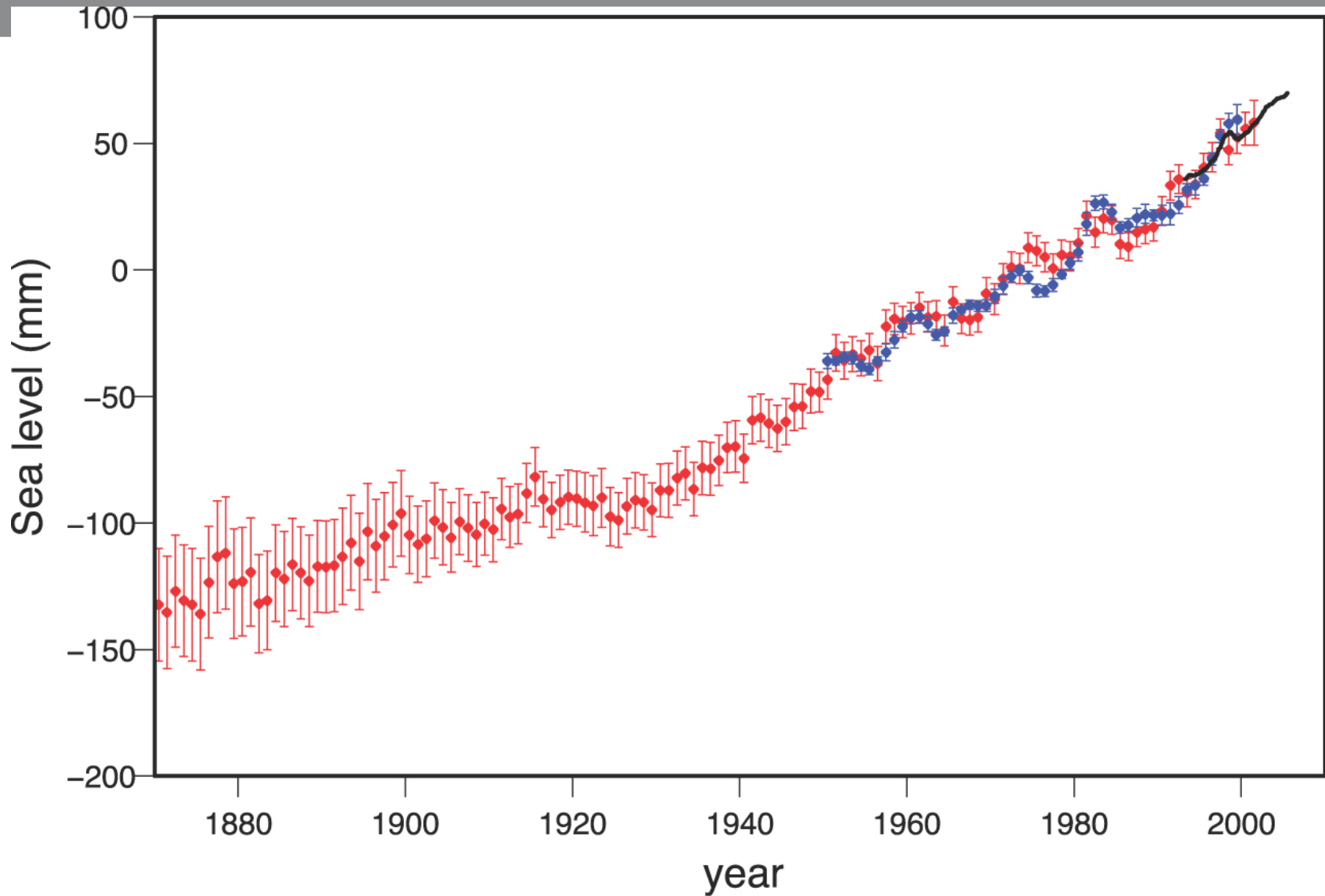


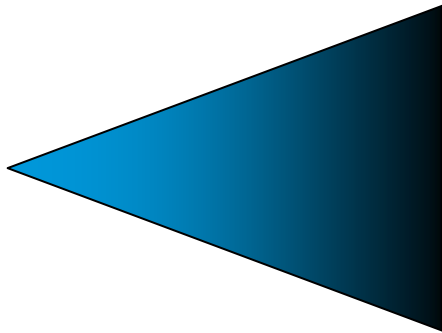
# **Issues and Opportunities when extending the long-term record using satellite data**

Plenary Discussion Chairs Mark Doherty and Craig Donlon  
MARCDAT-III, ESA ESRIN 2-6<sup>th</sup> May 2011

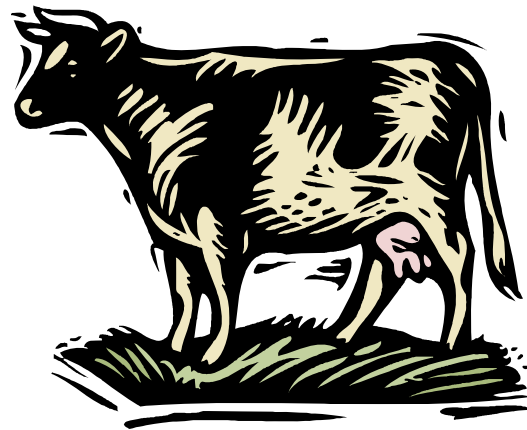
# Global mean sea level



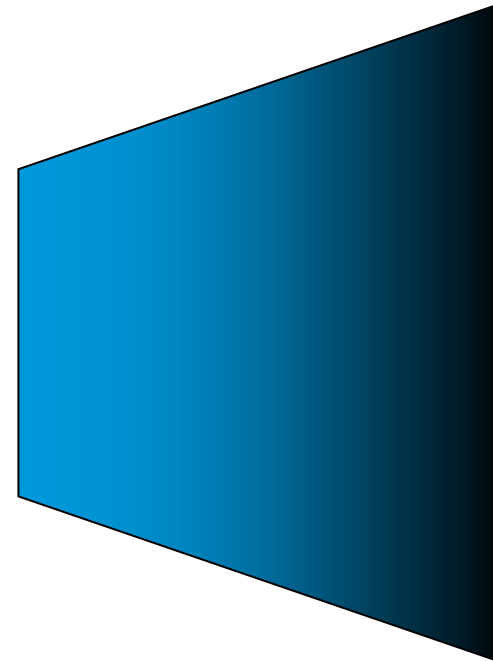
# The 'plump' record



**Rescue**



**Integrate and learn  
from the Cash Cow**



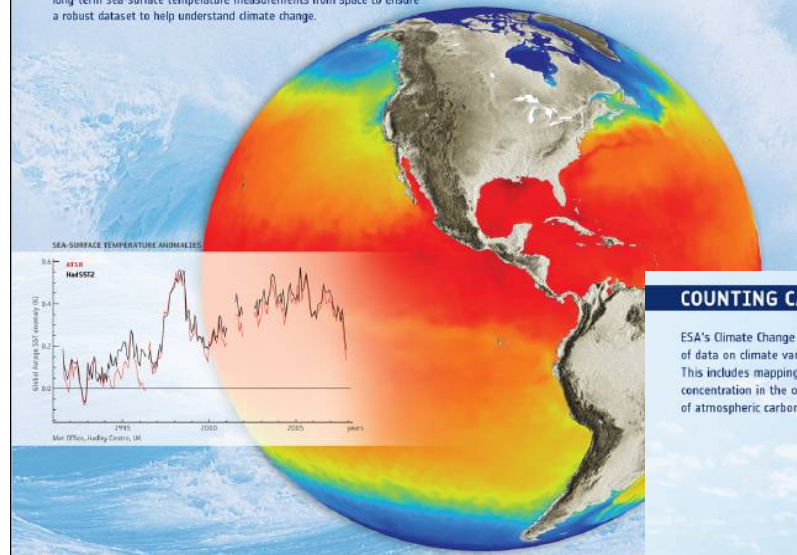
**Develop and manage**

# Where will space derived ECV's help climate modellers?



## ANSWERS FROM THE OCEAN

Long-term tracking of sea-surface temperature provides a reliable indication of global temperature rises. The Climate Change Initiative will capitalise on ESA's experience in gathering, collating and archiving long-term sea-surface temperature measurements from space to ensure a robust dataset to help understand climate change.

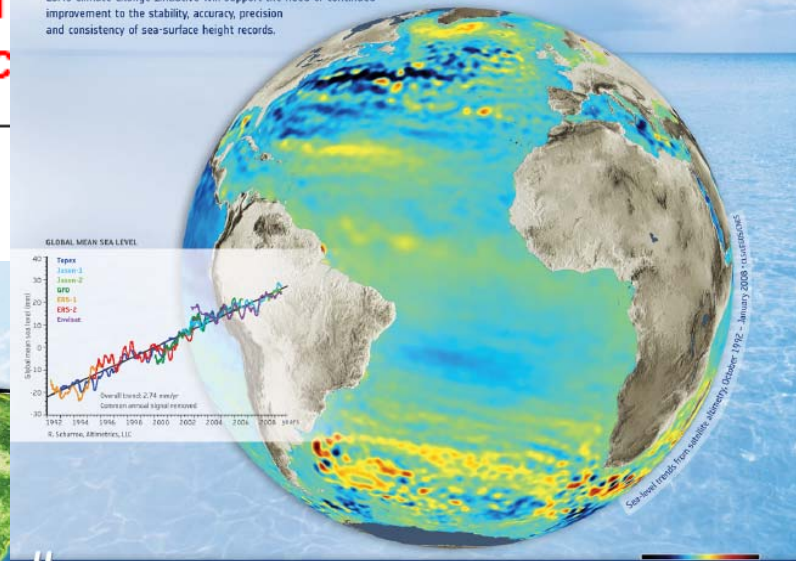


Global ocean heat content has increased since the late 1950s, the period for which adequate observations of sub-surface ocean temperatures have been available." Climate Change 2001: Working Group I: The Scientific Basis - Intergovernmental Panel on Climate Change

Uncertainty in pre-1990  
lead-time of  
(2007) Science

## AN OCEAN OF CHANGE

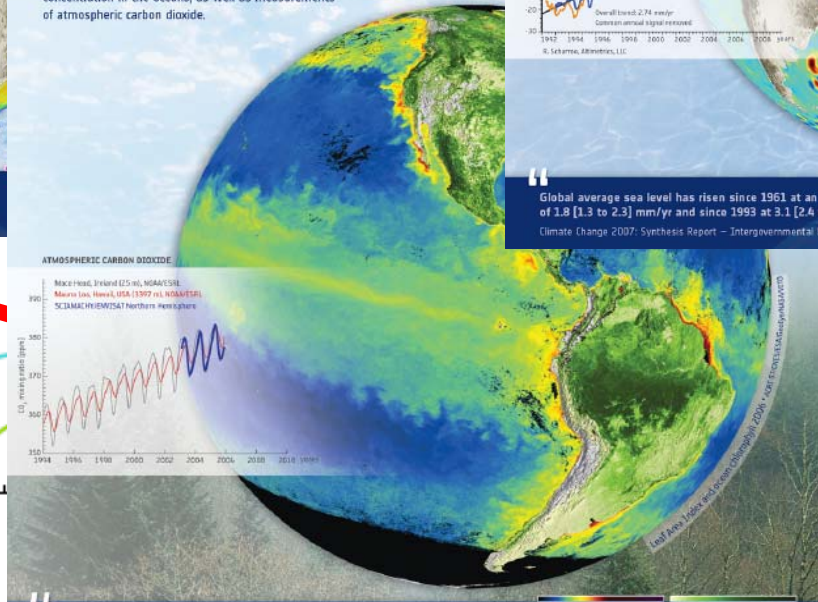
Change in sea-surface height is considered to be a primary indicator of global climate change. Building on the most accurate and best calibrated long-term observations, possible only from space, ESA's Climate Change Initiative will support the need or continued improvement to the stability, accuracy, precision and consistency of sea-surface height records.



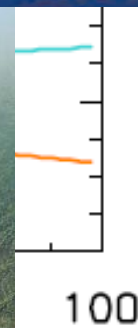
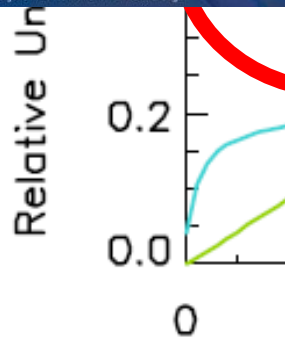
Global average sea level has risen since 1961 at an average rate of 1.8 [1.3 to 2.3] mm/yr and since 1993 at 3.1 [2.4 to 3.8] mm/yr." Climate Change 2007: Synthesis Report - Intergovernmental Panel on Climate Change

## COUNTING CARBON

ESA's Climate Change Initiative will ensure the long-term generation of data on climate variables for more accurate carbon modelling. This includes mapping the amount of vegetation on land and chlorophyll concentration in the oceans, as well as measurements of atmospheric carbon dioxide.



Global increases in CO<sub>2</sub> concentrations are due primarily to fossil fuel use, with land-use change providing another significant but smaller contribution." Climate Change 2007: Synthesis Report - Intergovernmental Panel on Climate Change



# Issues to think on...



- Sustainability and funding: people power!
- Get the data out!!! (access, interoperability, applications)
- Openness, traceability, repeatability...
- Scientific and practical cooperation and data federation of data and resources
- Data standards, nomenclature, symbology...
- Better documentation and support for users
- Synergy of in situ and EO data: looking backwards AND forwards
- Enhance inter-comparisons and production of standard data products and services (Validation “co-location” services, MDB’s, etc)
- Improved uncertainty: techniques and estimates with data
- Provide clear user requirements for future measurements
- Data recovery: in situ early records from logbooks and satellite data – where is SEASAT? Early AVHRR? Early ERS data?
- New variables: Ocean colour, salinity, winds waves and sea state...
- ...

- **How shall we improve integration and promote joint analysis** of remotely sensed and *in situ* data, in the context of the GCOS and CEOS Essential Climate Variable (ECV) framework?
- **How shall we improve the data management, accessibility, traceability, homogenization, and analysis of marine surface variables** as part of the development of long-term global surface data sets—with reference to cross-cutting issues in land-based research?
- What initiatives are needed to capitalize on available **advances in resolving data homogeneities and uncertainties, and in quality control** —by making bias-adjusted and better characterized data (and metadata) available directly to researchers?

# Working together: In Situ and Satellite communities



- How shall satellite and MARCDAT Communities work more effectively together to develop the blended long-term marine time series (future looking focus)?
- How do we develop public awareness and maintain credibility with marine climate data (in situ and EO)?
- How will the MARCDAT surface marine community get involved in CCI?
- What are the satellite validation tools, scope, focus, involvement of the in situ community in this process?
- What is the best way for satellite teams to pass their validation requirements (e.g instruments on ships) to the community?
- How do we gain common understandings across two different communities?
- How do we provide feedback between our communities?
- How do we build awareness and synergies on each side?
  - How can we make use of UUID's in our communities?
- How do we help create a better product together?
- How do we respond to GFCS?
- How do we show that our data are fit for [GCOS, GFCS] purpose?
- How do we begin to support new EO surface marine measurements (colour, salinity...)





# Seed Questions for this discussion



- We are all trying to generate the best data for use by users: develop and inter-compare algorithms, and produce, validate and characterize, global satellite-based data sets responding to the GCOS requirements for a given ECV. **How shall satellite and MARCDAT Communities work more effectively together to develop the blended long-term marine time series (future looking focus)?**
  - ESA CCI marine projects a focus area for collaborations addressing GCOS requirements?
  - Share documents and data
  - Share expertise
  - **How will the MARCDAT surface marine community get involved in CCI?**
    - Multiple realisations of variables?
- **Space and in situ data are complementary with their own strengths and weaknesses and EO teams use both routinely. How does this community plan to make more use of satellite data?**

# Seed Questions for this discussion



- One of the biggest challenges satellite team face is **finding** in situ reference data of suitable quality for algorithm development, geophysical validation and instrument commissioning and monitoring. **What are the satellite validation tools, scope, focus, involvement of the in situ community in this process?**
  - Are match-up services for satellite data is a good idea?
  - Inter-comparison of different data (satellite, in situ, model, climatology) is good.
- **What is the best way for satellite teams to pass their validation requirements to the community?**
  - Ship operators (talk of Shawn Smith)?
  - JCOMM Xcutting TT on satellite requirements?
  - WMO RRR?
- Excellent QC of in situ data is essential and satellite teams rely on the expertise of the in situ community.