

A composite image showing Earth from space with various orbital paths and a satellite, transitioning into a detailed satellite map of land and water bodies on the right.

Copernicus supporting the Marine Strategy Framework Directive

Copernicus for Local and Regional Authorities

Copernicus
Europe's eyes on Earth

Space



www.copernicus.eu



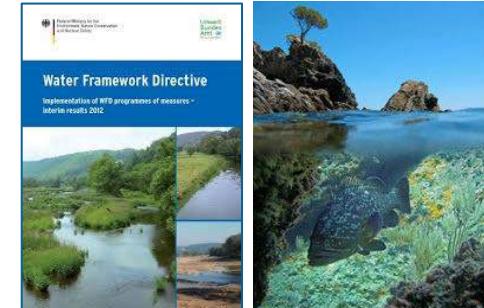
European Directives on coastal areas

- ✓ Water Framework Directive (WFD)
- ✓ Marine Strategy Framework Directive (MSFD)
- ✓ Recommendation on Integrated Coastal Zone Management
- ✓ Bathing Water, Habitats (Natura2000), ...



WFD: Good Status for all EU surface and groundwaters by 2015.
2027 final deadline for meeting objectives

MSFD: Good Environmental Status of EU marine waters by 2020





Evaluation of the water/environmental good status by evaluating/monitoring:

- environmental indicators in coastal waters, up to 1 n.m. (WFD)
- 11 status descriptors on marine waters up to 12 n.m. (MSFD)

Identified gaps after the first assessment/monitoring cycles:

- ✓ Very large marine areas to monitor
- ✓ In situ measurement/sampling costly and time/space limited
- ✓ Importance of cooperation between bordering Member States



MSFD implementation into national laws →

- **Appointing of a national referent**
- **Definition of a national monitoring strategy**
- **Bodies responsible for performing at sea monitoring**

Representative example: Italian implementation

- National referent/coordination: Environment Ministry
- EU reporting and scientific guidance: ISPRA
(National Institute for Environmental Protection and Research)
- ISPRA defined practices and parameters to be measured
- Monitoring mainly by regional bodies: ARPA
(Regional Agency for the Environmental Prevention and Protection)



Remote sensing of Water Quality

20 years of water quality measurements from
Earth Observation (EO)



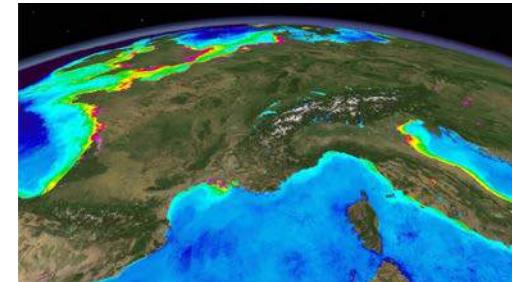
Large area coverage



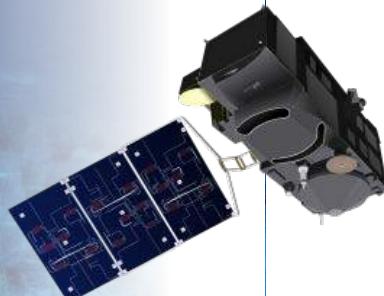
High temporal frequency



Scientific community recognizes its value for
complementing in situ measurements



Sensors currently used:



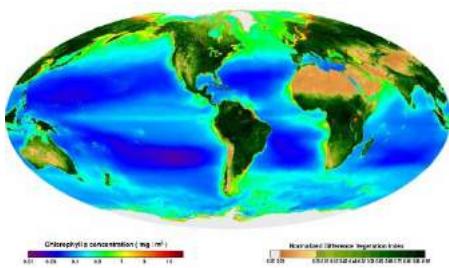
Sentinel 3



Modis



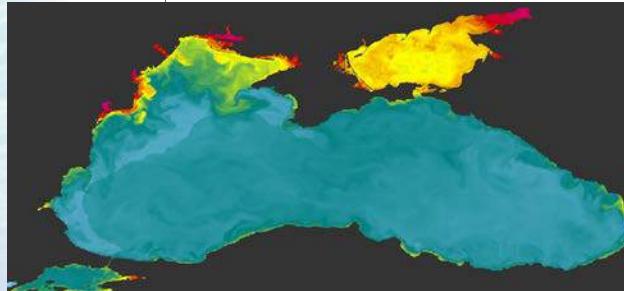
Viirs



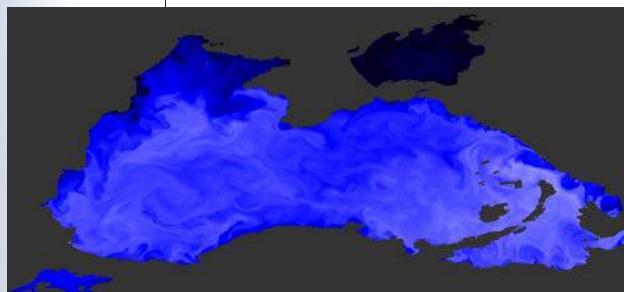


Useful data

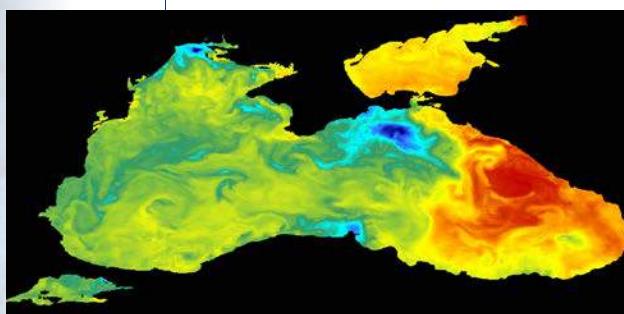
Marine
Monitoring



Chlorophyll-a concentration



Water transparency



Sea surface temperature



D E M O

Marine
Monitoring

DEMO

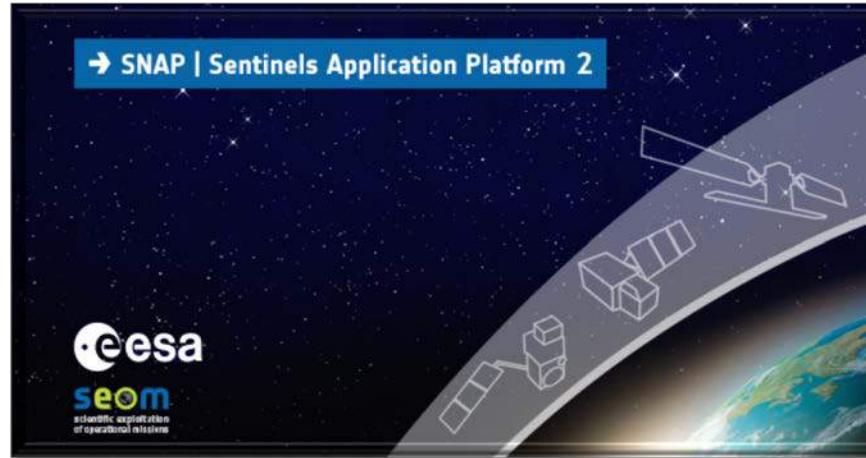


D E M O

Marine
Monitoring

Software used:

ESA -SNAP



Demonstration area:

Black Sea



DEMO

Marine
Monitoring

Data used:

- Chlorophyll concentration
- Sea Surface Temperature
- Diffuse absorption coefficient (Kd490)

The screenshot shows the homepage of the Copernicus Marine Environment Monitoring Service. At the top, there is the European Commission logo and the service's name "COPERNICUS MARINE ENVIRONMENT MONITORING SERVICE" along with the tagline "Providing PRODUCTS and SERVICES for all marine applications". Below the header, there is a navigation bar with links to "ABOUT US", "MARKETS & BENEFITS", "NEWS", "SCIENCE & MONITORING", "TRAINING & EDUCATION", and "SERVICES PORTFOLIO". A large central banner features the text "ACCESS YOUR OCEAN INFORMATION" and a "GETTING STARTED" button. To the right, there is a sidebar titled "SHORT-CUT TO SERVICES" with options like "REGISTER NOW!", "SCIENTIFIC QUALITY", "ONLINE TUTORIALS", and "COLLABORATIVE FORUM". Another section titled "LATEST NEWS FLASH" shows a news item about CMEMS being down since April 9, 2018. At the bottom right of the sidebar, there is a "ALL NEWS FLASH" button.

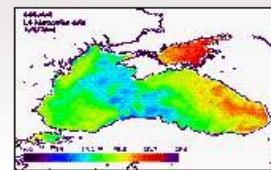


Home > Services portfolio > Access to products

BLACK SEA HIGH RESOLUTION AND ULTRA HIGH RESOLUTION SEA SURFACE TEMPERATURE ANALYSIS

Metadata provided by CMEMS

Credits: E.U. Copernicus Marine Service Information



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CART](#)



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PRODUCT](#)



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[SERVICES](#)

[NEWS FLASH](#)

PRODUCT IDENTIFIER

SST_BS_SST_L4_NRT_OBSERVATIONS_010_006

OVERVIEW

Short description:

For the Black Sea - The CNR BS Sea Surface Temperature provides daily gap-free maps (L4) at high (HR 0.0625°) and ultra-high (UHR 0.01°) spatial resolution over the Black Sea. The data are obtained from infra-red measurements collected by satellite radiometers and statistical interpolation.

Detailed description:

Remotely-sensed L4 Sea Surface Temperature (SST) datasets are operationally produced and distributed in near-real time by the Consiglio Nazionale delle Ricerche - Gruppo di Oceanografia da Satellite (CNR-GOS). These SST products are based on the night-time images collected by the infrared sensors mounted on different satellite platforms, and

DATA ACCESS

MY CART

OCEANCOLOUR_BS_OPT
ICS_L3_NRT_OBSERVATI
ONS_009_042REPORT
ISSUE

BACK TO SEARCH

Black Sea Remote Sensing Reflectances and Attenuation Coefficient at 490nm from Multi Satellite observations

DATASET SELECTED

DATASET-OC-BS-OPT-MULTI-L3-KD490_1KM_DAILY-RT-V02

DATASET-OC-BS-OPT-MULTI-L3-KD490_1KM_DAILY-RT-V02

DATA ACCESS
OPTION

DATASET FILTERS

GEOGRAPHICAL AREA

48.00



26.5

42.00

40



Intersection between product coverage and area defined by user.



Product coverage.

Reset geographical selection

TIME RANGE

(Default = Last date available)

search :

START DATE 2017-08-01

search :

END DATE 2017-08-07

DATA ACCESS

MY CART



OCEANCOLOUR_BS_OPTI
CS_L3_NRT_OBSERVATION
S_009_042

OCEANCOLOUR_BS_CHL
_L4_NRT_OBSERVATION
S_009_045

Black Sea Monthly, 8-Days and Daily Interpolated Surface Chlorophyll Concentration from Multi
Satellite observations

DATASET SELECTED

DATASET-OC-BS-CHL-MULTI-L4-INTERP_1KM_DAILY-RT-V02

DATASET-OC-BS-CHL-MULTI-L4-INTERP_1KM_DAILY-RT-V02

DATA ACCESS
OPTION

DATASET FILTERS

GEOGRAPHICAL AREA

48.00°



Intersection between product coverage and area defined by user.

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Reset geographical selection

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search :

START DATE 2017-08-01

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Product Explorer x Pixel Info

Products - Properties x



Layer Manager

Mask Manager

Products

<No Properties>

Navigation Colour Mani... x Uncertainty ... World View Layer Editor

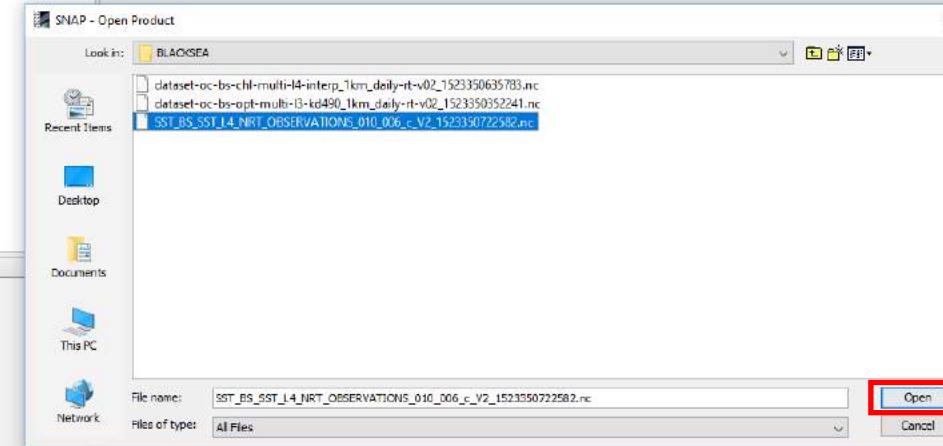


This tool window is used to manipulate the
colouring of images shown in an image view.
Right now, there is no selected image view.

Products



Product Explorer X Pixel Info



This tool window is used to manipulate the
colouring of images shown in an image view.
Right now, there is no selected image view.

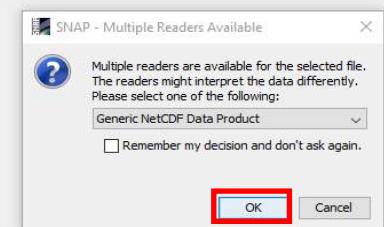


Product Explorer

Pixel Info

Navigation Colour Mani... Uncertainty ... World View Layer Editor

This tool window is used to manipulate the colouring of images shown in an image view.
Right now, there is no selected image view.



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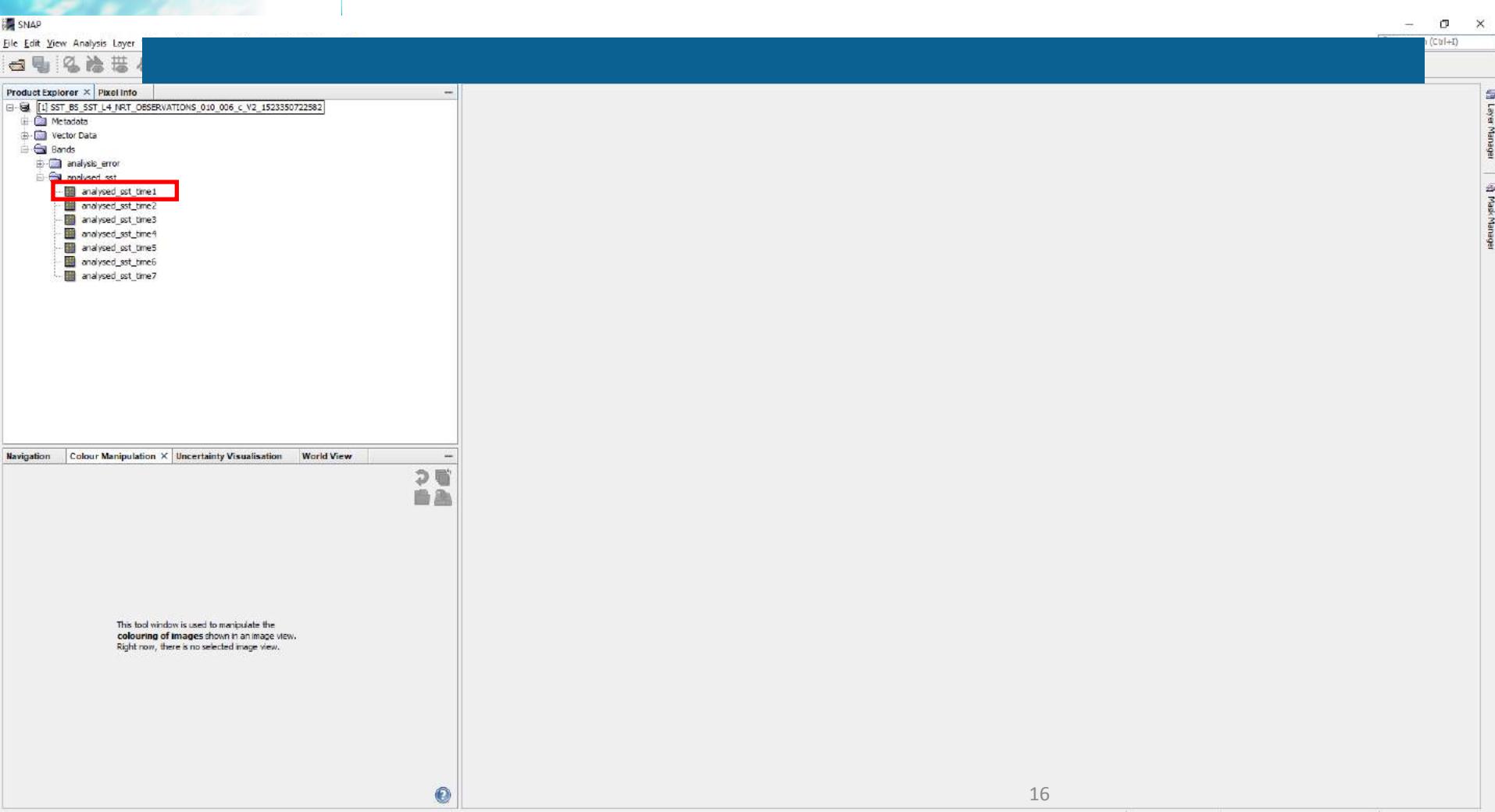
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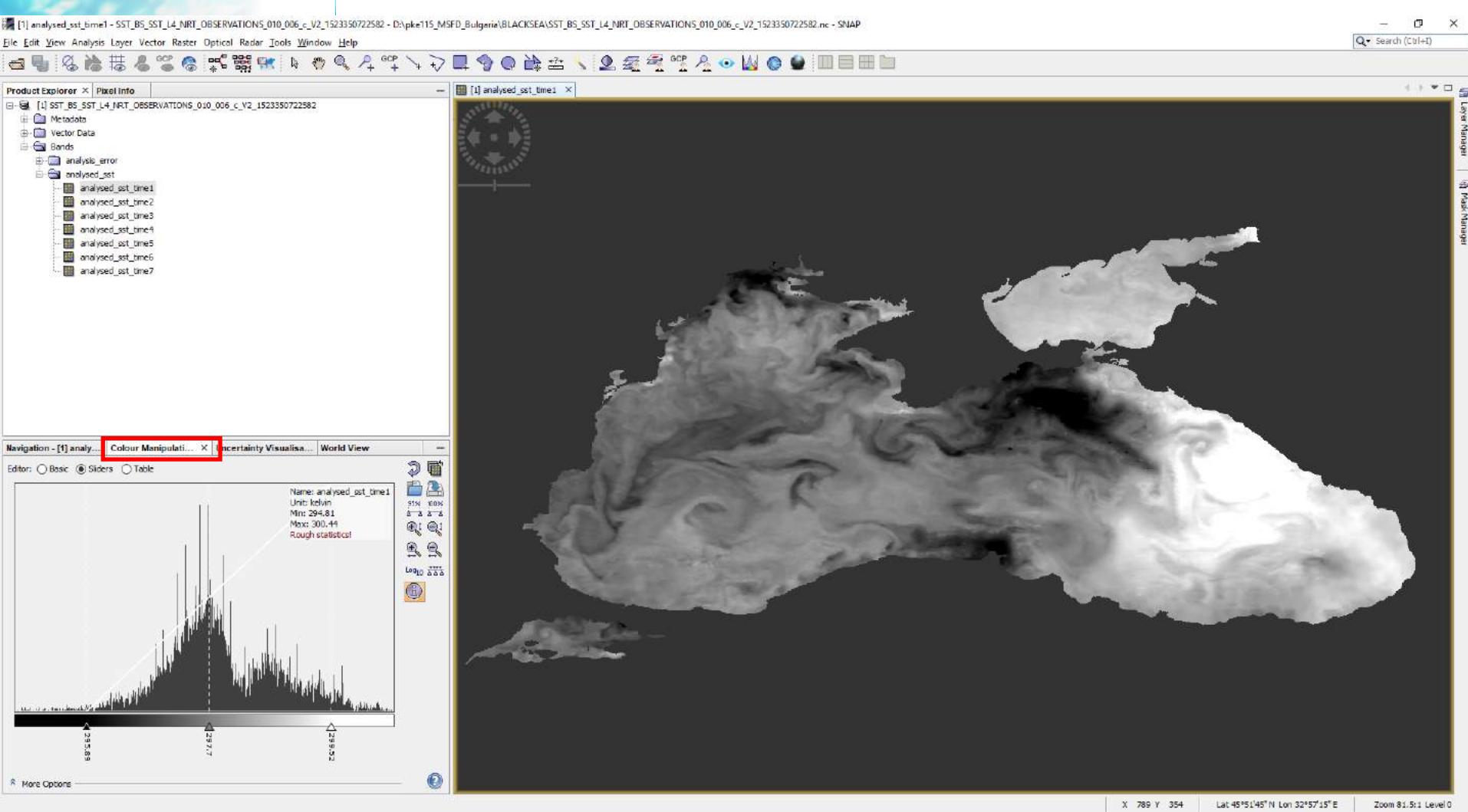
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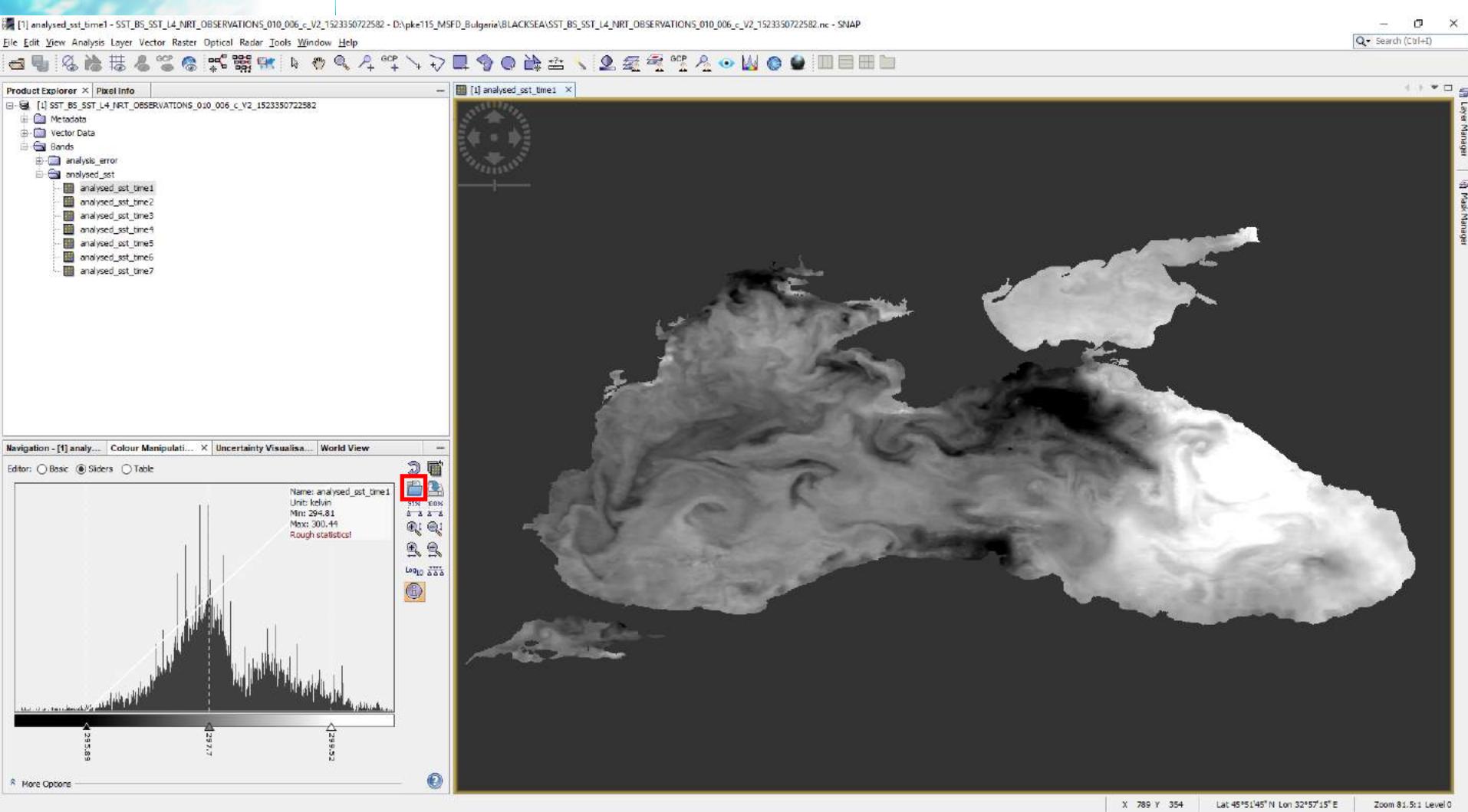
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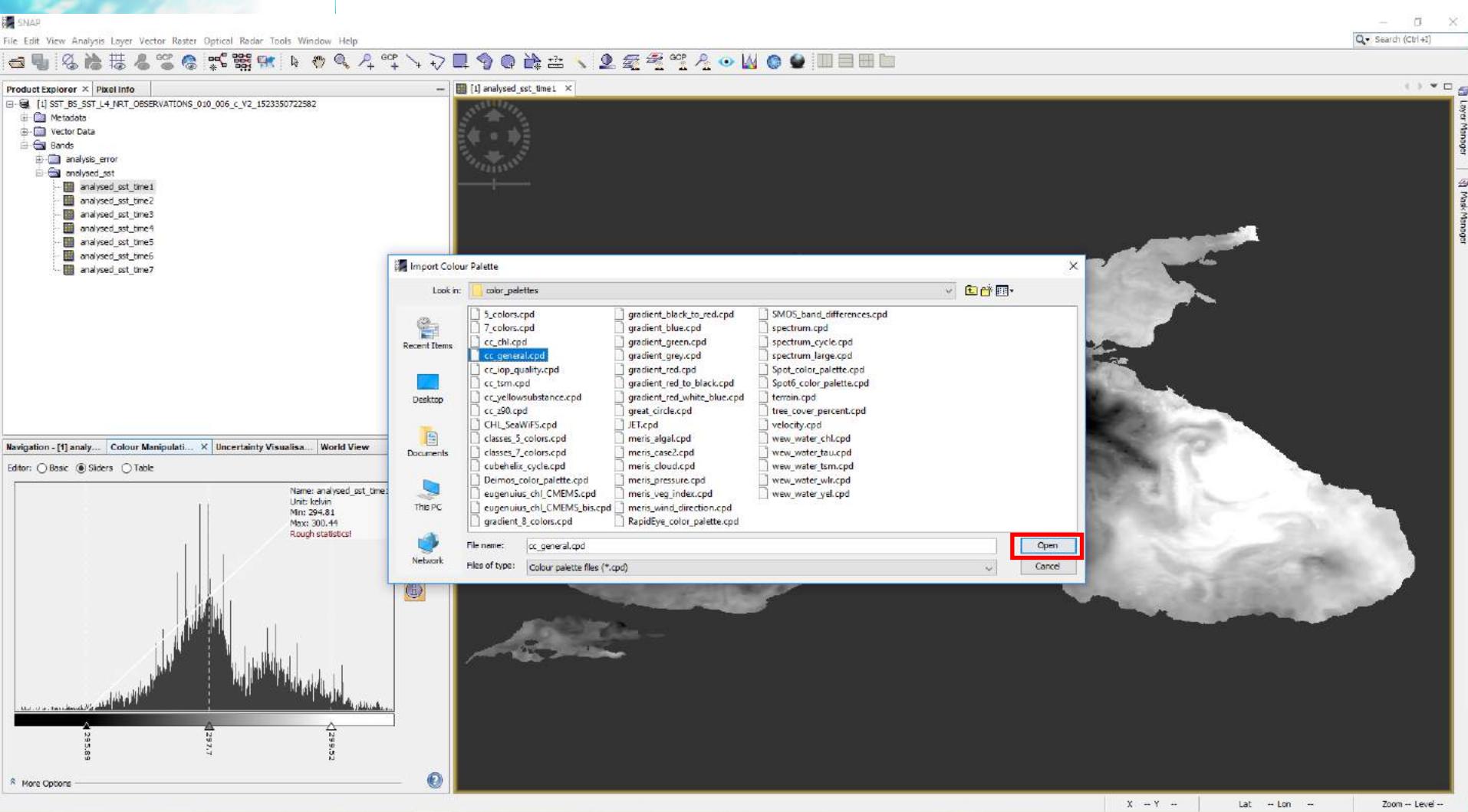
Mask Manager

X -- Y -- Lat -- Lon -- Zoom -- Level --







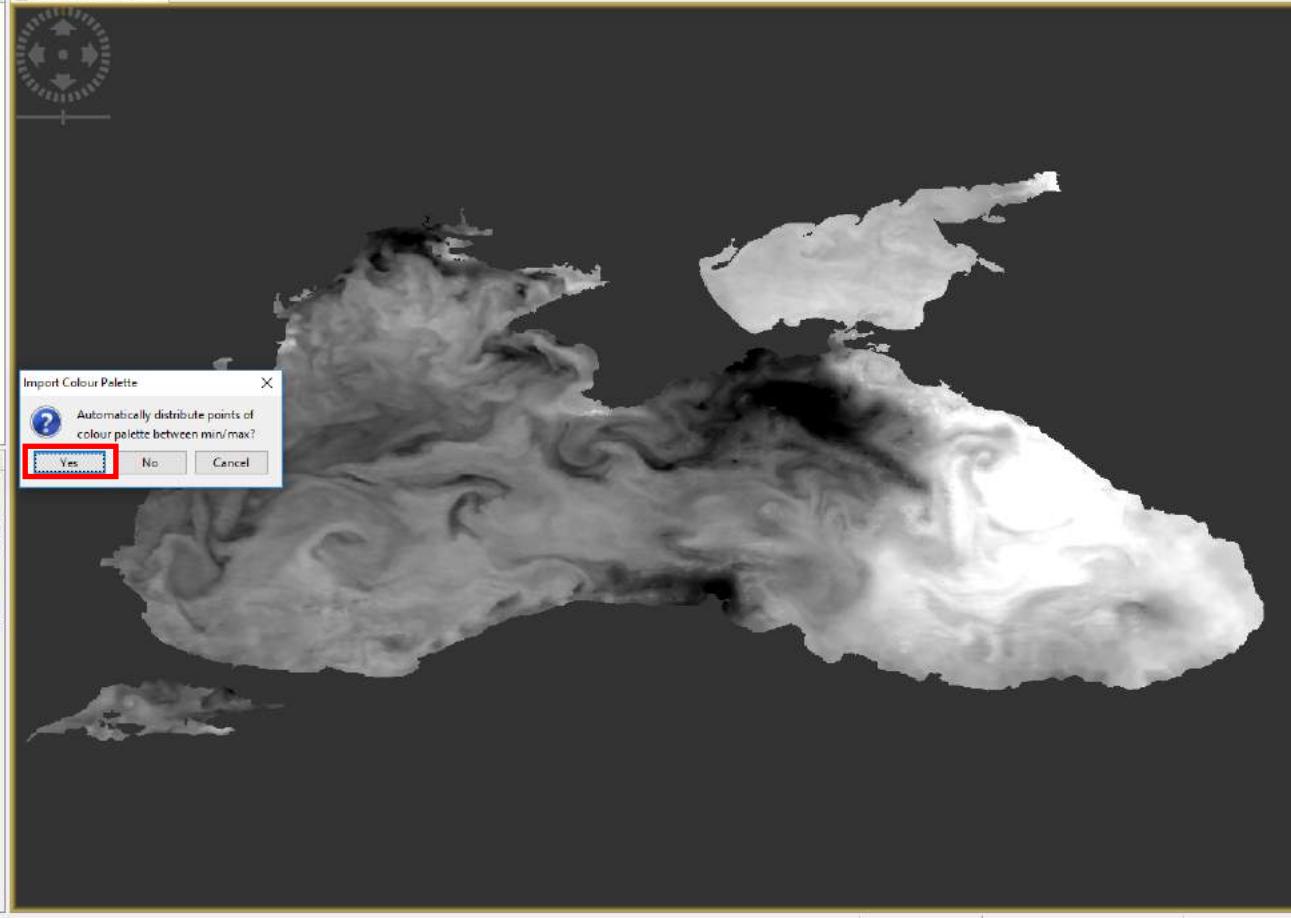


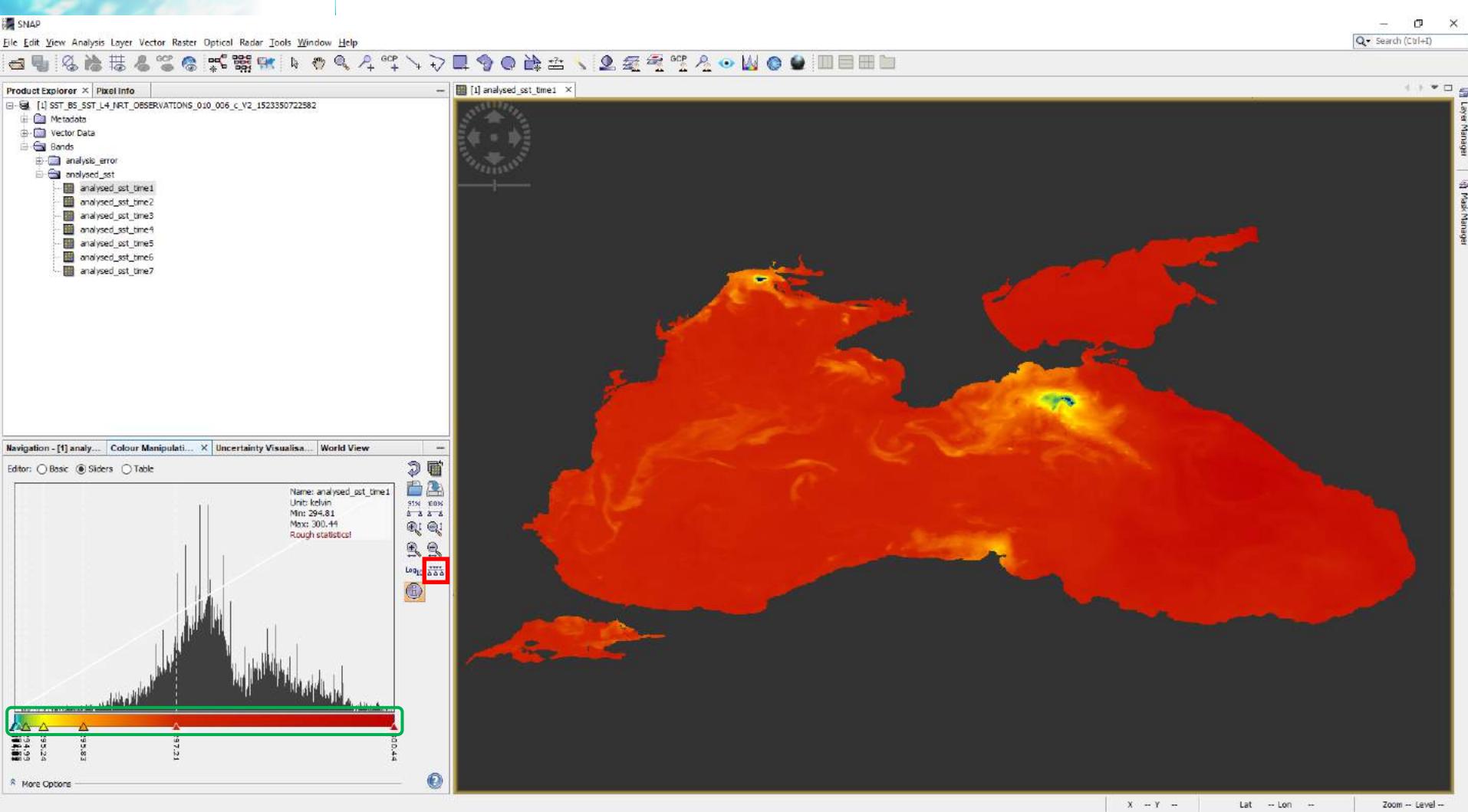


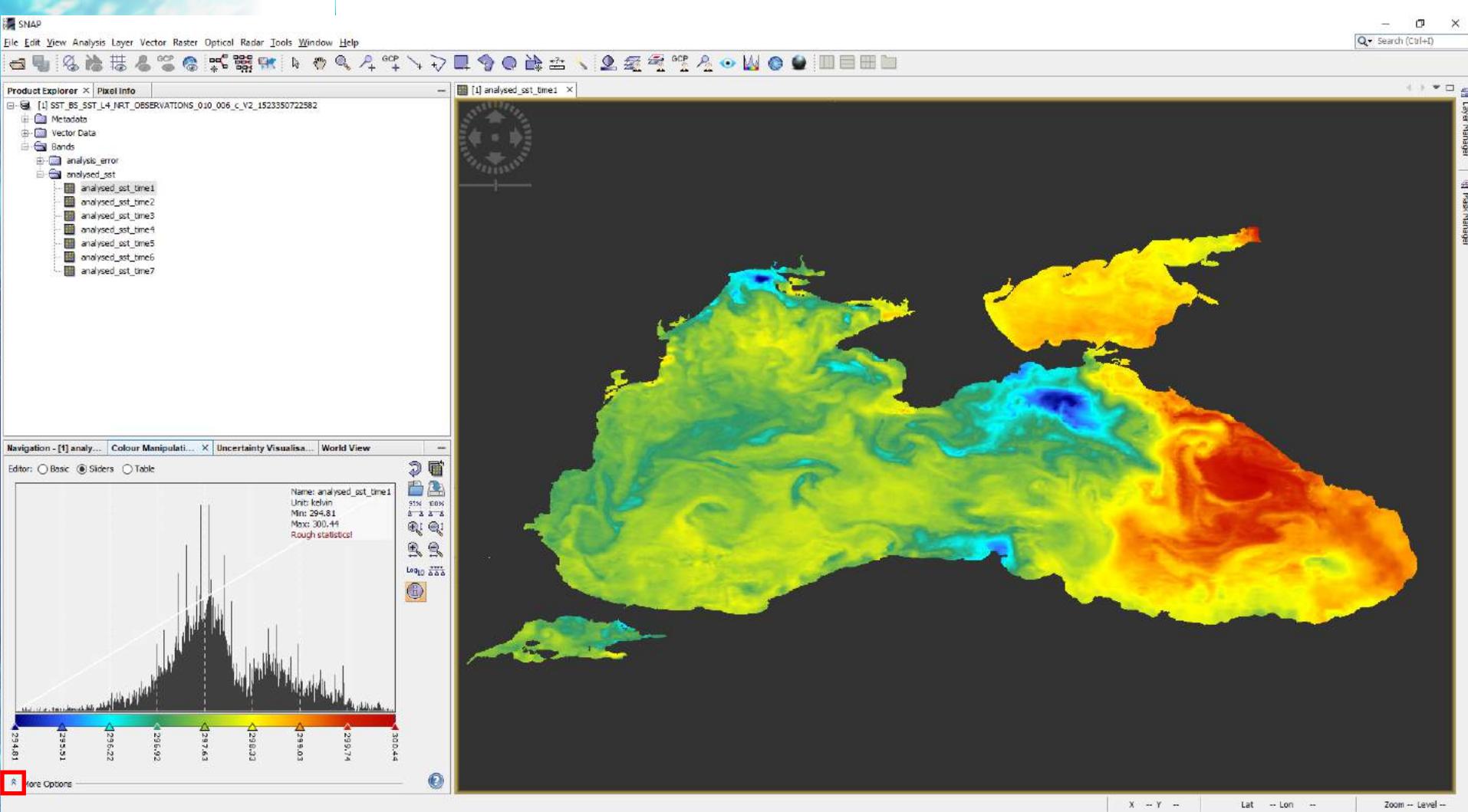
Product Explorer X Pixel Info

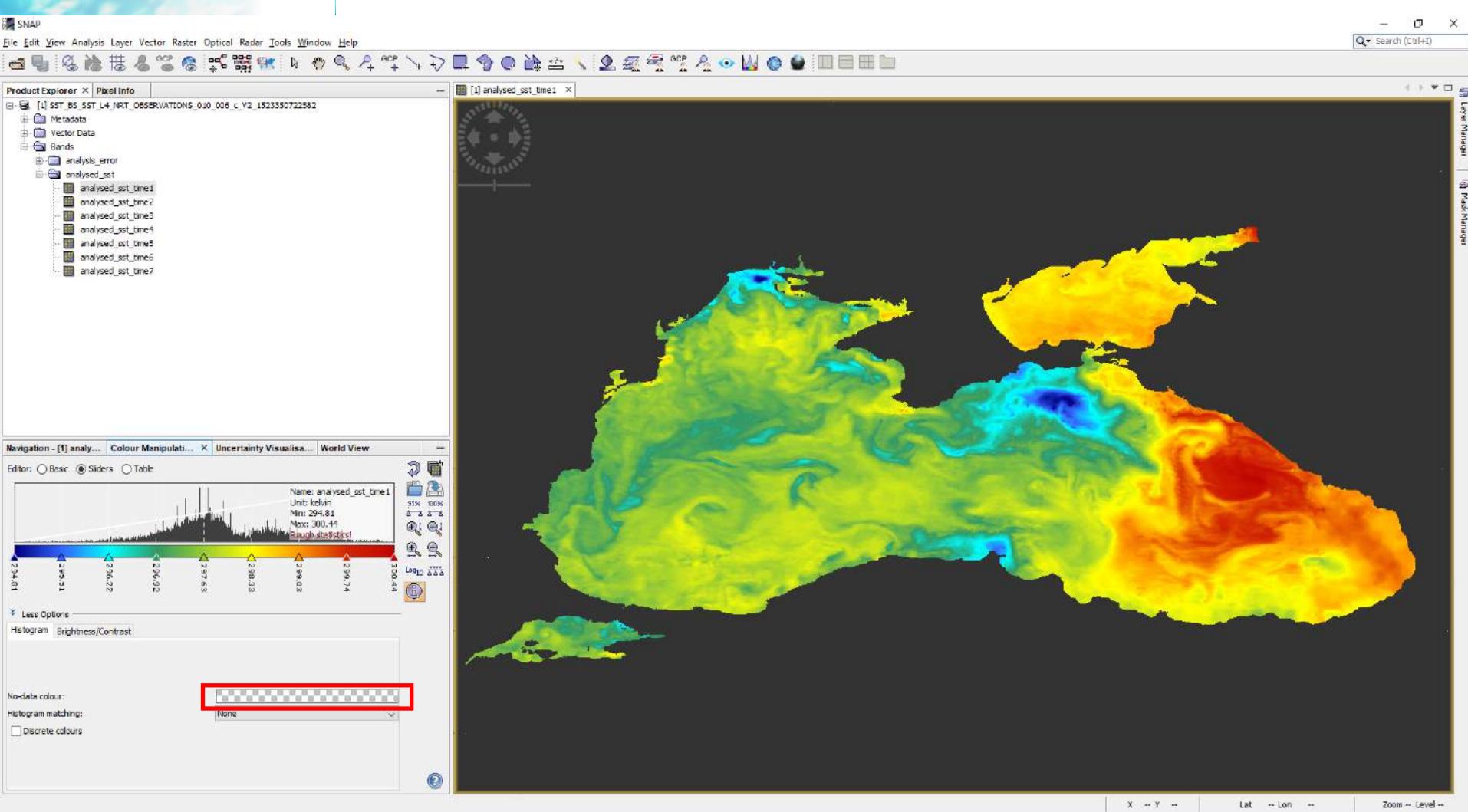
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 - Vector Data
 - Bands
 - analysis_error
 - analysed_sst
 - analysed_sst_time1
 - analysed_sst_time2
 - analysed_sst_time3
 - analysed_sst_time4
 - analysed_sst_time5
 - analysed_sst_time6
 - analysed_sst_time7

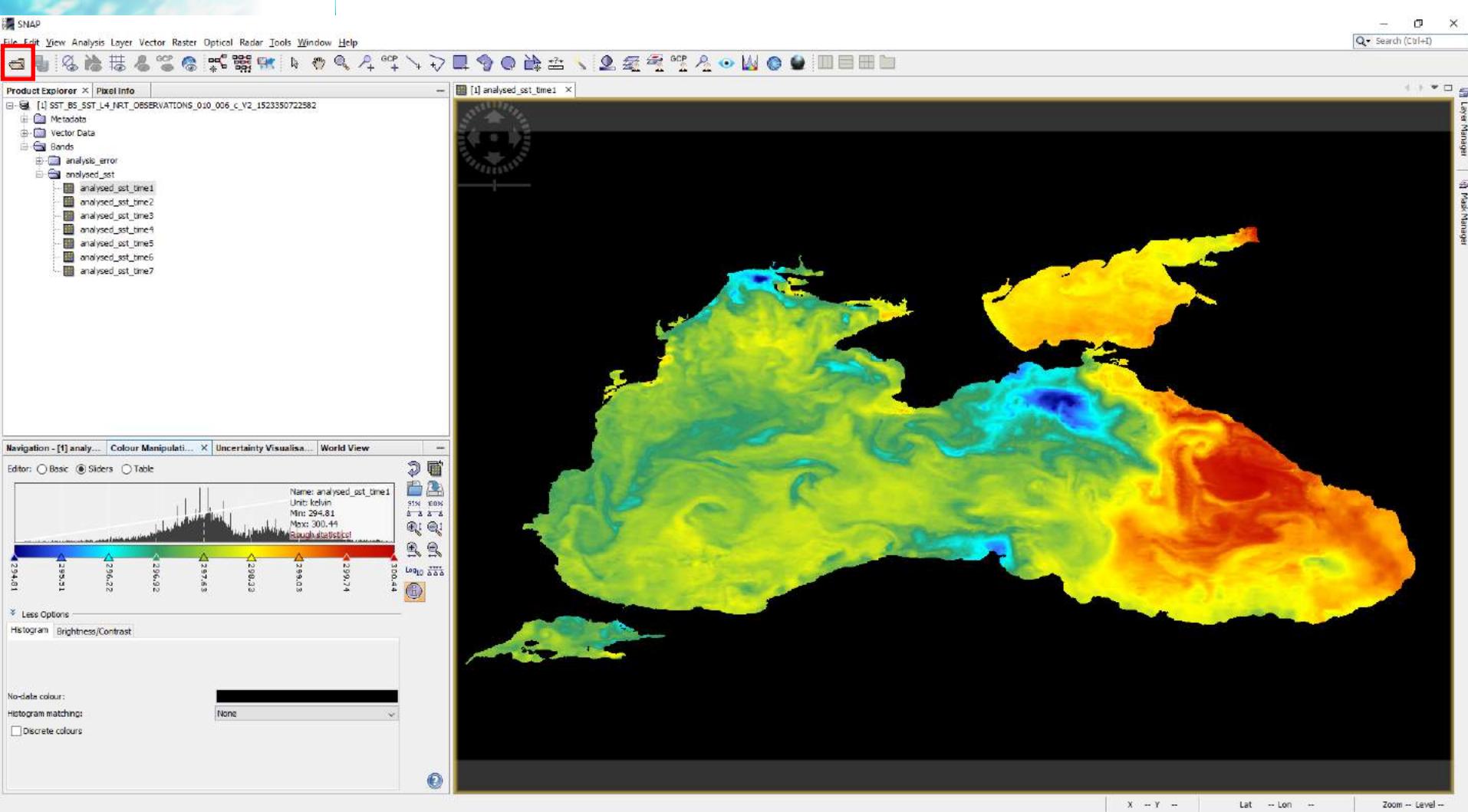
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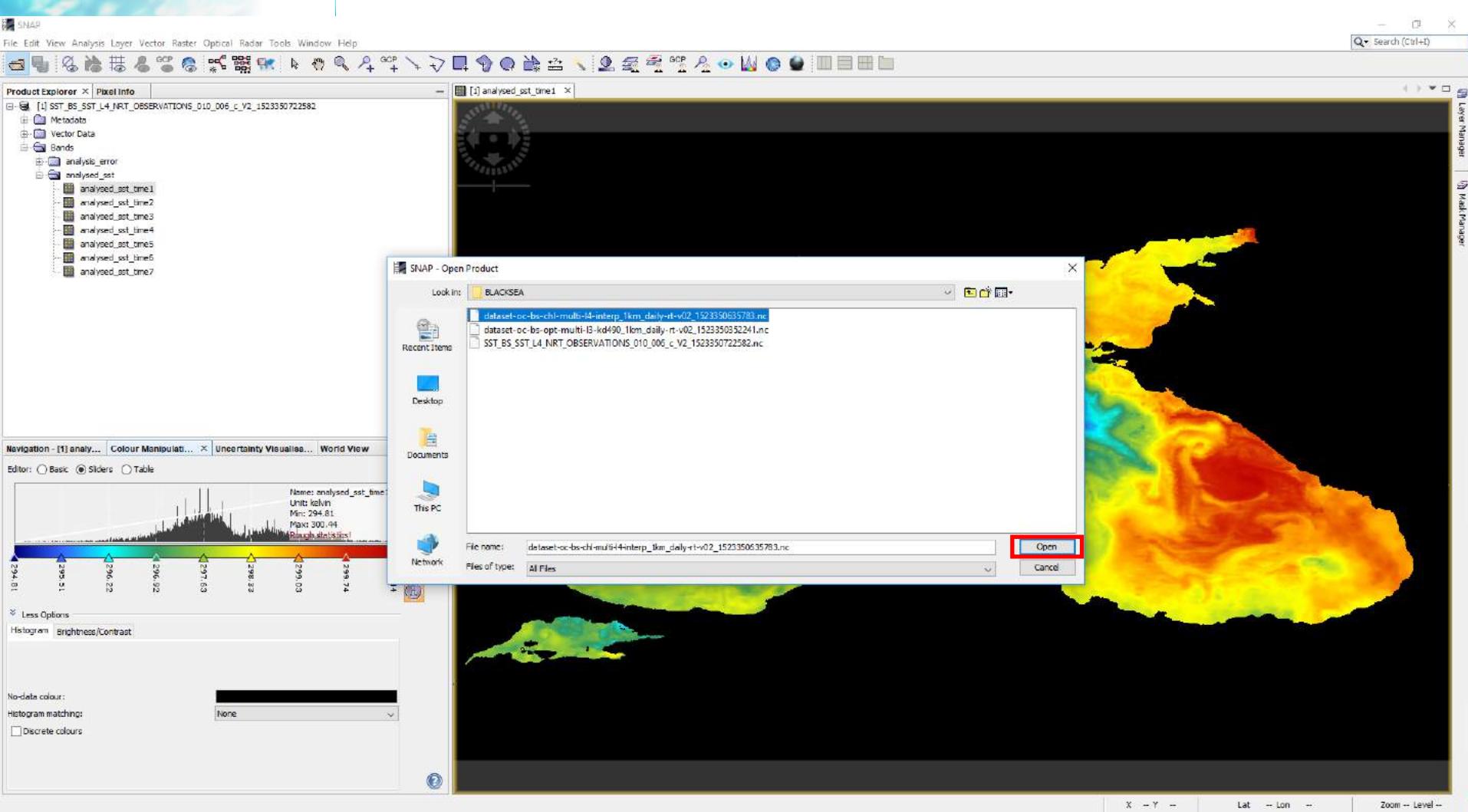


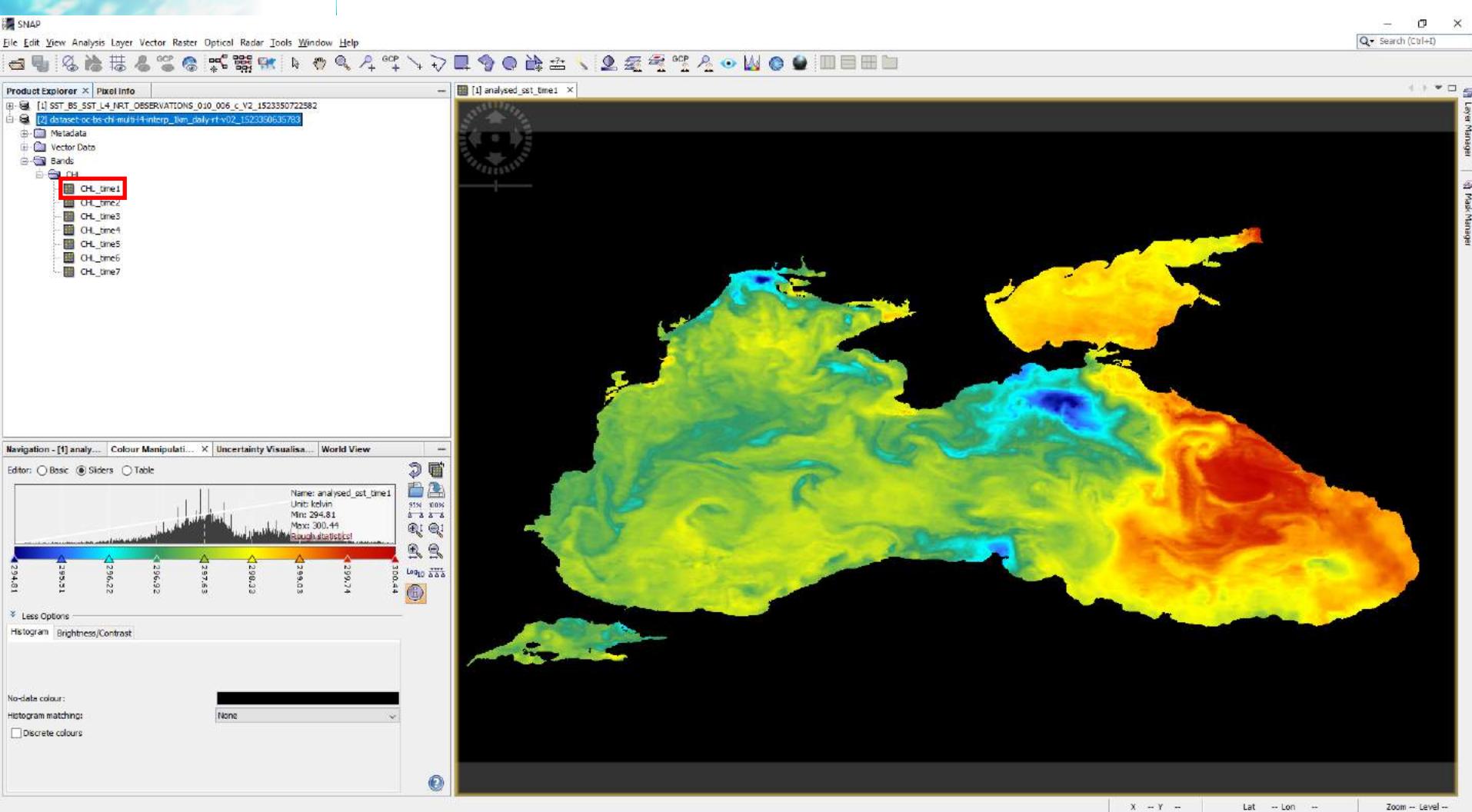


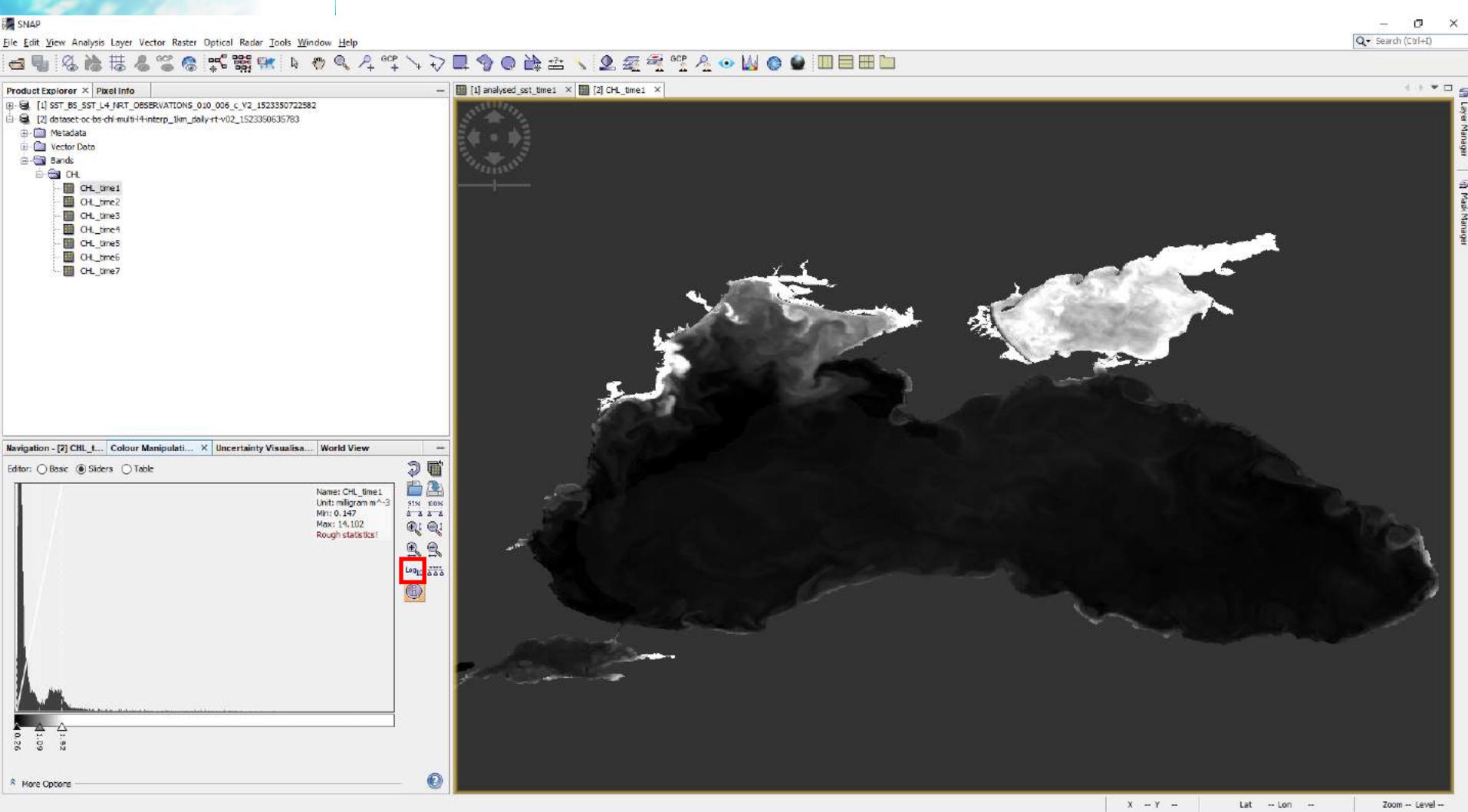


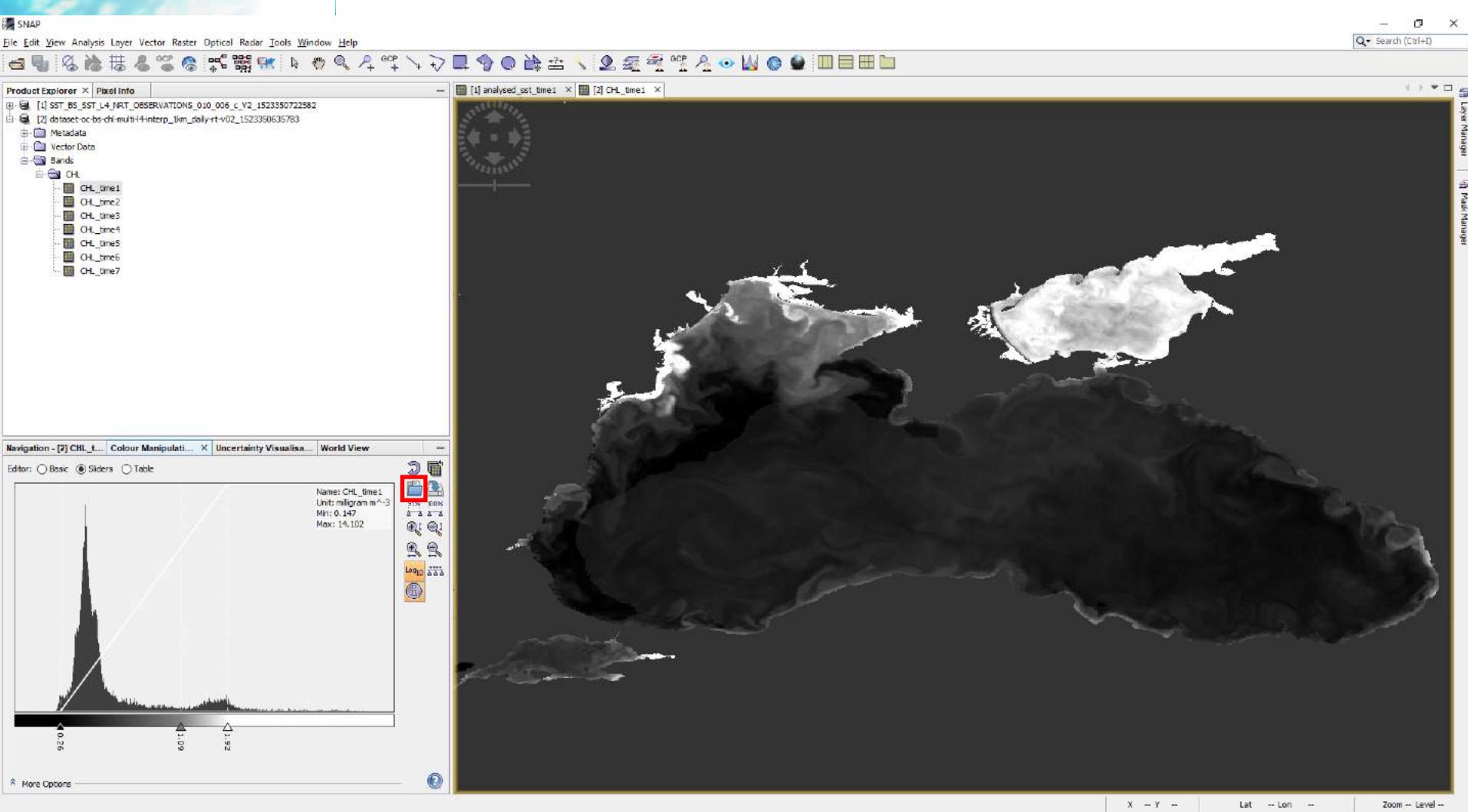


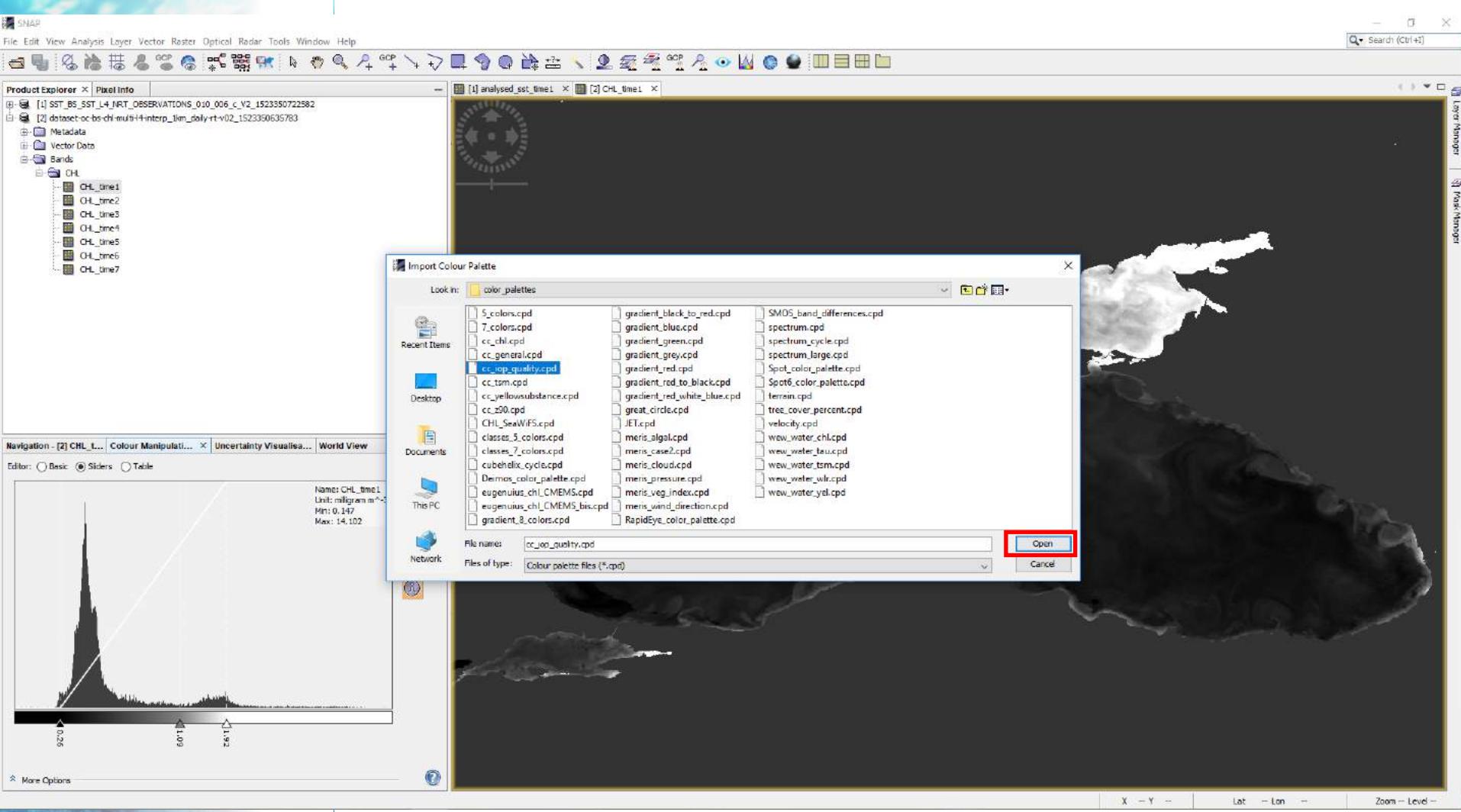


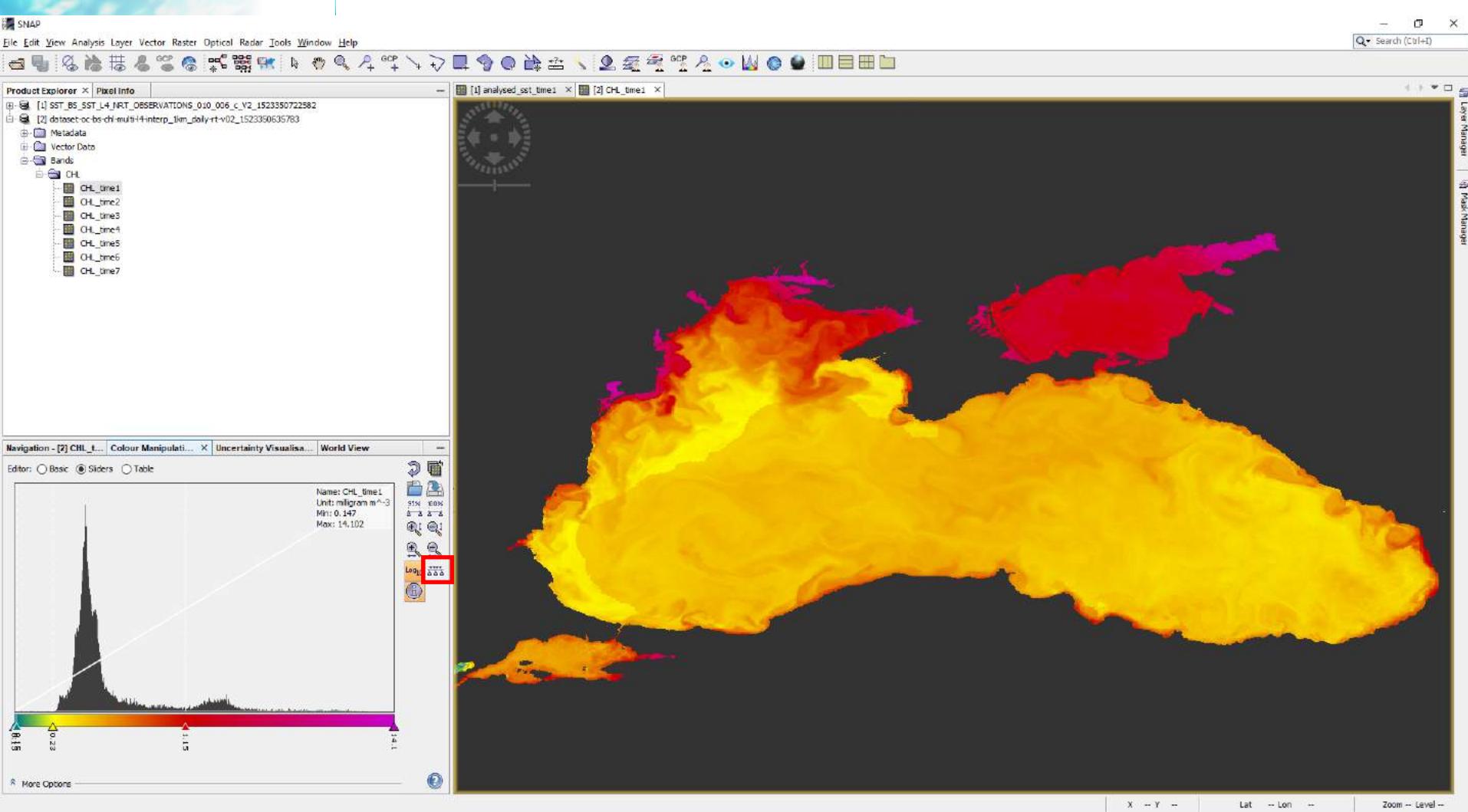


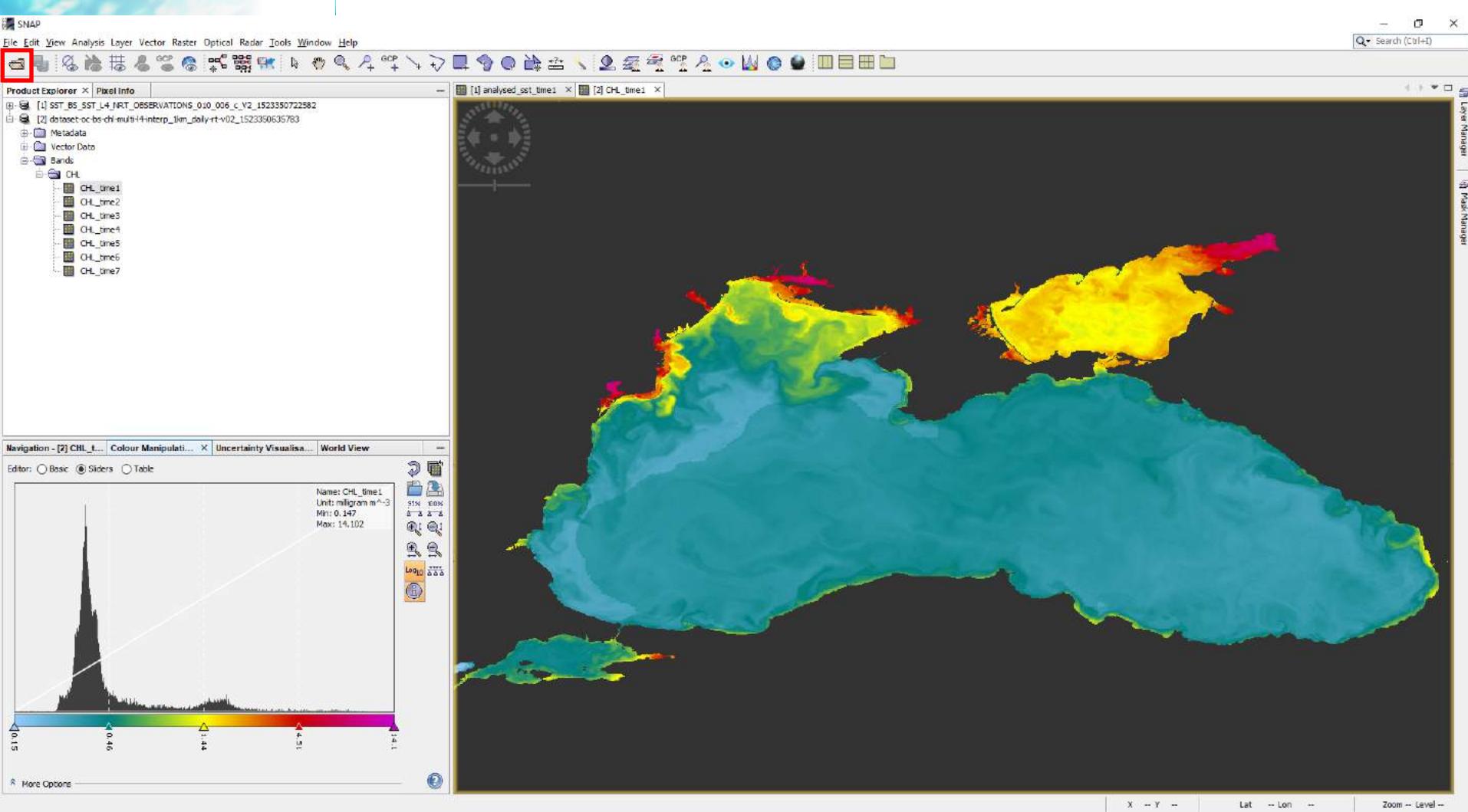


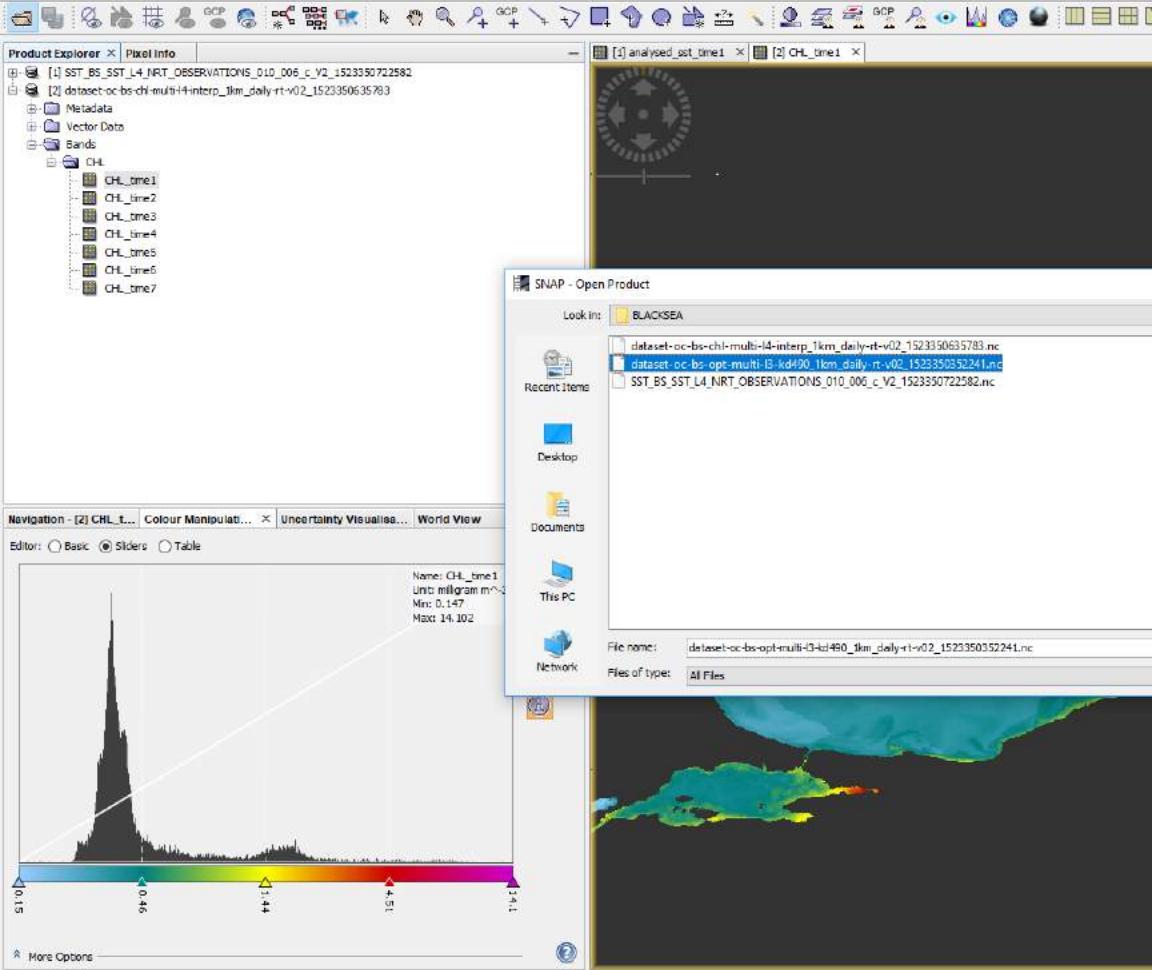


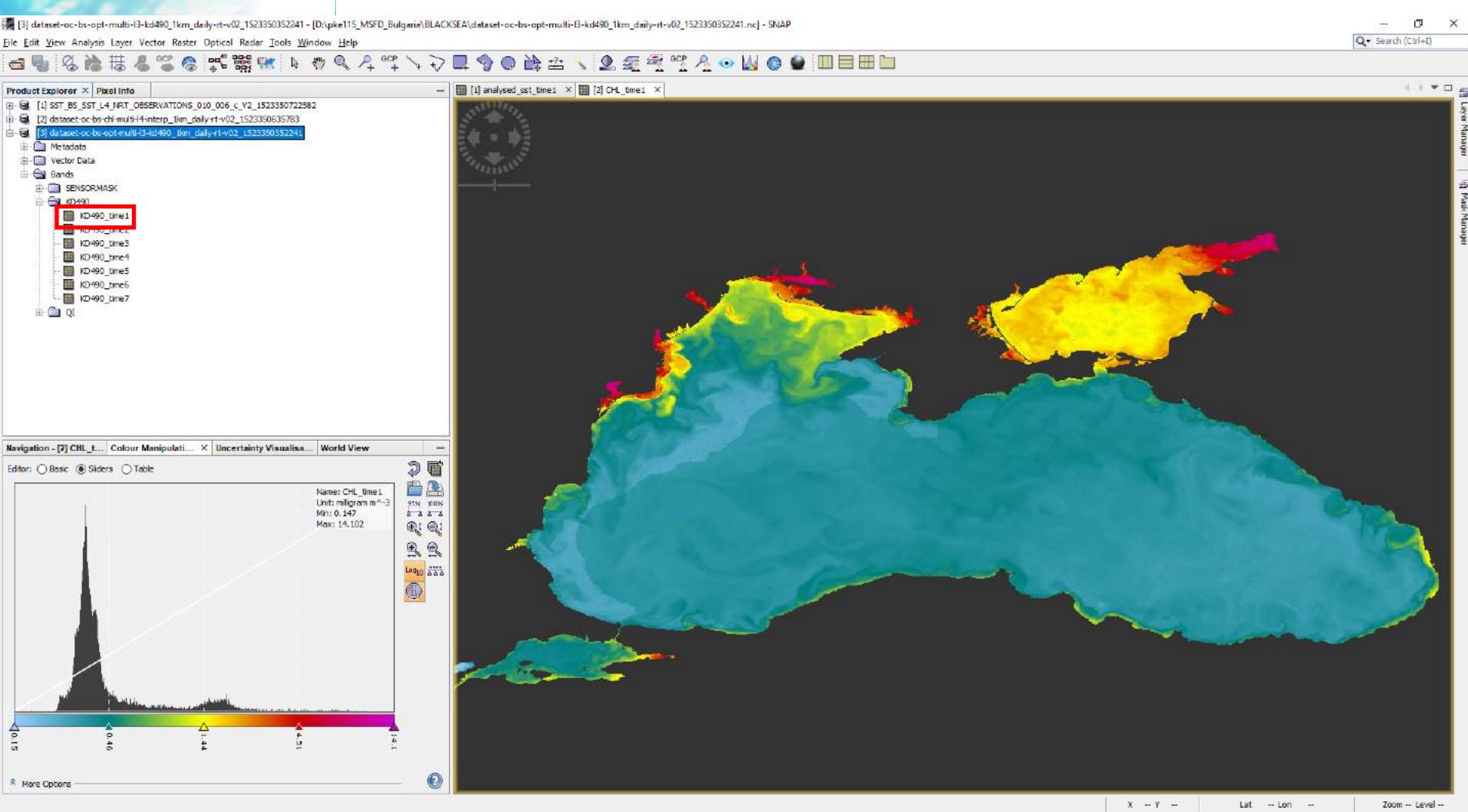


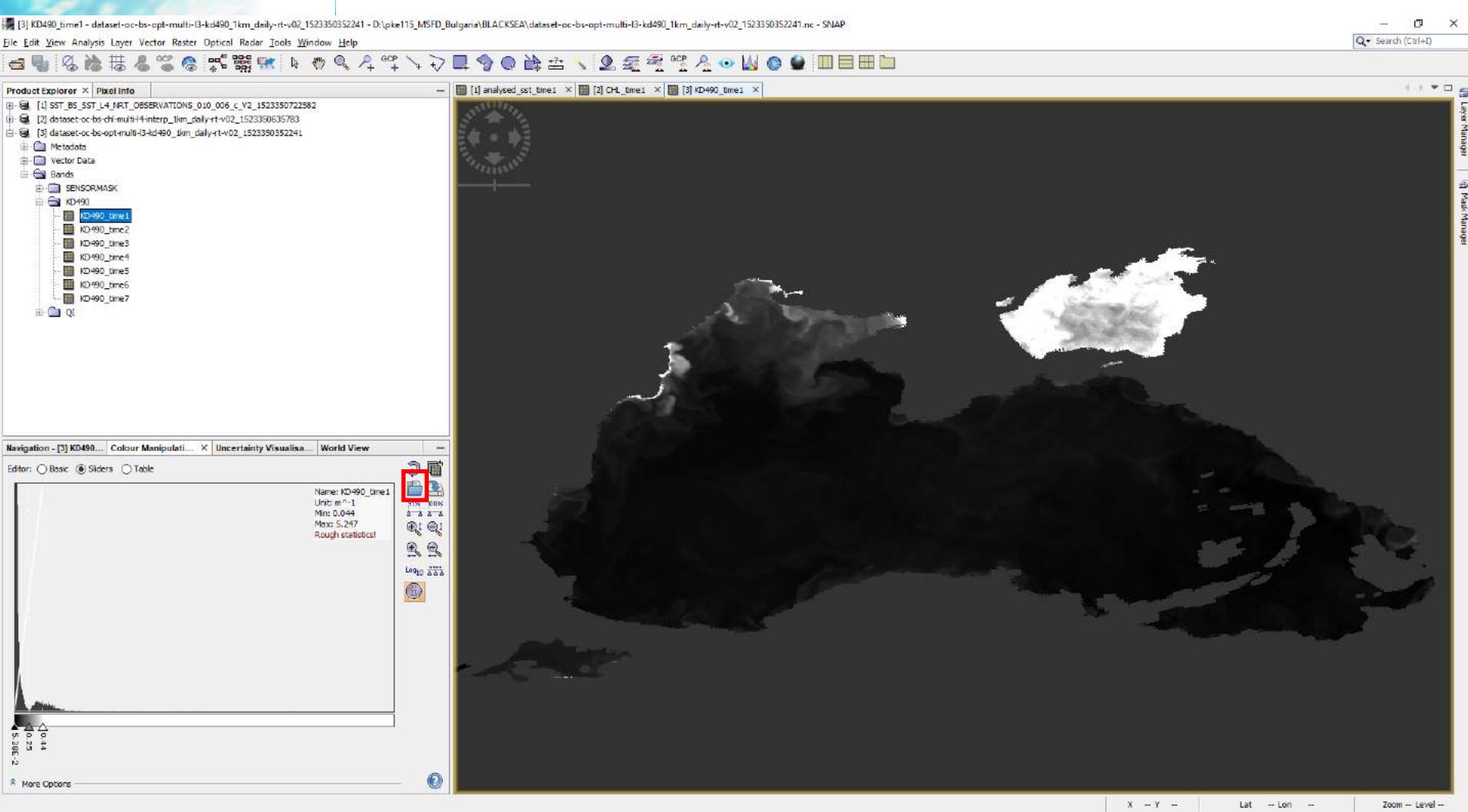


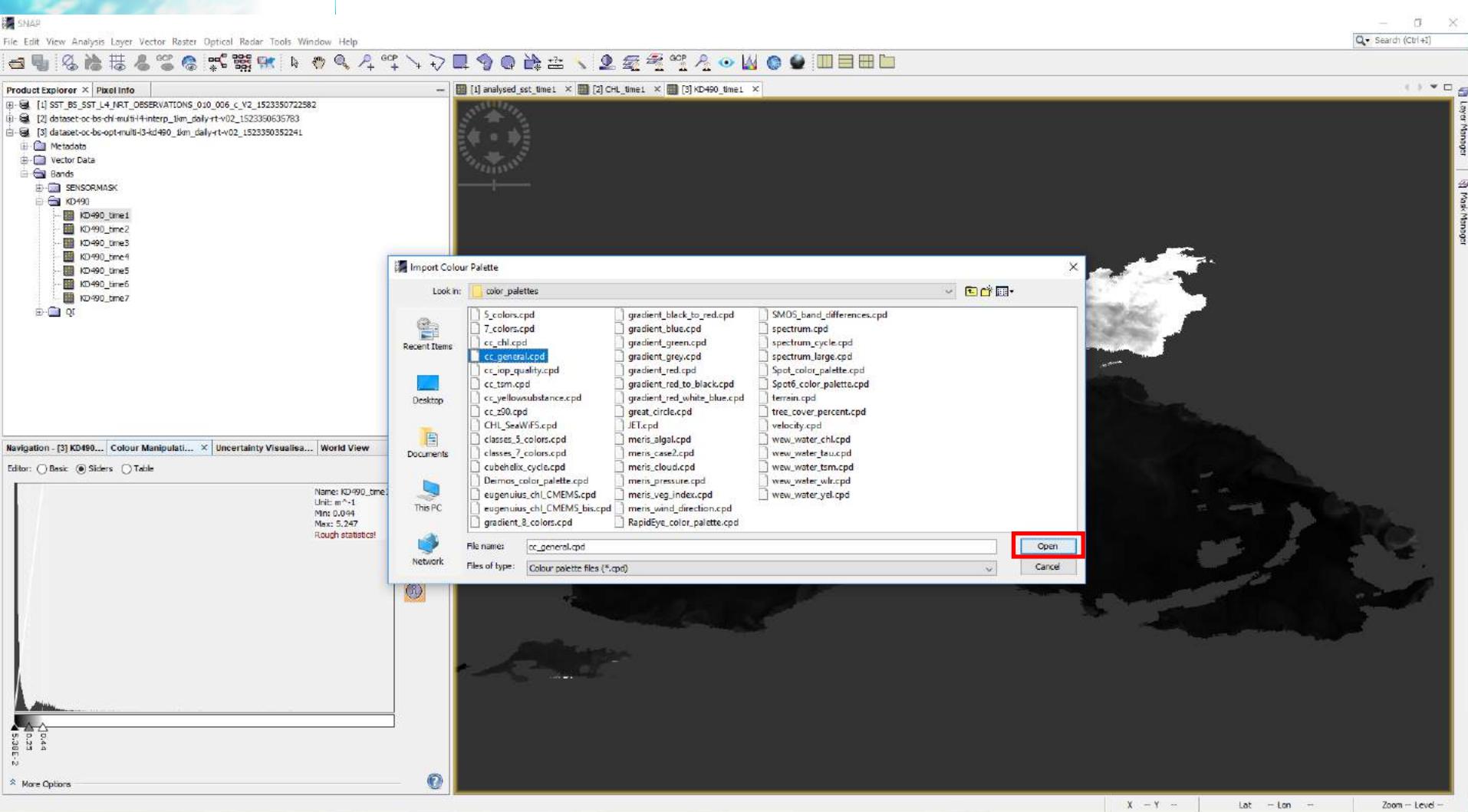


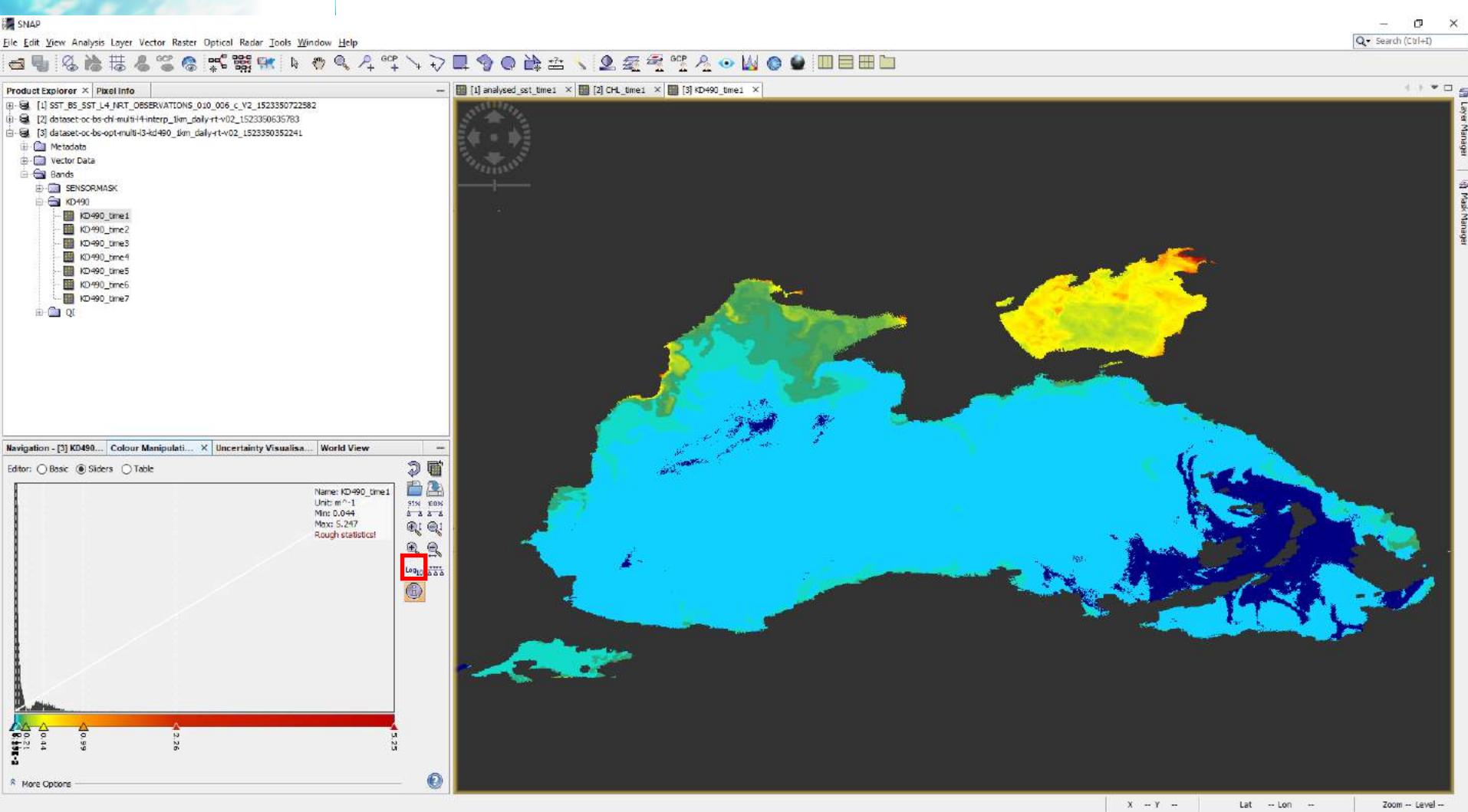














Product Explorer X Pixel Info

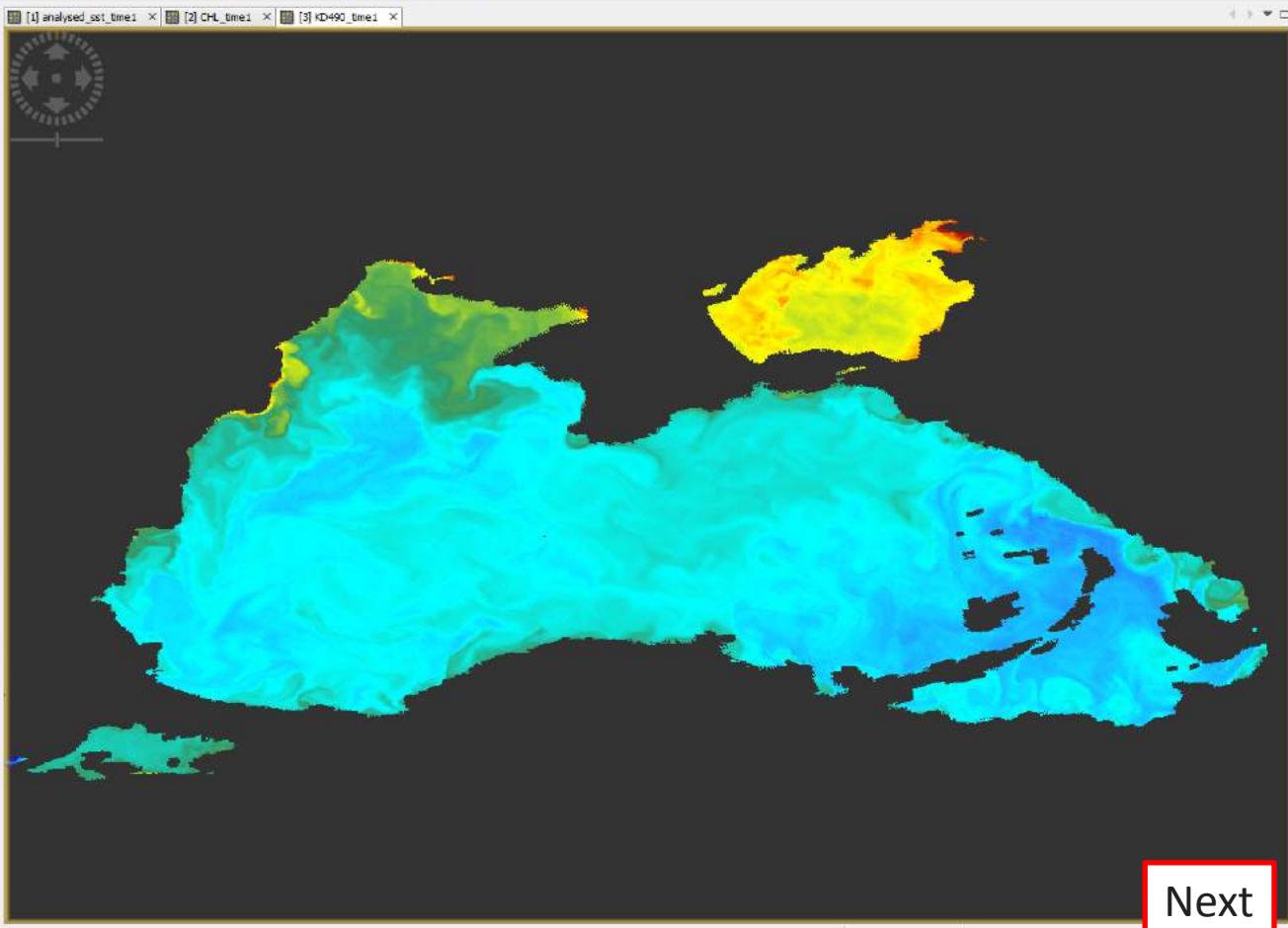
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Metadata

Vector Data

Bands

- SENSORMASK
- KD490
 - KD490_time1
 - KD490_time2
 - KD490_time3
 - KD490_time4
 - KD490_time5
 - KD490_time6
 - KD490_time7





Water transparency

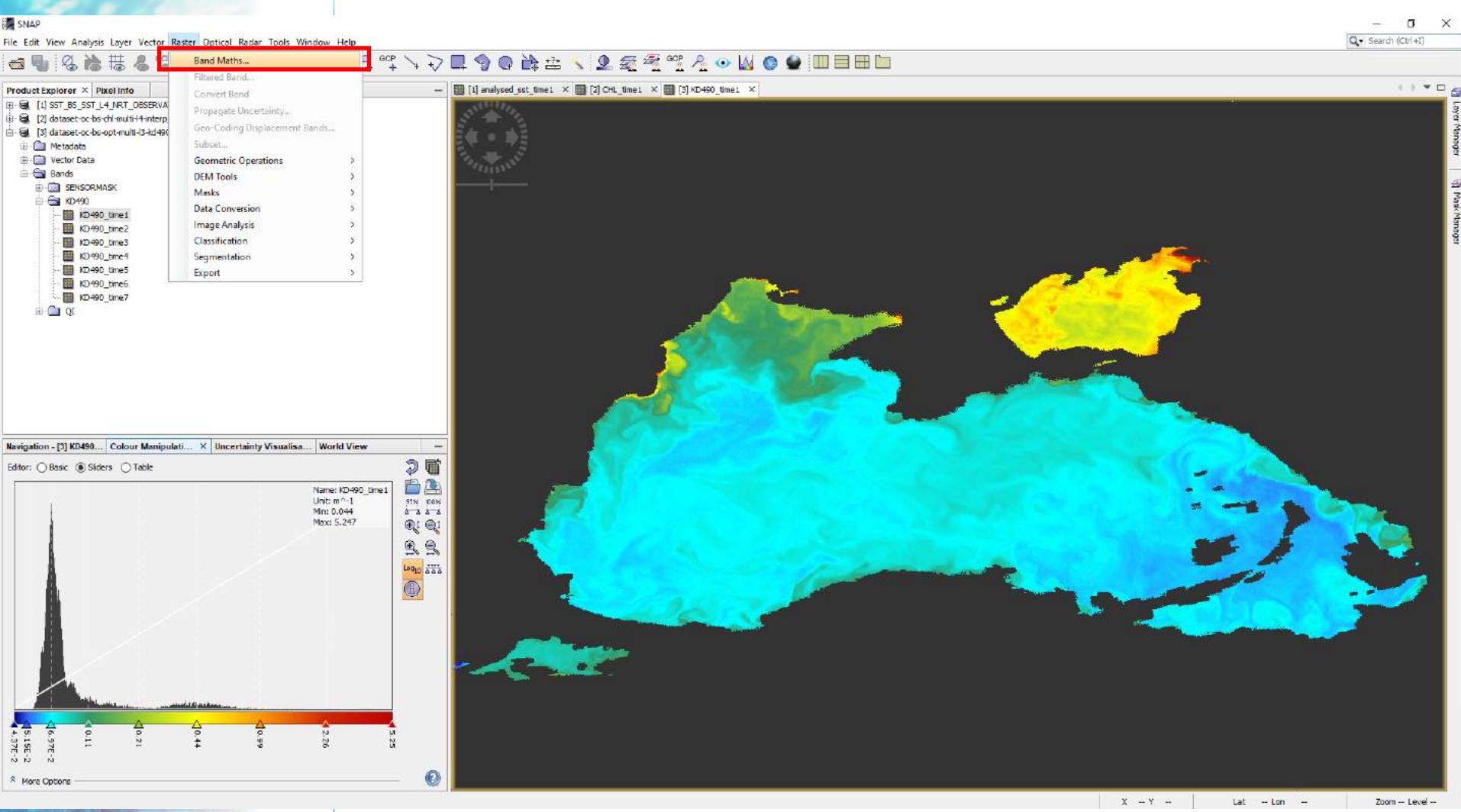
Marine
Monitoring

From Kd490 to water transparency (very simple algorithm):

$$Wt = \frac{1}{2} \cdot \frac{Const}{Kd490}$$



Const typically ranges from 4 to 7





Product Explorer X Pixel Info

- [1] SST_BS_SST_L4_NRT_OBSERVATIONS_010_006_c_V2_1523350722582
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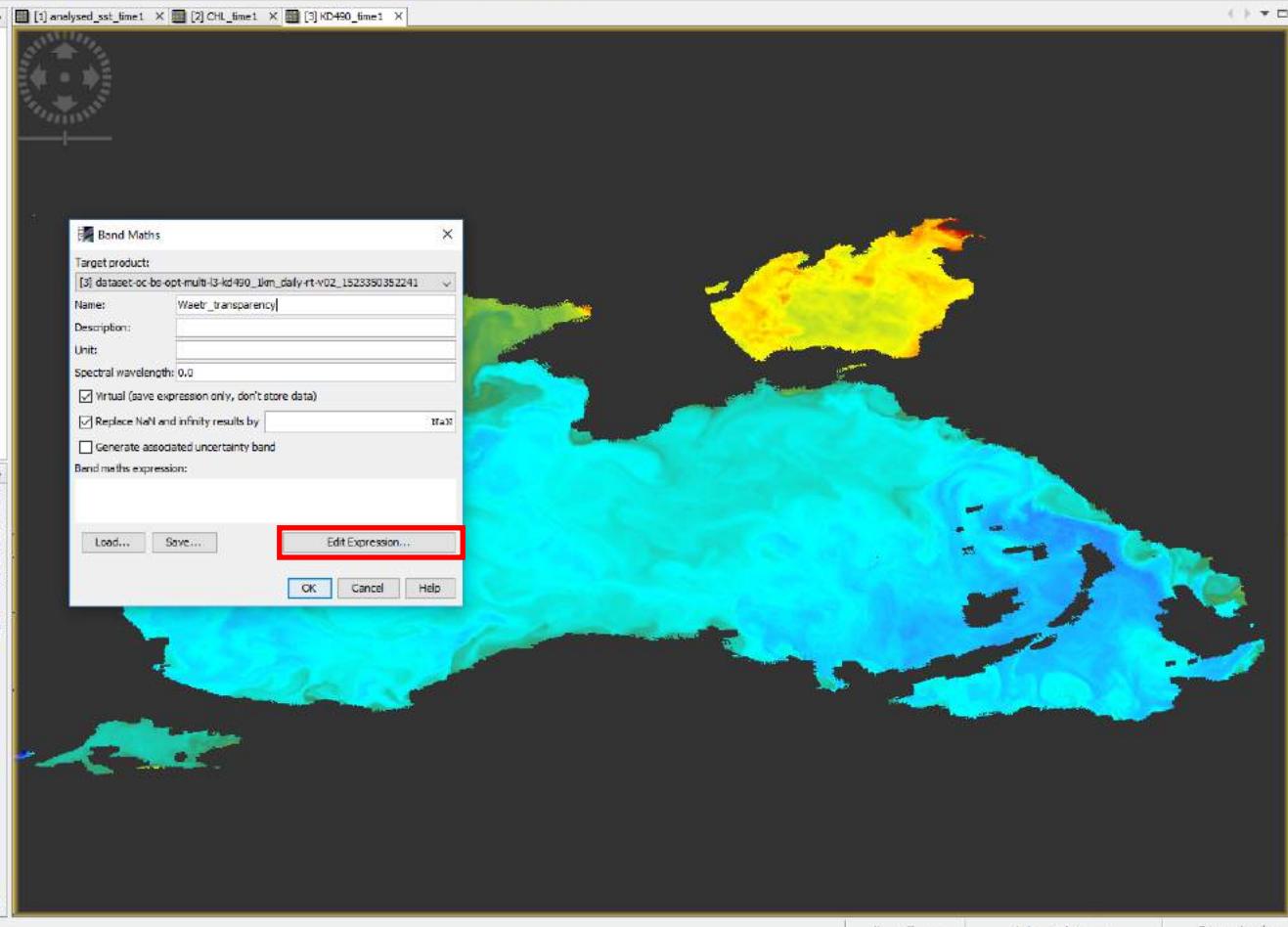
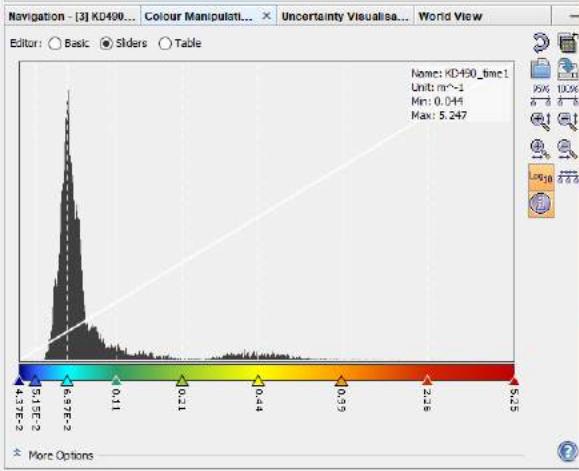
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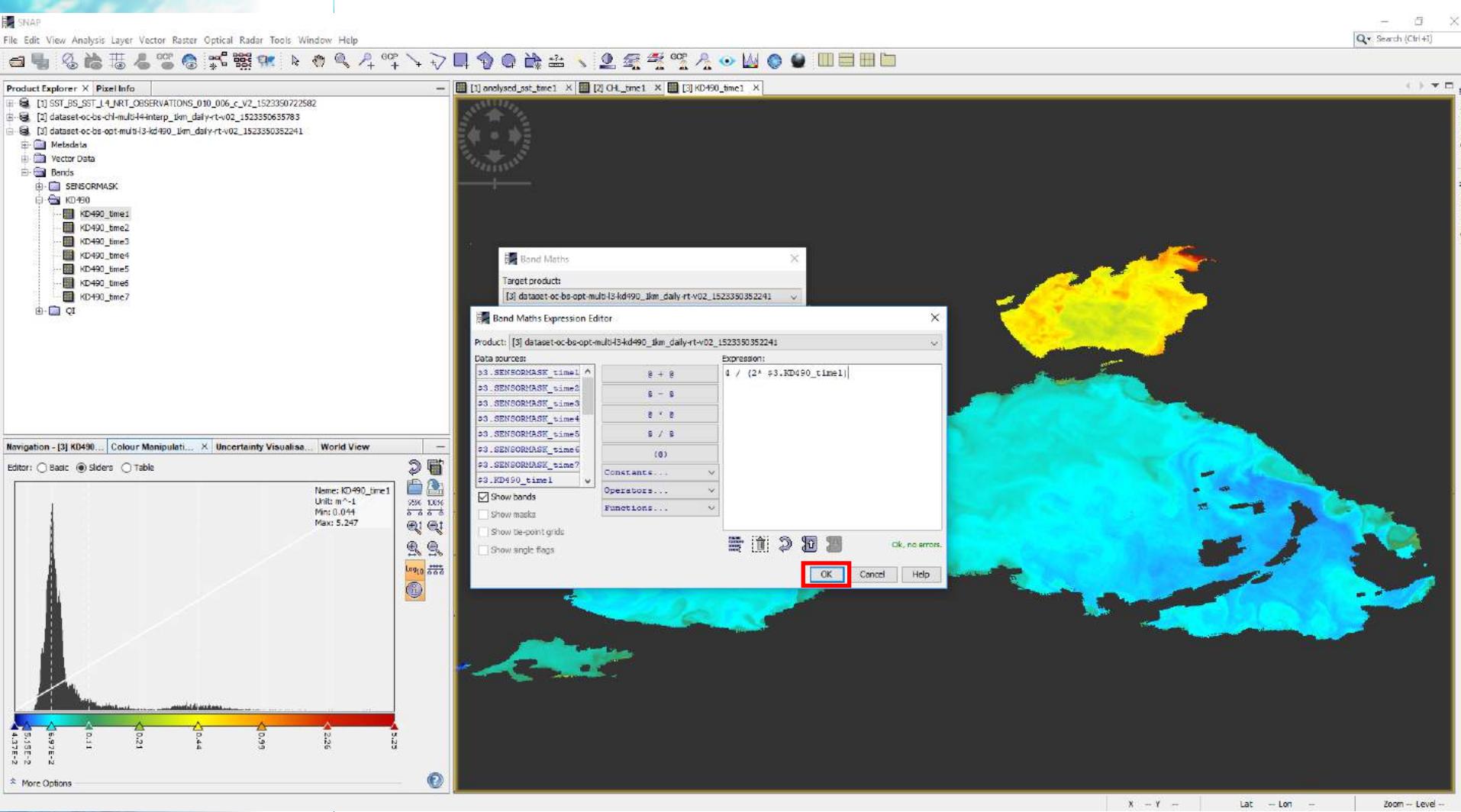
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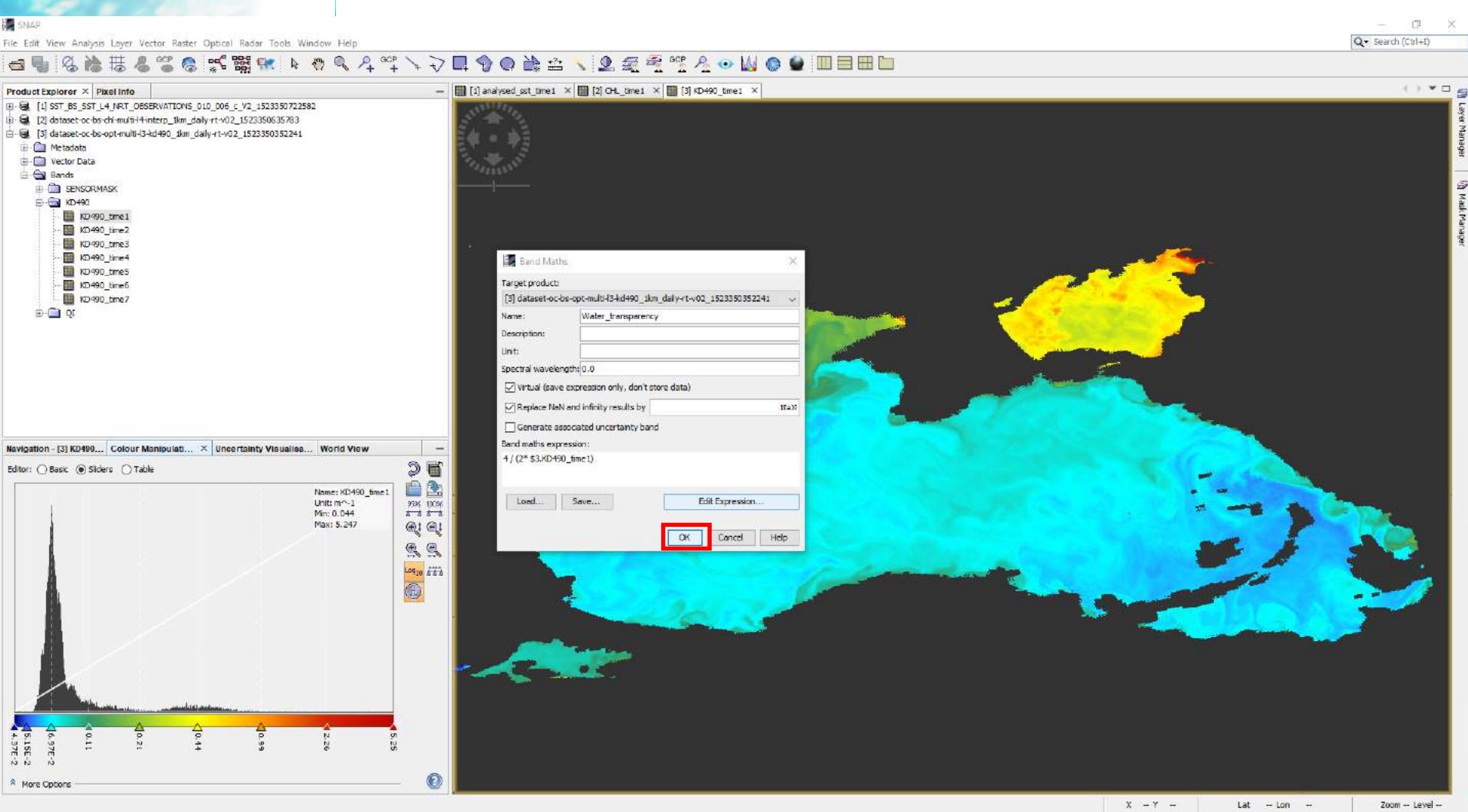
bands

- SENSORMASK
- KD490
 - KD490_line1
 - KD490_line2
 - KD490_line3
 - KD490_line4
 - KD490_line5
 - KD490_line6
 - KD490_line7

C3



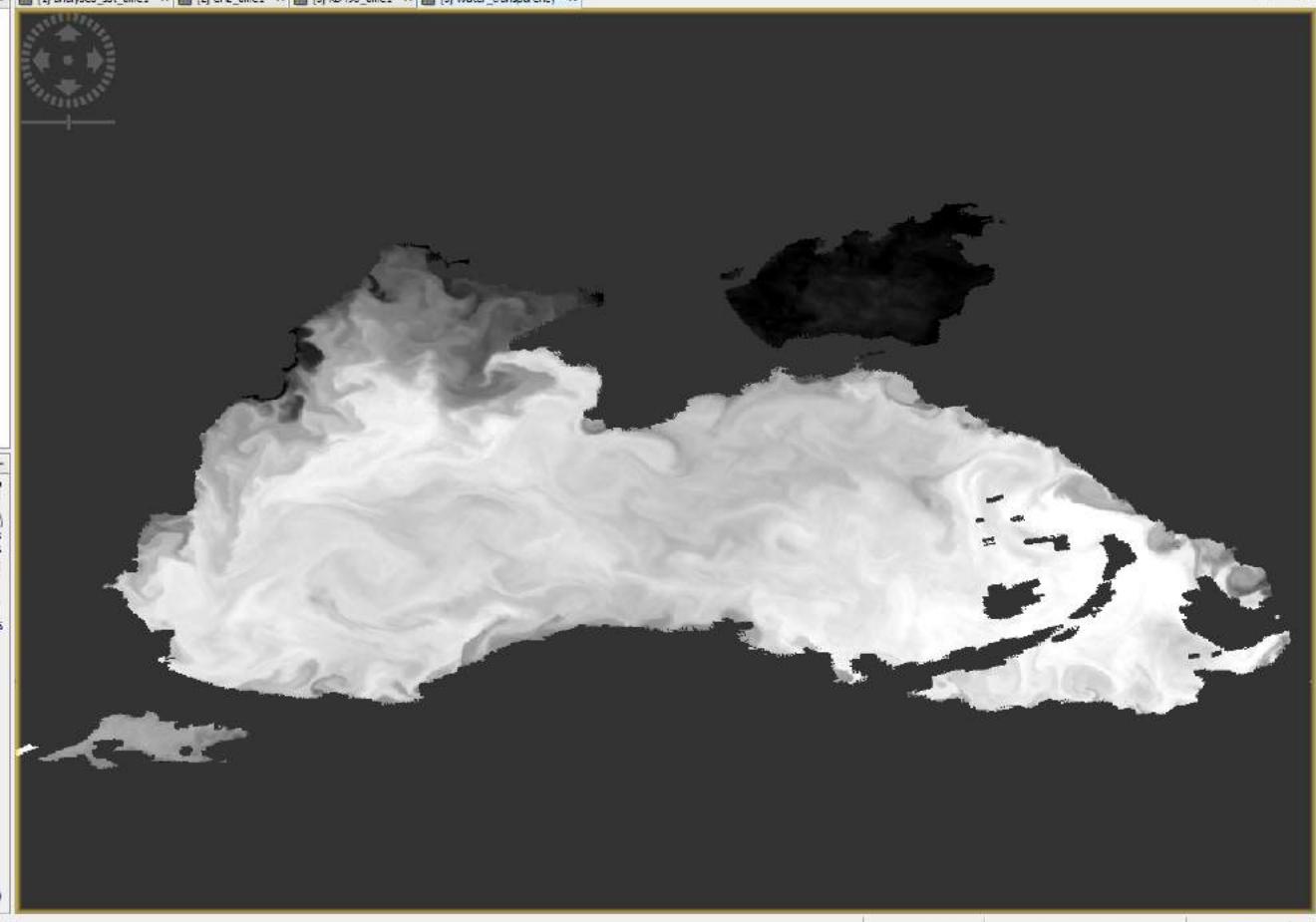


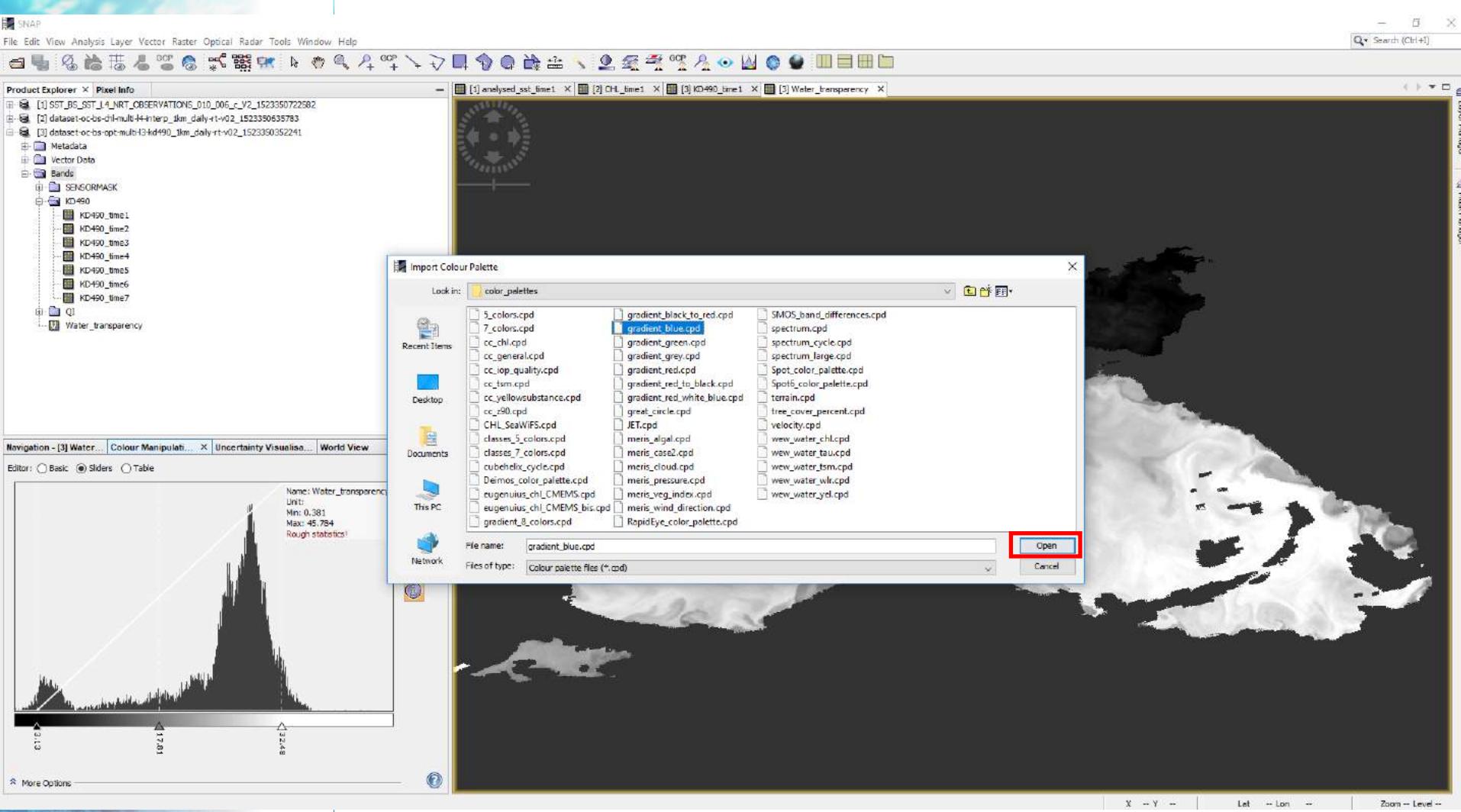


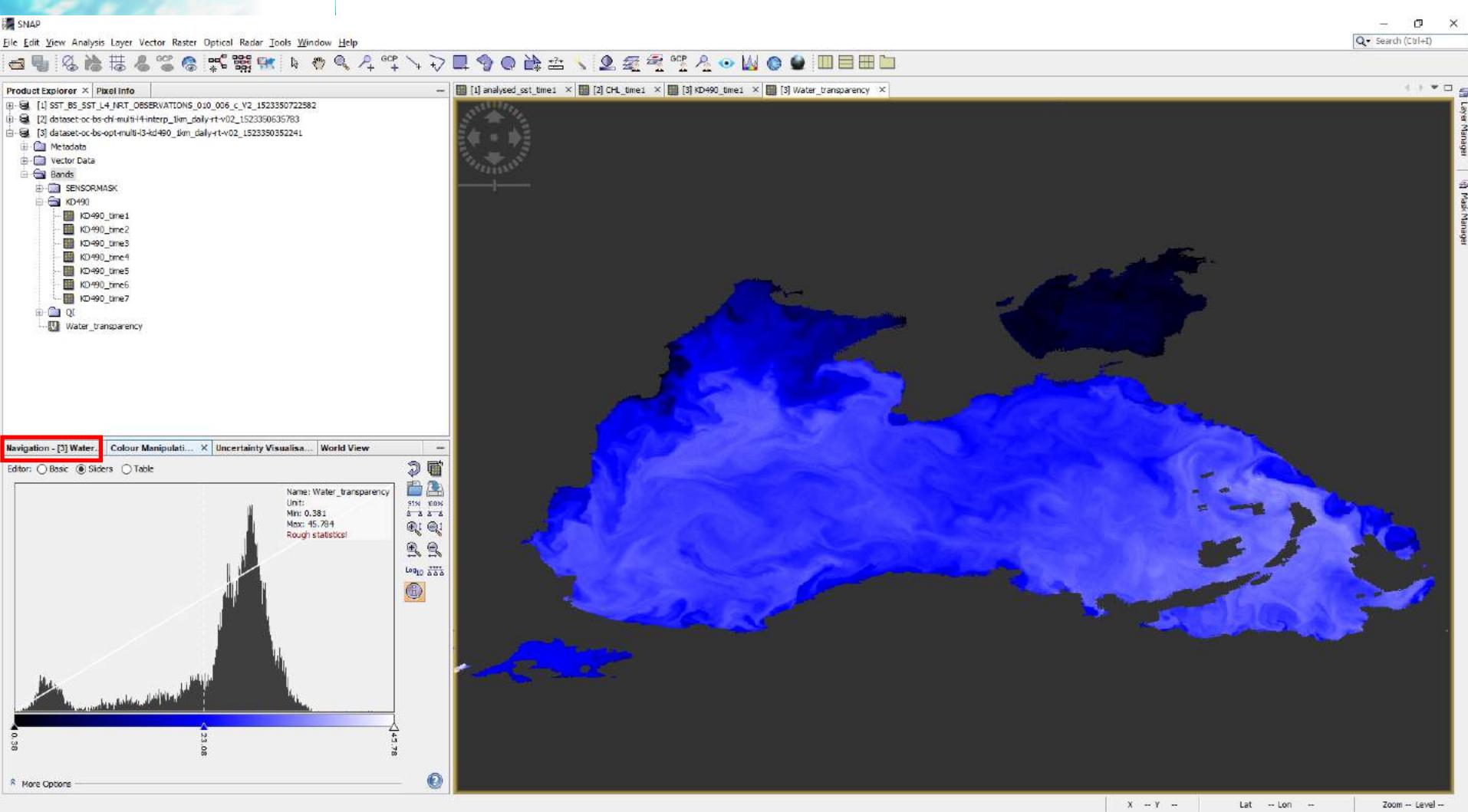


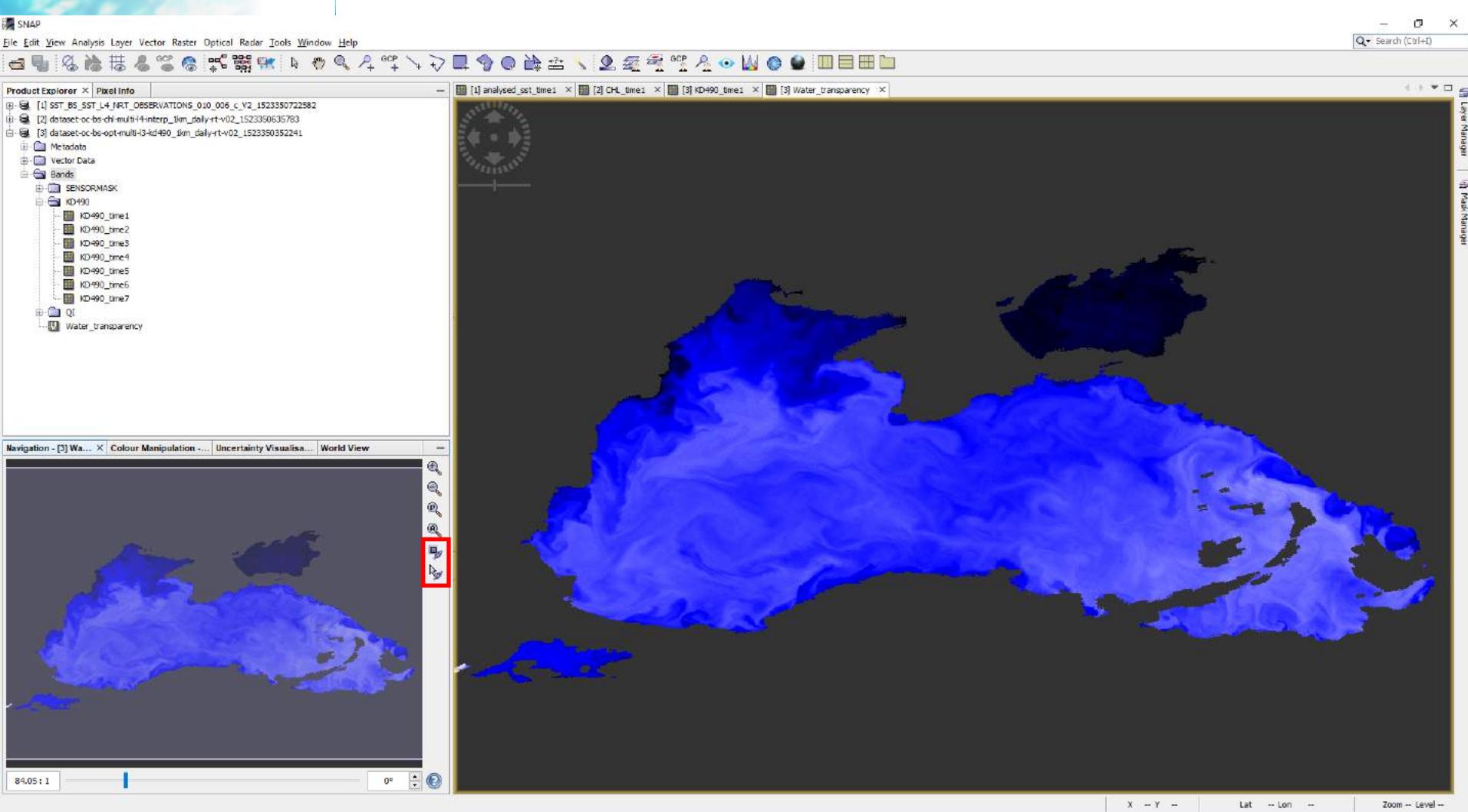
Product Explorer × Pixel Info

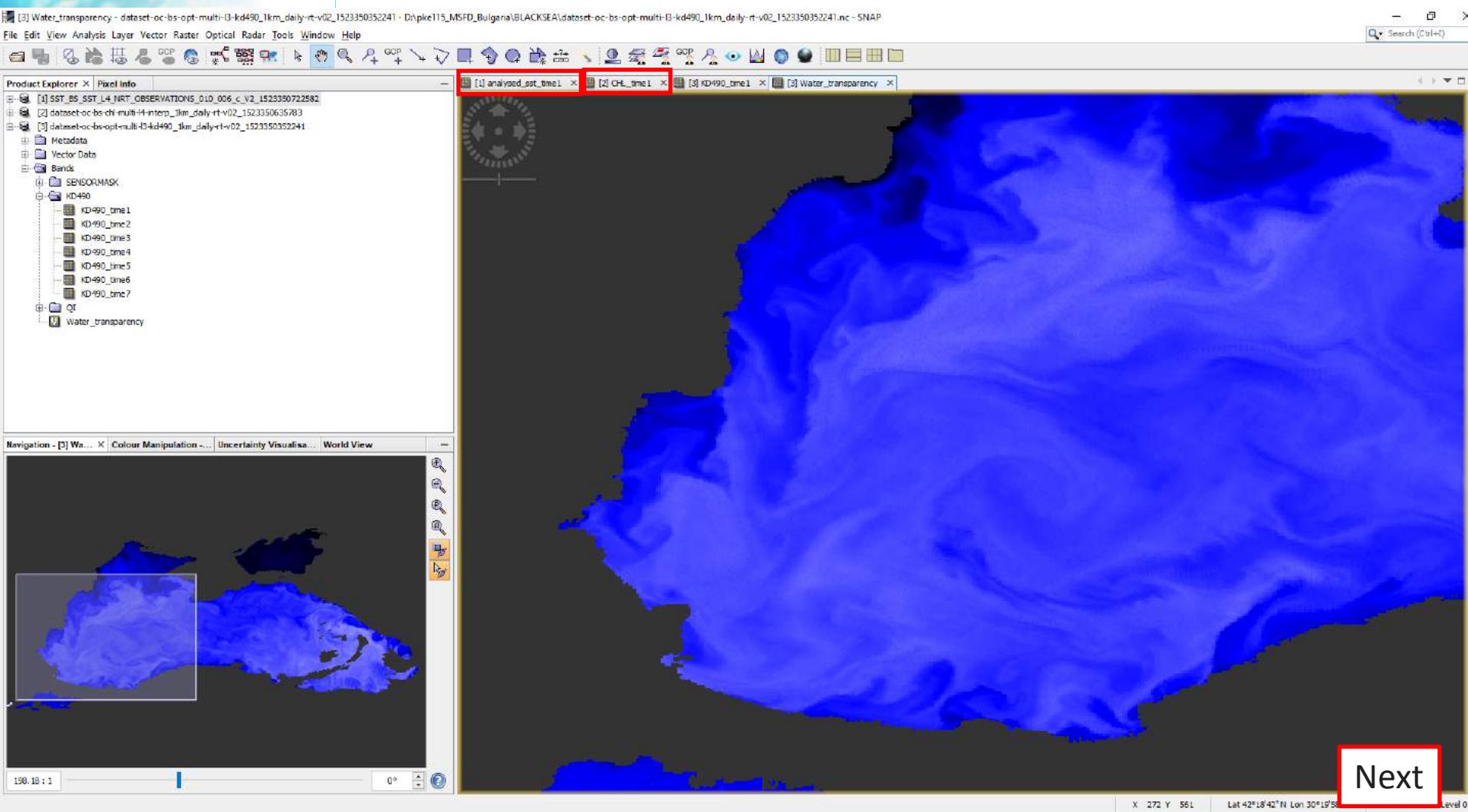
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- [3] dataset-oc-bs-opt-multi-3-kd490_1km_daily-rt-v02_1523350352241
 - Metadata
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 - KD490_time2
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 - KD490_time6
 - KD490_time7
 - QI
 - Water_transparency

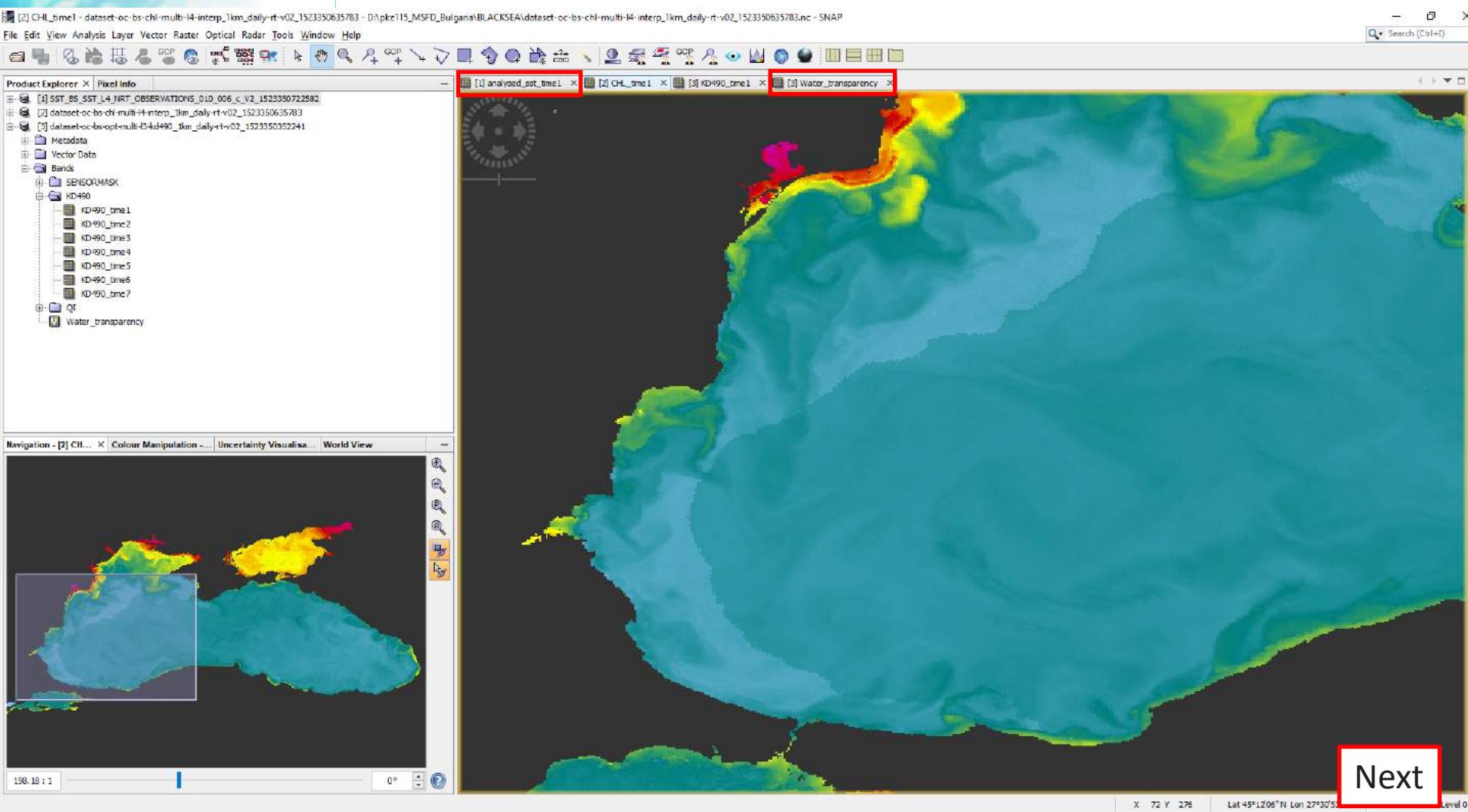


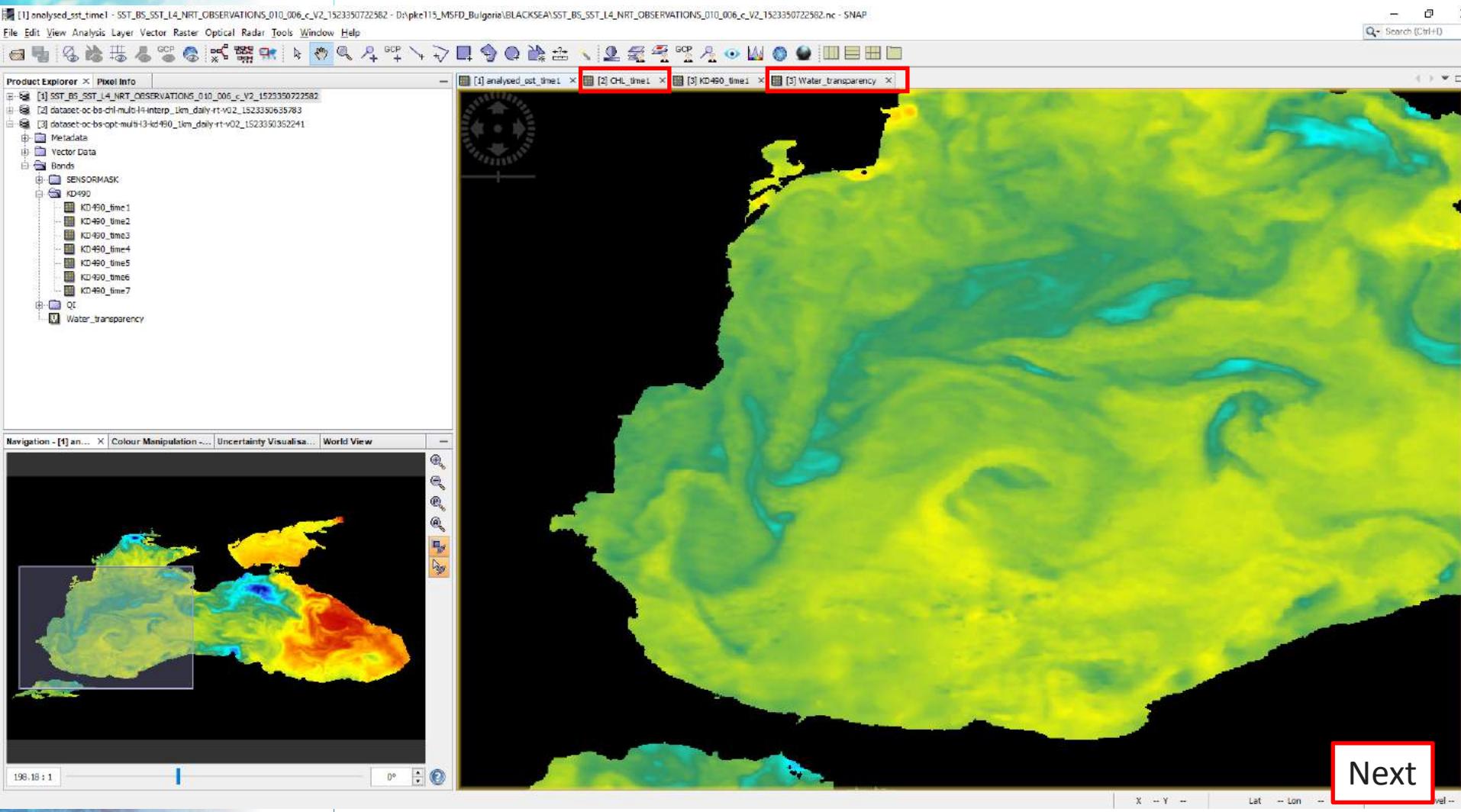


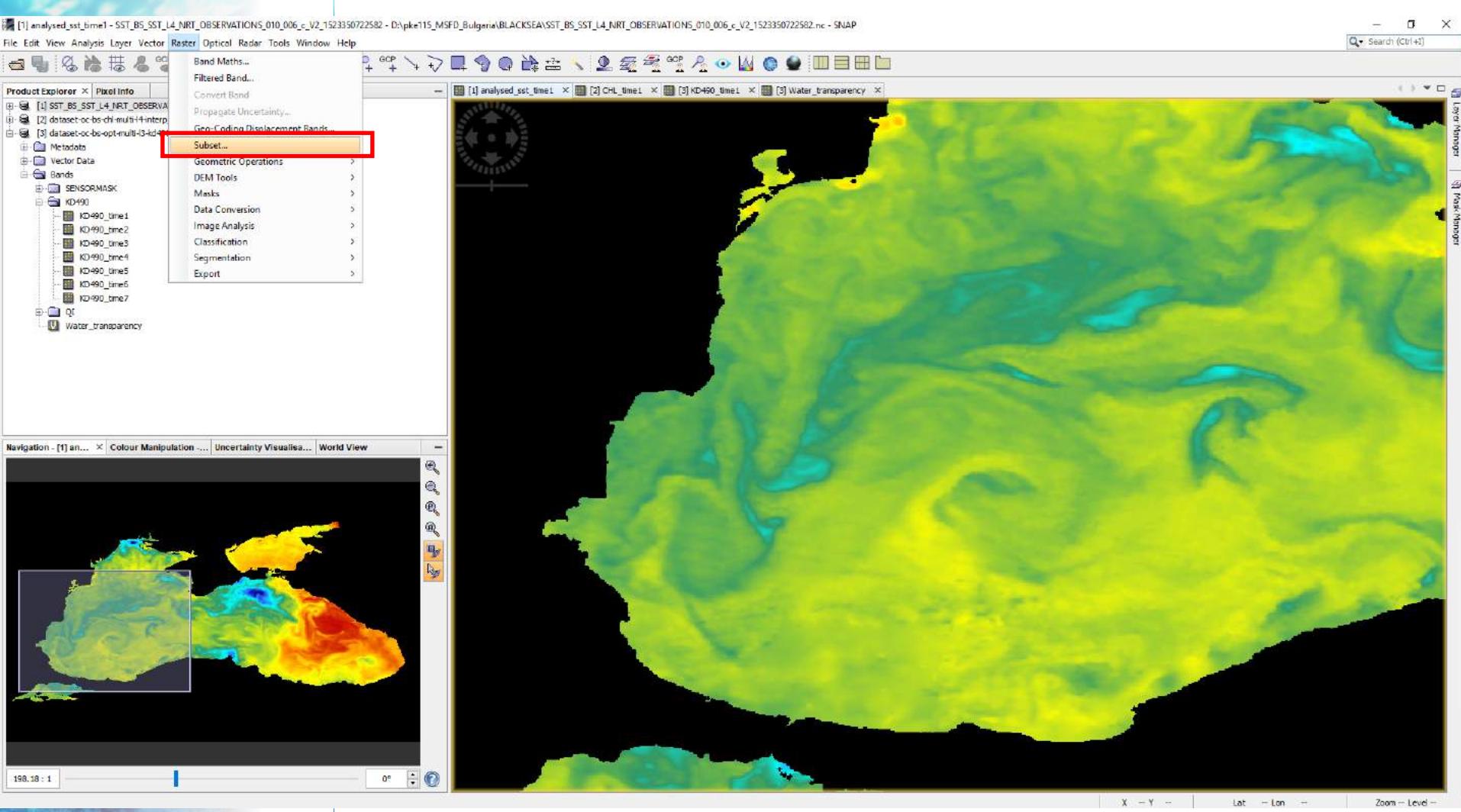


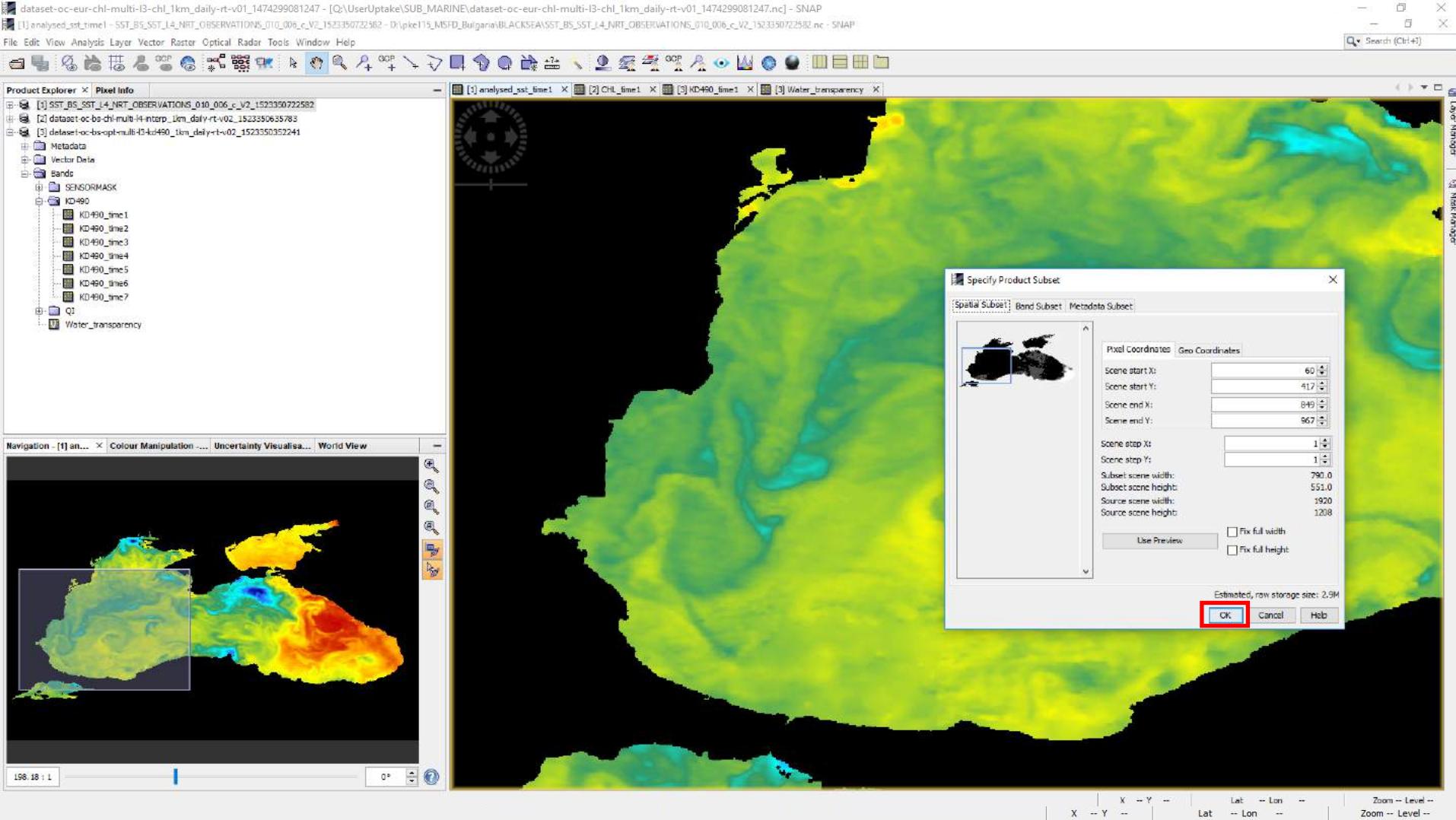


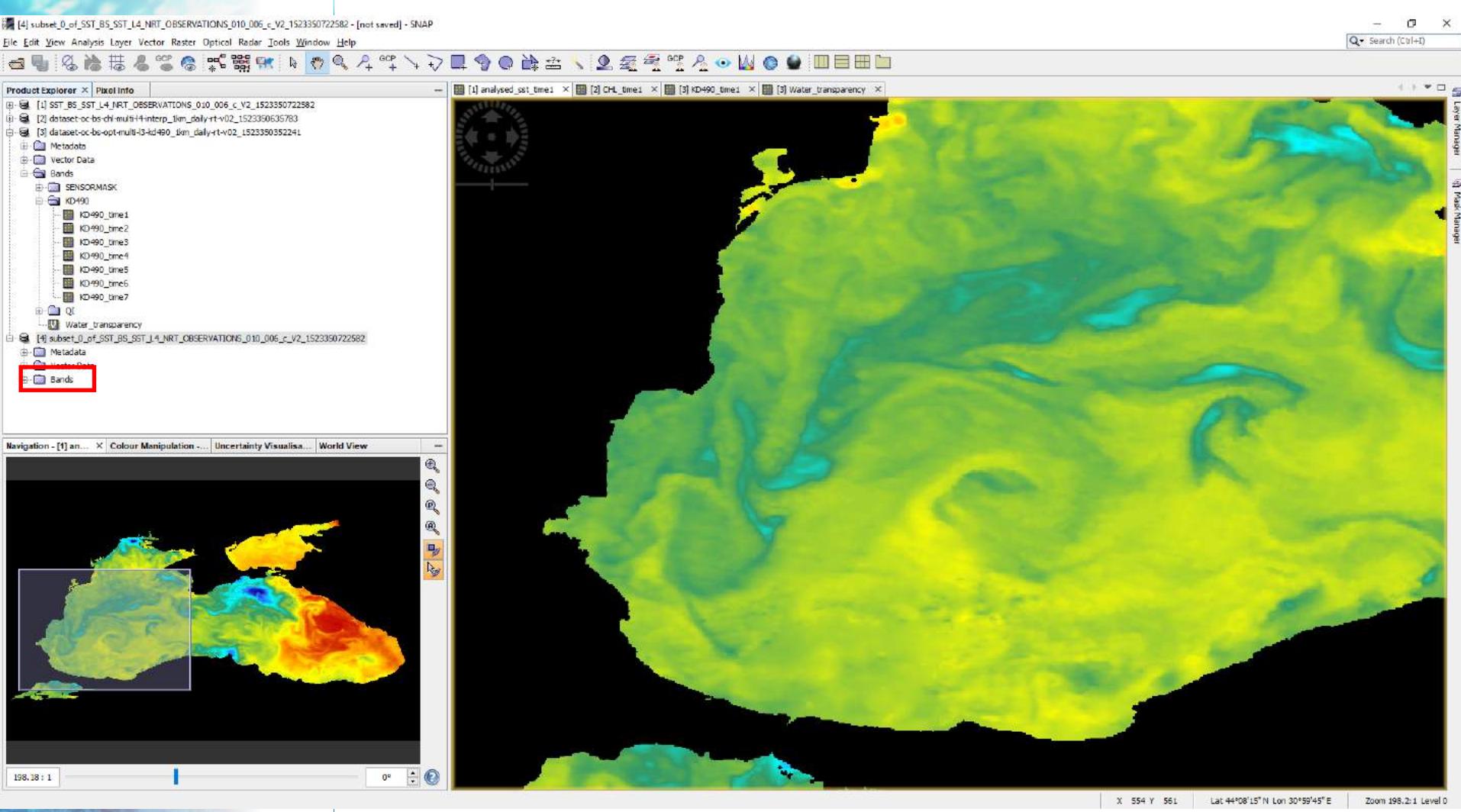


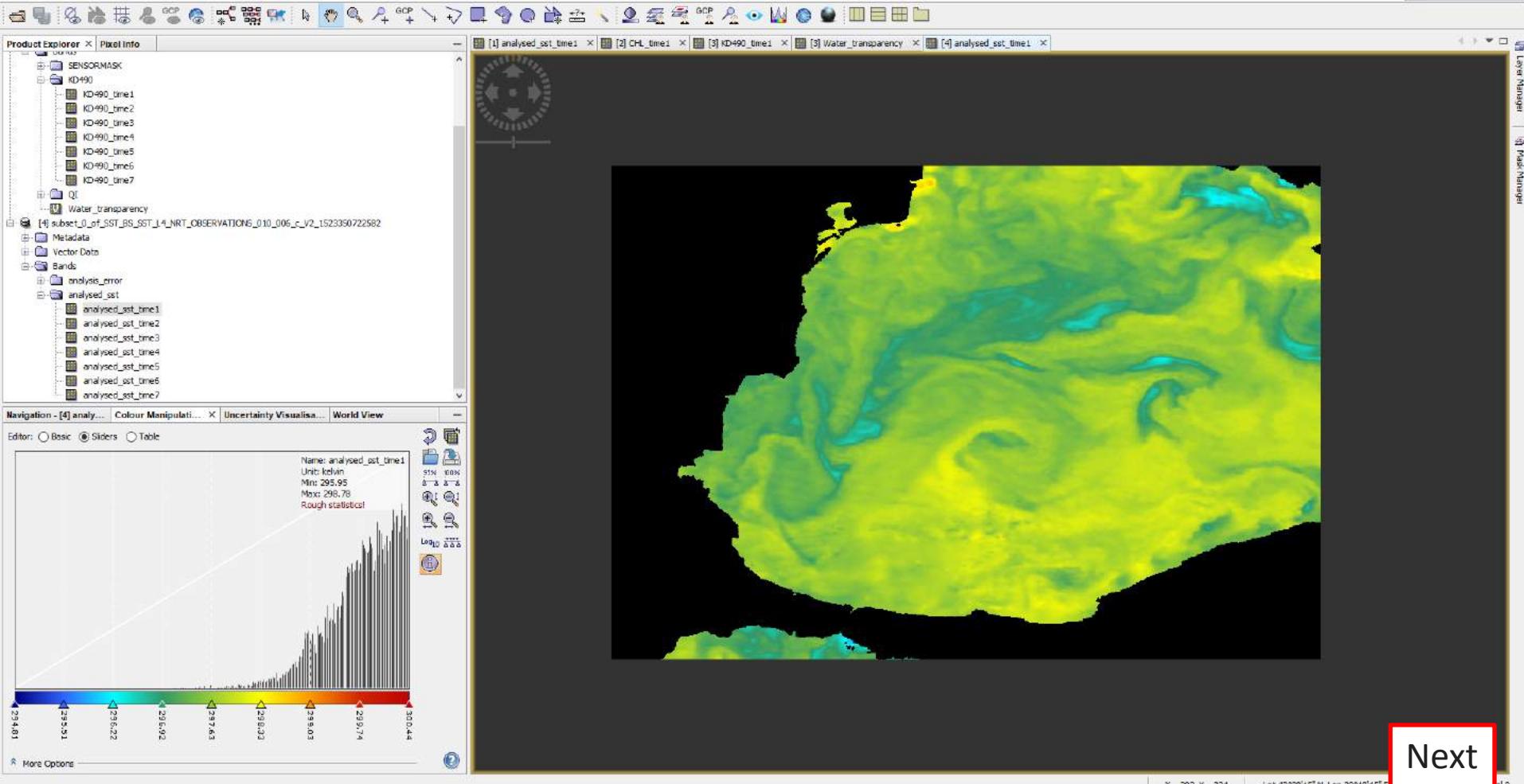


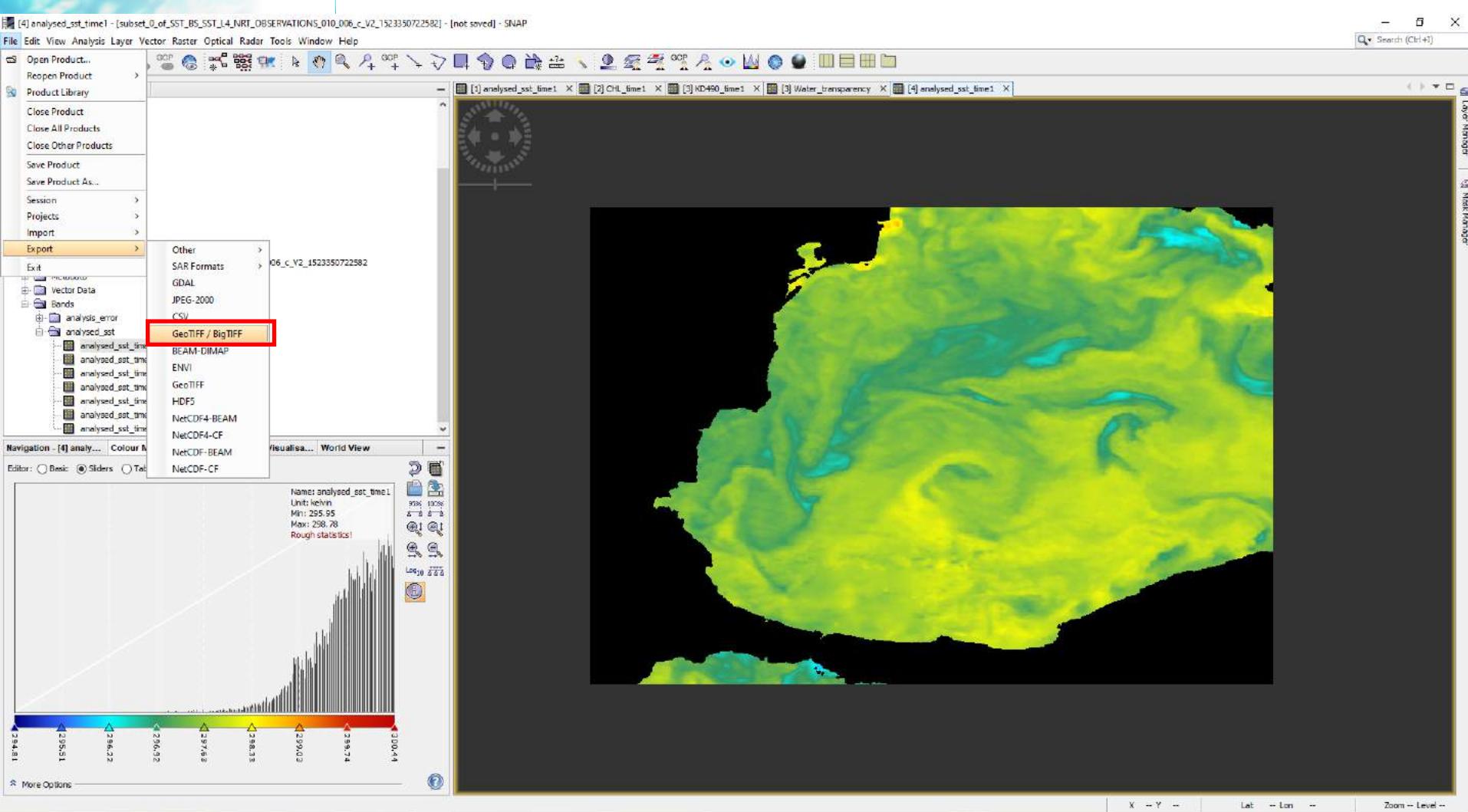


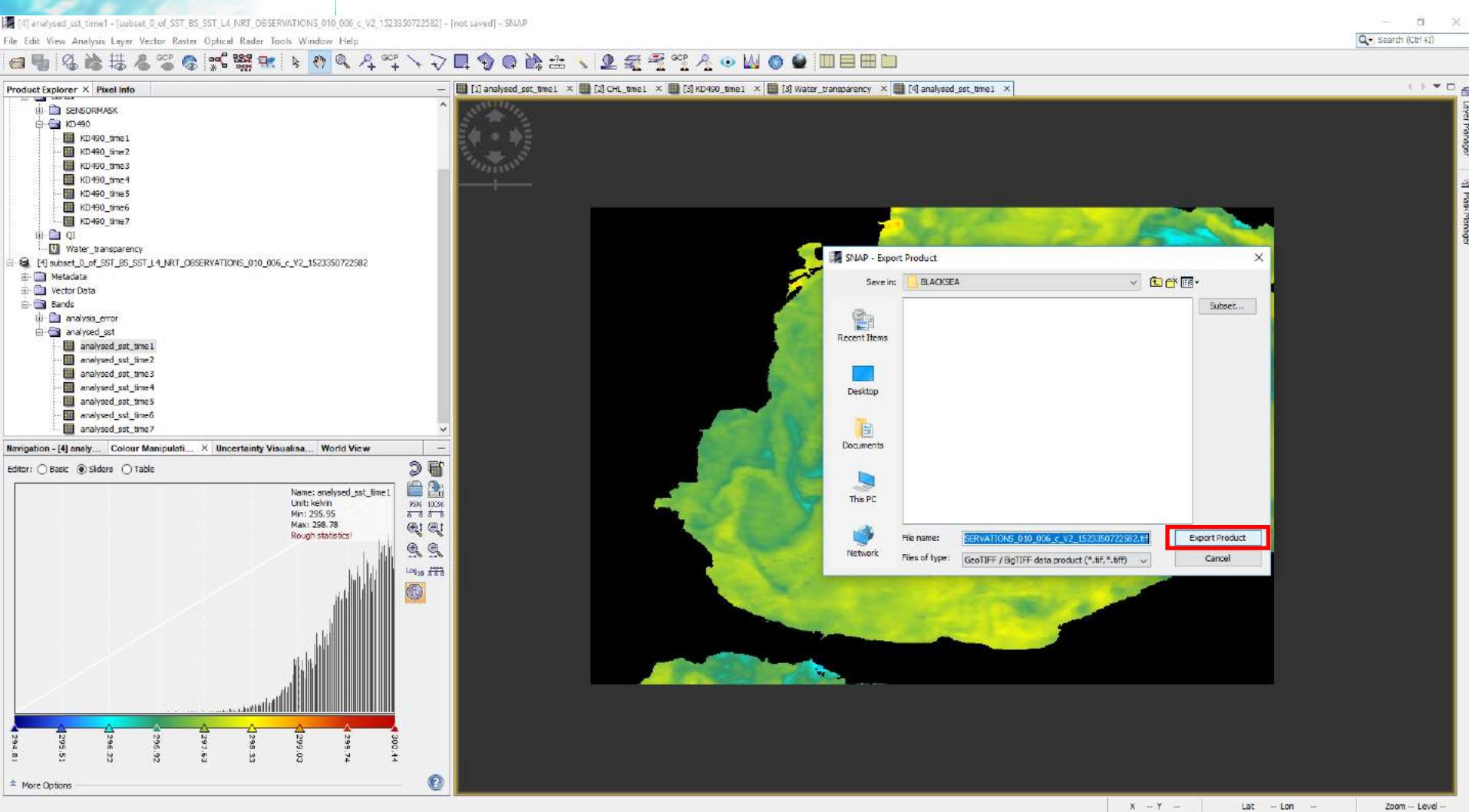








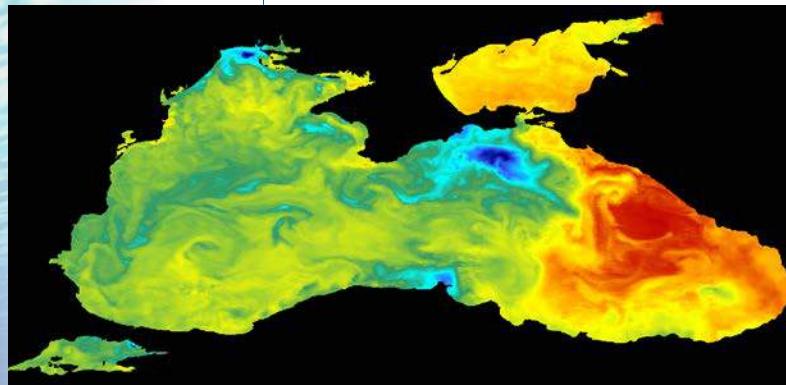




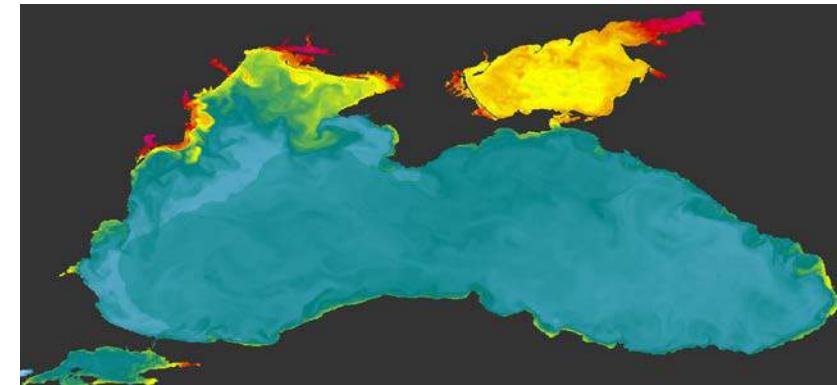


Marine
Monitoring

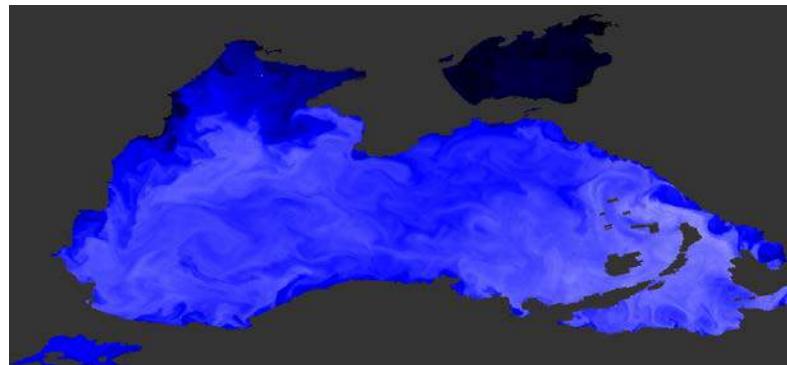
Examples on Black Sea, 2017 / 08 / 01



Sea Surface Temperature



Chlorophyll

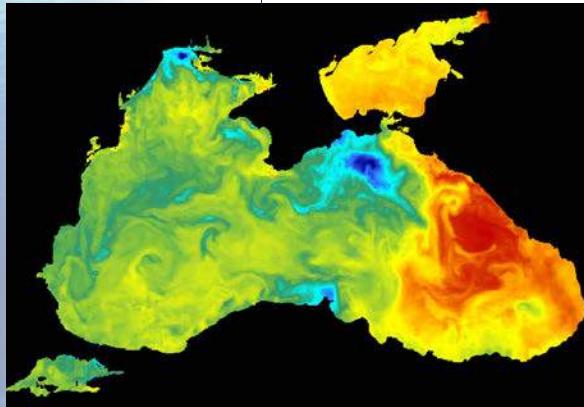


Water Transparency



Marine
Monitoring

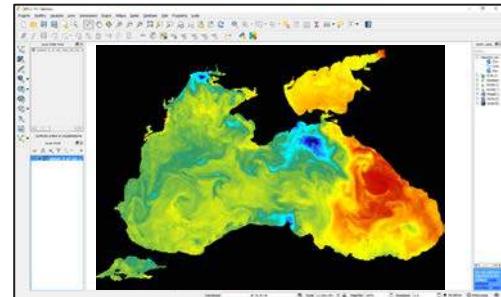
Use of generated maps



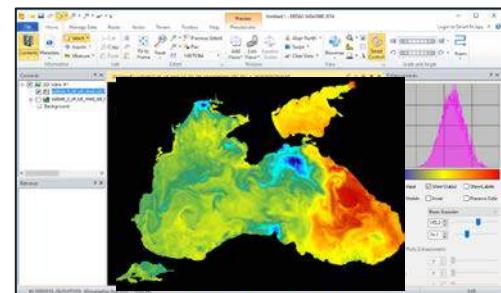
.TIF image*

* Colour palette applied

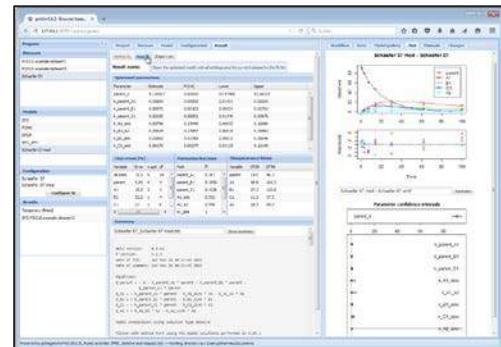
GIS tools



Remote
sensing tools



Analysis tools





Thank you