

# a decade of progress observing the global oceans from space





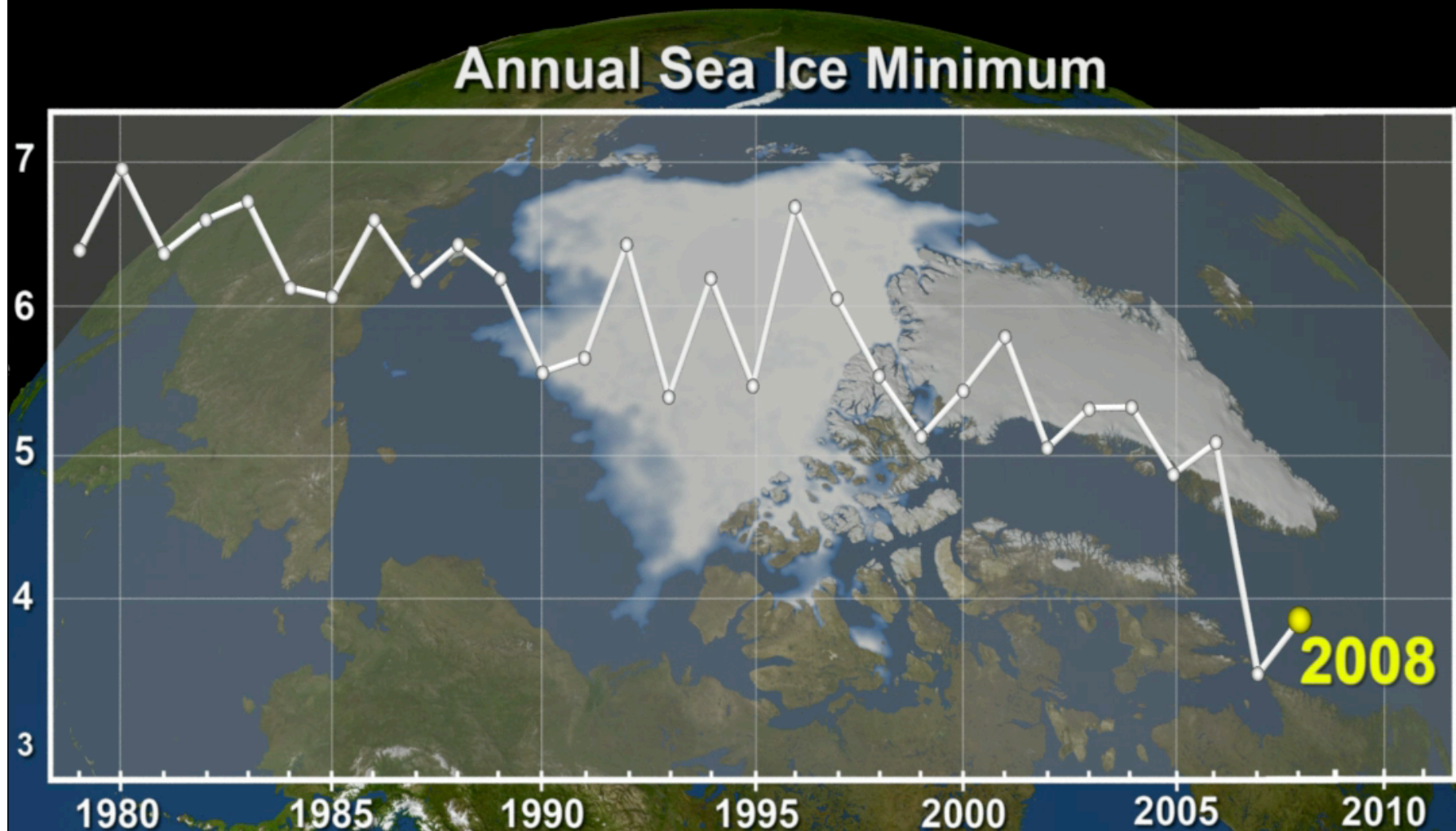
- progress
- challenges
- forward

# progress

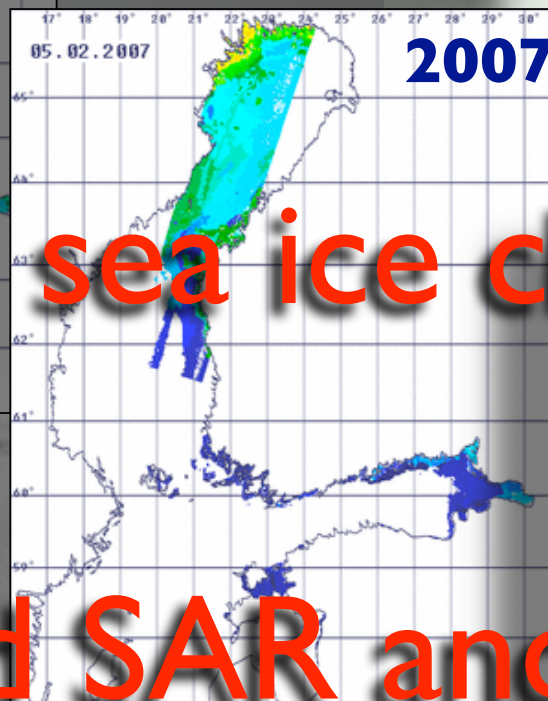
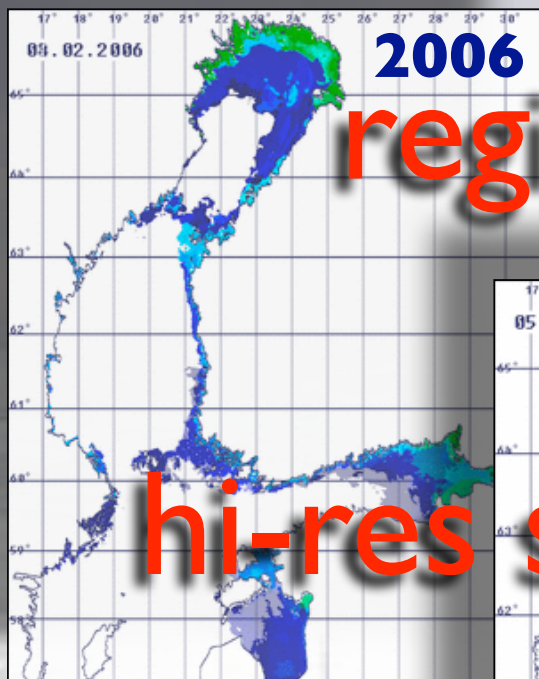
- a decade of **continuity** observing global oceans from space
- major advances in **ocean and climate science**
- a foundation for **earth system modeling**
- **operational services** of measurable **benefit to society**
- **innovative observations** from research missions
- enlarged international **cooperation**
- a **global political framework** for global earth observations
- **almost** sustainable...

a third decade observing  
sea ice  
from space

# 30-year record of polar sea ice extent







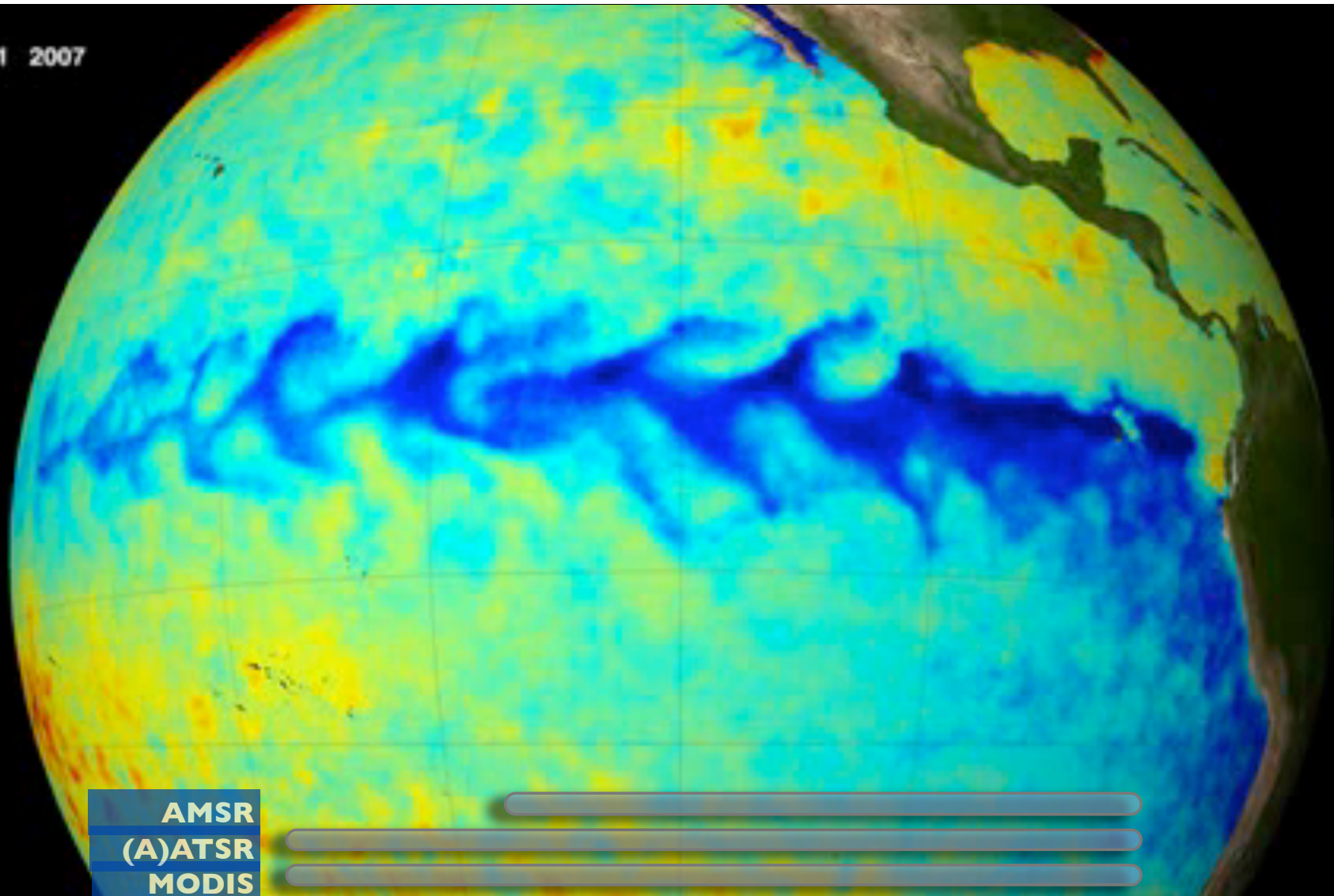
regional services

hi-res sea ice charting

C-band SAR and in-situ

a decade observing  
global sea surface temperature  
from space

Oct 1 2007



AMSR  
(A)ATSR  
MODIS  
FY-2  
AVHRR  
Meteosat  
GOES

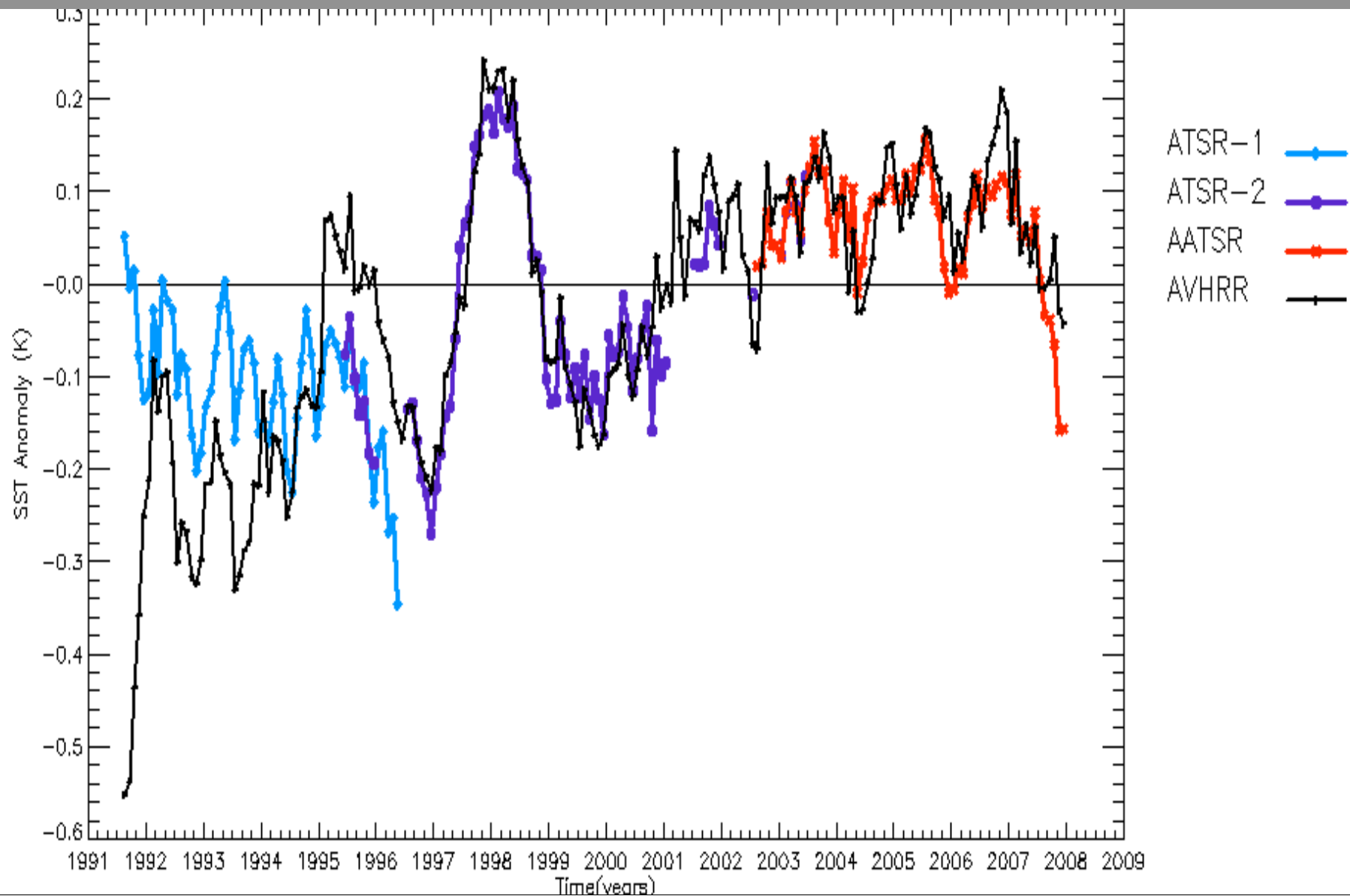


2000

2010



# record of global sst anomalies





**improved inputs to NWP**

**global high resolution  
sea surface temperature**

# worldwide ghrsst operations

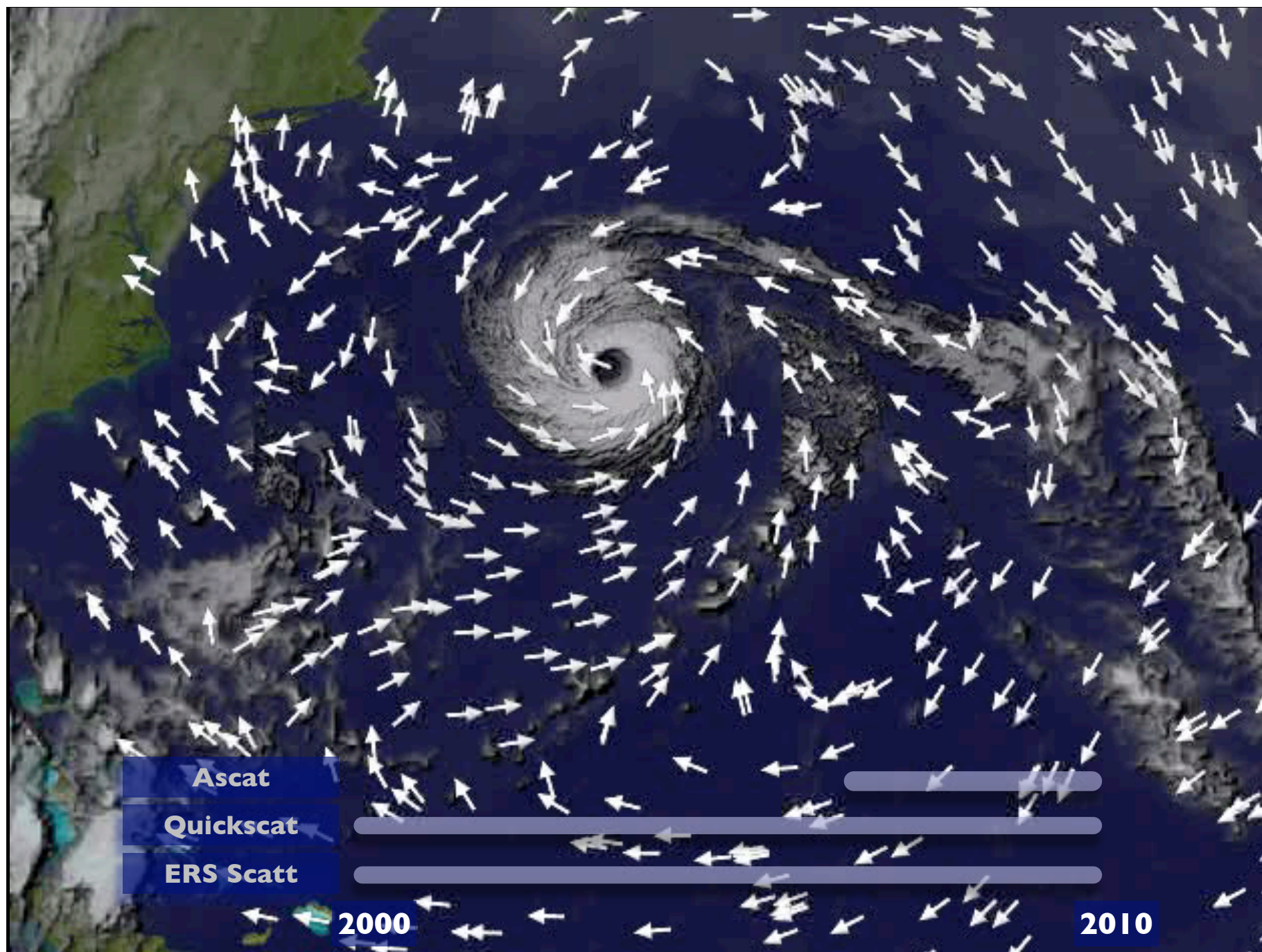
improved inputs to NVWP

Keyhole HR OI (GHRSSST-PP L4)	
Met Office OSTIA (global)	<input type="radio"/> <input type="radio"/> <input checked="" type="radio"/>
MSST MWOL (global)	<input type="radio"/> <input type="radio"/> <input checked="" type="radio"/>
Navy NMOC SSTaSI (global)	<input type="radio"/> <input type="radio"/> <input checked="" type="radio"/>
BLUElink (GAMSSA global)	<input type="radio"/> <input checked="" type="radio"/> <input checked="" type="radio"/>
BLUElink (RAMSSA Australia)	<input type="radio"/> <input checked="" type="radio"/> <input checked="" type="radio"/>
Medspiration (Med+Atl. Shelf)	<input type="radio"/> <input type="radio"/> <input checked="" type="radio"/>
JMA MGDSST (global)	<input type="radio"/> <input type="radio"/> <input checked="" type="radio"/>
NGSST (Japan regional)	<input type="radio"/> <input checked="" type="radio"/> <input checked="" type="radio"/>
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NAVOCEANO K10 (AVHRR Obs.)	<input type="radio"/> <input type="radio"/> <input checked="" type="radio"/>
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DMI Regional (NSea/Baltic)	<input type="radio"/> <input type="radio"/> <input checked="" type="radio"/>
GOS (CNR) Regional (Med)	<input type="radio"/> <input type="radio"/> <input checked="" type="radio"/>
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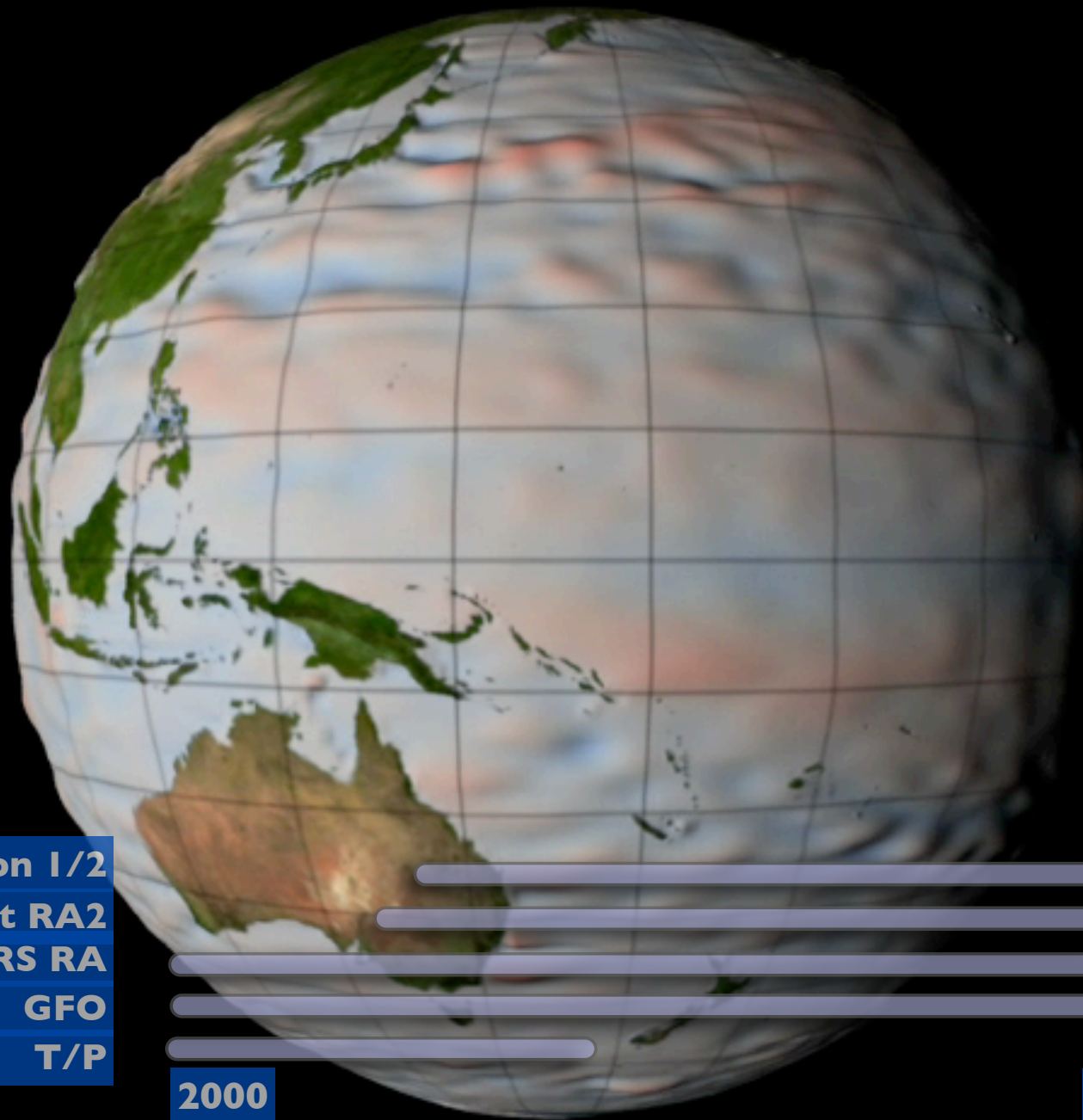
a decade observing  
ocean surface vector winds  
from space







a decade observing  
global sea surface height  
from space



**Jason I/2**

**Envisat RA2**

**ERS RA**

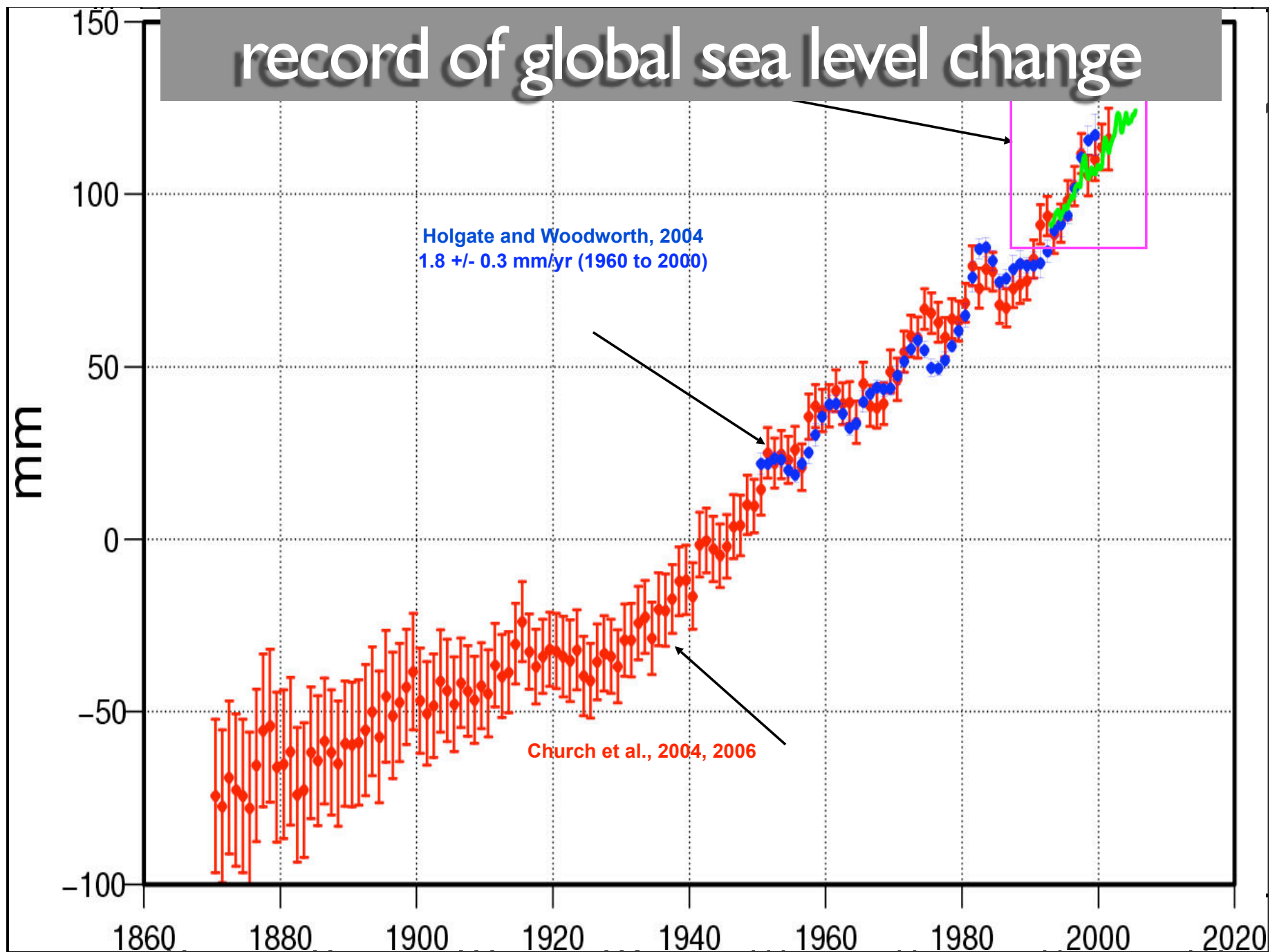
**GFO**

**T/P**

**2000**

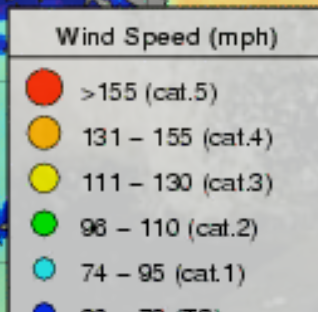
**2010**

# record of global sea level change



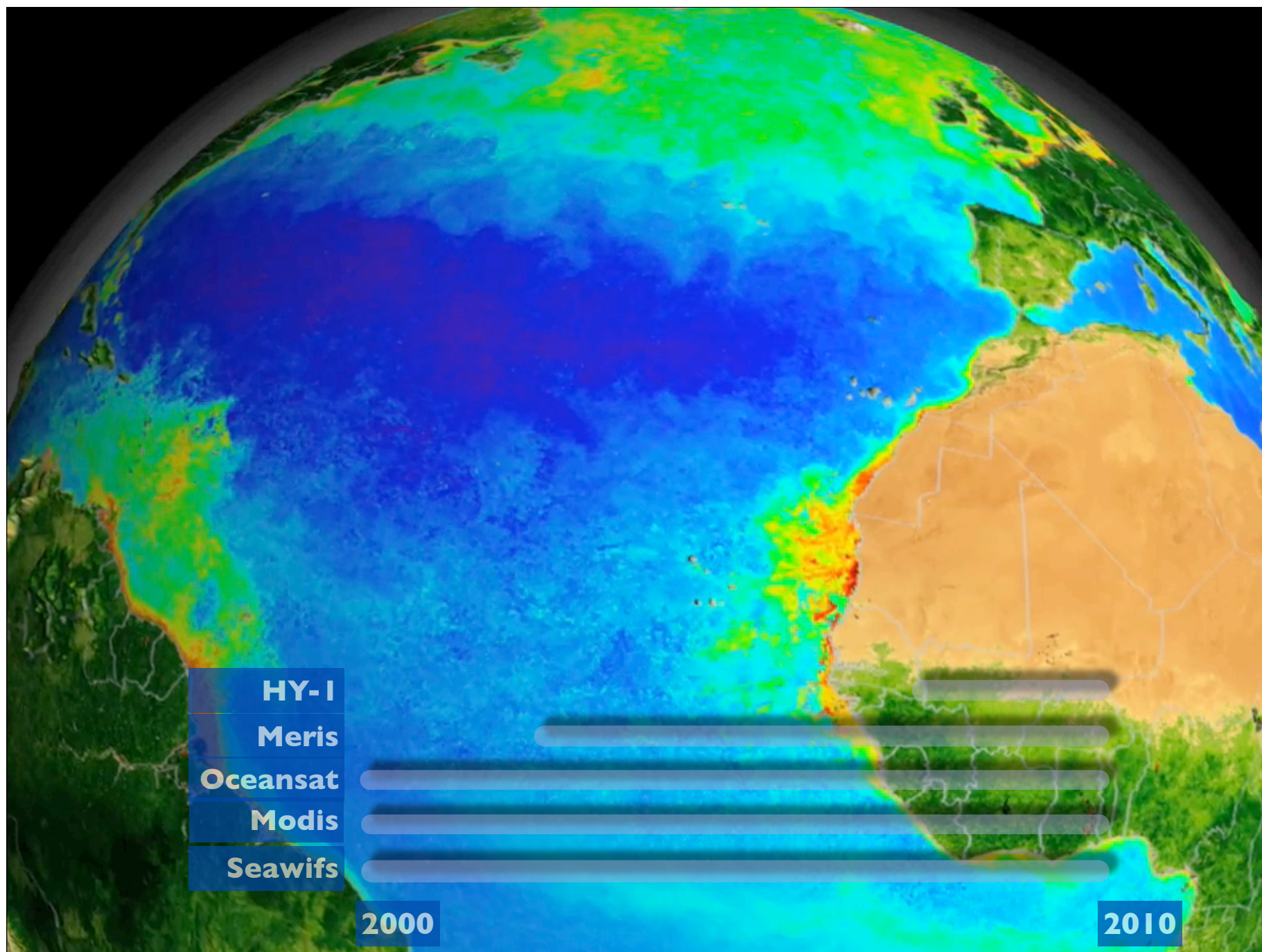
# monitoring tropical cyclones

tropical cyclone heat potential

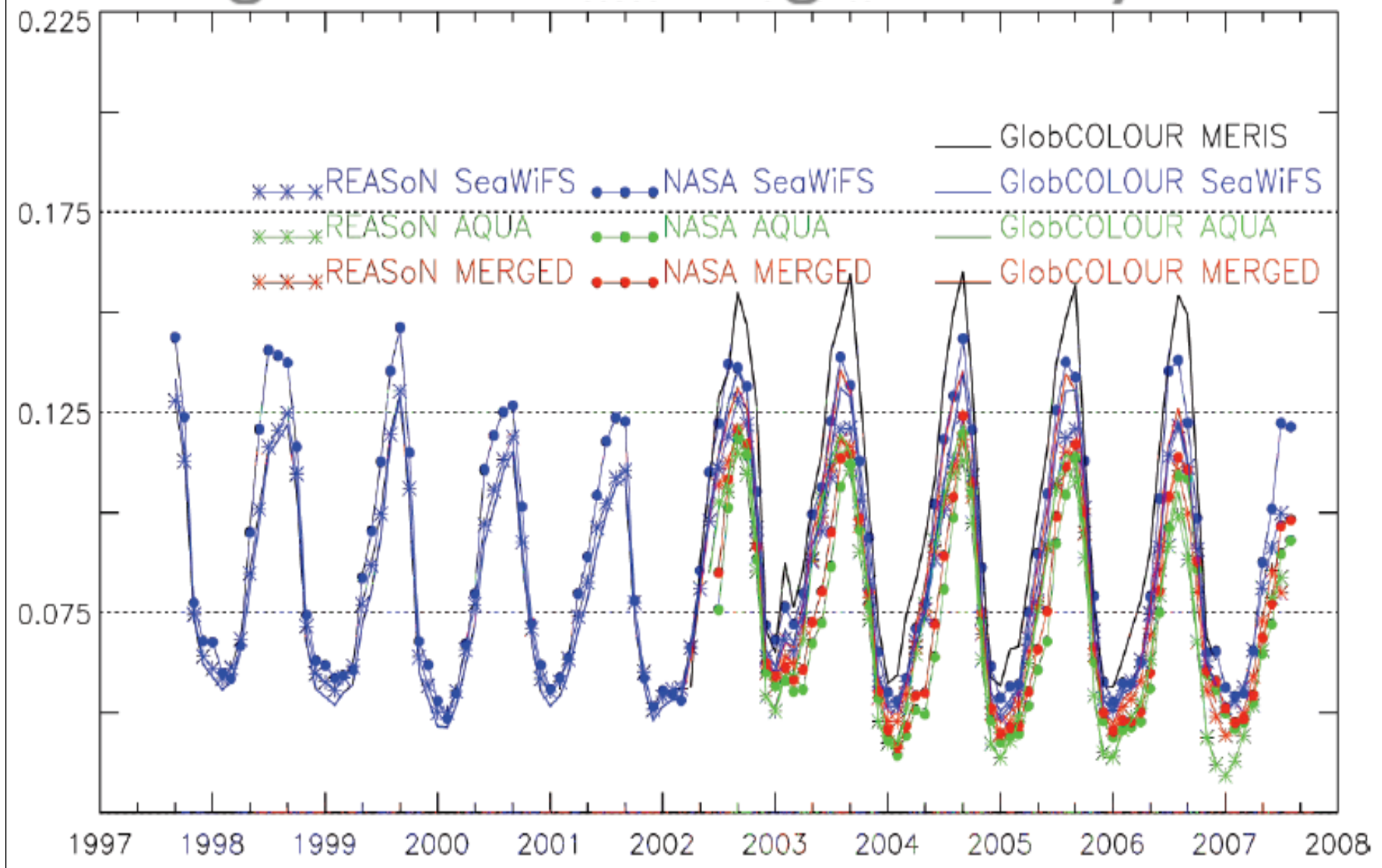


a decade observing  
global ocean colour  
from space





# first steps to analysis of long term changes in global ocean biological activity

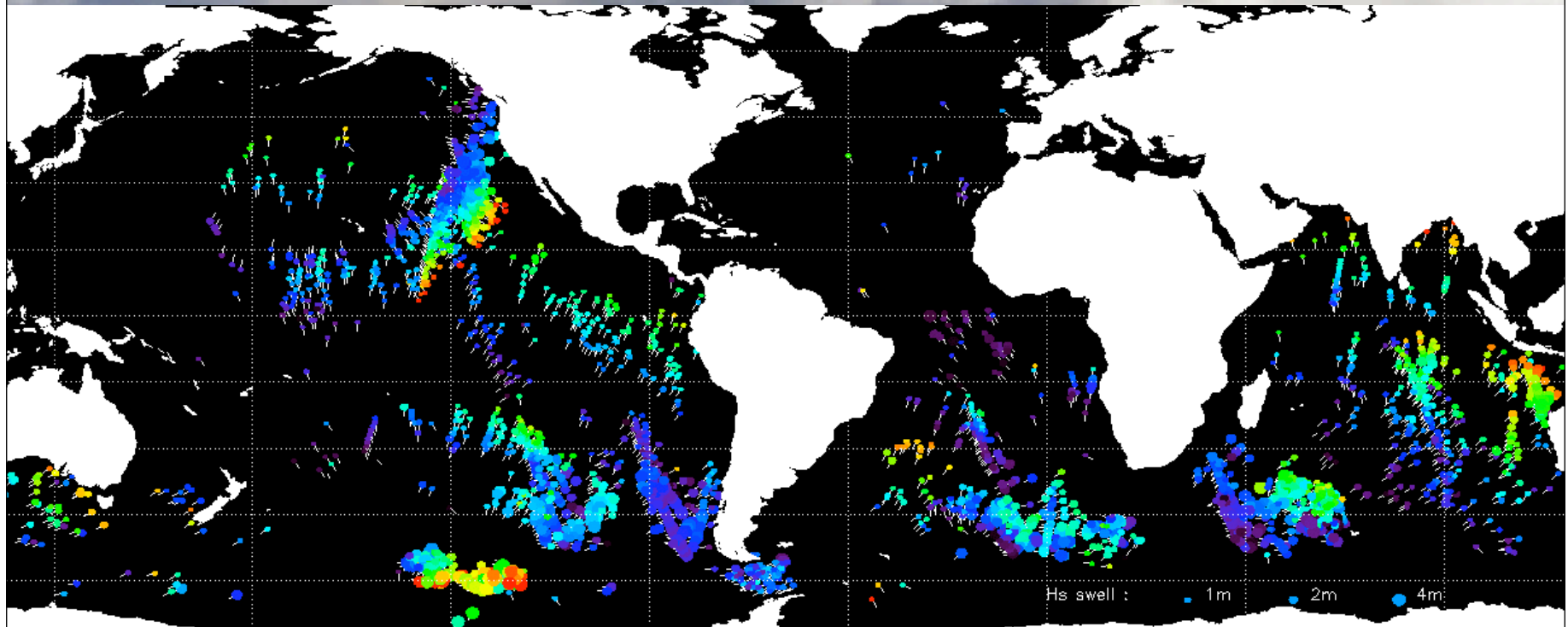






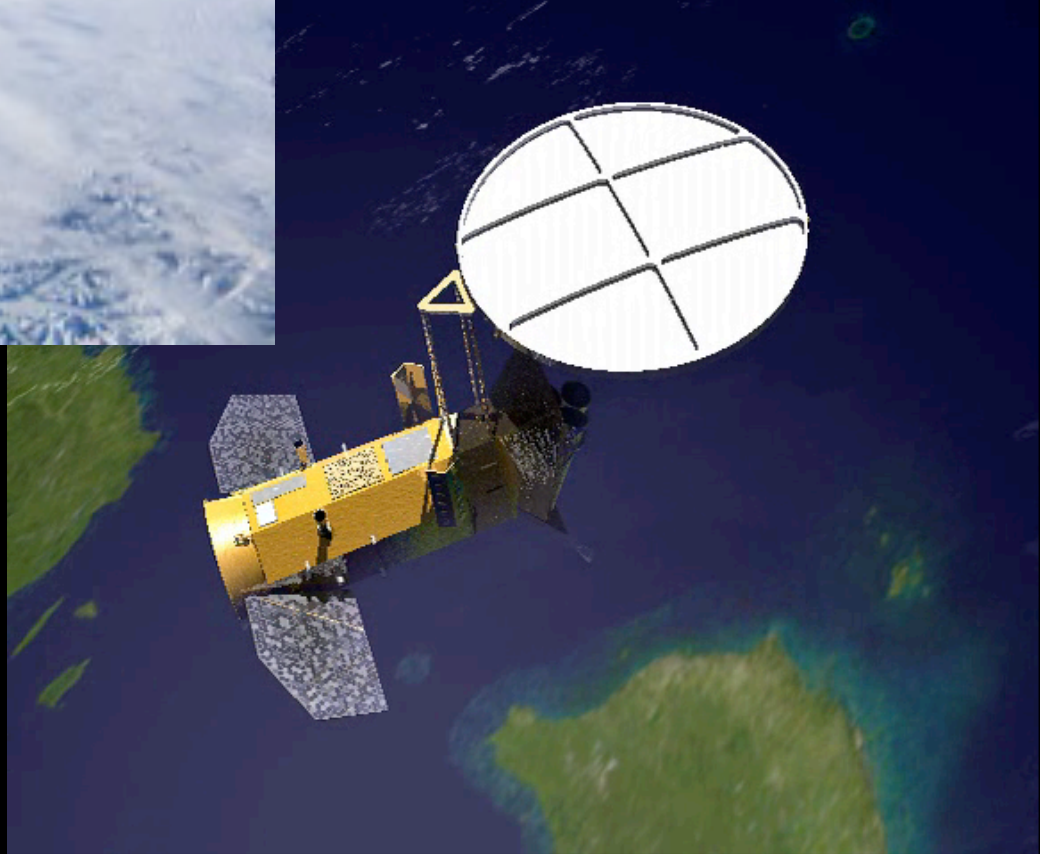
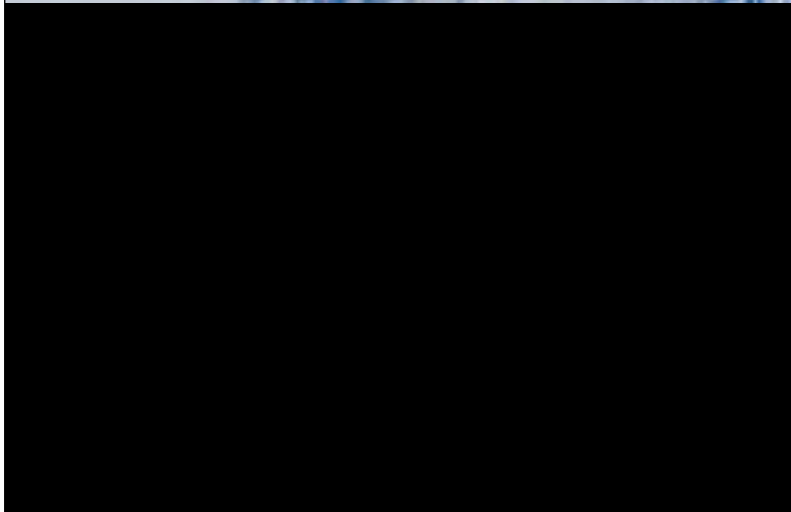
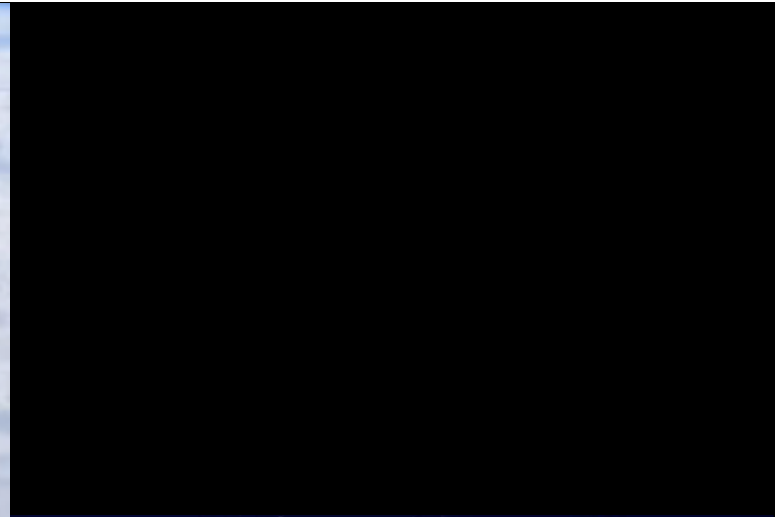
a decade observing  
global sea state  
from space

# ocean swell tracking with SAR wave mode





new observations of  
sea surface salinity  
from space



# challenges ahead

- sustainability
- robustness
- transition from research to monitoring
- climate science
- securing public funding
- delivering public benefits

# a global political framework

- GEOSS

- coordinated global earth observations
- data sharing principles

- CEOS

- satellite component
- virtual constellations

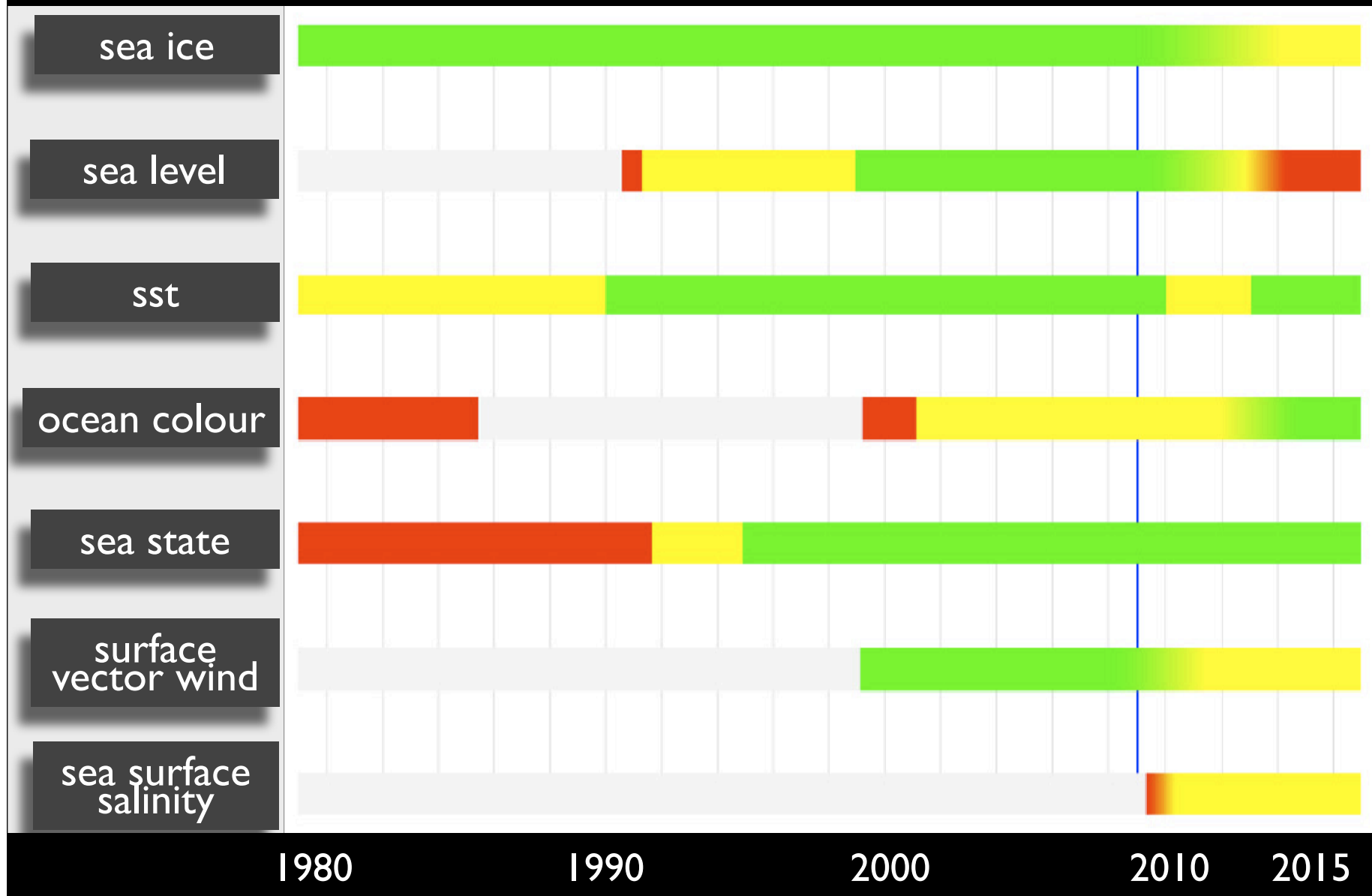
- GCOS

- authoritative requirements for climate
- climate monitoring principles

for global earth observations



# adequacy of satellite component





# Space 2030

## TACKLING SOCIETY'S CHALLENGES

- 
- Build a sustainable space infrastructure
  - Encourage public use
  - Encourage **industry initiatives**

**A global setting for European  
environmental monitoring — measuring  
what we must manage**

EEA International conference, 13–15 May 2009

**Key conclusions**

free and unrestricted data access

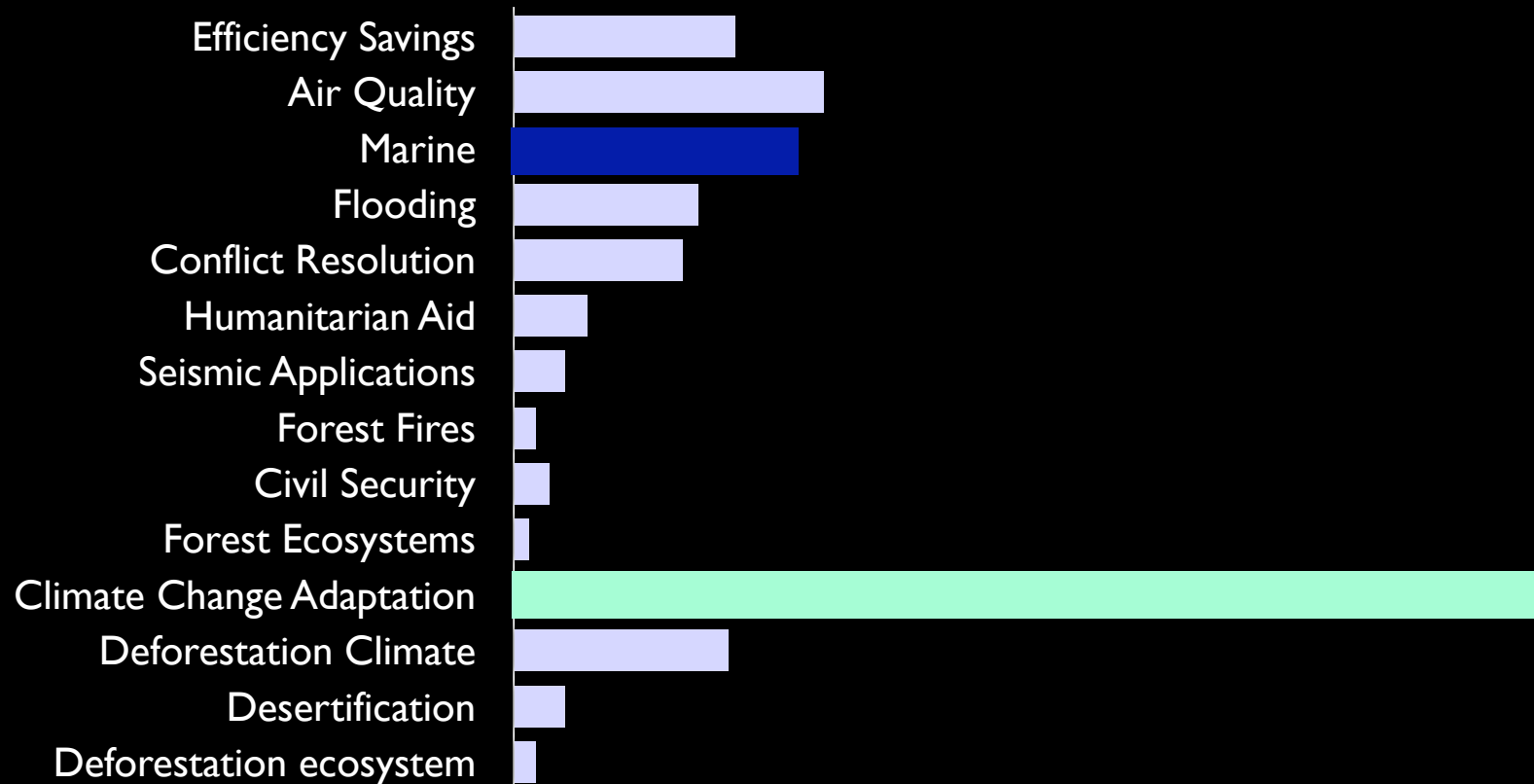


European Environment Agency



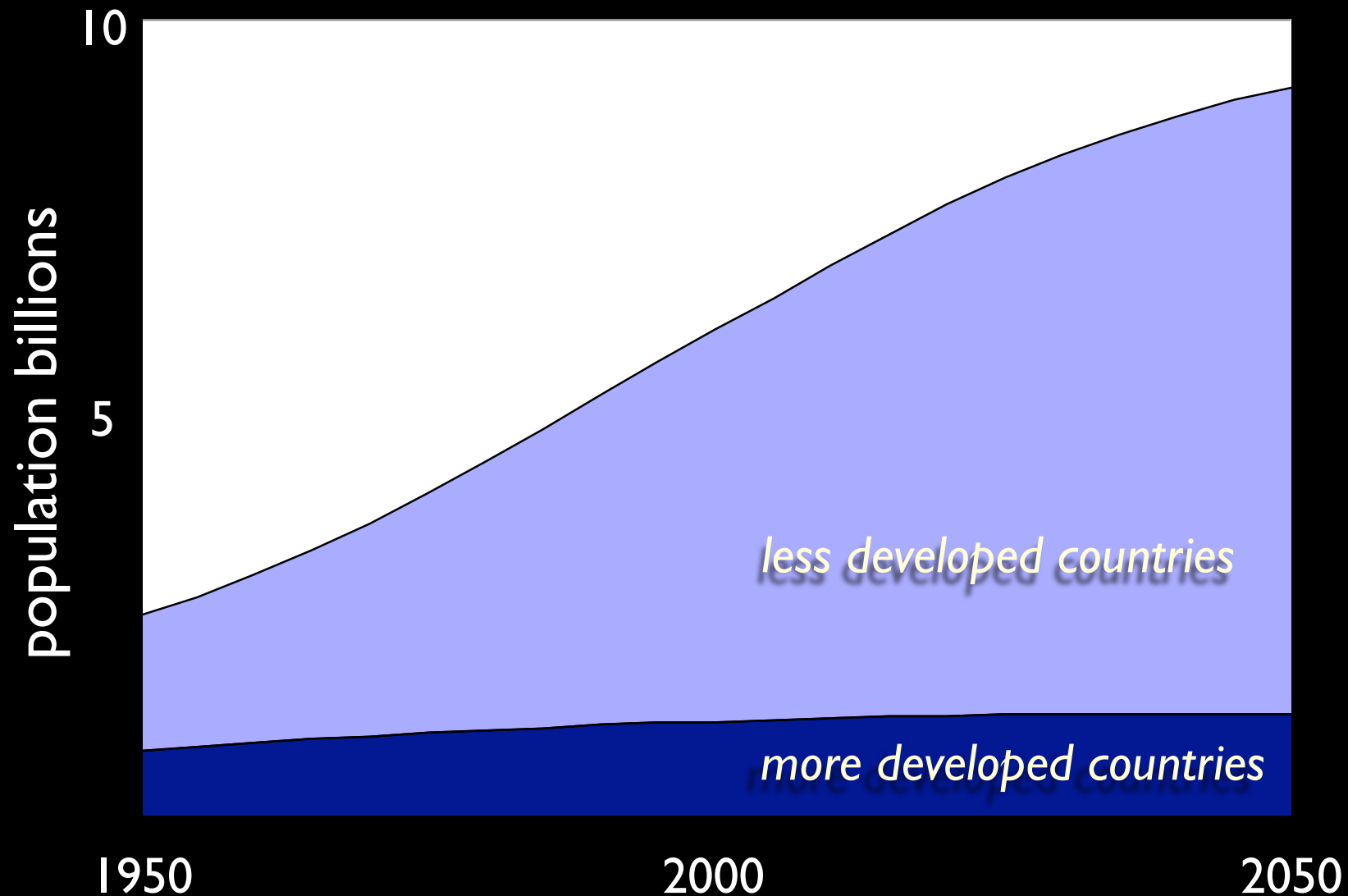
# socio-economic benefits

(GMES 25 years)





# benefits? who? where? when?



# forward !

- sustainability => public support
- robustness => international cooperation
- research and operational systems => balance
- free and unrestricted data access => benefits
- science from operational observations
- public needs => public funds => public services
- realizing benefits where they are needed

thank you