

# ESA Climate Change Initiative

ESA Climate Office

[cci.esa.int](http://cci.esa.int) | [@esaclimate](https://twitter.com/esaclimate)

ESA UNCLASSIFIED - For Official Use



# Harwell Science Campus, near Oxford



ECSAT – ESA's base in the UK....



Home of the **ESA Climate Office** – ESA's hub for climate research

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European Space Agency

# ESA Climate Office



Central point for coordinating all Earth  
Observation work conducted by ESA relating  
to **climate and climate change**



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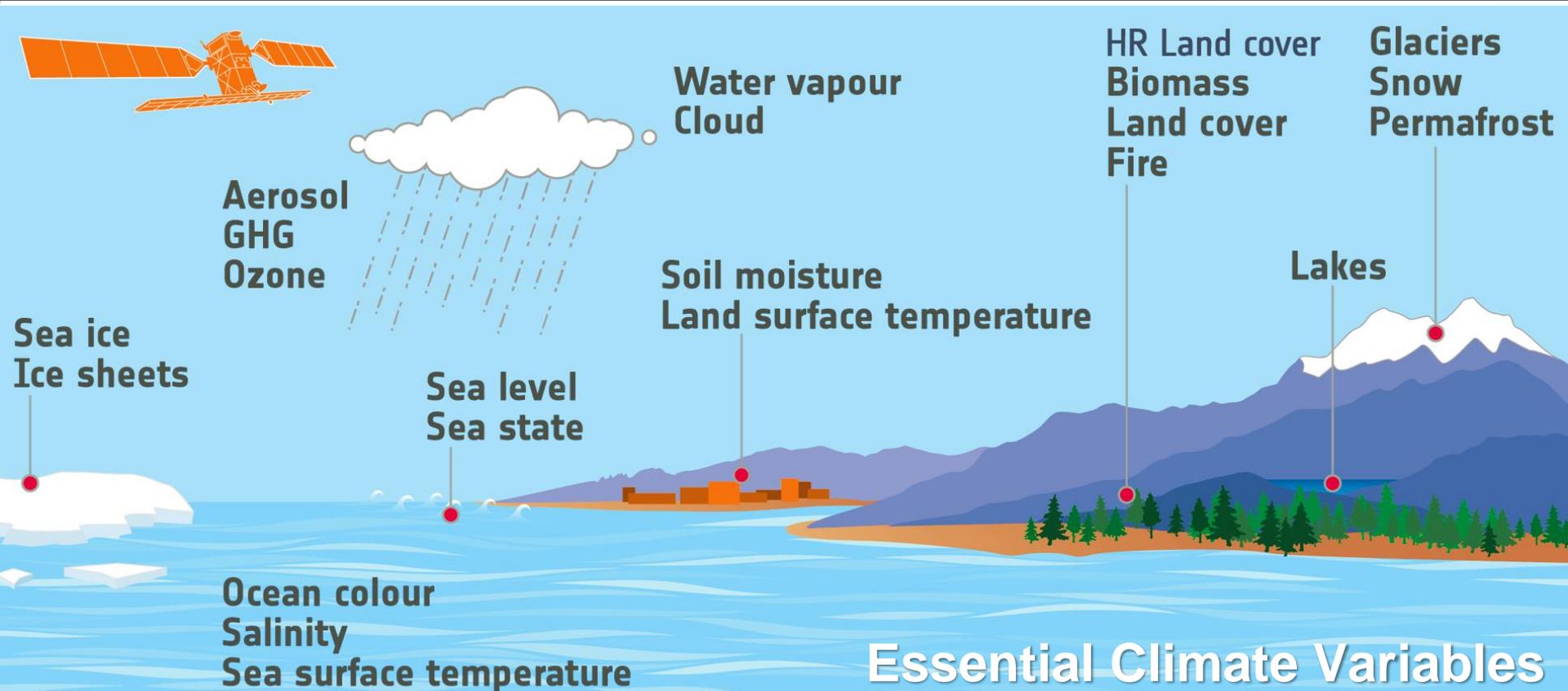
European Space Agency

# CCI

## Climate Change Initiative

ESA's 165 MEuro R&D Programme (2010-2024)  
to exploit the **full potential of Earth Observation**  
in support of **Climate Research and Assessment**

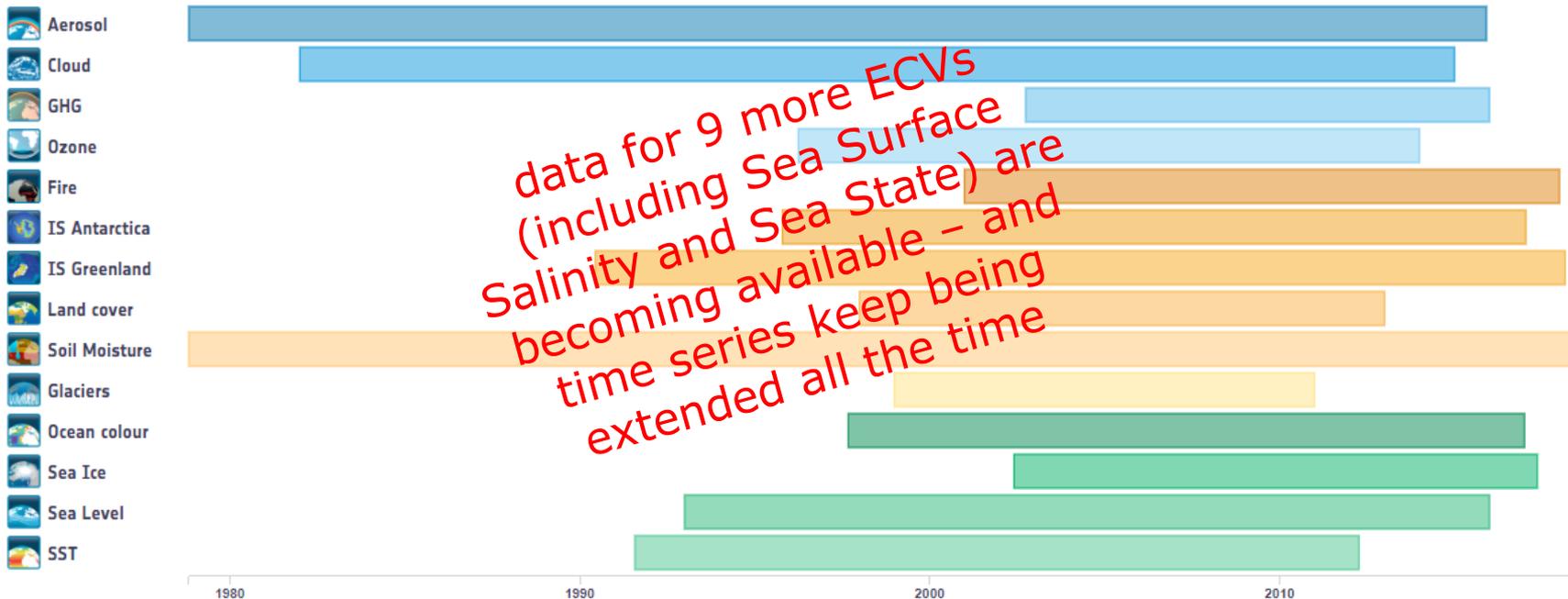
Produces long time series of **Essential Climate Variables** (ECVs)



## Essential Climate Variables

# CCI data products: time coverage

<http://climate.esa.int/data>



# CCI achievements to date



**450**  
European  
scientists

**178**  
Institutions



**21**  
ECVs

**13** ECVs transferred  
to Copernicus



Open data



**134**  
terabytes

**150+**  
datasets

**4.2**  
million  
files

**610**  
Peer-reviewed  
articles



IPCC AR5  
**28** Contributing  
authors

**15** Papers,  
cited 60 times



# IPCC Special Report: Oceans & Cryosphere

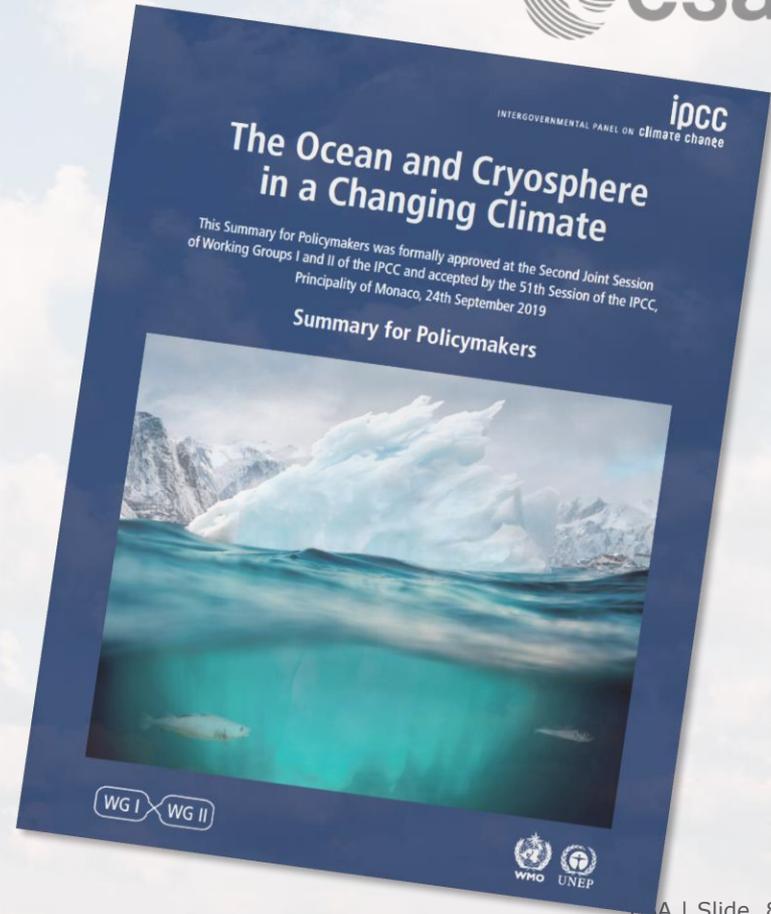
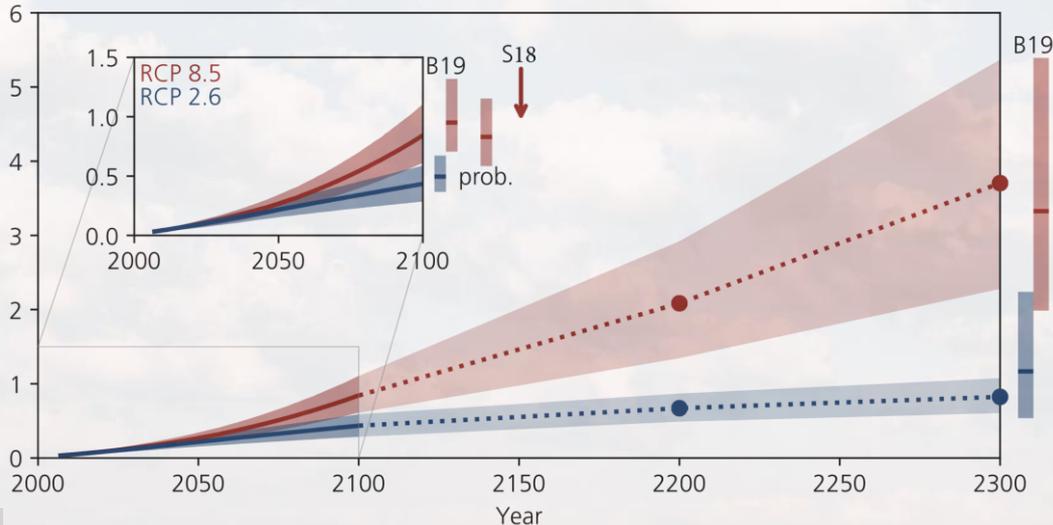
“The **best available scientific knowledge** to empower governments and communities”.

~50 ESA's Climate Change Initiative papers **cited**

CCI scientists contributing directly to the report

Includes results from several CCI projects

## Projected Sea Level Rise until 2300



# Oceanic ECVs in the CCI

Observing vital changes in the Blue Planet

# The Oceanic ECVs



**sea level**  
cci



**sst**  
cci



**ocean colour**  
cci



**sea ice**  
cci

Started in CCI (2010–), now transferred to C3S (but research continues in CCI+)

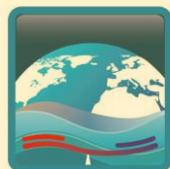


**sea state**  
cci



**sea surface salinity**  
cci

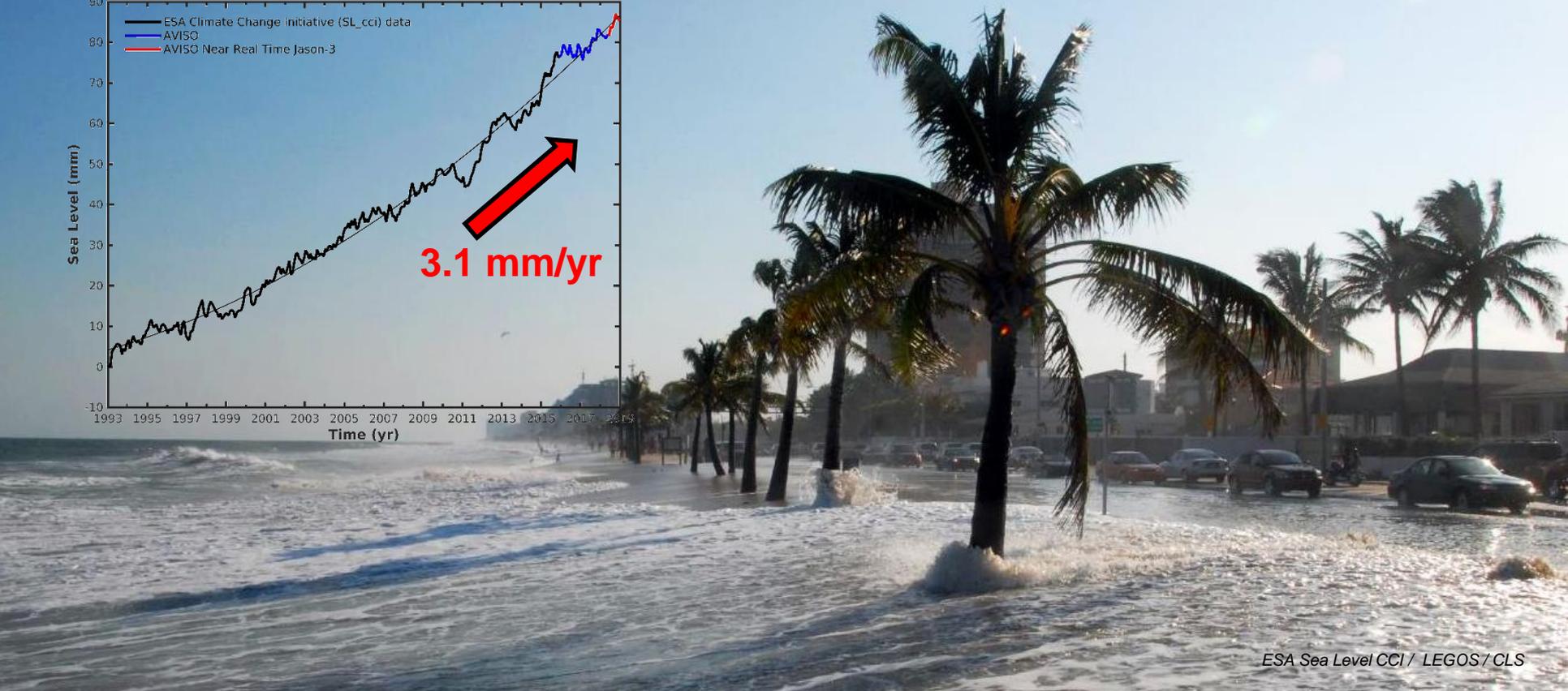
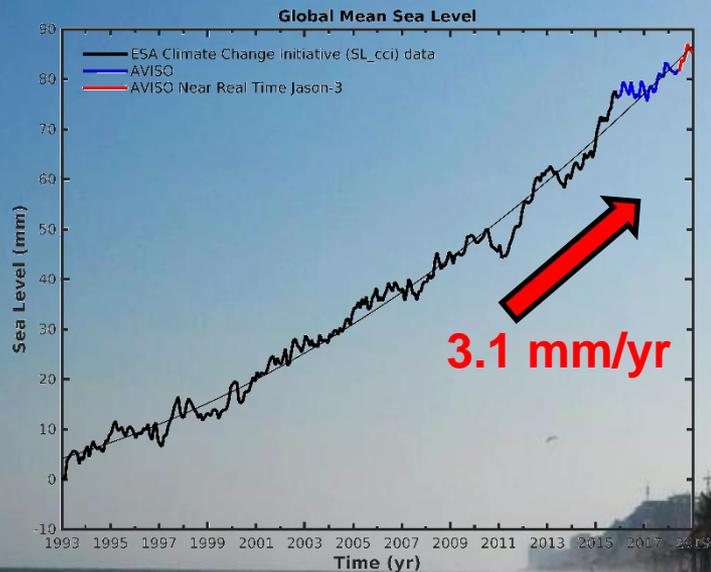
Started in CCI+ (2018–)



**sea level budget closure**  
cci

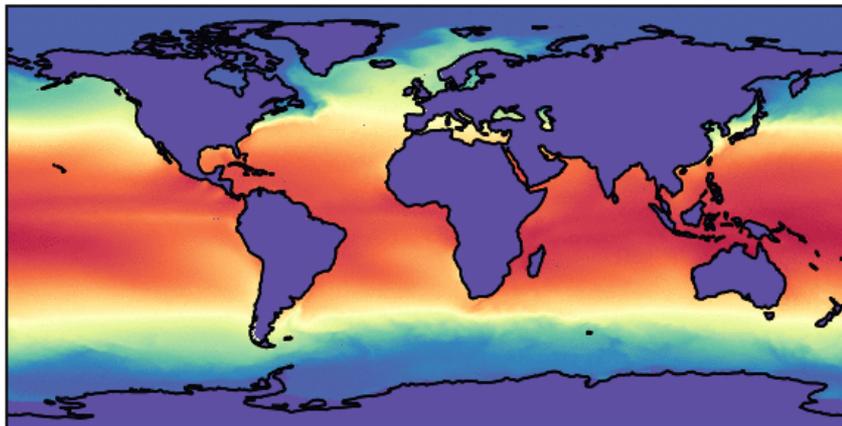
**Cross-ECV activity**

# Sea Level: indicator *and* impact of climate change



# Sea Surface Temperature: a warming ocean

Day of Year: 005

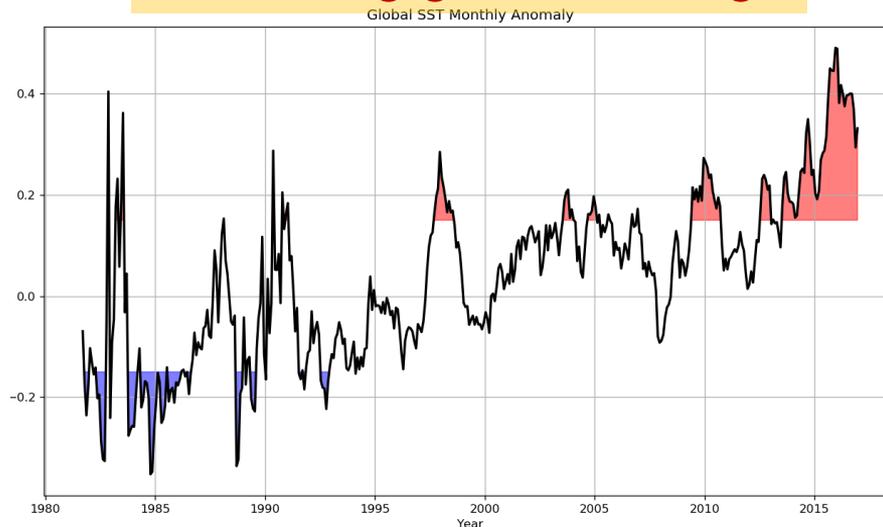


The daily climatology, from ~38 years



Dataset recently published:  
Merchant et al, Nature Scientific Data, 2019

## The rising global average

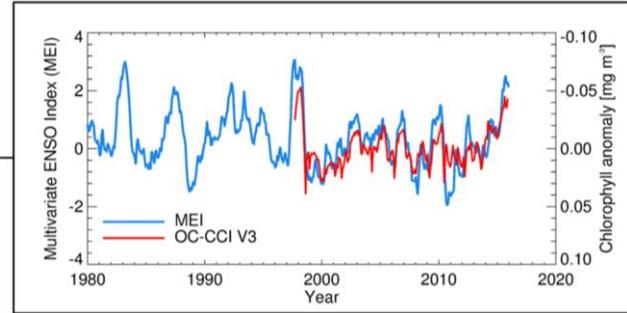
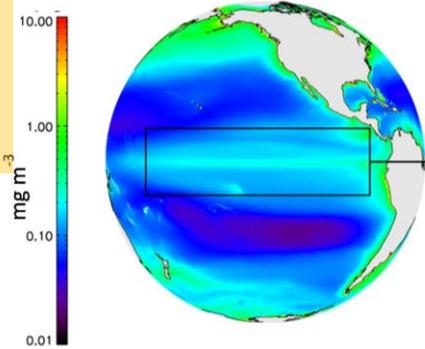


ESA SST CCI /C. Merchant

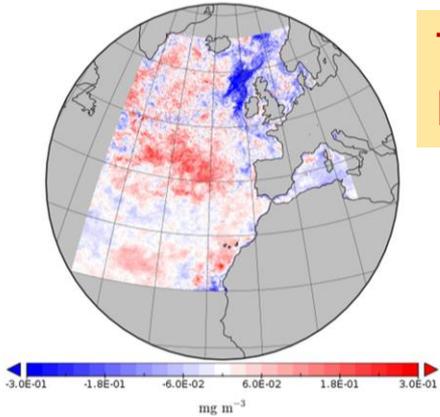
ESA | Slide 12

# Ocean colour: revealing changes in ocean life

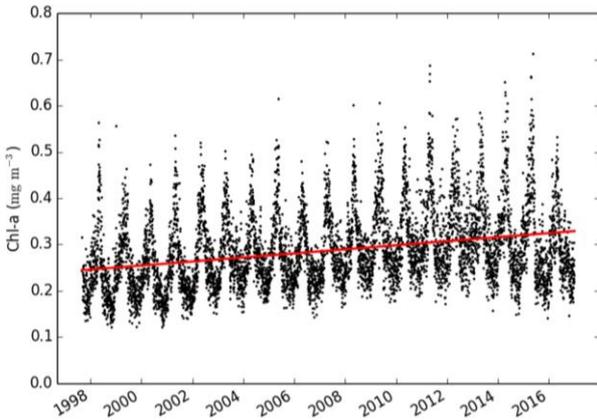
El Niño impacts on Phytoplankton



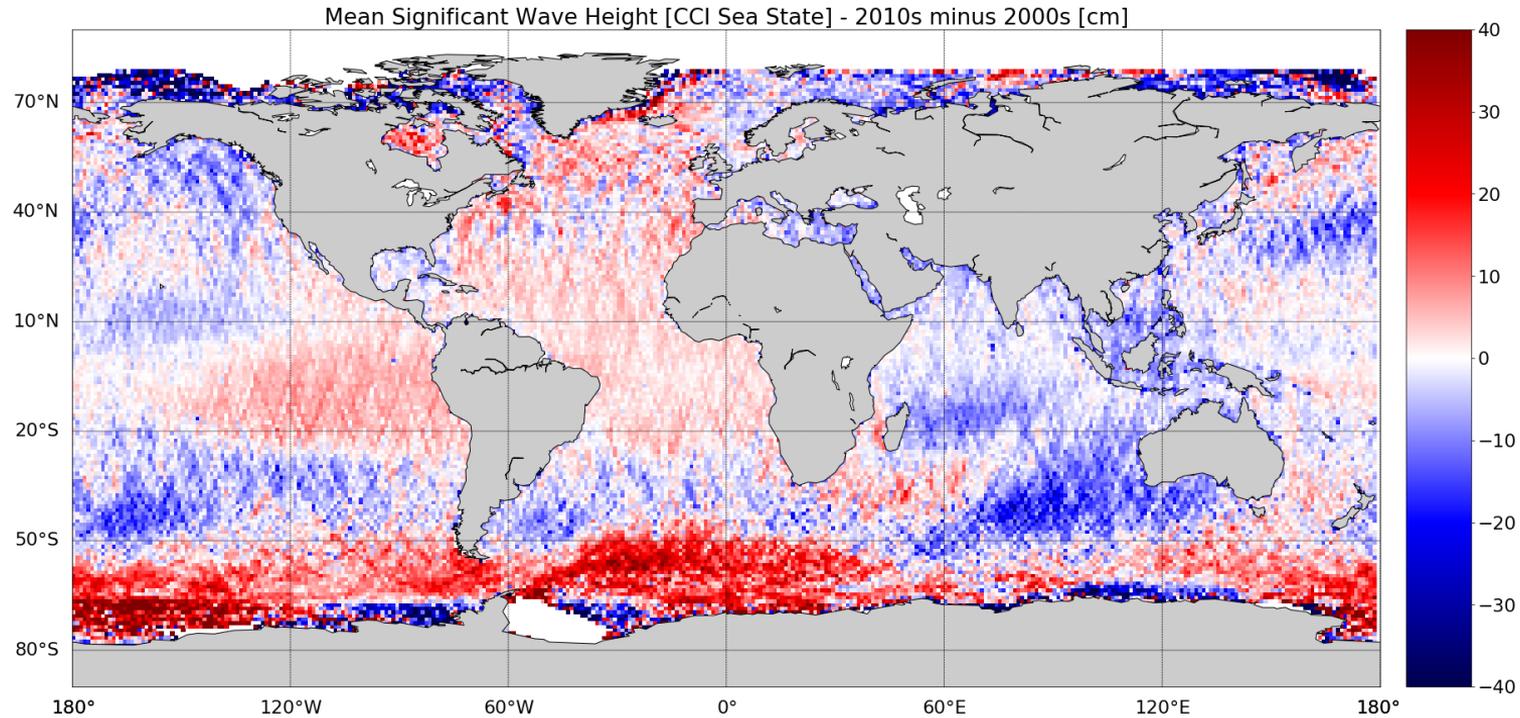
Trends over the North East Atlantic



ESA Ocean Colour CCI / CMEMS data  
von Schuckmann et al, 2016, 2018; Groom et al., 2019

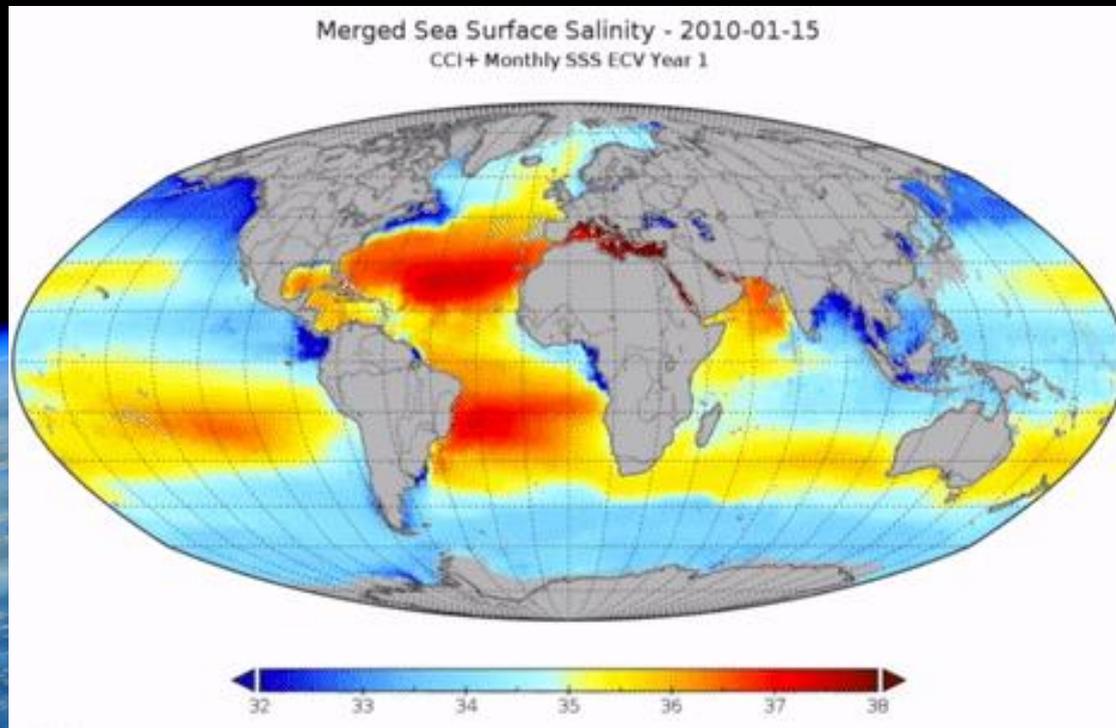


# Sea State: changes in stormy seas

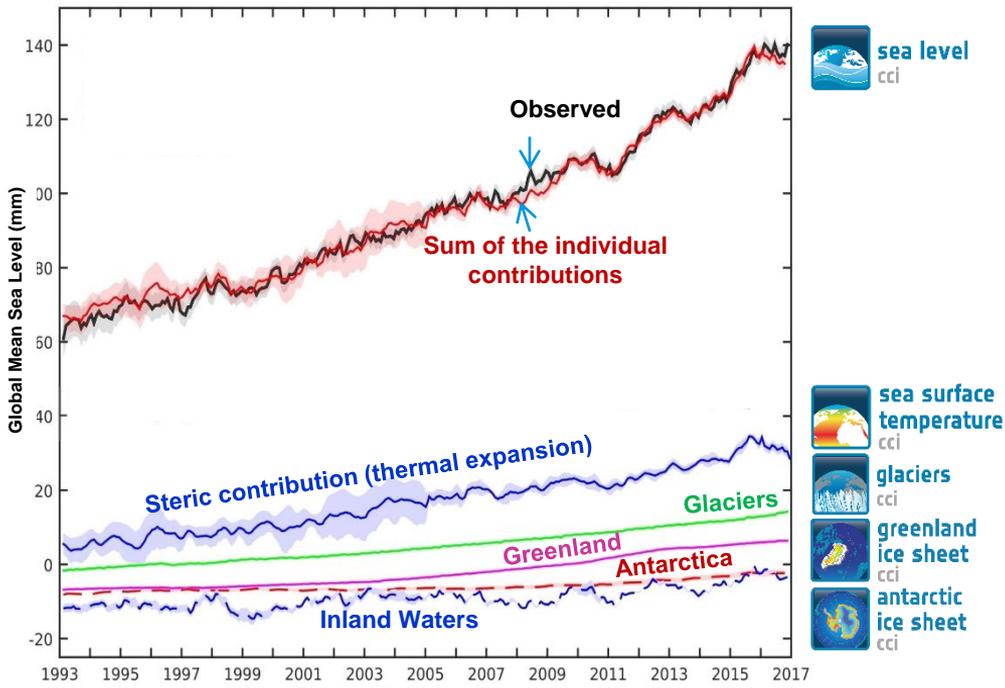


ESA Sea State CCI

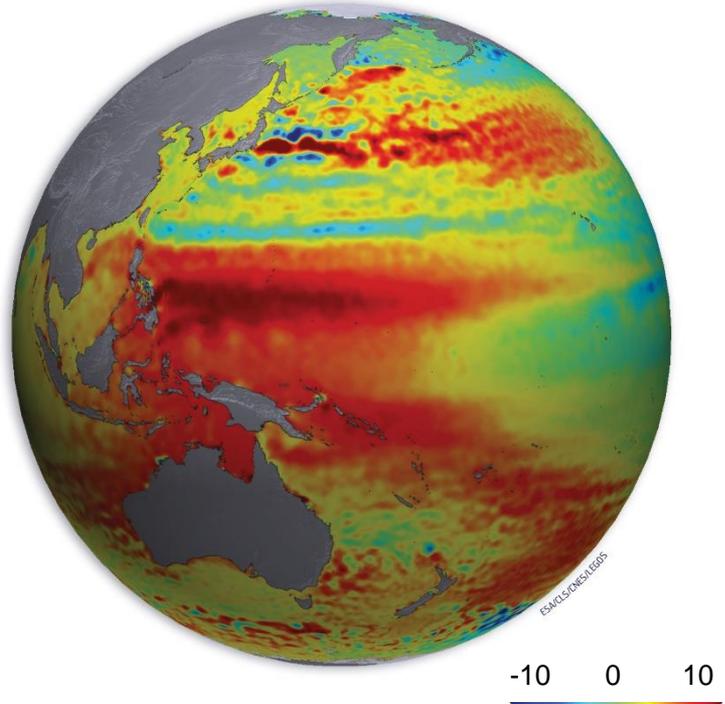
# Sea Surface Salinity: essential for ocean modeling



# Sea Level Budget Closure: the proof is in the pudding



ESA Sea Level Budget Closure CCI / M. Horwath



Map of sea level trends, mm/yr

