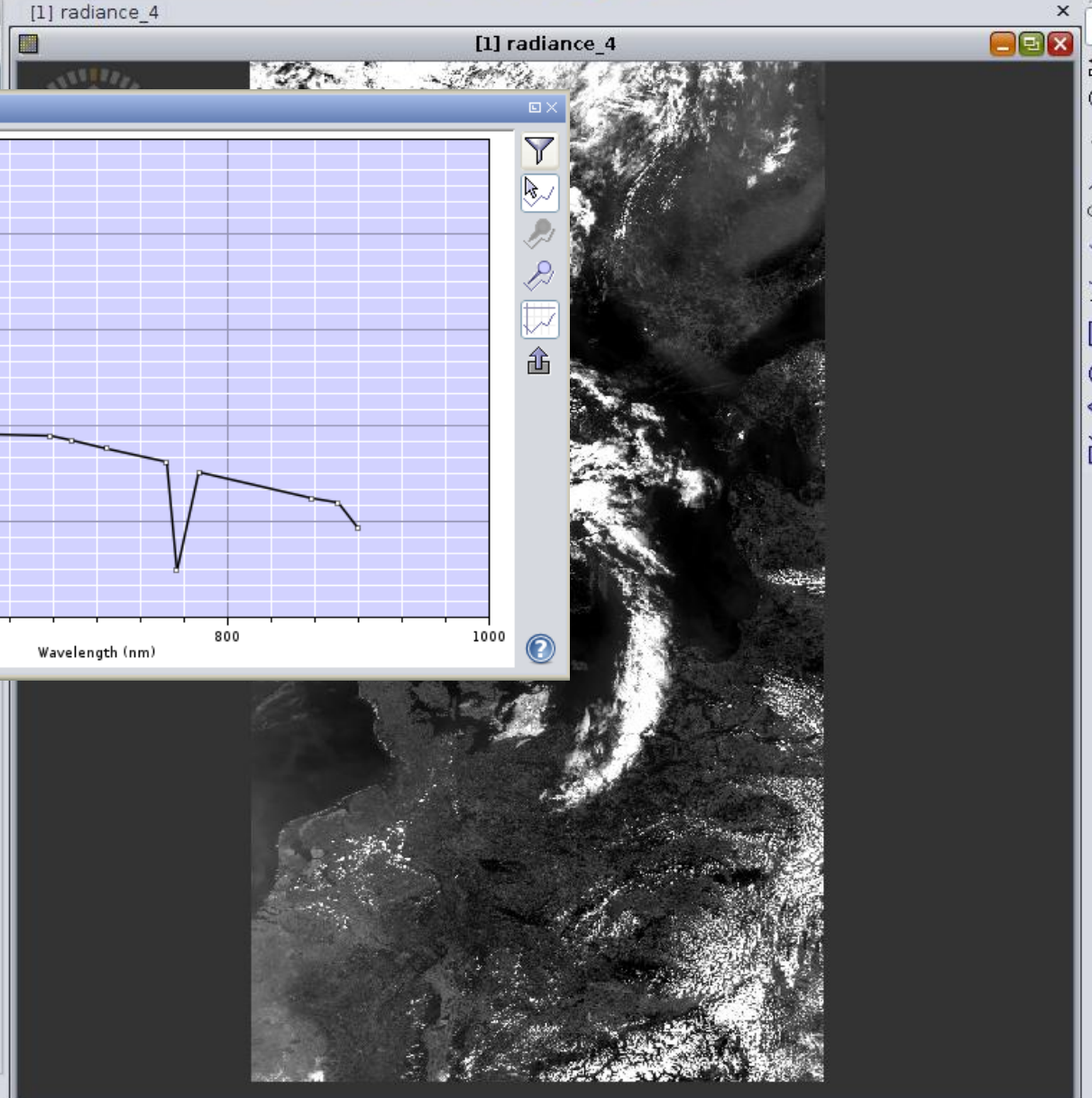
SeaDAS 7.0-beta is our first release of the new interface for SeaDAS.

As this is a beta release, there are a few known (and likely a few unknown) issues. We are actively working on the issues listed below. Please give the program a test drive and do not hesitate to report any issues to use via the OceanColor Forum.



Products View

- [1] MER\_RR\_1PNMAP20060511\_095146\_000003522047\_0
  - Metadata
  - Flag codings
  - Tie-point grids
  - Bands
    - radiance
      - radiance\_1
      - radiance\_2
      - radiance\_3
      - radiance\_4**
      - radiance\_5
      - radiance\_6
      - radiance\_7
      - radiance\_8
      - radiance\_9
      - radiance\_10
      - radiance\_11
      - radiance\_12
      - radiance\_13



Products Pixel Info

Colour Manipulation - [1]

Editor:  Basic  Slider

Name: radiance\_4  
Unit: mW/(m<sup>2</sup>\*sr\*nm)  
Min: 30.297  
Max: 424.009

95% 100%  
Log<sub>10</sub>

34.1419 76.4675 171.264

More Options

Navigation Colour Manipulation



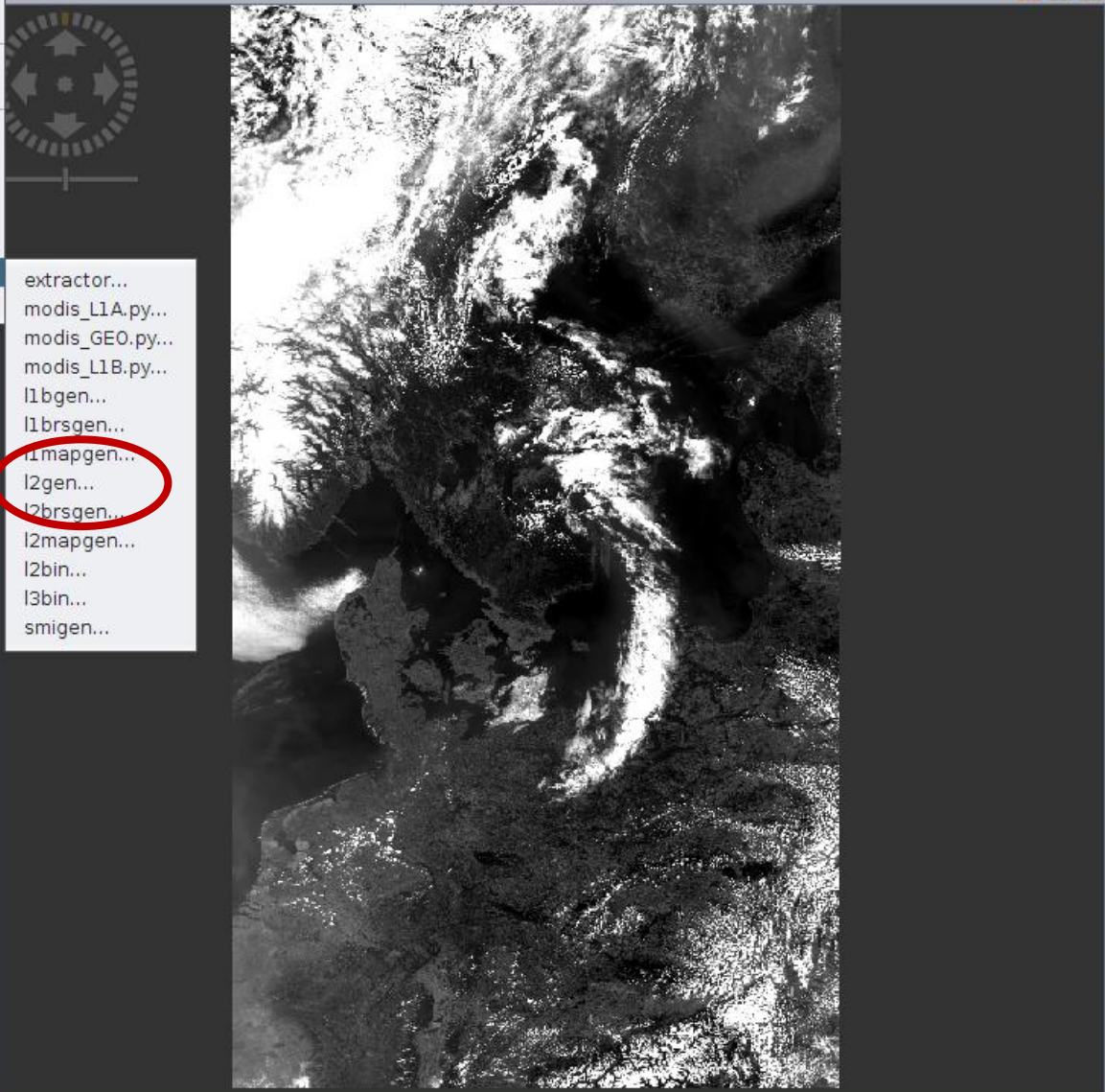
File Edit View Analysis Tools Window Help

- Create Band by Band Maths...
- Create DEM-related Bands...
- Create NRCS Bands (ASAR)...
- Create Filtered Band...
- Create Vector Data Container...
- Attach Pixel Geo-Coding...
- Detach Pixel Geo-Coding...
- Spatial Subset from View...
- Data Flip...
- Reprojection...
- Orthorectification...
- Mosaic...
- OCSSW Processing**
- Pixel Extraction...

Products View

- [1] MER\_RR\_1PNMAP
  - Metadata
  - Flag codings
  - Tie-point grids
  - Bands
    - radiance
      - radiance\_1
      - radiance\_2
      - radiance\_3
      - radiance\_4**
      - radiance\_5
      - radiance\_6
      - radiance\_7
      - radiance\_8
      - radiance\_9
      - radiance\_10
      - radiance\_11

[1] radiance\_4



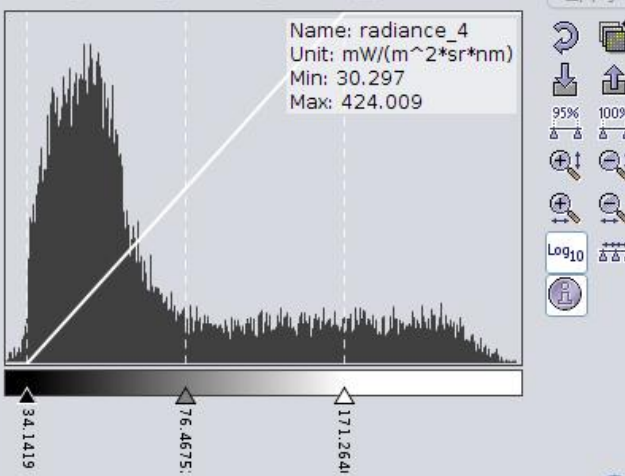
[1] radiance\_4

- extractor...
- modis\_L1A.py...
- modis\_GEO.py...
- modis\_L1B.py...
- l1bgen...
- l1brsgen...
- l1mapgen...
- l2gen...**
- l2brsgen...
- l2mapgen...
- l2bin...
- l3bin...
- smigen...

Products Pixel Info

Colour Manipulation - [1] radiance\_4

Editor:  Basic  Sliders  Table  Discrete colors



Name: radiance\_4  
Unit: mW/(m<sup>2</sup>\*sr\*nm)  
Min: 30.297  
Max: 424.009

34.1419 76.4675 171.264

Navigation Colour Manipulation



Products View

- [1] MER\_RR\_1PNMAP2006051
  - Metadata
  - Flag codings
  - Bands
    - aot
    - angstrom
    - Rrs
      - chlor\_a
    - Kd
    - pic
    - poc
    - cdom\_index
    - l2\_flags
    - latitude
    - longitude

Products Pixel Info

Colour Manipulation

Apply

No image view selected.



I2gen

Main Products\* Subsetting Options Thresholds IOP Options Processing Options Ancillary Inputs Miscellaneous Calibration Options

IOP Options

giop\_adg\_file \$OCDATAROOT/common/adg\_default.txt

giop\_adg\_opt 1 - exponential with exponent supplied via giop\_adg\_s

giop\_adg\_s 0.0145

giop\_aph\_file \$OCDATAROOT/common/aph\_default.txt filter:

giop\_aph\_opt 2 - Bricaud et al. 1995 (chlorophyll supplied via default empirical algor ...

giop\_aph\_s -1000.0

giop\_bbp\_file \$OCDATAROOT/common/bbp\_default.txt filter:

giop\_bbp\_opt 3 - power-law with exponent derived via Lee et al. (2002)

giop\_bbp\_s -1000.0

giop\_fit\_opt 1 - Levenberg-Marquardt optimization

giop\_grd [0.0949,0.0794]

giop\_maxiter 50

giop\_rrs\_opt 1 - Morel f/Q

giop\_wave -1

gsm\_adg\_s 0.02061

gsm\_aphs [0.00665, 0.05582, 0.02055, 0.01910, 0.01015, 0.01424]

gsm\_aphw [412.0, 443.0, 490.0, 510.0, 555.0, 670.0]

gsm\_bbp\_s 1.03373

gsm\_fit 0 - Amoeba

gsm\_opt 0 - default coefficients

iop\_opt 0 - None (products requiring a or bb will fail)

qaa\_adg\_s 0.015

qaa\_wave 0.443,490,560,6651

Restore Defaults (IOP Options only)

Open in SeaDAS

Run Cancel Apply ?



Products View

- [1] MER\_RR\_1PNMAP2006051
- [2] MER\_RR\_1PNMAP2006051
  - Metadata
  - Flag codings
  - Bands
    - aot
    - angstrom
    - Rrs
    - chlor\_a**
    - Kd
    - pic
    - poc
    - cdom\_index
    - l2\_flags
    - latitude
    - longitude

Products Pixel Info

Colour Manipulation - [2...]

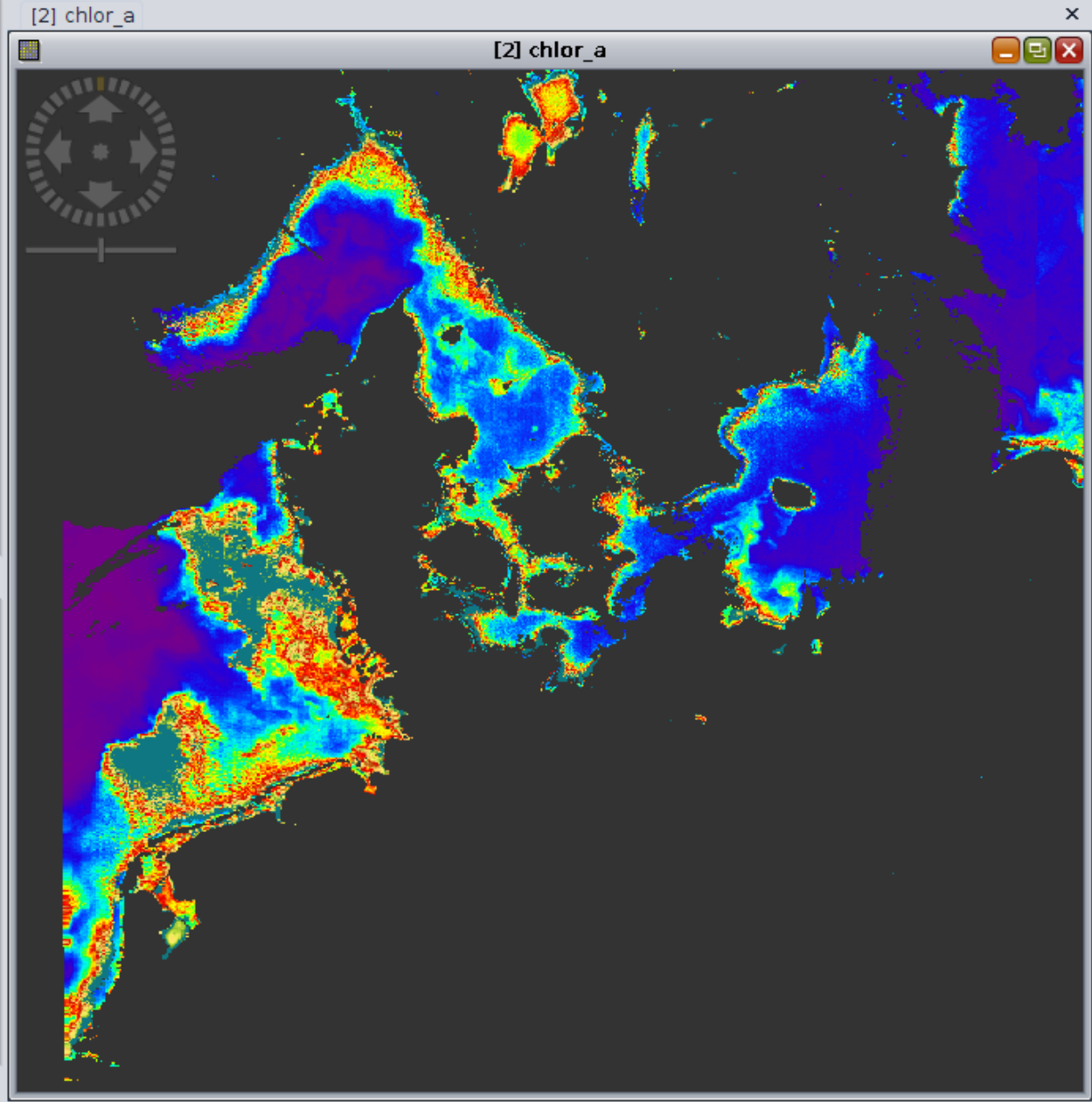
Editor:  Basic  Slide

Name: chlor\_a  
Unit: mg m<sup>-3</sup>  
Min: 0.213  
Max: 1000.0  
**Rough statistics!**

95% 100%  
Log<sub>10</sub>

More Options

Navigation Colour Man..



## Primary I/O Files

ifile  ... filter:

geofile  ... filter:

ofile  ...

## Parfile

  Retain Selected IFILE Show Defaults

# PRIMARY INPUT OUTPUT FIELDS

ifile=/mnt/hgfs/BC/internal/RS\_Products/Instrument/MERIS/RP2/RR/MER\_RR\_1PNMAP20060511\_095146\_000003522047\_00337\_21934\_0001.N1

ofile=/mnt/hgfs/BC/internal/RS\_Products/Instrument/MERIS/RP2/RR/MER\_RR\_1PNMAP20060511\_095146\_000003522047\_00337\_21934\_0001.N1.L2

## Primary I/O Files

ifile MER\_RR\_1PNMAP20060511\_095146\_000003522047\_00337\_21934\_0001.N1

... filter:

geofile

... filter:

ofile /mnt/hgfs/BC/internal/RS\_Products/Instrument/MERIS/RR2/RR/MER\_RR\_1PNMAP20060511\_095146\_000003522047\_00337\_21934\_0001.N1.L2

...

## Parfile

Import Parfile

 Retain Selected IFILE

Get Ancillary

 Show Defaults

Export Parfile

```
# watervapor=-1000
# windangle=-1000
# windspeed=-1000

# MISCELLANEOUS
# chlclark_coef=[0.789273,-3.925523,11.637764,-27.157997,27.936958,-10.398587]
# chlclark_wave=[443,490,560]
# chloc2_coef=[0.2389,-1.9369,1.7627,-3.0777,-0.1054]
# chloc2_wave=[490,560]
# chloc3_coef=[0.2521,-2.2146,1.5193,-0.7702,-0.4291]
# chloc3_wave=[443,490,560]
# chloc4_coef=[0.3255,-2.7677,2.4409,-1.1288,-0.4990]
# chloc4_wave=[443,489,510,560]
# coccolith=[1.1,0.9, 0.75, 1.85, 1.0, 1.65, 0.6, 1.15]
# ct_pt_incr=8
# kd2_coef=[0.0166,-0.8641,-1.6549,2.0112,-2.5174,-1.1035]
# kd2_wave=[490,555]
# pversion=Unspecified
# resolution=-1
# suite=OC

# CALIBRATION OPTIONS
# eval=0
# mode=0
# owmcfileroot=$OCDATAROOT/common/owmc_lut.hdf
# vcal_chl=-1.0
# vcal_opt=-1
# vcal_solz=-1.0
# xcalboxcenter=[0,0]
# xcalbox=0
# xcalpervalid=0
# xcalssmpl=1

# PARAMS NOT SUPPORTED IN GUI
# flaguse=ATMFAIL, LAND, HIGLINT, HILT, HISATZEN, STRAYLIGHT, CLDICE, COCCOLITH, LOWLW, CHLFAIL, NAVWARN, ABSAER, MAXAERITER, ATMWARN, HISOLZEN, NAV
```



Product Selector

- ▶ Radiances/Reflectances
- ▶ Derived Geophysical Parameters
- ▶ Inherent Optical Products
- ▶ Ancillary/Meteorological/Geometric Parameters
- ▶ Atmospheric Correction Intermediates
- ▶ Uncertainties/Error Estimates
- ▶ Miscellaneous

Wavelength Limiter

- Deselect All Visible
- Deselect All Near-Infrared
- Select All Infrared

- 413  443
- 490  510
- 560  620
- 665  681
- 709  754
- 762  779
- 865  885
- 900

Selected Products

Kd\_490 Rrs\_vw angstrom cdom\_index chlor\_a pic poc

Restore Defaults (Products only)

Open in SeaDAS

Main Products\* **Setting Options** Thresholds IOP Options Processing Options Ancillary Inputs Miscellaneous Calibration Options

## Product Selector

## ▼ Derived Geophysical Parameters

- alpha
- ▶  angstrom
- ▼  aot
  - aot\_413
  - aot\_443
  - aot\_490
  - aot\_510
  - aot\_560
  - aot\_620
  - aot\_665
  - aot\_681
  - aot\_709
- BT
- BT\_11
- BT\_12
- BT\_39
- BT\_40
- ▶  calcite
- ▶  cdom\_index
  - cdom\_percent\_morel
- chl1\_meris
- chl2\_meris
- ▶  chlor\_a
  - depth
  - dom\_sma
- evi

## Wavelength Limiter

Deselect All Visible

Deselect All Near-Infrared

Select All Infrared

- 413  443
- 490  510
- 560  620
- 665  681
- 709  754
- 762  779
- 865  885
- 900

## Selected Products

Kd\_490 Rrs\_vw angstrom aot\_vw cdom\_index chlor\_a pic poc

Restore Defaults (Products only)

Open in SeaDAS

Run

Cancel

Apply

?

Main Products\* Subsetting Options Thresholds IOP Options Processing Options Ancillary Inputs Miscellaneous Calibration Options

## Primary I/O Files

ifile MER\_RR\_1PNMAP20060511\_095146\_000003522047\_00337\_21934\_0001.N1

... filter:

geofile

... filter:

ofile /mnt/hgfs/BC/internal/RS\_Products/Instrument/MERIS/RP2/RR/MER\_RR\_1PNMAP20060511\_095146\_000003522047\_00337\_21934\_0001.N1.L2

## Parfile

Import Parfile

Retain Selected IFILE

Get Ancillary

Show Defaults

Export Parfile

# PRIMARY INPUT OUTPUT FIELDS

ifile=/mnt/hgfs/BC/internal/RS\_Products/Instrument/MERIS/RP2/RR/MER\_RR\_1PNMAP20060511\_095146\_000003522047\_00337\_21934\_0001.N1

ofile=/mnt/hgfs/BC/internal/RS\_Products/Instrument/MERIS/RP2/RR/MER\_RR\_1PNMAP20060511\_095146\_000003522047\_00337\_21934\_0001.N1.L2

# PRODUCTS

l2prod=Kd\_490 Rrs\_vw angstrom aot\_vw cdom\_index chlor\_a pic poc

Open in SeaDAS

Run

Cancel

Apply

?

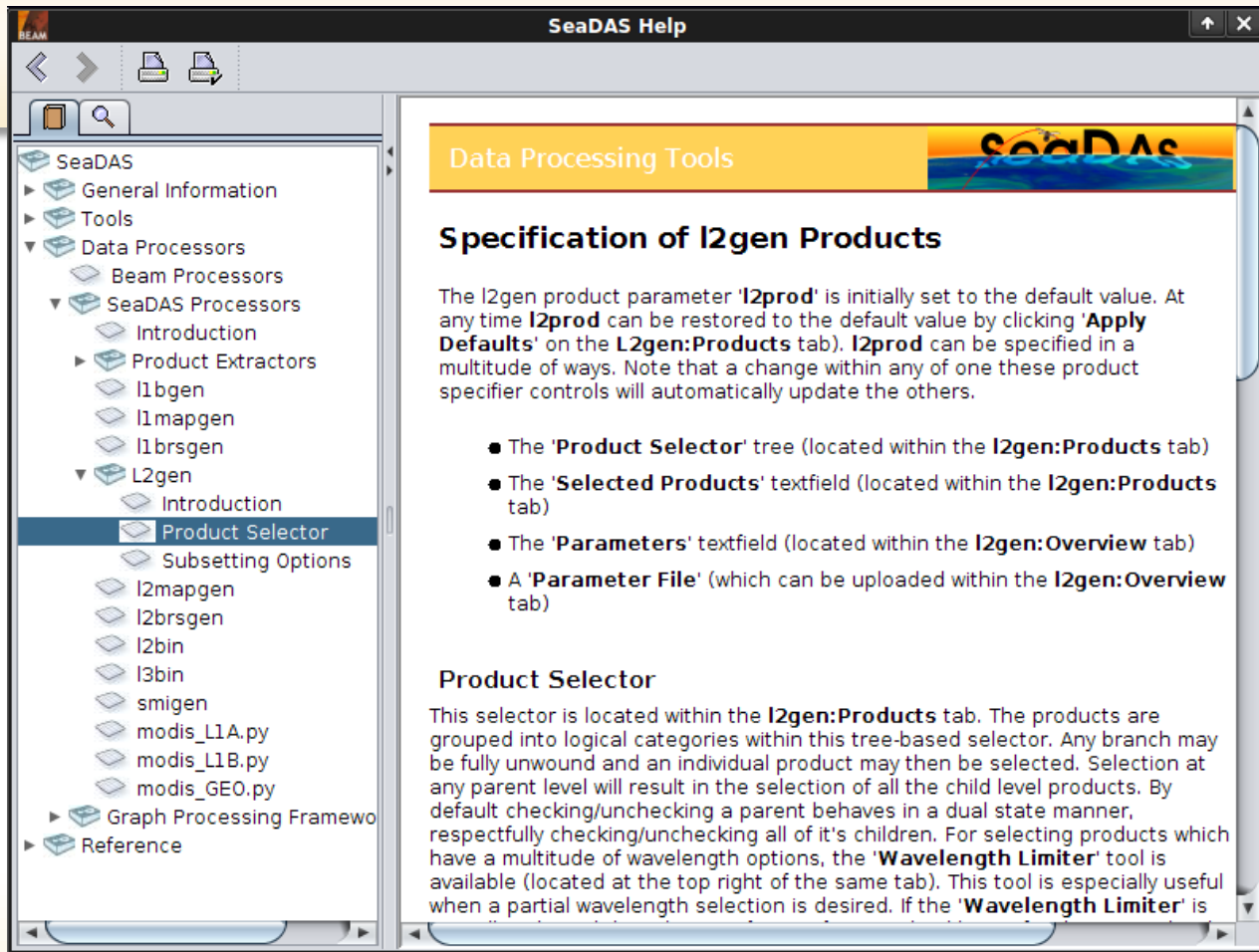
IOP Options

giop_adg_file	<input type="text" value="\$OCDATAROOT/common/adg_default.txt"/>
giop_adg_opt	1 - exponential with exponent supplied via giop_adg_s
giop_adg_s	<input type="text" value="0.0145"/>
giop_aph_file	<input type="text" value="\$OCDATAROOT/common/aph_default.txt"/> ... filter: <input type="text"/>
giop_aph_opt	2 - Bricaud et al. 1995 (chlorophyll supplied via default empirical algor ...
giop_aph_s	<input type="text" value="-1000.0"/>
giop_bbp_file	<input type="text" value="\$OCDATAROOT/common/bbp_default.txt"/> ... filter: <input type="text"/>
giop_bbp_opt	3 - power-law with exponent derived via Lee et al. (2002)
giop_bbp_s	<input type="text" value="-1000.0"/>
giop_fit_opt	1 - Levenberg-Marquardt optimization
giop_grd	<input type="text" value="[0.0949,0.0794]"/>
giop_maxiter	<input type="text" value="50"/>
giop_rrs_opt	1 - Morel f/Q
giop_wave	<input type="text" value="-1"/>
gsm_adg_s	<input type="text" value="0.02061"/>
gsm_aphs	<input type="text" value="[0.00665, 0.05582, 0.02055, 0.01910, 0.01015, 0.01424]"/>
gsm_aphw	<input type="text" value="[412.0, 443.0, 490.0, 510.0, 555.0, 670.0]"/>
gsm_bbp_s	<input type="text" value="1.03373"/>
gsm_fit	0 - Amoeba
gsm_opt	0 - default coefficients
iop_opt	0 - None (products requiring a or bb will fail)
qaa_adg_s	<input type="text" value="0.015"/>
naa_wave	<input type="text" value="1.443.490.560.6651"/>

Restore Defaults (IOP Options only)

Open in SeaDAS





NOT YET COMPLETED IN BETA RELEASE!

## Primary I/O Files

ifile  ... filter:

geofile  ... filter:

ofile  ...

## Parfile

Import Parfile

 Retain Selected IFILE

Get Ancillary

 Show Defaults

Export Parfile

```
# PRIMARY INPUT OUTPUT FIELDS
ifile=/mnt/hgfs/BC/internal/RS_Products/Instrument/MERIS/RP2/RR/MER_RR_1PNMAP20060511_095146_000003522047_00337_21934_0001.N1
ofile=/mnt/hgfs/BC/internal/RS_Products/Instrument/MERIS/RP2/RR/MER_RR_1PNMAP20060511_095146_000003522047_00337_21934_0001.N1.L2
```

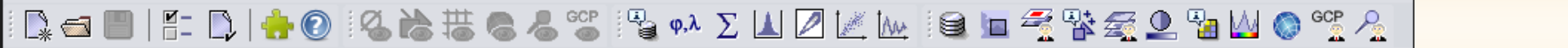
 Open in SeaDAS

Run

Cancel

Apply

?



Products View

- [1] MER\_RR\_1PNMAP2006051
- [2] MER\_RR\_1PNMAP2006051
  - Metadata
  - Flag codings
  - Bands
    - aot
    - angstrom
    - Rrs
      - chlor\_a
    - Kd
    - pic
    - poc
    - cdom\_index
    - l2\_flags
    - latitude
    - longitude

Products Pixel Info

Colour Manipulation

Apply

No image view selected.

I2gen

Main Products\* Subsetting Options Thresholds IOP Options Processing Options Ancillary Inputs Miscellaneous Calibration Options

IOP Options

giop\_adg\_file \$OCDATAROOT/common/adg\_default.txt

giop\_adg\_opt 1 - exponential with exponent supplied via giop\_adg\_s

giop\_adg\_s 0.0145

giop\_aph\_file \$OCDATAROOT/common/aph\_default.txt filter:

giop\_aph\_opt 2 - Bricaud et al. 1995 (chlorophyll supplied via default empirical algor ...

giop\_aph\_s -1000.0

giop\_bbp\_file \$OCDATAROOT/common/bbp\_default.txt filter:

giop\_bbp\_opt 3 - power-law with exponent derived via Lee et al. (2002)

giop\_bbp\_s -1000.0

giop\_fit\_opt 1 - Levenberg-Marquardt optimization

giop\_grd [0.0949,0.0794]

giop\_maxiter 50

giop\_rrs\_opt 1 - Morel f/Q

giop\_wave -1

gsm\_adg\_s 0.02061

gsm\_aphs [0.00665, 0.05582, 0.02055, 0.01910, 0.01015, 0.01424]

gsm\_aphw [412.0, 443.0, 490.0, 510.0, 555.0, 670.0]

gsm\_bbp\_s 1.03373

gsm\_fit 0 - Amoeba

gsm\_opt 0 - default coefficients

iop\_opt 0 - None (products requiring a or bb will fail)

qaa\_adg\_s 0.015

qaa\_wave 0.443,490,560,6651

Restore Defaults (IOP Options only)

Open in SeaDAS

Run Cancel Apply ?



Products View

- [1] MER\_RR\_1PNMAP2006051
- [2] MER\_RR\_1PNMAP2006051
  - Metadata
  - Flag codings
  - Bands
    - aot
    - angstrom
    - Rrs
    - chlor\_a**
    - Kd
    - pic
    - poc
    - cdom\_index
    - l2\_flags
    - latitude
    - longitude

Products Pixel Info

Colour Manipulation - [2...]

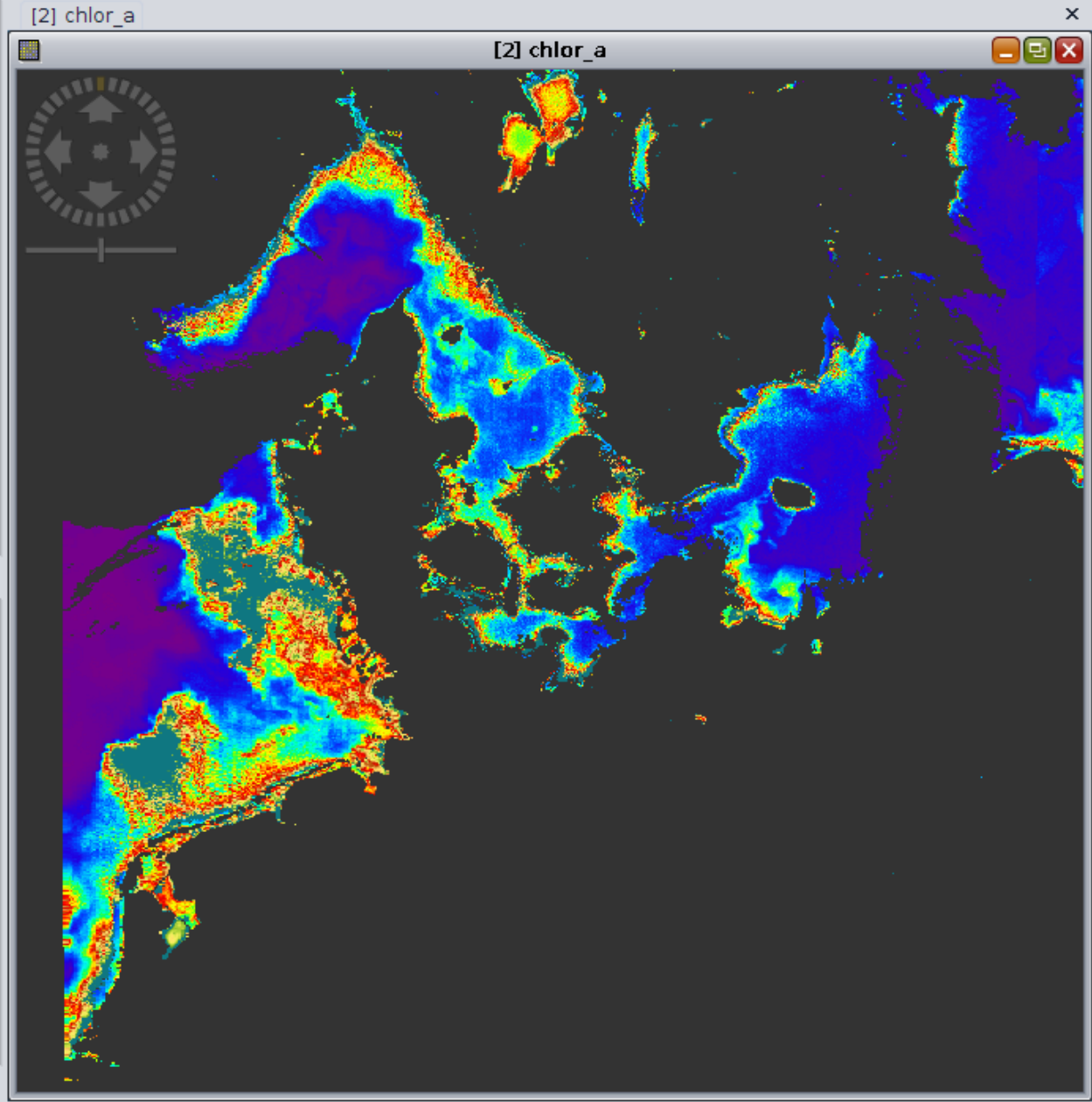
Editor:  Basic  Slide

Name: chlor\_a  
Unit: mg m<sup>-3</sup>  
Min: 0.213  
Max: 1000.0  
**Rough statistics!**

95% 100%  
Log<sub>10</sub>

More Options

Navigation Colour Man..





---

# BEAM IN BATCH MODE

# Options for Batch Mode Usage

1. Use BEAM's command-line tools
  - from a command-line shell
  - from shell scripts
  - from Python, IDL, MATLAB scripts
2. Use the BEAM Java libraries to directly call BEAM functions
  - from your **Java** program
    - *BEAM Programming Tutorial, Thursday, 15:00-17:00*
  - from your **C** or **Python** program
    - *In progress, 1st version expected Spring 2013*
    - *We are happy to consider your requirements!*
3. Use the VISAT Scripting Console (experimental)
  - ▣ Use BEAM libraries within VISAT to automate work
  - ▣ **Python** (Jython) and **JavaScript**, see VISAT Help

# BEAM Command-Line Tools

- Have a look into the  $\${BEAM-HOME}/bin$  directory
- **gpt** –Used to execute various “BEAM operators” and chains of operators.
- **pconvert** – Used to convert product files into other data and images formats (will become a gpt operator)
- **binning**
- **meris-smac** – Envisat MERIS smile correction
- **meris-cloud** – Envisat MERIS cloud screening
- **flhmci** – Envisat MERIS/AATSR FLH/MCI processors
- **aatsr-sst** – ATSR/AATSR SST processor
- **mosaic** – deprecated, use **gpt Reproject**
- **mapproj** – deprecated, use **gpt Mosaic**

# BEAM gpt

- Most important BEAM batch-mode tool
- Usage
  - **gpt <op> | <graph-file> [options] [<source-file-1> <source-file-2> ...]**
- Which operators are available?
  - **gpt -h**
  - Note that list of operators may vary depending on the installed BEAM plug-ins



# Available GPT Operators

C:\Windows\system32\cmd.exe

```
Operators:
Aatsr.SST          Computes sea surface temperature (SST) from (A
BandMaths         Create a product with one or more bands using
Collocate         Collocates two products based on their geo-coo
EMClusterAnalysis Performs an expectation-maximization (EM) clus
FlhMci            Computes fluorescence line height (FLH) or max
KMeansClusterAnalysis Performs a K-Means cluster analysis.
LandWaterMask     Operator creating a target product with a sing
ver world map (above 60 north) and therefore very accurate.
Merge            Allows copying raster data from any number of
Meris.Brr        Compute the BRR of a MERIS L1b product.
Meris.Case2Regional Performs IOP retrieval on L1b MERIS products,
Meris.CorrectRadiometry Performs radiometric corrections on MERIS L1b
Meris.GlintCorrection MERIS atmospheric correction using a neural ne
Meris.Lakes      Performs IOP retrieval for eutrophic and boreal
Meris.N1Patcher  Copies an existing N1 file and replaces the da
Mosaic           Creates a mosaic out of a set of source produc
PixEx           Extracts pixels from given locations and sourc
Read            Reads a product from disk.
Reproject       Reprojection of a source product to a target (
Subset          Create a spatial and/or spectral subset of a c
Unmix           Performs a linear spectral unmixing.
Write           Writes a data product to a file.
glint.Flint     Flint Processor.
icol.EnhancedThematicMapper Performs a correction of the adjacency effect
icol.Meris      Performs a correction of the adjacency effect
icol.ThematicMapper Performs a correction of the adjacency effect
recalibrateAATSRReflectances Recalibrate AATSR Reflectances.
```

C:\Program Files\beam-4.10.3\bin>\_

# BEAM gpt Graph XML Example 2

- Two operator chain: (1) IOP retrieval, (2) subset

```
<graph id="Case2RGraph">
  <version>1.0</version>
  <node id="case2r">
    <operator>Meris.Case2Regional</operator>
    <sources>
      <source>${source}</source>
    </sources>
    <parameters>
      <doSmileCorrection>>false</doSmileCorrection>
      <outputReflecAs>IRRADIANCE_REFLECTANCES</outputReflecAs>
      <outputNormReflec>>true</outputNormReflec>
      <cloudIceExpression>toa_reflec_14 > 0.025</cloudIceExpression>
    </parameters>
  </node>

  <node id="subsetNode">
    <operator>Subset</operator>
    <sources>
      <source>case2r</source>
    </sources>
    <parameters>
      <geoRegion>POLYGON((119.0 36.0, 125.0 35.0, 122.0 30.0, 117.0 30.0, 119.0 36.0))</geoRegion>
      <copyMetadata>>true</copyMetadata>
    </parameters>
  </node>
</graph>
```