



# Connecting Data Providers and Users - Examples from the West Coast Node of CoastWatch

Cara Wilson & Dale Robinson

NOAA CoastWatch West Coast Node

1<sup>st</sup> International Operational Satellite Oceanography Symposium

College Park, MD

June 17-19, 2019

**NOAA CoastWatch**



# CoastWatch is a national program funded by NESDIS<sup>1</sup>

## Regional nodes are embedded in NOAA line offices

NOAA is both a data provider (NESDIS) and a data user (other line offices)

### <sup>1</sup>NESDIS:

National Environmental  
Satellite, Data, and  
Information Service

### NMFS:

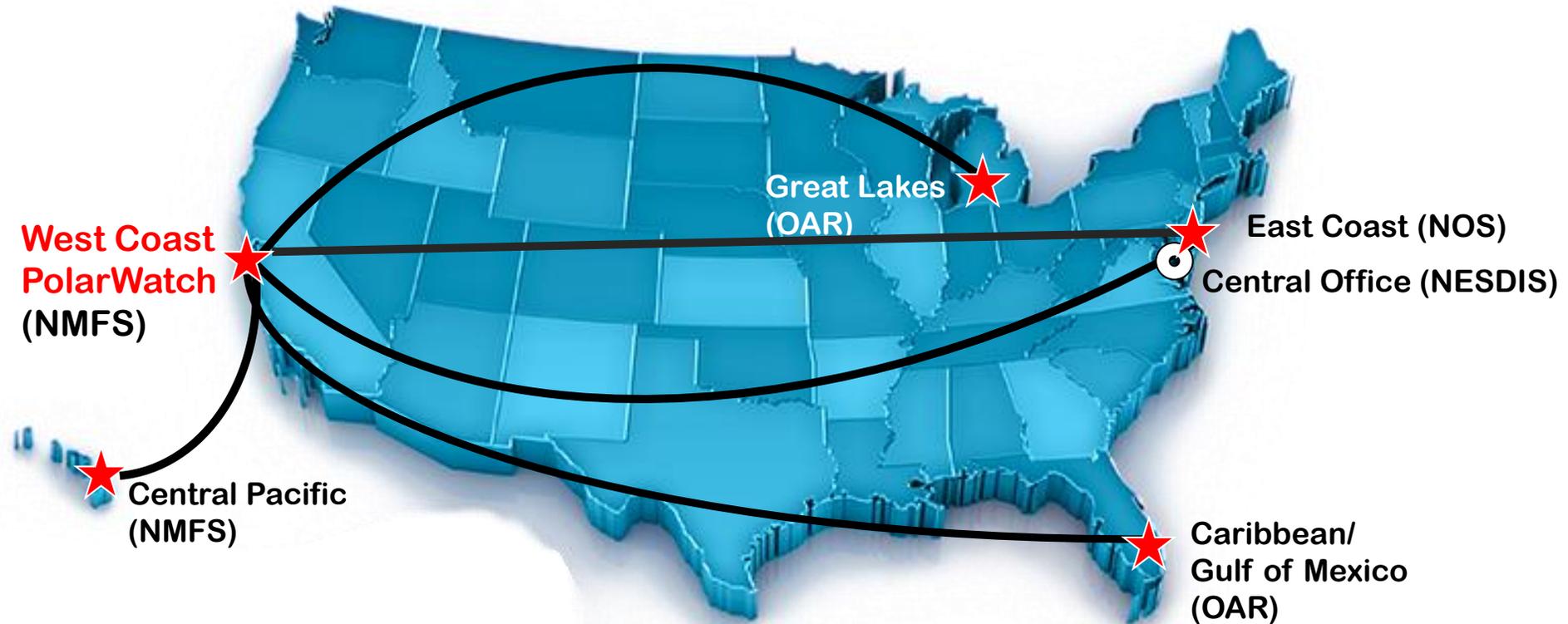
National Marine  
Fisheries Service

### NOS:

National Ocean Service

### OAR:

Oceanic and  
Atmospheric Research



# CoastWatch mission is to help users access and use satellite data

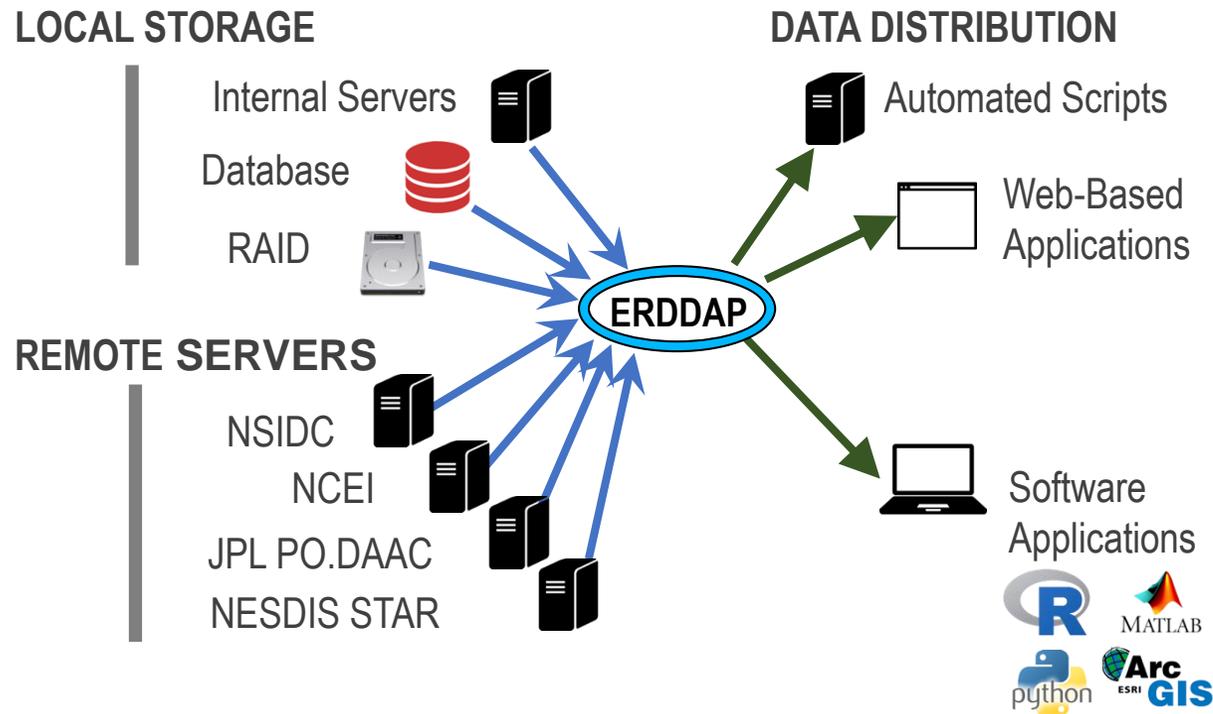


1. Provide access to datasets with data servers
2. Develop tools and tutorials to help users access and use data
3. Provide training and hands-on assistance
4. Find or create products in response to users needs
5. Work directly with users on projects

*The CoastWatch nodes are Value Added Providers*



# ERDDAP – designed to make data access easier



ERDDAP provides a simple, consistent way to:

- Subset datasets temporally and spatially
- Download data in > 30 formats
- Access data within analysis tools (R, Matlab, python...) using urls which completely define the data request
- Machine-to-machine data exchange

ERDDAP - developed at SWFSC/ERD by Bob Simons

- 80 ERDDAPs exists worldwide
- Every NOAA CoastWatch node has its own ERDDAP.

See Robinson et al. poster #381



# The ERDDAP interface is functional not beautiful



## ERDDAP > List of All Datasets

1392 matching datasets, listed in alphabetical order. View page: 1 (current) 2 .

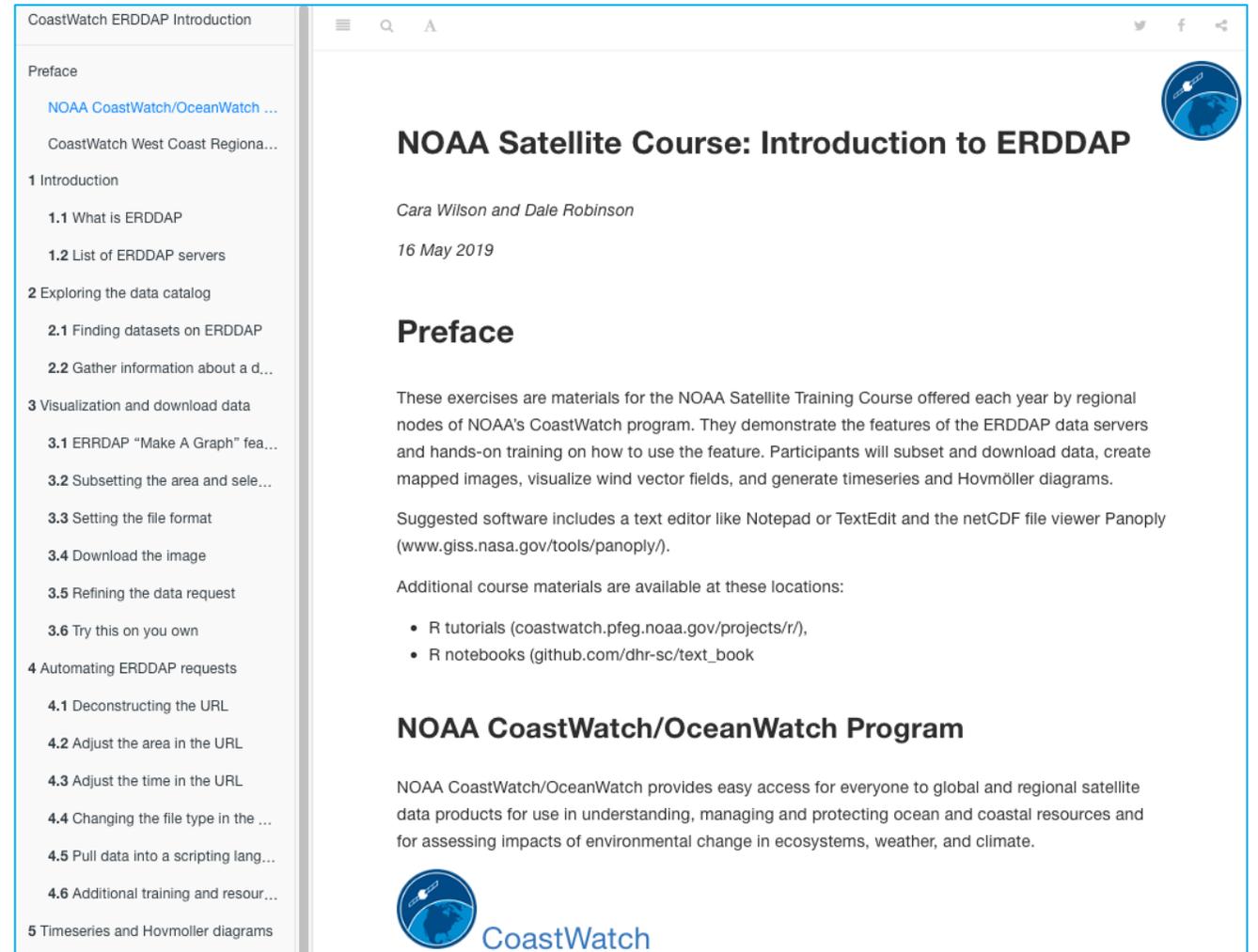
Grid DAP Data	Sub-set	Table DAP Data	Make A Graph	W M S	Source Data Files	Access-ible	Title	Sum-mary	FGDC, ISO, Metadata	Back-ground Info	RSS	E mail	Institution	Dataset ID
	set	data	graph			public	* The List of All Active Datasets in this ERDDAP *		M	background			NOAA NMFS SWFSC E...	allDatasets
data			graph			public	AMSRE Model Output, obs4MIPs NASA-JPL, Global, 1 Degree, 2002-2010, Monthly		F I M	background	RSS		Remote Sensing Sy...	jplAmsreSstMon
data			graph	M		public	AMSRE Model Output, obs4MIPs NASA-JPL, Global, 1 Degree, 2002-2010, Monthly, Lon+/-180		F I M	background	RSS		Remote Sensing Sy...	jplAmsreSstMon_LonPM180
		data	graph		files	public	AN EXPERIMENTAL DATASET: Underway Sea Surface Temperature and Salinity Aboard the Oleander, 2007-2010		F I M	background	RSS		NOAA OAR AOML	nodcPJJU
	set	data	graph			public	Animal Telemetry Network (ATN)		F I M	background	RSS		Animal Telemetry ...	gtoppAT
data			graph	M		public	Aquarius Sea Surface Salinity, L3 SMI, Version 5, 1.0°, Global, 2011-2015, 3-Month		F I M	background	RSS		NASA/GSFC OBPG	jplAquariusSSS3MonthV5
data			graph	M		public	Aquarius Sea Surface Salinity, L3 SMI, Version 5, 1.0°, Global, 2011-2015, 7-Day		F I M	background	RSS		NASA/GSFC OBPG	jplAquariusSSS7DayV5
data			graph	M		public	Aquarius Sea Surface Salinity, L3 SMI, Version 5, 1.0°, Global, 2011-2015, Daily		F I M	background	RSS		NASA/GSFC OBPG	jplAquariusSSSDailyV5
data			graph	M		public	Aquarius Sea Surface Salinity, L3 SMI, Version 5, 1.0°, Global, 2011-2015, Monthly		F I M	background	RSS		NASA/GSFC OBPG	jplAquariusSSSMonthlyV5
data			graph		files	public	Audio data from a local source.		M	background	RSS		???	testGridWav
	set	data	graph		files	public	Audio data from a local source.		M	background	RSS		???	testTableWav
data			graph	M		public	AVHRR Pathfinder Version 5.3 L3-Collated (L3C) SST, Global, 0.0417°, 1981-present, Daytime (1 Day Composite)		F I M	background	RSS		NCEI	nceiPH53sst1day
data			graph	M		public	AVHRR Pathfinder Version 5.3 L3-Collated (L3C) SST, Global, 0.0417°, 1981-present, Nighttime (1 Day Composite)		F I M	background	RSS		NCEI	nceiPH53sstn1day
data			graph			public	AVISO Model Output, obs4MIPs NASA-JPL, Global, 1 Degree, 1992-2010, Monthly		F I M	background	RSS		Centre National d...	jplAvisoSshMon
data			graph	M		public	AVISO Model Output, obs4MIPs NASA-JPL, Global, 1 Degree, 1992-2010, Monthly, Lon+/-180		F I M	background	RSS		Centre National d...	jplAvisoSshMon_LonPM180
data			graph	M	files	public	C-HARM 1-Day Advanced Forecast: Pseudo-Nitzschia, cellular domoic acid, and particulate domoic acid probability, California and Southern Oregon coast		F I M	background	RSS		UCSC, UCSD	charmForecast1day
data			graph	M	files	public	C-HARM 2-Day Advanced Forecast: Pseudo-Nitzschia, cellular domoic acid, and particulate domoic acid probability, California and Southern Oregon coast		F I M	background	RSS		UCSC, UCSD	charmForecast2day
data			graph	M	files	public	C-HARM 3-Day Advanced Forecast: Pseudo-Nitzschia, cellular domoic acid, and particulate domoic acid probability, California and Southern Oregon coast		F I M	background	RSS		UCSC, UCSD	charmForecast3day
data			graph	M	files	public	C-HARM Nowcast: Pseudo-Nitzschia, cellular domoic acid, and particulate domoic acid probability, California and Southern Oregon coast		F I M	background	RSS		UCSC, UCSD	charmForecast0day
	set	data	graph			public	CalCOFI Continuous Underway Fish-Egg Sampler		F I M	background	RSS		NOAA SWFSC	erdCalCOFIcufes
	set	data	graph			public	CalCOFI Cruises		M	background	RSS		NOAA SWFSC	erdCalCOFicruises



# Understanding ERDDAP with a hands-on tutorial

## Online ERDDAP tutorial

- Developed by WCN
- Walks users through using ERDDAP



The screenshot shows a web browser displaying the NOAA Satellite Course: Introduction to ERDDAP. The page has a white background with a blue header and footer. The main content area is titled "NOAA Satellite Course: Introduction to ERDDAP" and is authored by Cara Wilson and Dale Robinson, dated 16 May 2019. The page includes a "Preface" section that describes the course materials and suggests software like Notepad or TextEdit and Panoply. A list of additional course materials is provided, including R tutorials and notebooks. The NOAA CoastWatch/OceanWatch Program logo is visible in the bottom right corner of the page.

CoastWatch ERDDAP Introduction

Preface

NOAA CoastWatch/OceanWatch ...

CoastWatch West Coast Regiona...

1 Introduction

1.1 What is ERDDAP

1.2 List of ERDDAP servers

2 Exploring the data catalog

2.1 Finding datasets on ERDDAP

2.2 Gather information about a d...

3 Visualization and download data

3.1 ERDDAP "Make A Graph" fea...

3.2 Subsetting the area and sele...

3.3 Setting the file format

3.4 Download the image

3.5 Refining the data request

3.6 Try this on you own

4 Automating ERDDAP requests

4.1 Deconstructing the URL

4.2 Adjust the area in the URL

4.3 Adjust the time in the URL

4.4 Changing the file type in the ...

4.5 Pull data into a scripting lang...

4.6 Additional training and resour...

5 Timeseries and Hovmoller diagrams

## NOAA Satellite Course: Introduction to ERDDAP

*Cara Wilson and Dale Robinson*

16 May 2019

### Preface

These exercises are materials for the NOAA Satellite Training Course offered each year by regional nodes of NOAA's CoastWatch program. They demonstrate the features of the ERDDAP data servers and hands-on training on how to use the feature. Participants will subset and download data, create mapped images, visualize wind vector fields, and generate timeseries and Hovmöller diagrams.

Suggested software includes a text editor like Notepad or TextEdit and the netCDF file viewer Panoply ([www.giss.nasa.gov/tools/panoply/](http://www.giss.nasa.gov/tools/panoply/)).

Additional course materials are available at these locations:

- R tutorials ([coastwatch.pfeg.noaa.gov/projects/r/](http://coastwatch.pfeg.noaa.gov/projects/r/)),
- R notebooks ([github.com/dhr-sc/text\\_book](https://github.com/dhr-sc/text_book))

### NOAA CoastWatch/OceanWatch Program

NOAA CoastWatch/OceanWatch provides easy access for everyone to global and regional satellite data products for use in understanding, managing and protecting ocean and coastal resources and for assessing impacts of environmental change in ecosystems, weather, and climate.



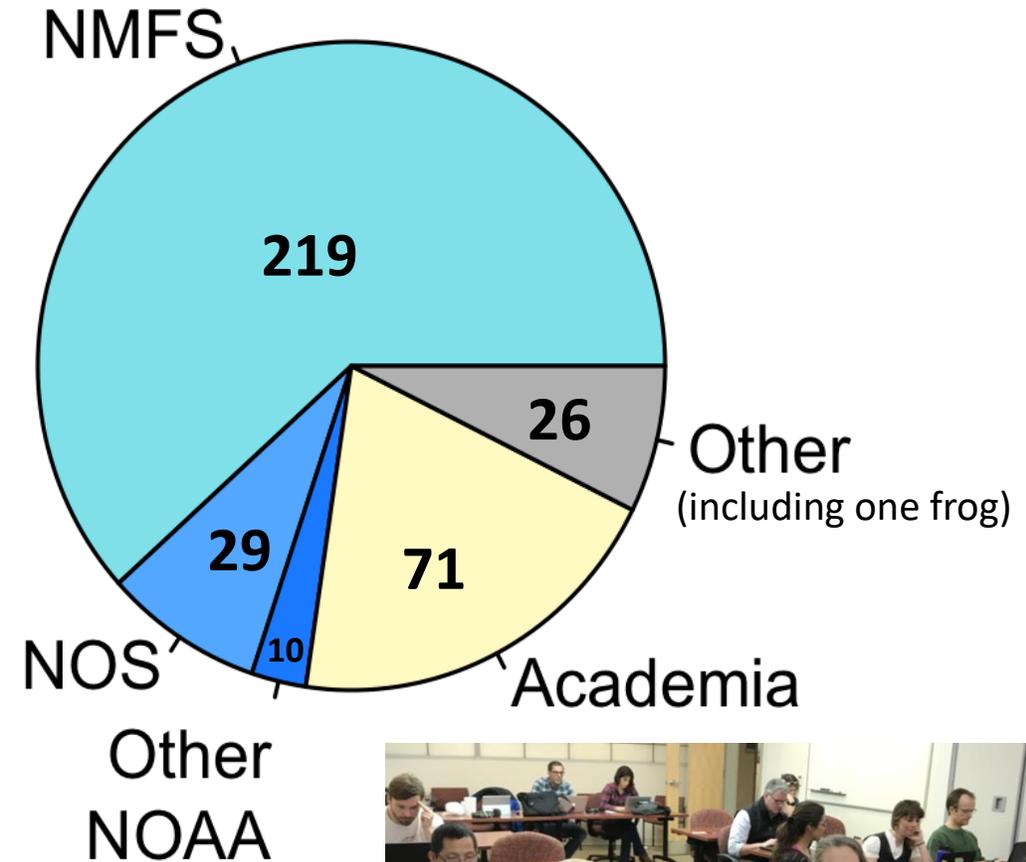
CoastWatch

<https://coastwatch.pfeg.noaa.gov/projects/erddap/>

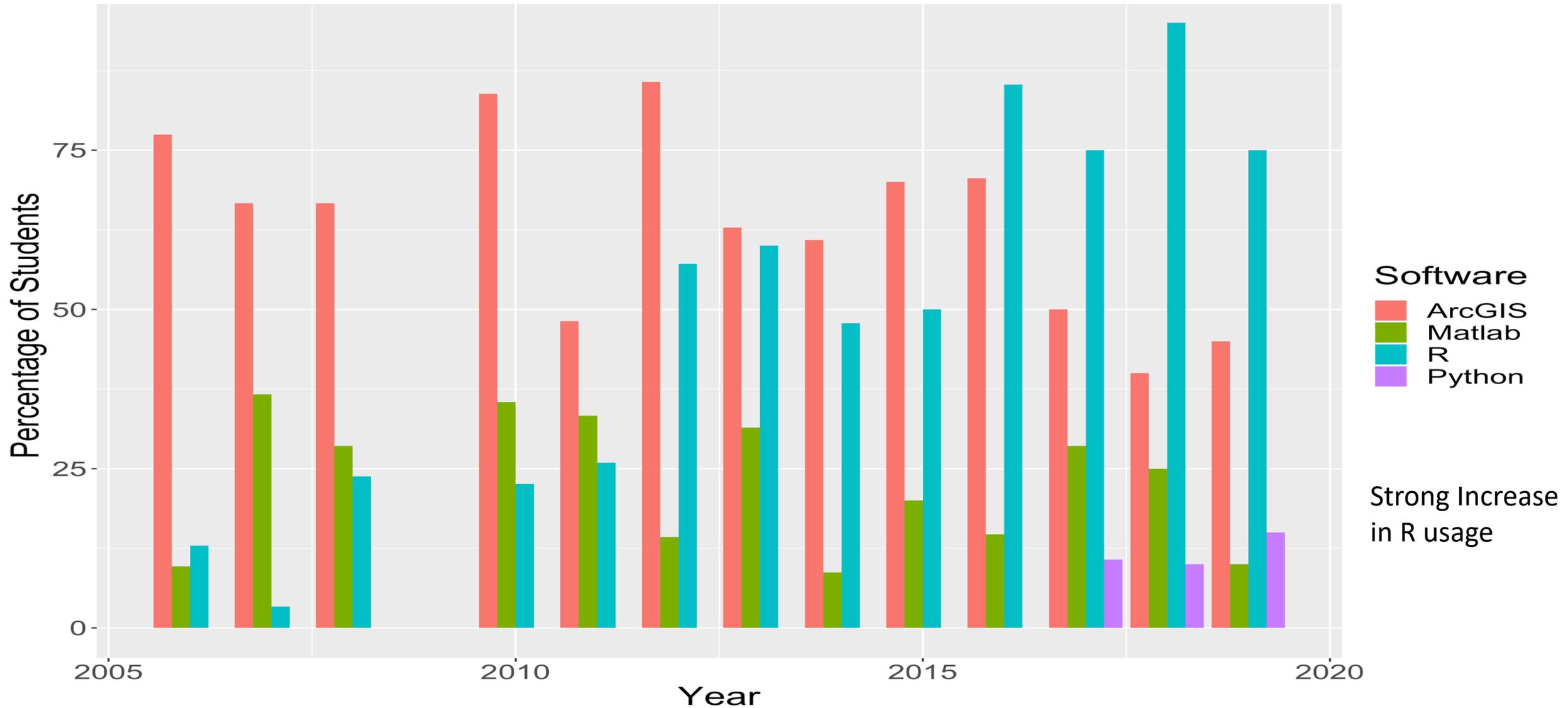


# CoastWatch ocean satellite data courses

- Developed in 2006 by the West Coast Node of CoastWatch
- 3-Day (free) course, held annually
- Targeted towards NMFS and NOS scientists and managers but open to anyone
- Show participants how to access satellite data *in the software they work with*: R, ArcGIS, Matlab and python
- Request slides from Participants
- In 2018 other CoastWatch nodes started offering this course
- 2019 Courses:
  - Mar, Juneau Alaska, WCN
  - April, Honolulu, Hawaii, CPN
  - May, College Park, MD, ECN
  - Aug, Galveston, TX, GOM/WCN
  - Sep, La Jolla, CA, WCN
  - Nov, Ann Arbor, MI, GLN
- Components used in the international PORSEC Tutorial, see Levy et al. poster #416



# Trends in software usage (WCN courses only)



# Lessons learned from NOAA Satellite Courses

- Special Issue on “Education and Training in Applied Remote Sensing” in the ISPRS *International Journal of Geo-Information*.
- Dedicated to educational and training programs that enable participants to integrate remote sensing data in applied or operational environments.
- Submission Deadline: **April 30, 2019**
- Guest Editor: Ana Prados (NASA/GSFC)
- Manuscript in revision

1 Article

2 **Lessons learned from the NOAA CoastWatch Ocean**  
3 **Satellite Course Developed for Integrating**  
4 **Oceanographic Satellite Data into Operational Use**

5 Cara Wilson <sup>1\*</sup> and Dale Robinson <sup>2</sup>

6 <sup>1</sup> NOAA/SWFSC/ERD, 99 Pacific Street, Suite 255A, Monterey, CA USA 93940; cara.wilson@noaa.gov

7 <sup>2</sup> Institute of Marine Sciences, University of California, Santa Cruz, Santa Cruz, CA 95064, USA.

8 \* Correspondence: cara.wilson@noaa.gov

9

10 Received: April 28, 2019; Accepted: date; Published: date

11 **Abstract:** Data from environmental satellites are underutilized in many branches of operational  
12 oceanography. Several challenges exist for potential users of satellite data that may impede or  
13 preclude employing satellite products in their work. In particular, users outside of the satellite  
14 community often encounter difficulty in discovering the types of satellite measurements that are  
15 available, and determining which satellite products are best for operational activities. In addition,  
16 the large choice of satellite data providers, each with their own data access protocols and formats,  
17 can make data access difficult. This paper focuses on efforts to overcome these barriers and increase  
18 the operational use of satellite data in fisheries management through the instructional activities  
19 applied in the NOAA Ocean Satellite Course, which introduces scientists and resource managers to  
20 ocean satellite products. The course includes training on tools that facilitate the access and use of  
21 satellite products in management activities. The course has been offered annually since 2006. Results  
22 of post-course surveys are analyzed to measure course effectiveness. Some lessons learned from  
23 conducting these courses are summarized.

24 **Keywords:** Remote Sensing, Satellites, NOAA, CoastWatch, Oceanography, Capacity Building,  
25 Training, Education, Research to Operations

26

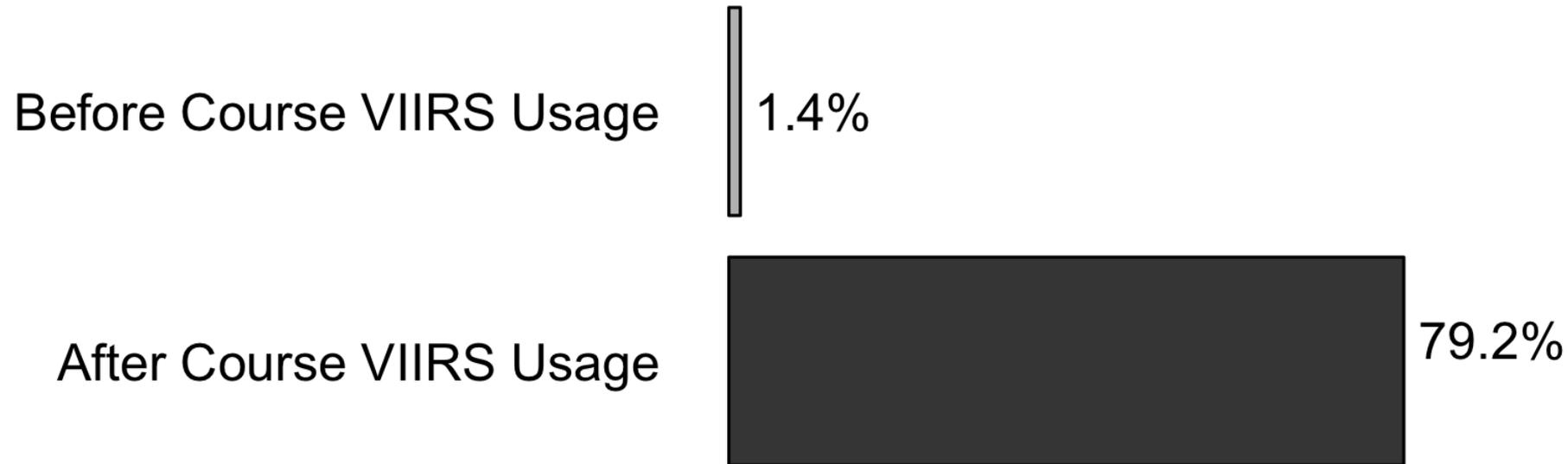
27 **1. Introduction**

28 The inclusion of satellite data into operational applications has often lagged behind its use in  
29 research applications [1]. The first meteorological satellites were launched in 1960's [2], but it took a  
30 decade before data from satellites were routinely used operationally and several more decades before  
31 satellite data were used in numerical weather prediction [1]. Similarly, ocean satellite data have been  
32 readily available for decades (Table 1), yet these data resources are still underutilized in many



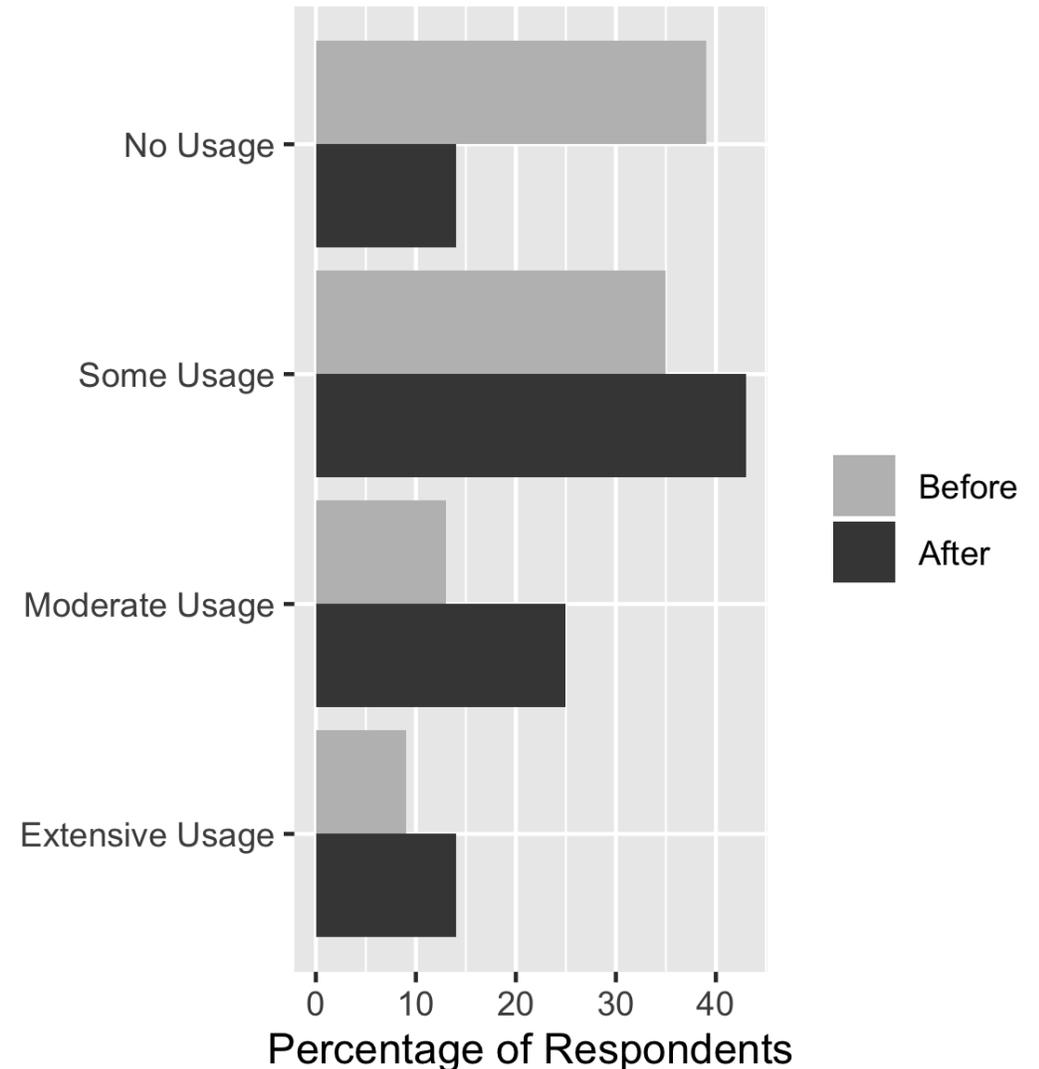
# Course Effectiveness: VIIRS data uptake among Participants

- From 2013-2017 participants were specifically asked about their pre- and post- course VIIRS usage
- 74 survey responses received for those years
- Most participants (81%) were not aware of VIIRS data before the course



# Course Effectiveness: Satellite data uptake among Participants

- In February 2019 a survey was sent to all participants who had ever taken the NOAA CoastWatch Ocean Satellite Course, including the 2018 ECN and PIN courses
- 293 participants were located and sent surveys
- 96 responded, a response rate of 33%.
- The amount of moderate satellite data usage doubled, from 13% before the course, to 26% after.
- The overall satellite usage of respondents increased from 61% prior to the course to 86% after taking the course.



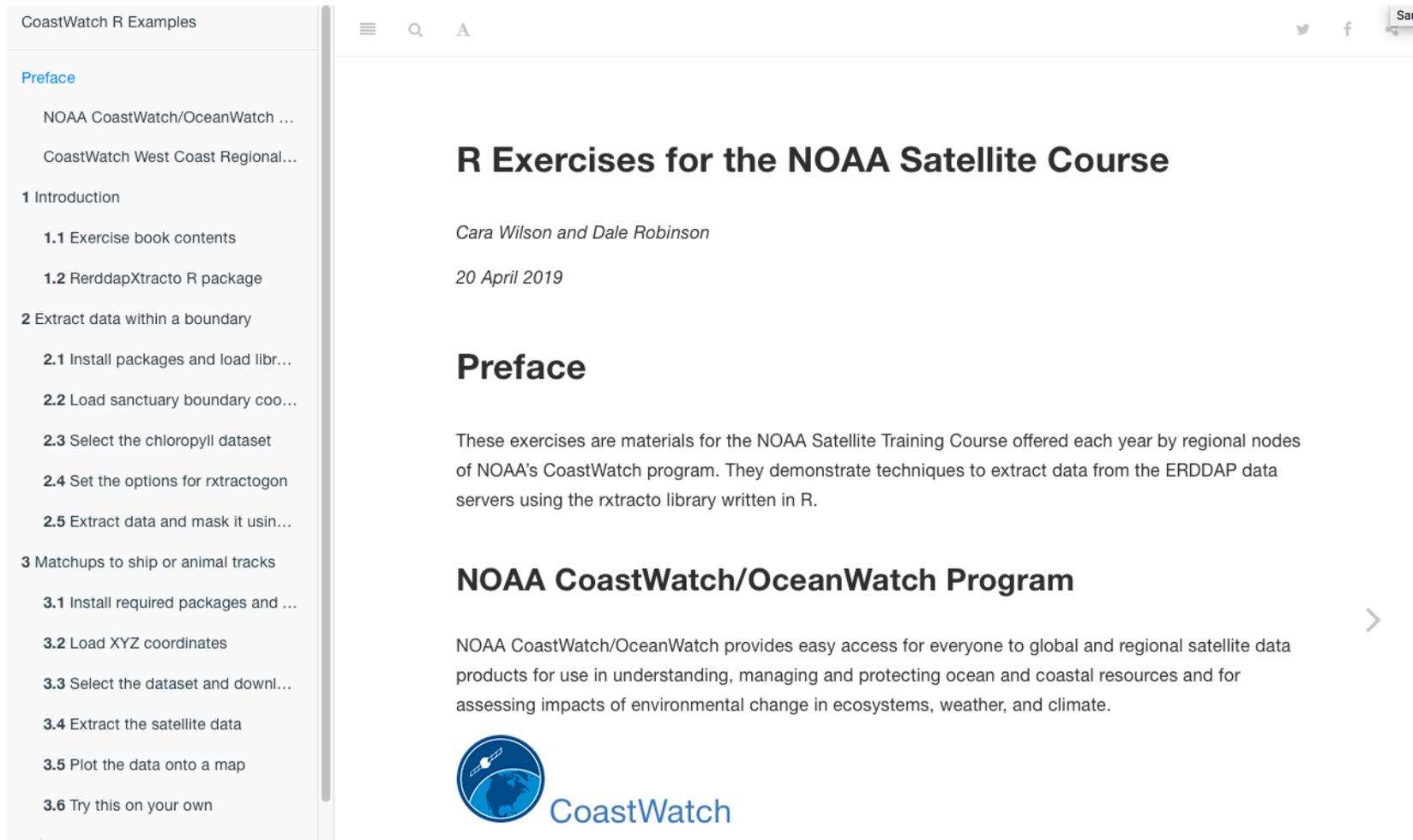
# RerddapXtracto tools help R users extract data from ERDDAP

- Developed based on user needs identified from the NOAA satellite courses
- R package written by Roy Mendelssohn (SWFSC/ERD), based on code by Dave Foley for Matlab
- Uses the rerddap and plotdap packages
- All packages are on cran
- Three main functions are within rerddapXtracto:
  - rxtracto**: extracts data along xyt points (e.g. tagged animals, ship stations)
  - rxtractogon**: extracts data within a user-supplied polygon
  - rxtracto\_3D**: extracts data from a 3-dimensional (latitude, longitude and time)
- Will work on any dataset on any ERDDAP

<https://coastwatch.pfeg.noaa.gov/xtracto>  
<https://github.com/rmendels/rerddapXtracto>



# An rerddapXtracto tutorial is available online



CoastWatch R Examples

NOAA CoastWatch/OceanWatch ...  
CoastWatch West Coast Regional...

1 Introduction

- 1.1 Exercise book contents
- 1.2 RerddapXtracto R package

2 Extract data within a boundary

- 2.1 Install packages and load libr...
- 2.2 Load sanctuary boundary coo...
- 2.3 Select the chlorophyll dataset
- 2.4 Set the options for rextractogon
- 2.5 Extract data and mask it usin...

3 Matchups to ship or animal tracks

- 3.1 Install required packages and ...
- 3.2 Load XYZ coordinates
- 3.3 Select the dataset and downl...
- 3.4 Extract the satellite data
- 3.5 Plot the data onto a map
- 3.6 Try this on your own

## R Exercises for the NOAA Satellite Course

*Cara Wilson and Dale Robinson*

20 April 2019

### Preface

These exercises are materials for the NOAA Satellite Training Course offered each year by regional nodes of NOAA's CoastWatch program. They demonstrate techniques to extract data from the ERDDAP data servers using the rextracto library written in R.

### NOAA CoastWatch/OceanWatch Program

NOAA CoastWatch/OceanWatch provides easy access for everyone to global and regional satellite data products for use in understanding, managing and protecting ocean and coastal resources and for assessing impacts of environmental change in ecosystems, weather, and climate.



<https://coastwatch.pfeg.noaa.gov/projects/r/>



# Participant Slide: salmon survival in 2011

Brian Burke, Fish Ecology Division, NWFSC, NOAA Fisheries, 2014 class

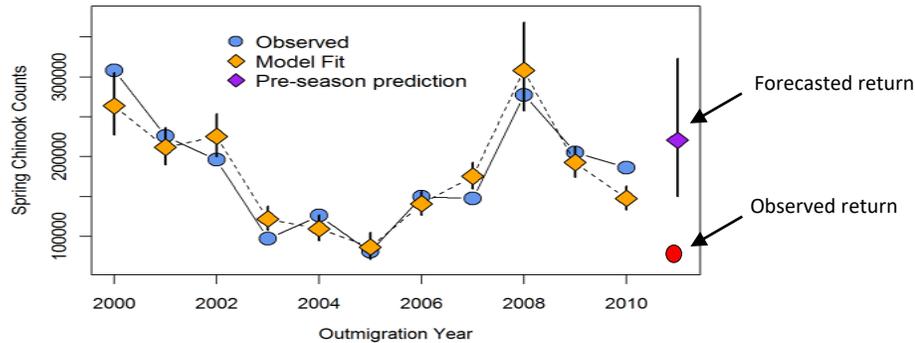


Figure 1. Observed and fitted adult spring Chinook salmon returns, with the forecasted and observed returns for fish entering the ocean in 2011.

May 2008

May 2009

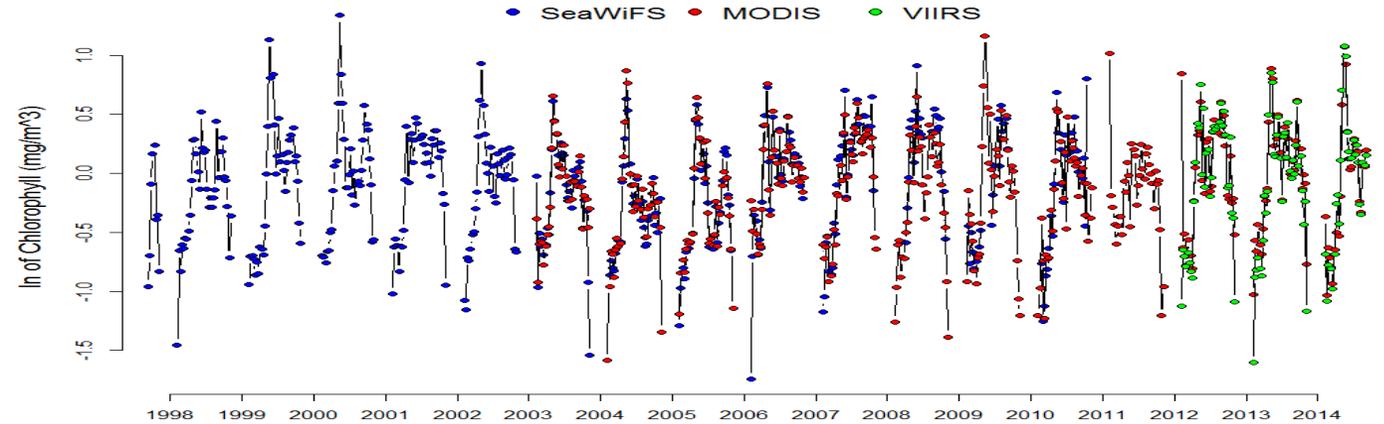
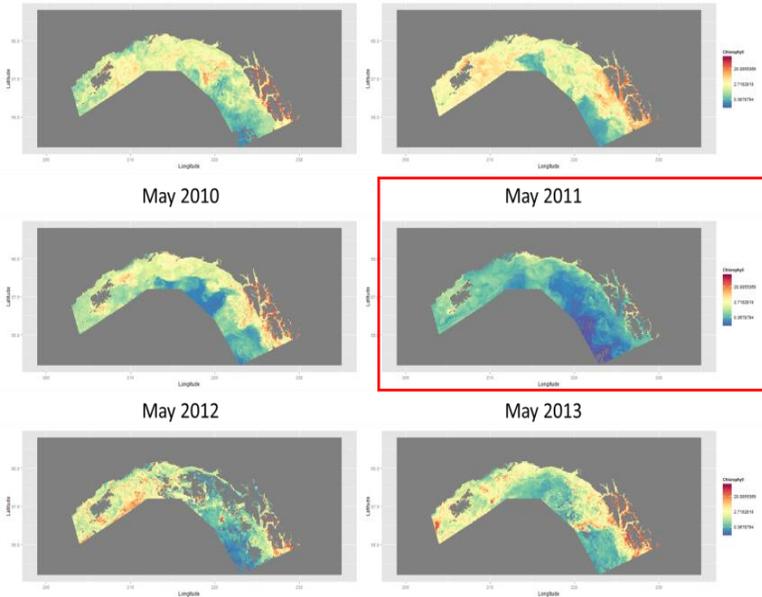


Figure 3. Time series of 8-day composite chlorophyll concentrations.

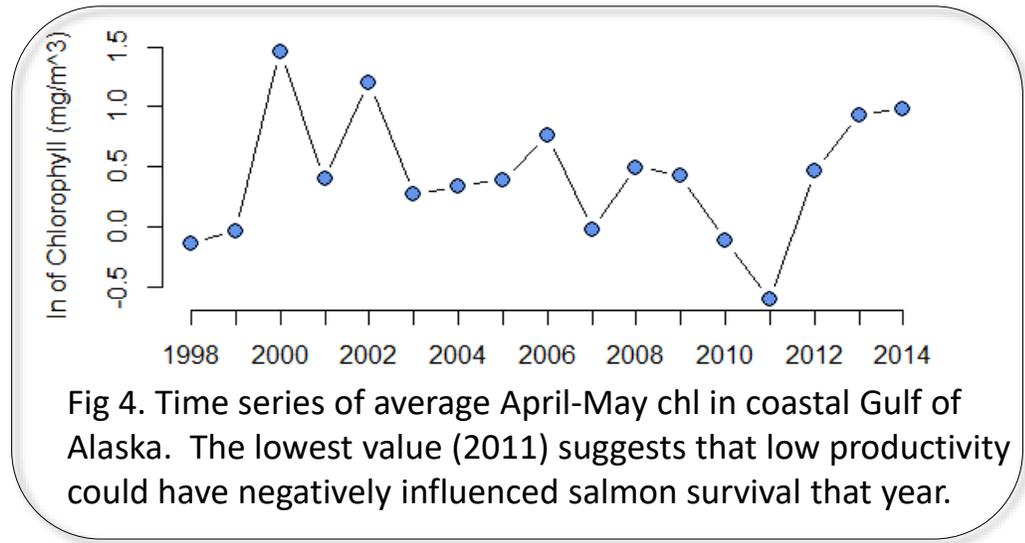
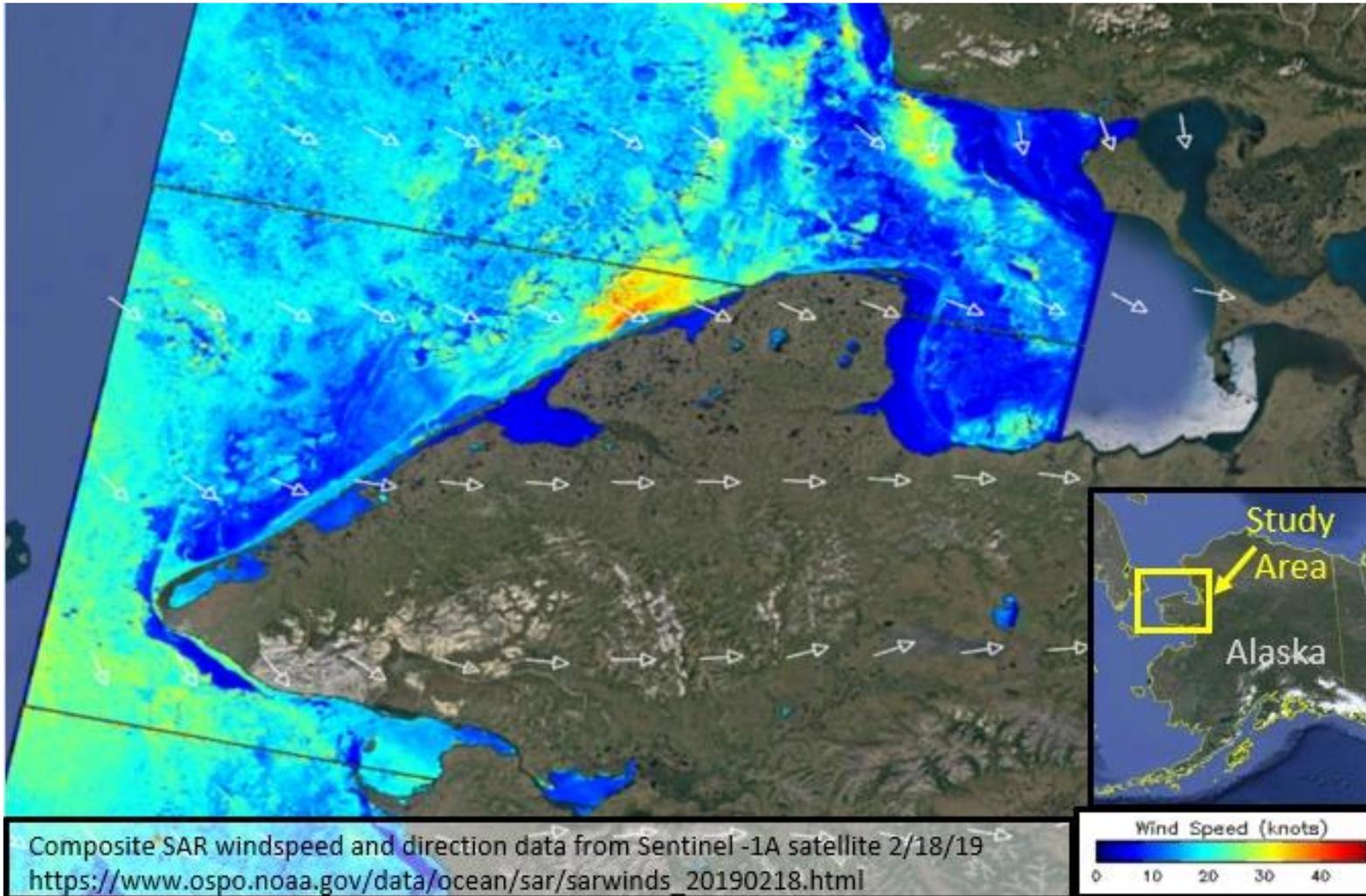


Fig 4. Time series of average April-May chl in coastal Gulf of Alaska. The lowest value (2011) suggests that low productivity could have negatively influenced salmon survival that year.

# Participant Slide: SAR data for monitoring coast storm hazards

Tahzay Jones, NPS, 2019 Satellite Course participant (Juneau)



- Seward Peninsula is host to natural and cultural resources significant enough for the majority of the northeast coast to be designated a Natural Preserve.
- Storm activity in ice-free conditions is accelerating erosion.
- Erosion threatens coastal villages, important archeological artifacts and migratory bird habitat.



# Ecosystem-Socioeconomic Profile (ESP) report of the Alaska Sablefish Stock

Kalei Shotwell, NOAA Alaska Fisheries Science Center (AFSC) Auke Bay Laboratory  
NOAA CoastWatch- WCN & PolarWatch • polarwatch.noaa.gov

AFSC is developing stock-specific Ecosystem-Socioeconomic Profile (ESP) reports, which will be part of the traditional stock assessment fishery evaluation (SAFE) reports. Satellite data from PolarWatch was used in the ESP report.

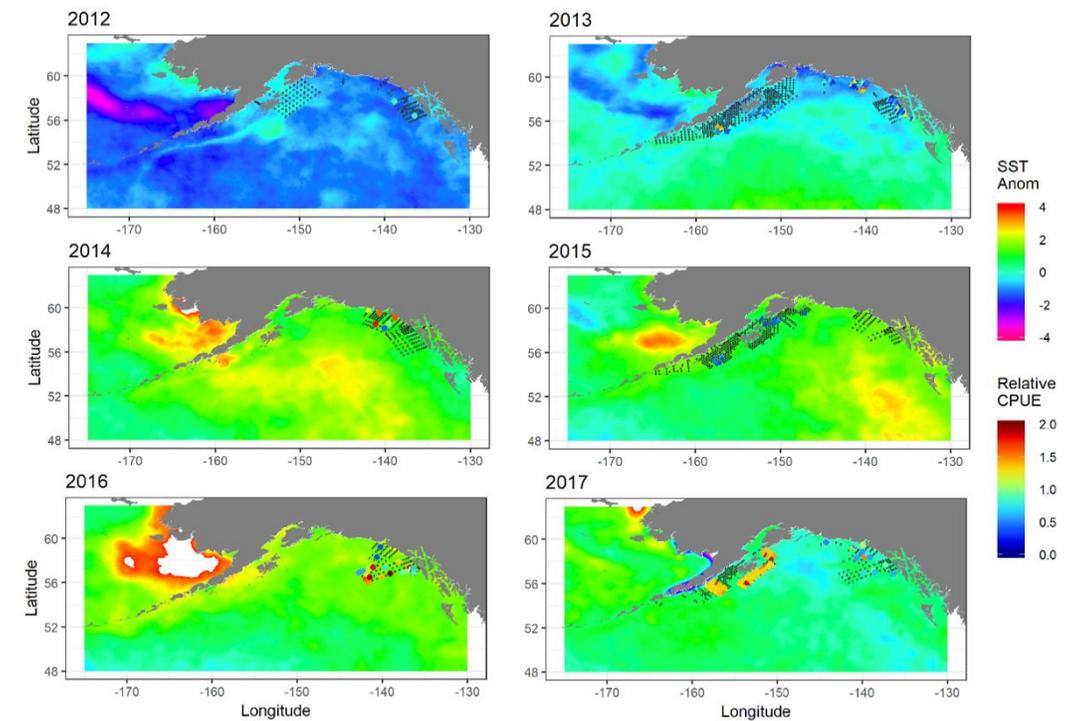
## Appendix 3C. Ecosystem-Socioeconomic Profile of the Sablefish stock in Alaska

S. Kalei Shotwell, Ben Fissel, Dana H. Hanselman  
November 2017



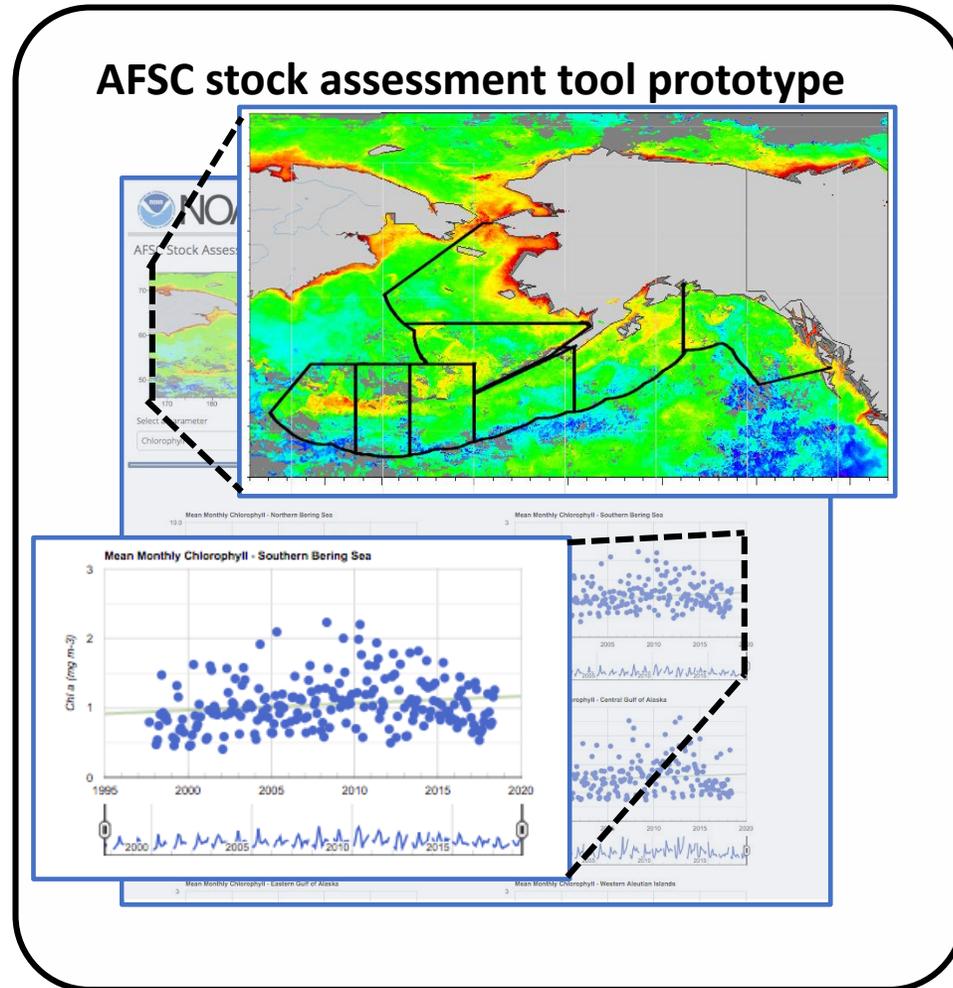
*With Contributions from:*

Mayumi Arimitsu, Alison Deary, Miriam Doyle, Georgina Gibson, Ron Heintz, Stephen Kasperski, Chris Lunsford, Jodi Pirtle, Ashwin Sreenivasan, Kally Spalinger, Wesley Strasburger, Johanna Vollenweider, Sarah Wise, Ellen Yasumiishi



MUR SST anomalies for the Gulf of Alaska AFSC from May 2012-2016 during the annual survey (stations overlain in black).

# Develop tool to bring satellite data into stock assessment



Worked with AFSC to develop a prototype for a tool with indicators derived from SST and chlorophyll

## ACCOMPLISHMENTS

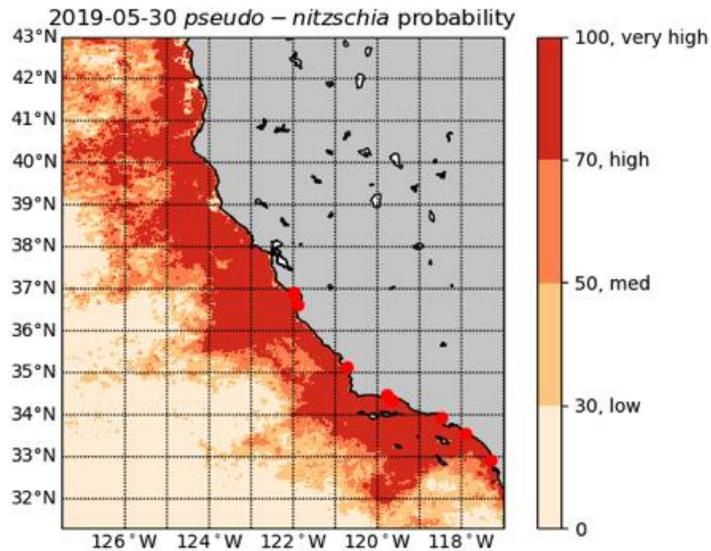
- Extracted Chlorophyll and SST timeseries within sectors to generate ERDDAP datasets
- Develop a prototype online tool to view and download indicators by sector, with ERDDAP on the backend
- AFSC is evaluating prototype

## FUTURE GOALS

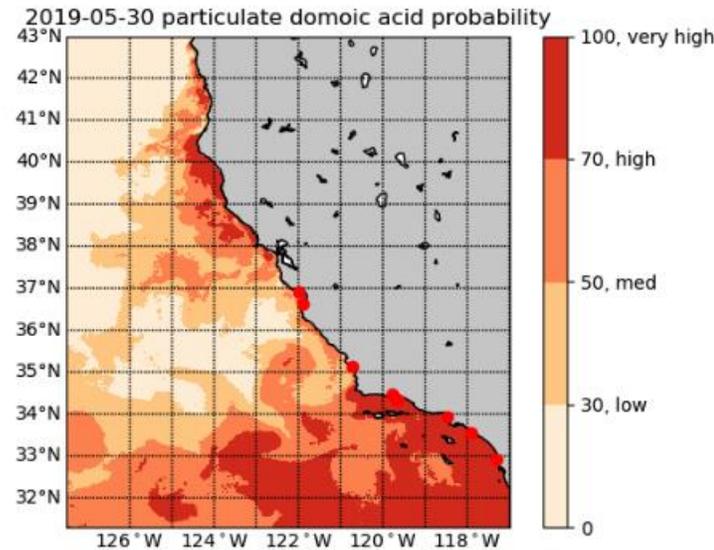
- Finish development
- Transition tool to AFSC ERDDAP

# C-HARM Model, California-Harmful Algal Risk Mapping

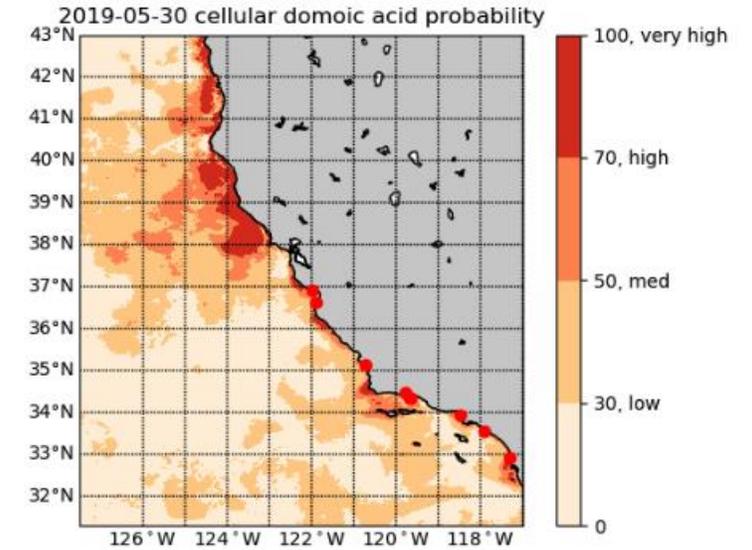
*Pseudo-nitzschia* Nowcast



Particulate Domoic Acid Nowcast



Cellular Domoic Acid Nowcast



CENCOOS Website:

Data served on WCN ERDDAP:

<https://www.cencoos.org/data/models/habs>

<https://coastwatch.pfeg.noaa.gov/erddap/griddap/charmForecast0day.graph>

<https://coastwatch.pfeg.noaa.gov/erddap/griddap/charmForecast1day.graph>

<https://coastwatch.pfeg.noaa.gov/erddap/griddap/charmForecast2day.graph>

<https://coastwatch.pfeg.noaa.gov/erddap/griddap/charmForecast3day.graph>



# Loggerhead turtle online management tool

Higher than normal SST have been correlated with the presence of loggerheads in the waters off Southern California that overlap with California drift gillnet fishing grounds. In an effort to reduce bycatch of loggerhead turtles, the Pacific Loggerhead Conservation Area was established in 2003 by NMFS.

The Pacific Loggerhead Conservation Area is subject to closure to drift gillnet fishing from June 1 to August 31 if the following conditions are met:

- an El Niño event is occurring or is forecast to occur
- El Niño conditions (warmer than normal waters) occur off Southern California.

<https://coastwatch.pfeg.noaa.gov/loggerheads>

The screenshot shows the NOAA CoastWatch West Coast Regional Node interface for Loggerhead Turtle Conservation. At the top, there is a navigation bar with tabs for "Background", "Conservation Area Status", and "Data Dashboard". A prominent red banner indicates "Closure is in effect" with dates from June 1, 2019, to August 31, 2019. Below this, a section titled "Environmental Conditions" contains two panels. The "El Niño Status" panel shows a "Status: El Niño Advisory" and a "Forecast" that a weak El Niño is likely to continue through the Northern Hemisphere summer 2019 (65% chance) and possibly fall (50-55% chance). The "Closure Area Sea Temperature" panel displays a table for the year 2018 with columns for months from November to April, showing temperature and anomaly values. Below the table, it notes that the data represents recent and historical monthly sea surface temperatures within the Loggerhead sea turtle conservation area. A "Monthly Sea Surface Maps" section at the bottom features two maps: "Sea Surface Temperature" and "Sea Surface Temperature Anomaly" for April 2019. Both maps show the coastal region of Southern California with a black outline indicating the conservation area. The SST map uses a color scale from 54 to 82 degrees Fahrenheit, while the anomaly map shows deviations from the average temperature, ranging from -5 to 5 degrees Fahrenheit.

**NOAA COASTWATCH WEST COAST REGIONAL NODE**  
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION

Loggerhead Turtle Conservation

**Closure is in effect**  
Closure dates: June 1, 2019 - August 31, 2019

NMFS is prohibiting fishing with large-mesh drift gillnet gear in the Pacific Loggerhead Conservation Area this year.  
\*NOAA National Marine Fisheries Service

**Environmental Conditions**

**El Niño Status**

Status: El Niño Advisory

Forecast:  
A weak El Niño is likely to continue through the Northern Hemisphere summer 2019 (65% chance) and possibly fall (50-55% chance).

Updated: 11 April, 2019  
\*NOAA's Climate Prediction Center

**Closure Area Sea Temperature**

2018

	Nov	Dec	Jan	Feb	Mar	Apr
Temperature	18.7	16.9	15.4	14.9	15	15.5
Anomaly	1.5	1.4	0.7	0.4	0.6	0.8

Recent and historical monthly sea surface temperatures within the Loggerhead sea turtle conservation area. \*GHRSSST\_MUR dataset

**Monthly Sea Surface Maps**

**Sea Surface Temperature**

SST, Apr-2019

Monthly mean sea surface temperature off Southern California. The Pacific Loggerhead Conservation Area is located within the black lines and the coast. Use arrows to view the last six months of measurements. \*GHRSSST\_MUR dataset

**Sea Surface Temperature Anomaly**

SST Anomaly, Apr-2019

Monthly mean surface temperature anomaly (deviation from the average temperature) off Southern California. The Pacific Loggerhead Conservation Area is located within the black lines and the coast. Use arrows to view the last six months of measurements. \*GHRSSST\_MUR dataset



# EcoCast dynamic ocean management tool

The EcoCast Map product is a novel fishery sustainability tool that uses satellite data and animal weighting factors to help fishers and managers better evaluate how to allocate fishing effort to optimize the catch of target species (e.g. swordfish) while minimizing the accidental bycatch of blue sharks and protected species (leatherback sea turtles, California sea lions).

<https://coastwatch.pfeg.noaa.gov/ecocast>

**NOAA COASTWATCH WEST COAST REGIONAL NODE**  
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION

**EcoCast** EcoCast Map EcoCast Explorer About EcoCast

EcoCast Map Product Map only page

Most recent daily maps

previous ●●●●● newer

**EcoCast**  
An Eco-informatic Tool for Fisheries Sustainability  
**Experimental Product**

**Jun 02 2019**

**Species weightings**  
Blue sharks weighting = -0.1  
Sea lions weighting = -0.05  
Leatherbacks weighting = -0.9  
Swordfish weighting = 0.9

**Environmental data**  
Sea surface temperature is from 2019-06-02  
Chlorophyll a is from 2019-06-02  
Eddy kinetic energy is from 2019-06-02  
Sea surface height is from 2019-06-02  
Surface wind is from 2019-06-02

1.0  
better to fish  
poorer to fish  
-1.0

45  
40  
35  
30

-130 -128 -126 -124 -122 -120 -118 -116

Map created 2019-06-02 by IM, Beth, postscript, image, data: 2019-06-02

EcoCast is a dynamic ocean management tool that aims to minimize fisheries bycatch and maximize fisheries target catch in real-time. Map shows daily relative bycatch target catch probabilities. Species weightings reflect management priorities and recent catch events. Environmental data are used to predict where species are likely to be each day.

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**EcoCast Map Product FAQs**

- What is the EcoCast Map product?
- How do I use the EcoCast Map product?
- How is the EcoCast Map product made?
- How are the species weightings determined?
- What environmental data are used?
- Can I access the environmental data?

**Download EcoCast Data**

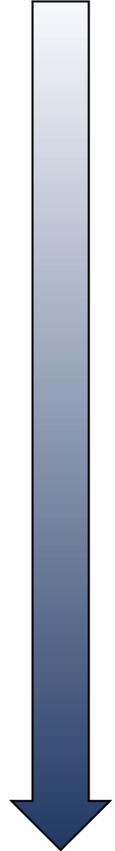
The EcoCast product data can be downloaded from the ERD/CoastWatch West Coast ERDDAP server:

- EcoCast Map product as a data file
- Animal weighting factors and the dates of the environmental data used for each map



# CoastWatch mission is to help users access and use satellite data

INCREASING  
ASSISTANCE TO USER



1. Provide access to datasets with data servers:

[ERDDAP](#)

2. Develop tools and tutorials to help users access and use data:

[Online tutorials on R scripts & ERDDAP, EDC, rerrdapXtracto package](#)

3. Provide training and hands-on assistance:

[NOAA Satellite Course](#)

4. Find or create products in response to users needs:

[OC-CCI products, MUR SST Anomaly](#)

5. Work directly with users on projects:

[C-HARM, AFSC Stock Assessment, Loggerhead Turtle Management Tool](#)



# Answers to Questions 1-2

## 1. What do you use the data/products for? What is their purpose?

The CoastWatch nodes are Value Added Providers, they serve as middlemen, easing data delivery and access between providers and users. The primary users of the CoastWatch West Coast Node are the National Marine Fisheries Service (NMFS), the Integrated Ocean Observing System (IOOS), and universities on the US West Coast who use satellite data for stock assessment, environmental monitoring, and ecosystem management.

## 2. What data / products are you using and are they described adequately?

The CoastWatch West Coast Node serves over 1400 datasets that include satellite data (SST, ocean color, SSH, ocean vector and scalar winds, SSH and sea-ice), modeling data, and in situ measurements (Argo floats, NDBC buoy, shipboard measurements). All datasets have metadata that comply with CF and ACDD standards, including links to data descriptions from the data providers. Often we need to augment the metadata to bring it into compliance.



# Answers to Questions 3-5

## 3. What are the barriers and problems you encountered?

ERDDAP works best as an aggregator of datasets if the datasets can be accessed via a data service like aggregated THREDDS. Often the datasets are available only via FTP, HTTPS, or on THREDDS without aggregation, which requires downloading and storing data locally.

## 4. What is easy and useful?

Datasets that blend sensor data from many mission to increase coverage in space and time, for example the ESA CCI Ocean Colour Product.

## 5. What would you like to see done differently?

Better metadata associated with the datasets, blended datasets (sensor independent), and datasets with longer timespans.



# Questions?

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