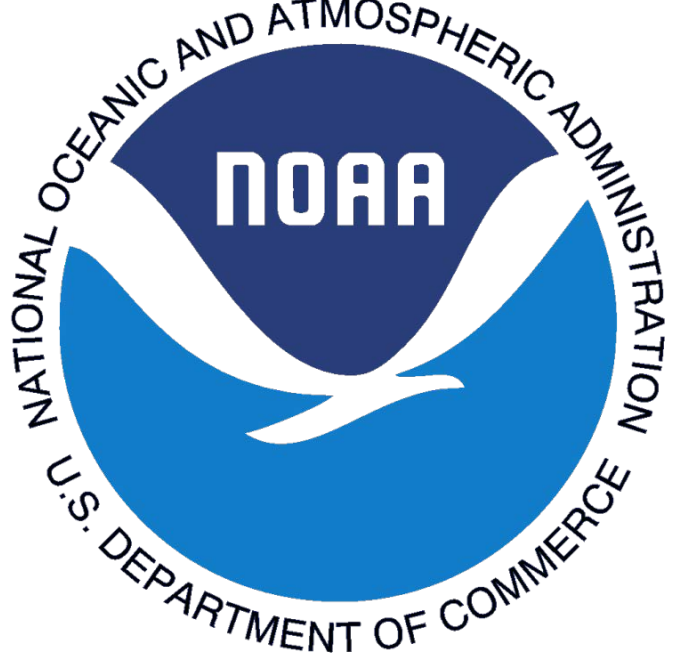


# NOAA Coastwatch/Oceanwatch Altimetry Products



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## Abstract

The NOAA Laboratory for Satellite Altimetry provides a gridded Level 3 sea level anomaly product publicly available for download through ftp and NOAA's Coastwatch/Oceanwatch Environmental Research Division's Data Access Program data server (coastwatch.noaa.gov). This is a near real time product available daily, having a global spatial coverage with a ¼ degree spatial resolution, and a temporal coverage of February 2017 through the present. It is a multiple altimeter optimal interpolation sea level anomaly product currently using Jason-2, Jason-3, AltiKa, and Cryosat-2 data. Recently we have been working on evaluating the processing of this product. This has included tuning our error-weighting for the optimal interpolation, which has reduced differences between our grids and AVISO grids.

## NOAA CoastWatch • OceanWatch Satellite Data Products

The following list highlights the various data product types available from NOAA CoastWatch:

### • Ocean Color (Radiances, Chlorophyll, etc.; OC)

Radiation from the ocean surface of light in the visible wavelengths gives information about the color of the ocean. This "ocean color" (radiances) can be used to estimate chlorophyll concentration (the pigment in plants and phytoplankton responsible for photosynthesis and the dominant source of color in the open ocean) or the coefficients of light attenuation through the water column and other parameters (generally related to biological processes). In coastal areas, other biological compounds and minerals add complexity to interpretation. Clouds will block remotely sensed OC.

### • Sea Surface Height (SSH)

Satellite altimeters use active radar to observe the surface height of the ocean which is not smooth or flat. Fluid hills and valleys deviate from a reference (mean geoid) height at the ocean surface. These vertical gradients are of interest for sea level rise, storm predictions, ocean currents, ecosystem ecology and other applications.

### • Sea Surface Salinity (SSS)

The salinity of seawater at the ocean surface can be remotely sensed using microwave frequencies. Currently, this technique is valid for open ocean measurements, while recognizing decreased sensitivity for colder water. Measurements within approximately 50 km of land are biased by land contamination and less accurate. Salinity is a defining parameter for ocean dynamics and can also serve as a proxy for certain biogeochemical processes.

### • Sea Surface Temperature (SST)

Using satellites to observe the temperature of seawater near the surface of the ocean is probably the most mature application of ocean remote sensing. Observations are made with IR, which cannot "see" through clouds and with passive microwave which is not affected by clouds but has other trade-offs. SST sensors are aboard both polar-orbiting satellites and geostationary satellites.

### • Sea Surface Winds (also known as Ocean Surface Vector Winds (OSVW) for some techniques)

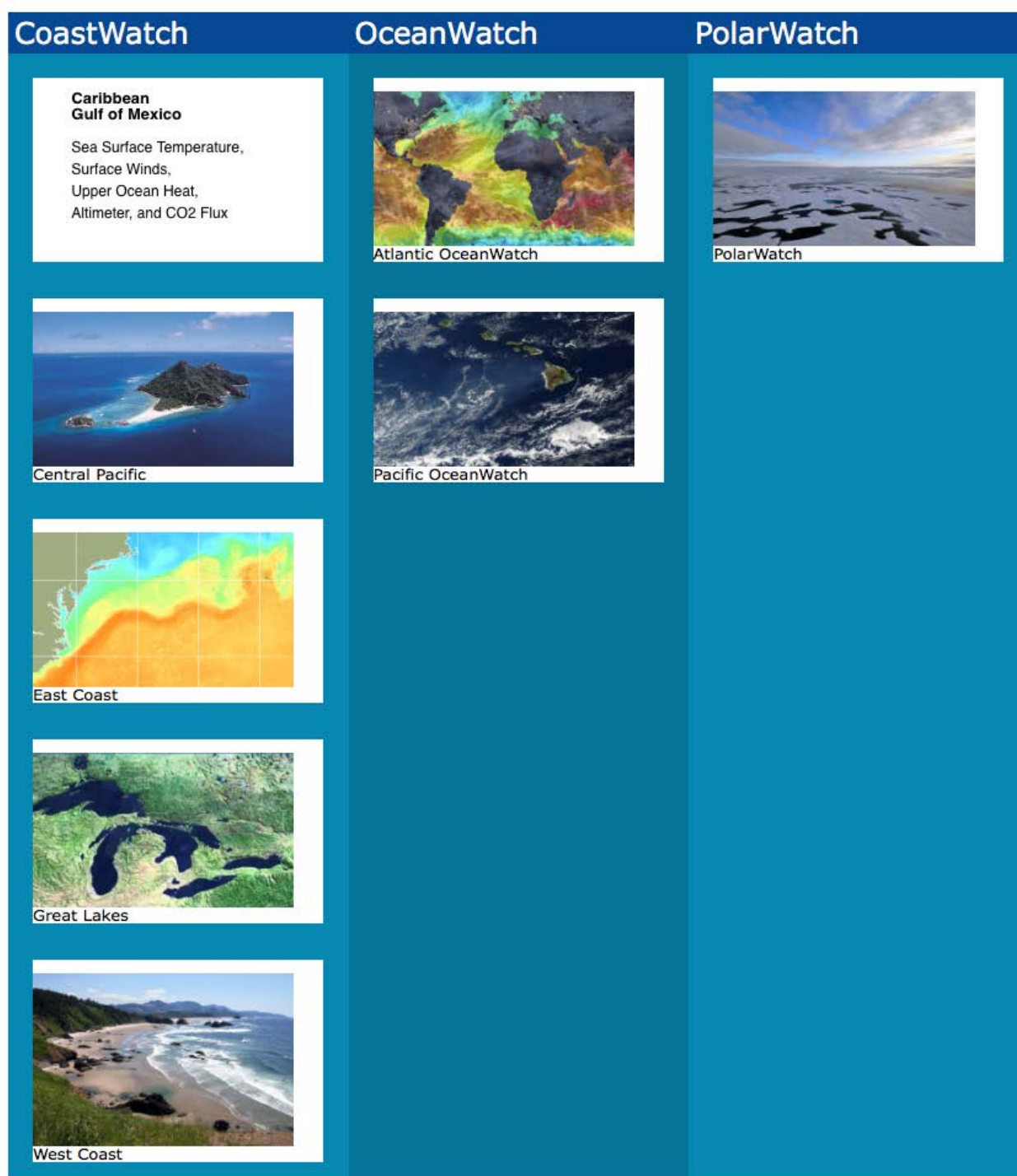
Winds, both magnitude (speed) and direction over the ocean drive other physical and chemical processes and so are used to model dynamic earth/ocean/atmosphere coupled systems ocean and are used for marine weather forecasting. Different remote sensing techniques may be used for gathering information on ocean surface winds including active radar and passive microwave.

### • True Color (Near Real Time)

Visible radiances can be combined to form images that look similar to a "photograph" of the earth and ocean from the satellite perspective.

[https://coastwatch.noaa.gov/cw\\_html/SatelliteDataProducts.html](https://coastwatch.noaa.gov/cw_html/SatelliteDataProducts.html)

## NOAA CoastWatch • OceanWatch Nodes



Central Operations and Regional Nodes make up NOAA CoastWatch/OceanWatch and provide for the distribution pathway for its satellite data. The regional nodes are housed around the country within NOAA line offices that participate in the CoastWatch program.

## ERDDAP (Environmental Research Division's Data Access Program)

<http://coastwatch.pfeg.noaa.gov/erddap/>

ERDDAP is a free and open source data server that provides an easy and consistent way to download gridded and tabular scientific datasets in common file formats. ERDDAP reformats your request into the required format of the remote server, gets the data from the remote server and then formats the data into the format you requested. ERDDAP's griddap lets you use the OPeNDAP (Open-source Project for a Network Data Access Protocol) hyperslab protocol to request data subsets, graphs and maps from datasets and ERDDAP's Web Map Service (WMS) lets you request an image with data plotted on a map.

## ERDDAP > griddap > Make A Graph

Dataset Title: **NOAA CoastWatch, Sea Surface Height Anomalies from Altimetry, Global, 2017-present, EXPERIMENTAL**

Institution: NOAA/NESDIS Center for Satellite Applications and Research (Dataset ID: nesdisSSH1day)

Information: [Summary](#) | [License](#) | [FGDC](#) | [ISO 19115](#) | [Metadata](#) | [Background](#) | [Data Access Form](#) | [Files](#)

Graph Type:

X Axis:

Y Axis:

Color:

Dimensions:  Start:  Stop:

latitude (degrees\_north):

longitude (degrees\_east):

Graph Settings: Color Bar:   N Sections:  Scale:

Draw the land mask: ☐ Y Axis Minimum:

[Redraw the Graph](#) (Please be patient. It may take a while to get the data.)

Optional: Then set the File Type:  and  or view the URL: [\(http://coastwatch.pfeg.noaa.gov/erddap/griddap/nesdisSSH1day.pdf?sla\(2017-10-19T00:00:00Z\)\)](http://coastwatch.pfeg.noaa.gov/erddap/griddap/nesdisSSH1day.pdf?sla(2017-10-19T00:00:00Z)) ([Documentation / Bypass this form](#)) ([File Type information](#))

## ERDDAP > griddap > Data Access Form

Dataset Title: **NOAA CoastWatch, Sea Surface Height Anomalies from Altimetry, Global, 2017-present, EXPERIMENTAL**

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Information: [Summary](#) | [License](#) | [FGDC](#) | [ISO 19115](#) | [Metadata](#) | [Background](#) | [Files](#) | [Make a graph](#)

Dimensions:  Start:  Stride:  Stop:  Size:  Spacing:

latitude (degrees\_north):

longitude (degrees\_east):

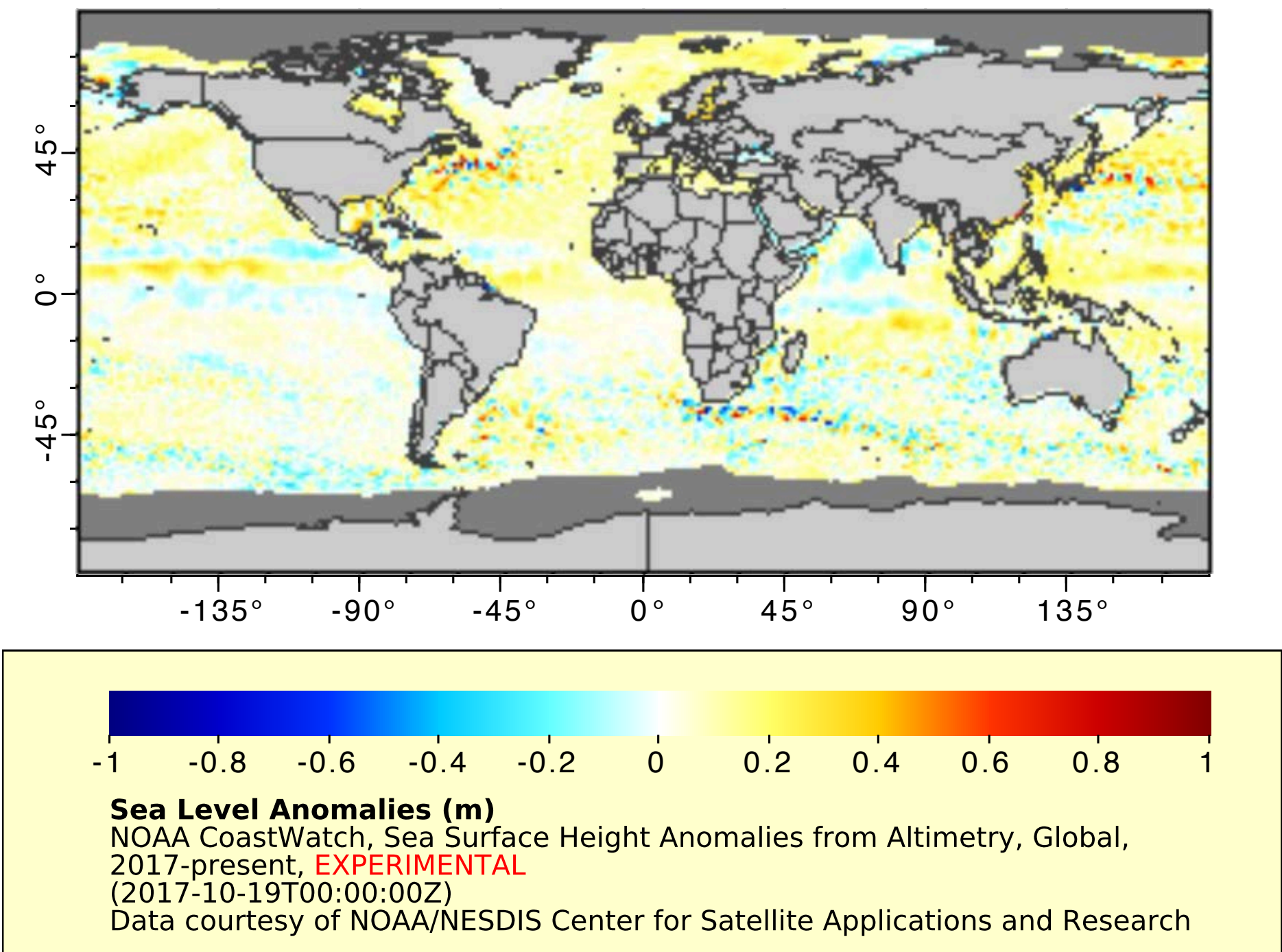
Grid Variables (which always also download all of the dimension variables)

☒ sla (Sea Level Anomalies, m)

File type:  View a UTF-8 .html web page with the data in a table. Times are ISO 8601 strings. [more info](#)

[Documentation / Bypass this form](#)

[Submit](#) (Please be patient. It may take a while to get the data.)



## NOAA CoastWatch • OceanWatch Optimal interpolation Level-3 sea level anomalies from multiple altimeter missions

Data Access: <ftp://ftp.star.nesdis.noaa.gov/pub/socd/lsa/rads/sla/daily/nrt>

[https://coastwatch.noaa.gov/cw\\_html/SSH\\_SeaLevelAnomaly.html](https://coastwatch.noaa.gov/cw_html/SSH_SeaLevelAnomaly.html)

Key	Description
Platform/Sensor	Jason-2; Jason-3; Sentinel-3A; CryoSat-2; SARAL
Measurement/Products	Earth Science > Oceans > Surface Sea Surface Height
DOI	n/a
Short Name	RADS-NRT-SLA-Daily-L3
Sample Filename	1-day: rads_global_nrt_sla_20170313_20170314_000.nc
Dataset Type	n/a
Processing Level	L3
Spatial Coverage	Global 180W-180E 90N-90S
Temporal Coverage	1 January 2017 - current
Resolution	0.25x0.25 longitude/latitude degree
Projection	n/a
Latency	12 hours
Swath Width	n/a
Sample Frequency	n/a
Temporal Repeat	Jason-2/Jason-3: 9.9156 days; Sentinel-3A: 27 days; CryoSat-2: 369 days; SARAL: ~35 days
Orbital Period	Jason-2/Jason-3: 112.4 minutes; Sentinel-3A: 101 minutes; CryoSat-2: 100 minutes; SARAL: 100.6 minutes
Orbit	n/a
Data Provider	Creator: Eric Leuliette, NOAA/NESDIS/STAR/SOCD/LSA
Keywords	Jason-2; Jason-3; Sentinel-3A; CryoSat-2; SARAL; sea surface height; sea level anomalies
Formats	n/a

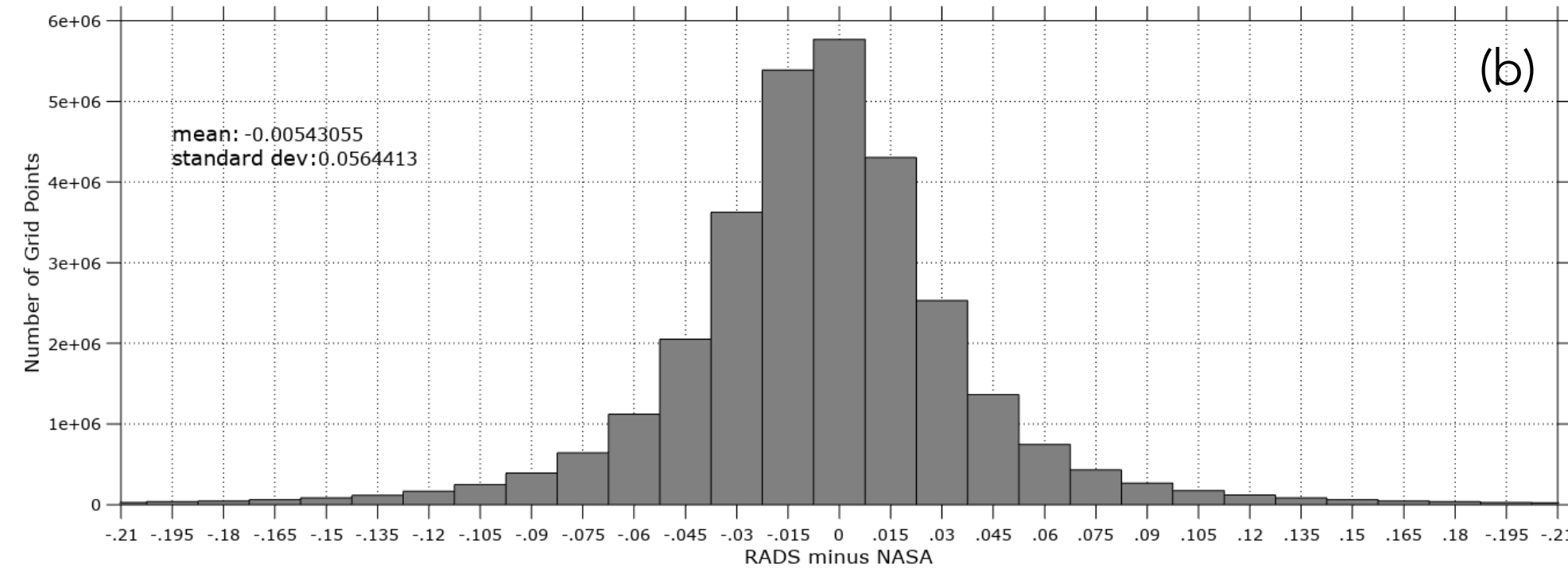
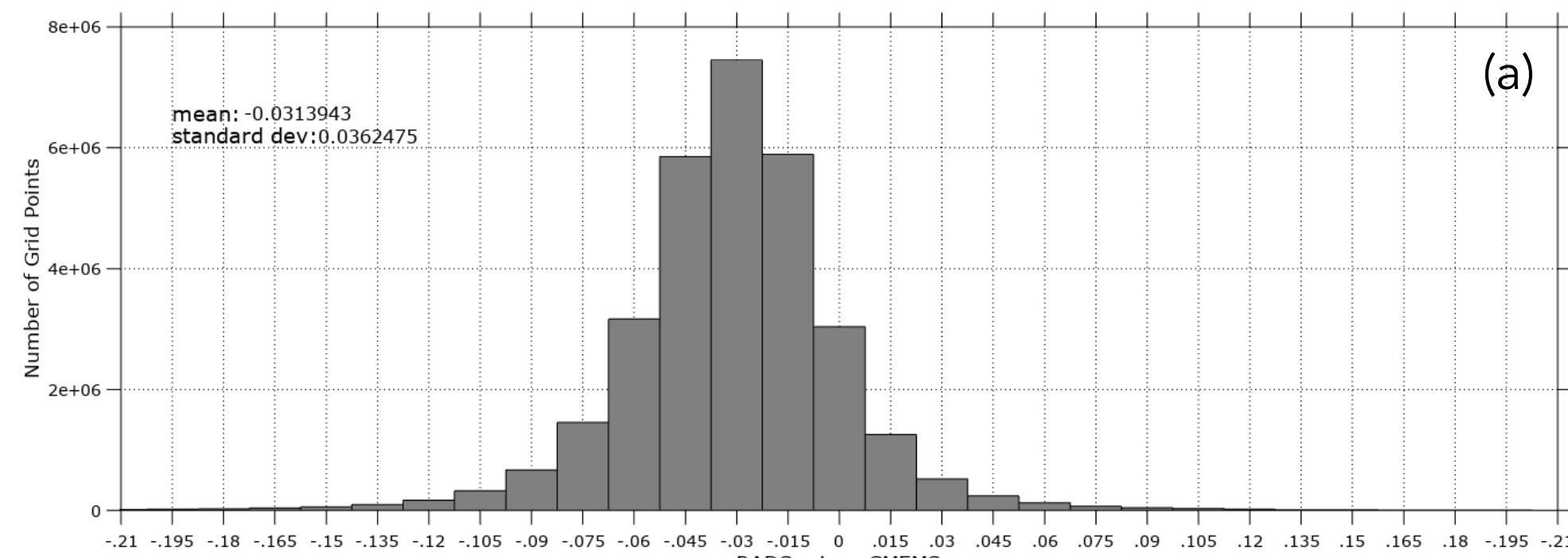


Figure 1. Histogram of the differences between our near real time sea level anomaly grids and CMEMS NRT grids (a) and the differences between our near real time sea level anomaly grids and JPL's grids (b) for every five days from January 2017 through October 2017.

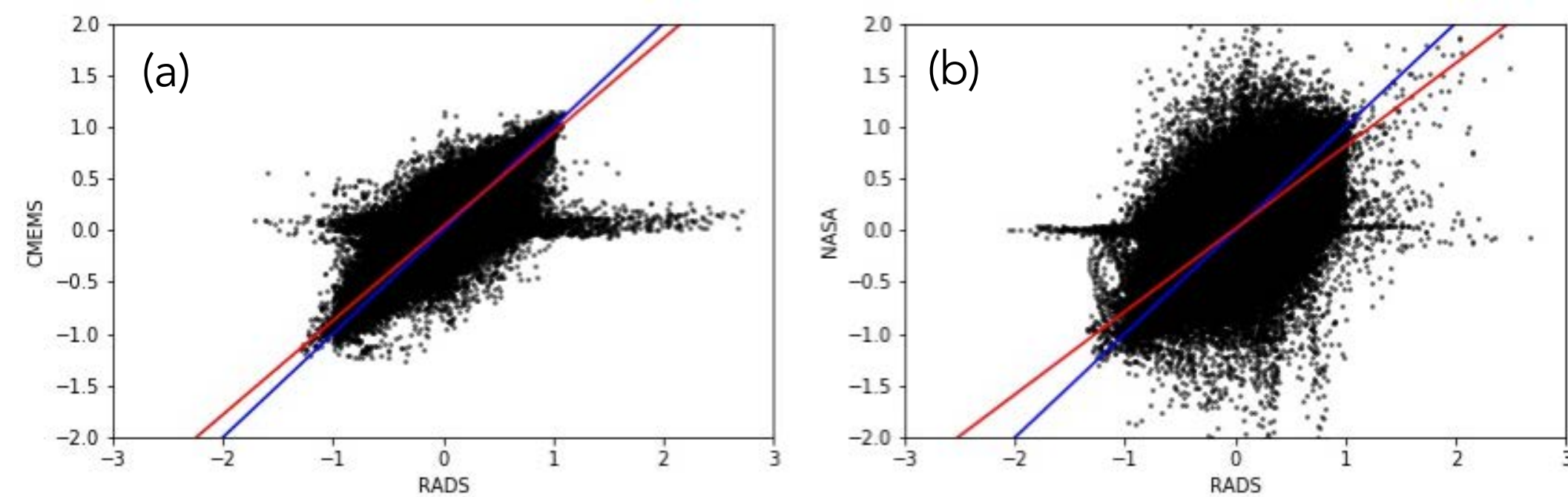


Figure 2. Scatter plot showing the relationship between our near real time sea level anomaly grids and CMEMS NRT grids (a) and our NRT sea level anomaly grids and JPL's grids (b) with data for every five days from January 2017 through October 2017.

## PolarWatch/ Future CoastWatch

NOAA PolarWatch (<https://polarwatch.noaa.gov/>) started in Fall of 2016. It is a joint effort between NOAA's Center for Satellite Applications and Research and Information Service and the Southwest Fisheries Science Center providing near real time and delayed mode data. In addition to providing our gridded level 3 sea level anomaly product, other parameters that PolarWatch will provide include: sea surface temperature (SST), wind speed, sea ice concentration, sea ice thickness, sea ice velocity, sea ice type, ocean color, and additional parameters determined by user need and data availability.

Tuning our error-weighting for the optimal interpolation has reduced the differences between our grids and the grids of AVISO/ CMEMS. We have also been working on removing the orbit error which will hopefully further reduce the differences. Sentinel-3A data will also soon be included. A delayed mode of the gridded sea level anomaly product will also soon be available on CoastWatch.

## Acknowledgments

The altimeter data is from the Radar Altimeter Database System (<http://rads.tudelft.nl/>). The Copernicus Marine Environment Monitoring Service gridded sea level anomaly data are available at <http://marine.copernicus.eu/services-portfolio/access-to-products>. JPL's gridded sea surface height anomalies are available at <https://podaac.jpl.nasa.gov/dataaccess>. CoastWatch information and website images are available at <https://coastwatch.noaa.gov>.

