SST measurements over the Arctic based on METOP data

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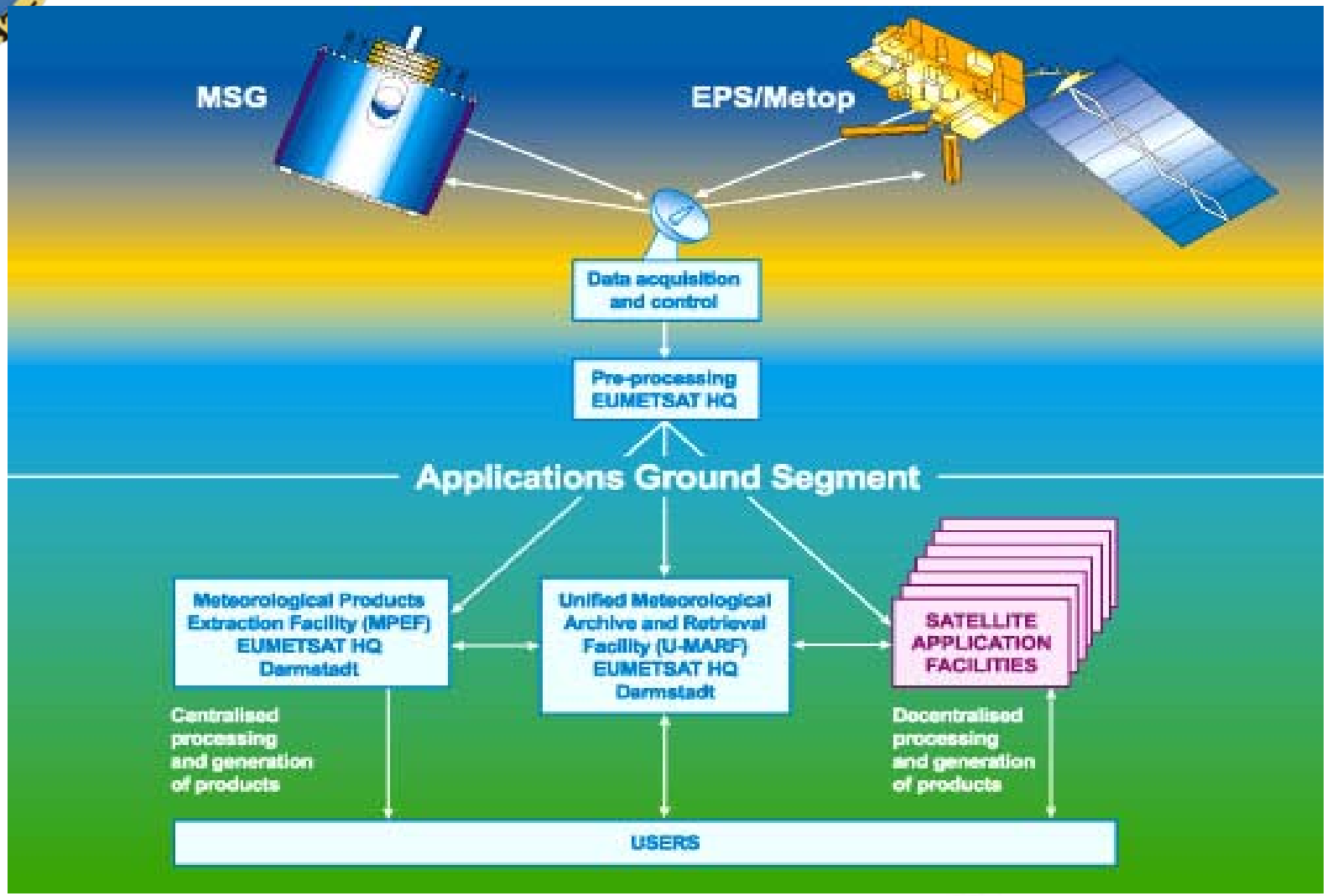
Outline

- EUMETSAT and the Ocean and Sea Ice SAF
- METOP and the AVHRR
- SST products
- Challenges
- Applications
- Conclusions

EUMETSAT and the Satellite Application Facilities



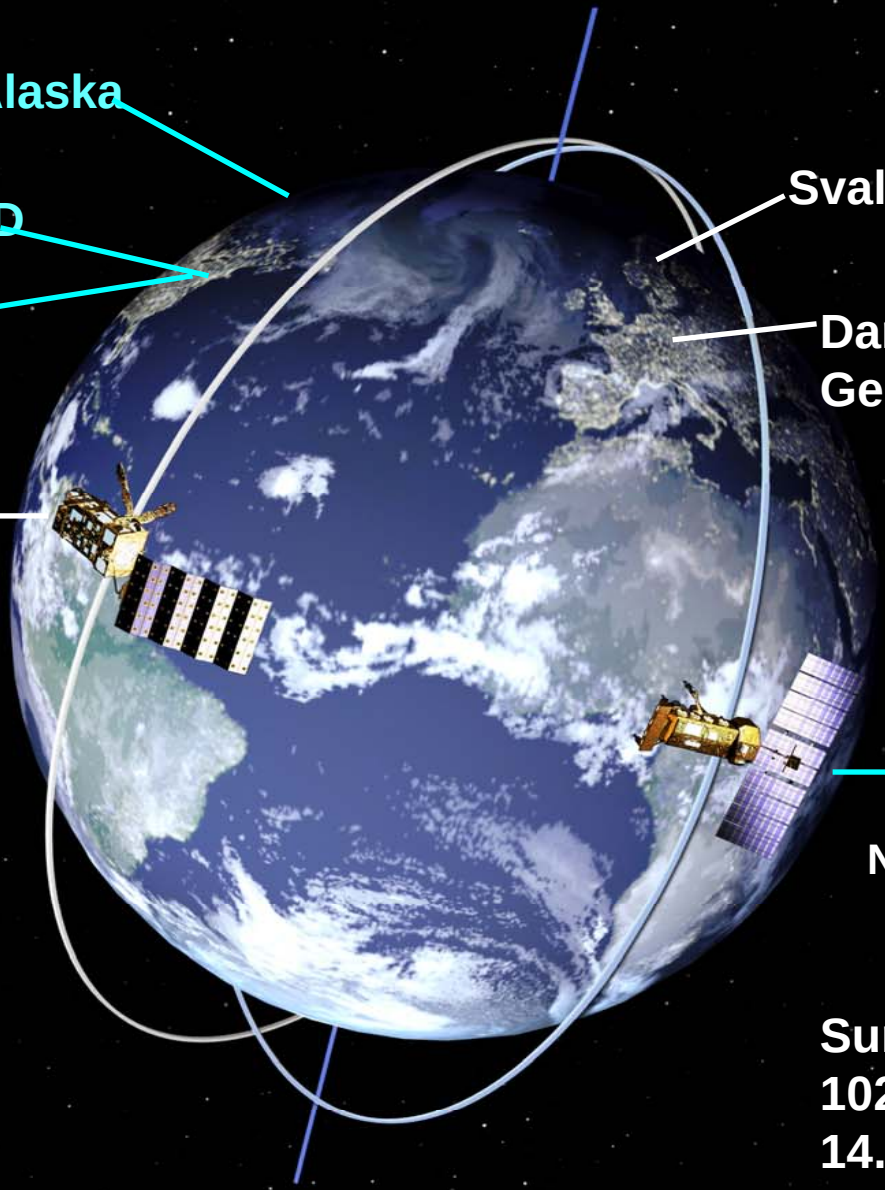
Ocean and Sea Ice SAF

- CONSORTIUM:
  - Meteo-France, as host institute,
  - Met.No (Norway),
  - DMI (Denmark),
  - Ifremer (France),
  - KNMI (Netherlands),
  - SMHI (Sweden),

- PRODUCTS

More: http://www.osi-saf.org

Initial Joint Polar-orbiting System (IJPS)



Fairbanks, Alaska

Wallops Island, MD

Suitland, MD

Svalbard, Norway

Darmstadt, Germany

MetOp

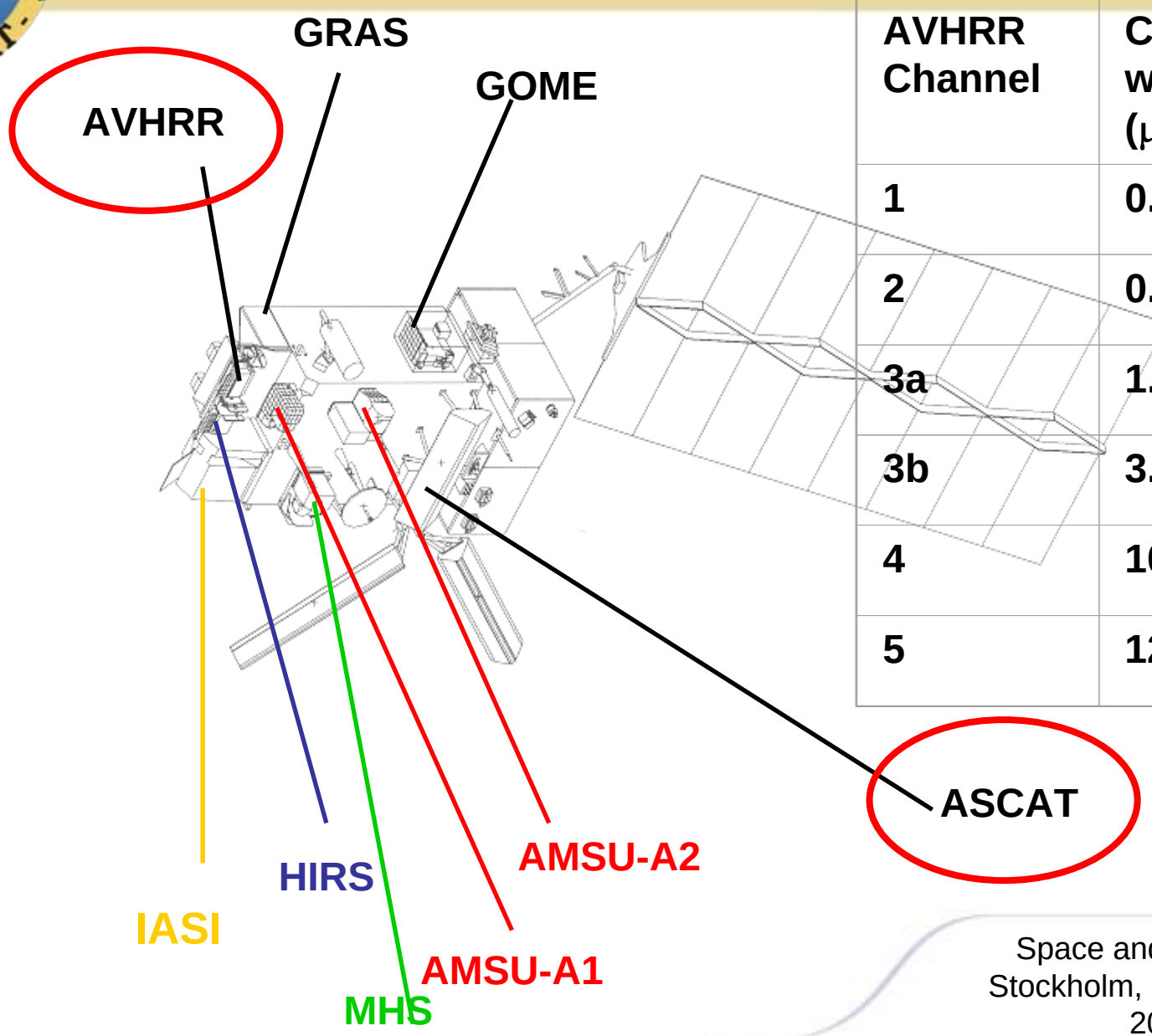
METOP-A (in use)
METOP-B (2010)
METOP-C (2014)

POES

NOAA-19 (in use)

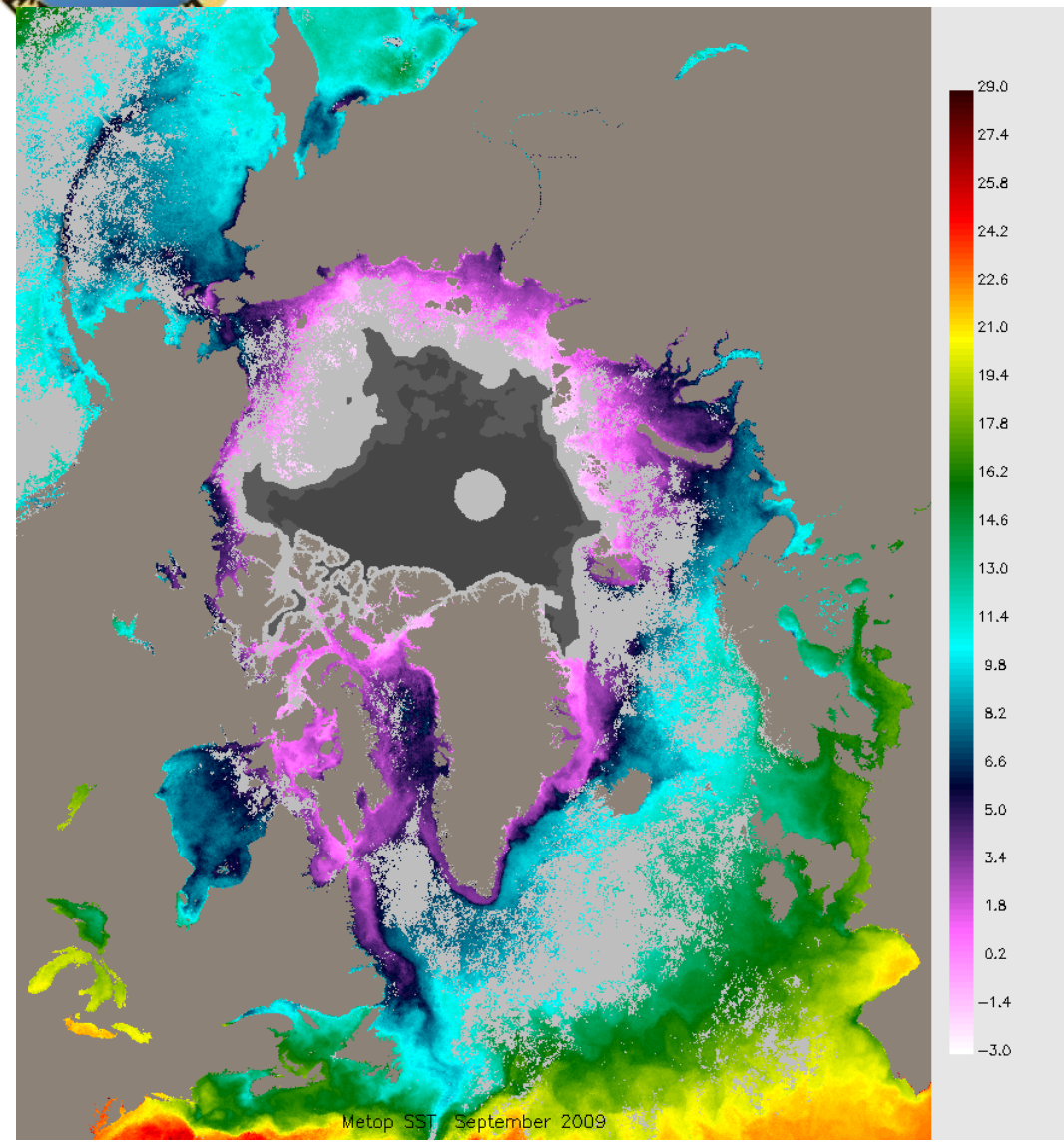
SunSynchronous
102 minute orbit
14.1 orbits per day

METOP



AVHRR Channel	Central wavelength (μm)	
1	0.630	VIS
2	0.865	VIS
3a	1.610	VIS
3b	3.740	IR
4	10.80	IR
5	12.00	IR

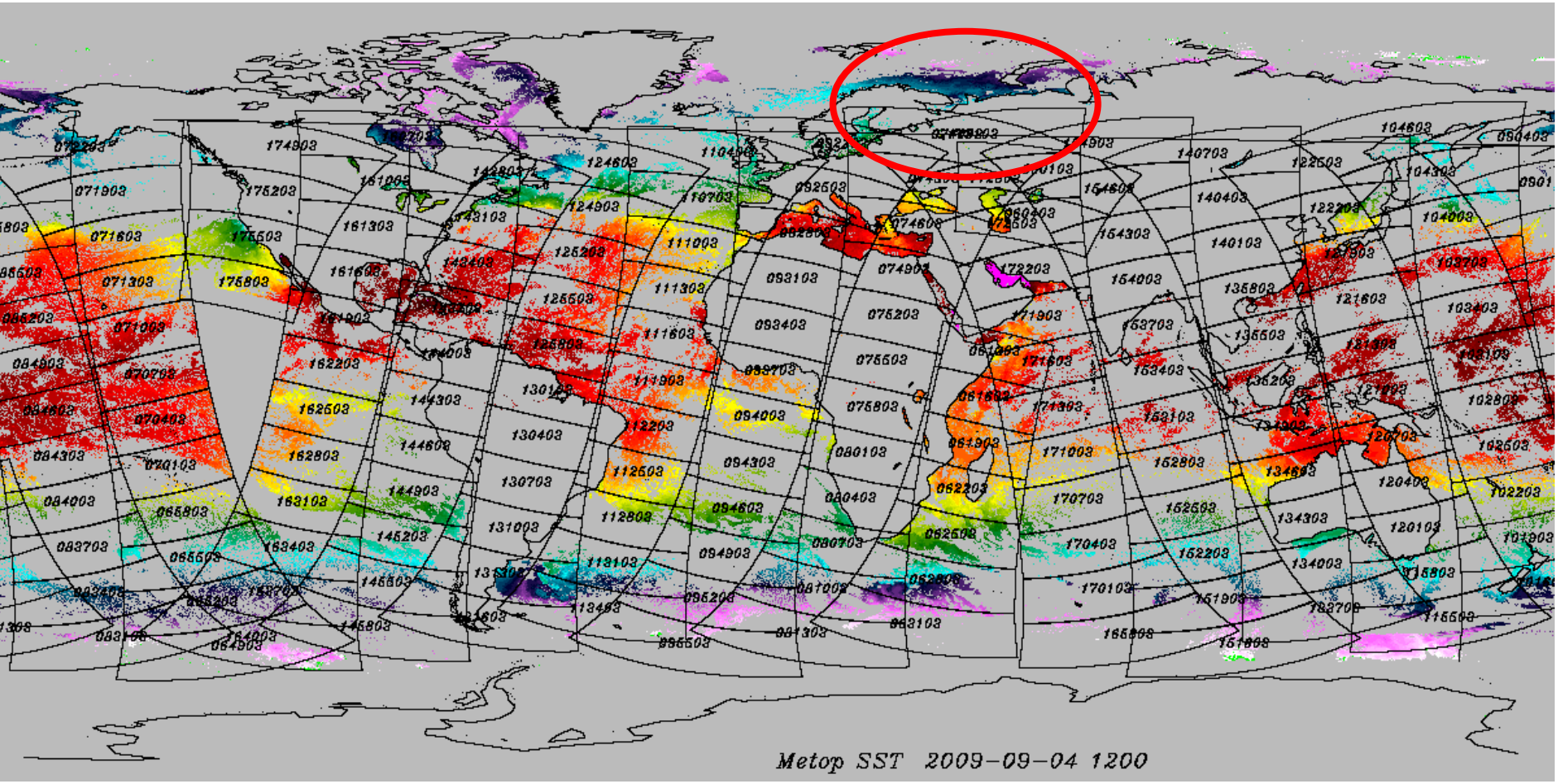
Products



Mean METOP SST field in September 2009
Over the Arctic Ocean

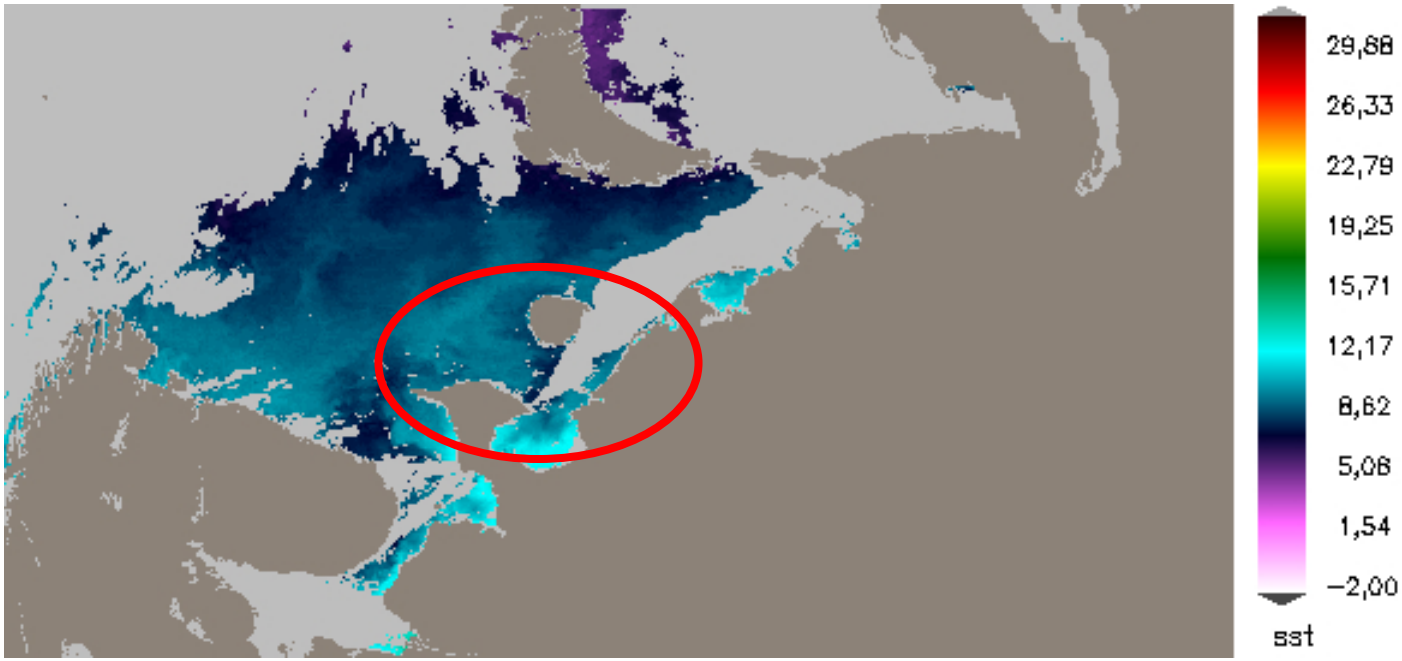
Products

Coverage on the 04/09/09 by 3 minute granules from 0600 till 1800



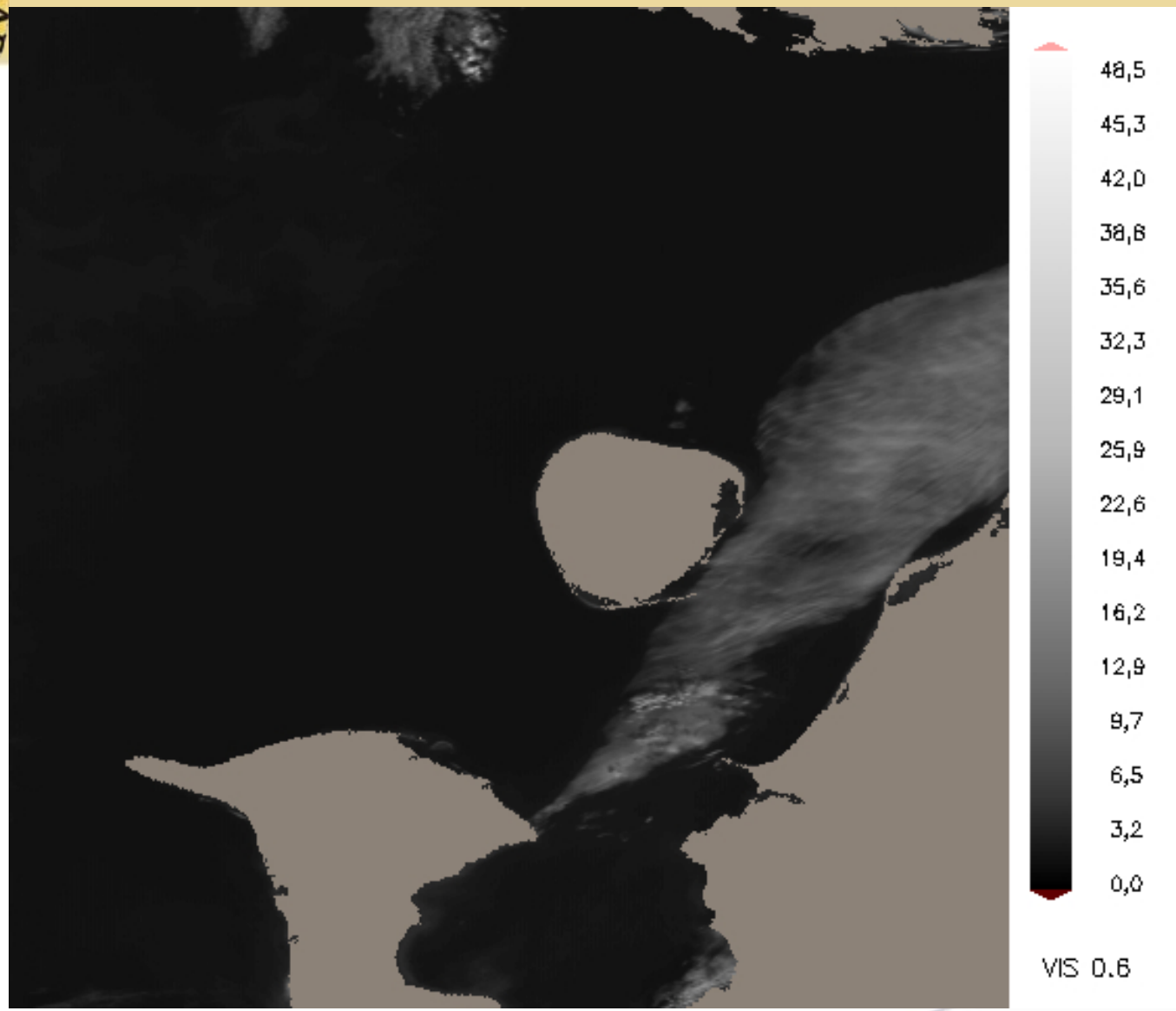
More: http://www.osi-saf.org

Products



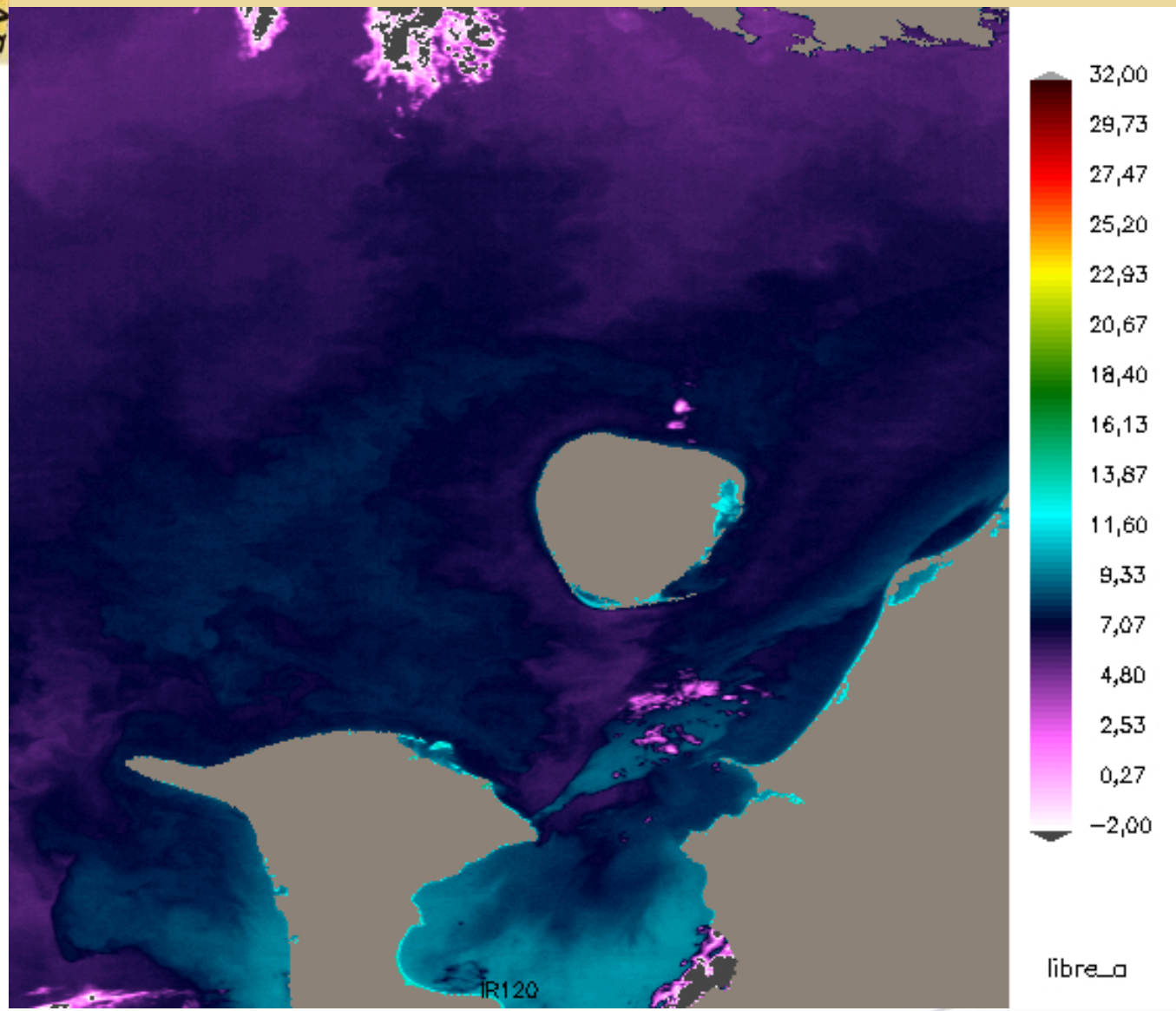
04/09/2009 at 0737

SST from the AVHRR



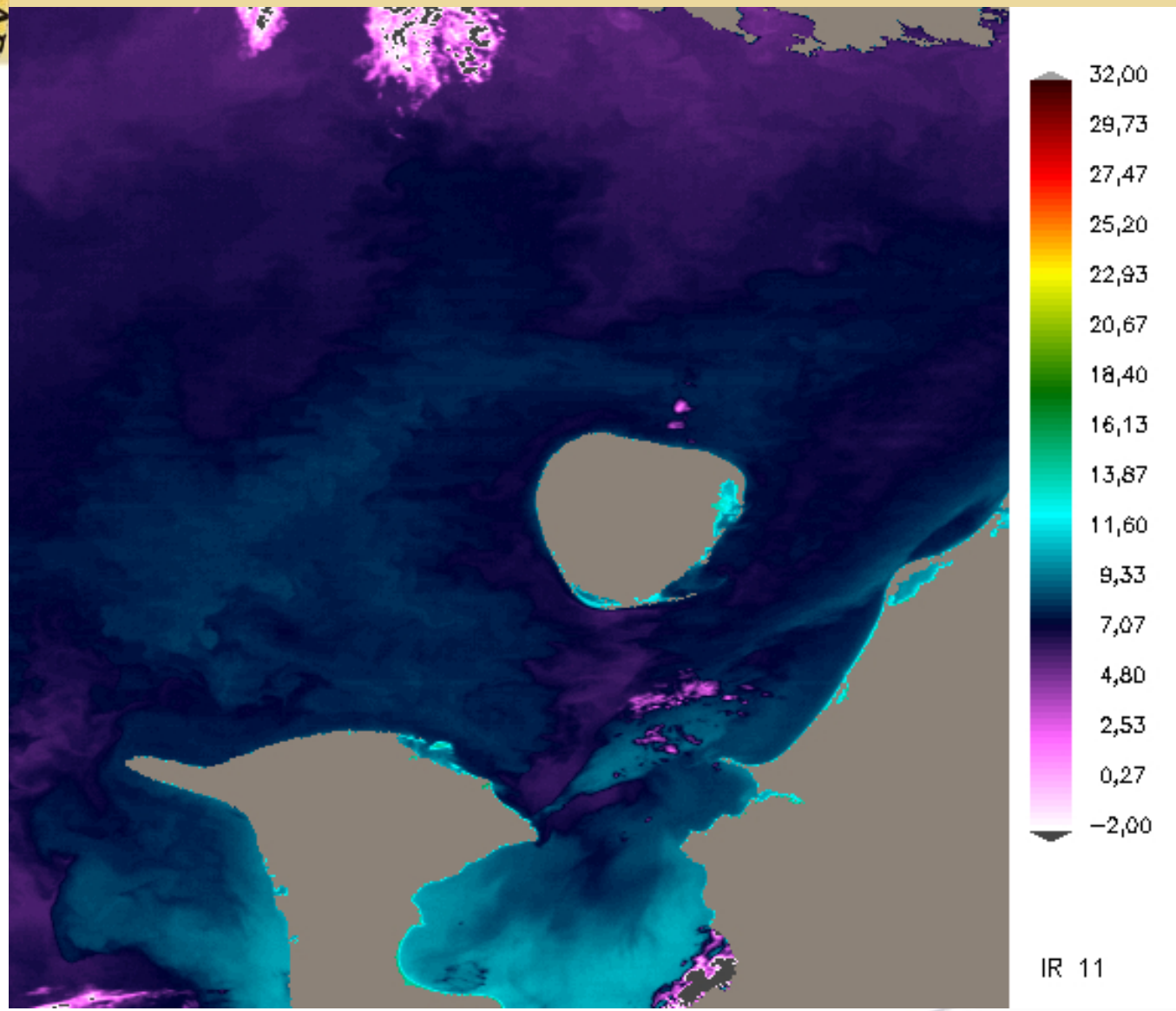
Channel 0.6 μm

SST from the AVHRR



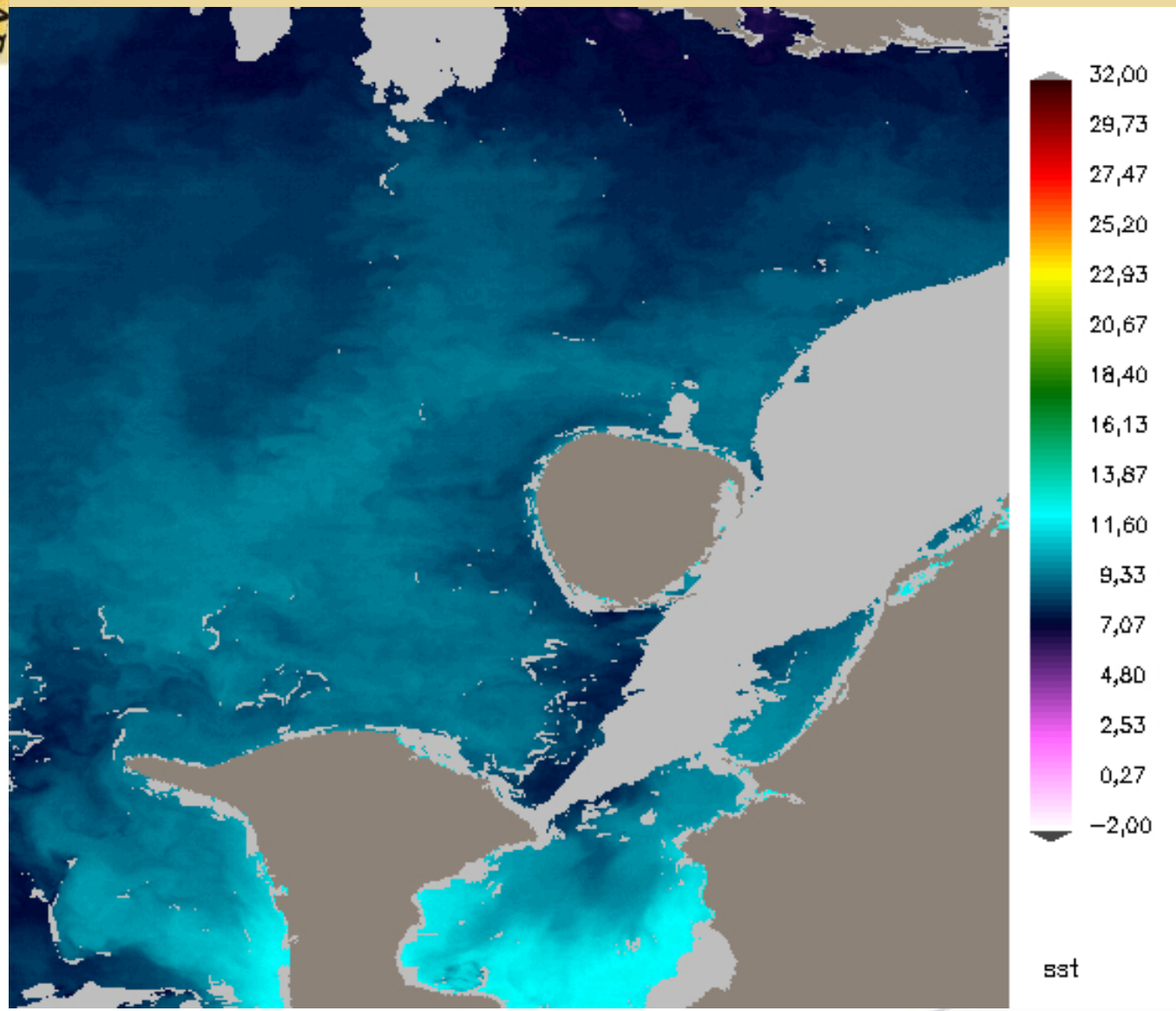
Channel
12 μm

SST from the AVHRR



Channel
10.8 μm

SST from AVHRR

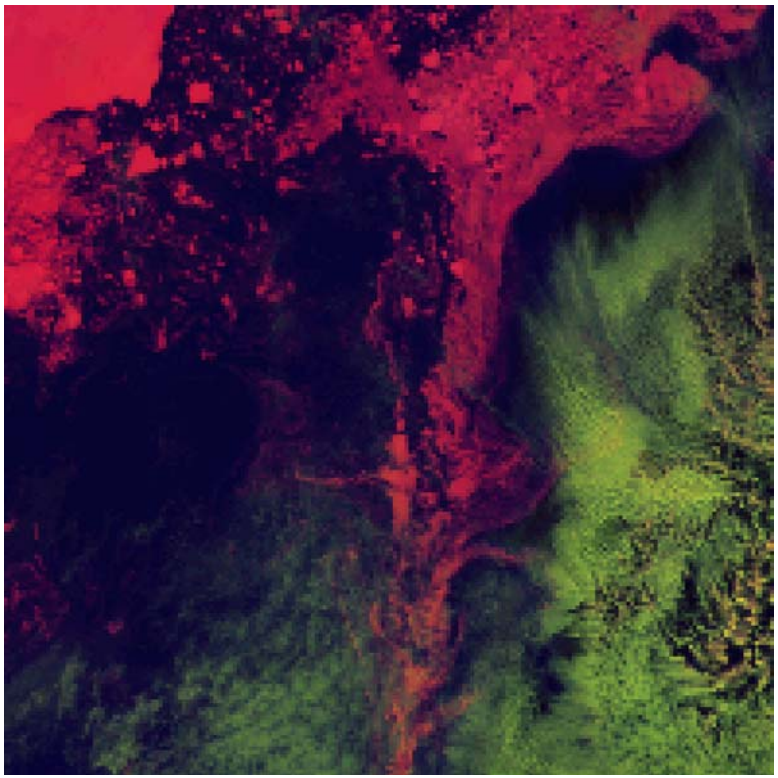


SST

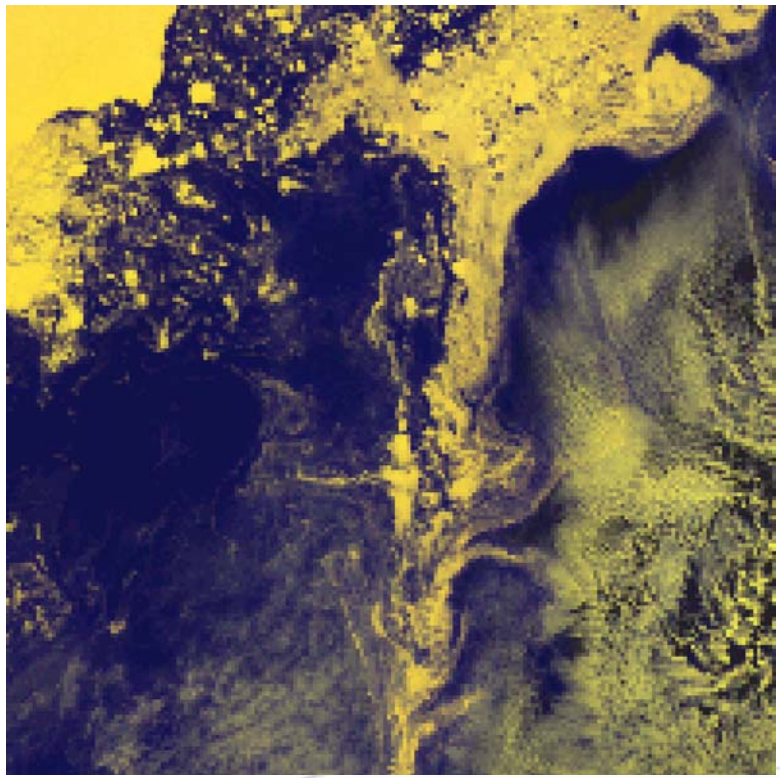
(Expected) Challenges: ice and clouds

Fram Strait in September

AVHRR ch 0.9, 1.6, 10.8 μm

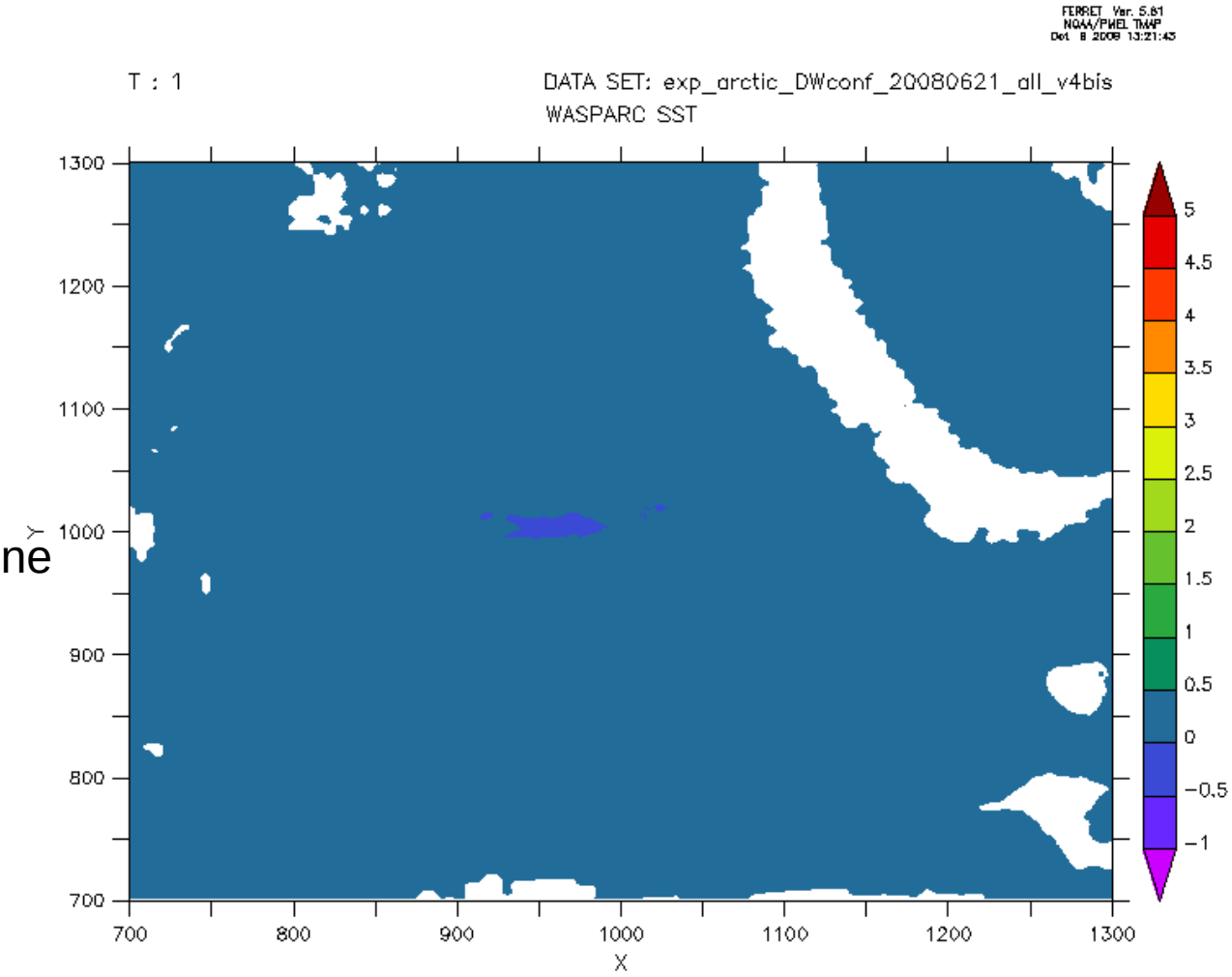


AVHRR ch 0.6, 0.9, 10.8 μm



(Unexpected) Challenge: Diurnal warming

21st of June 2008

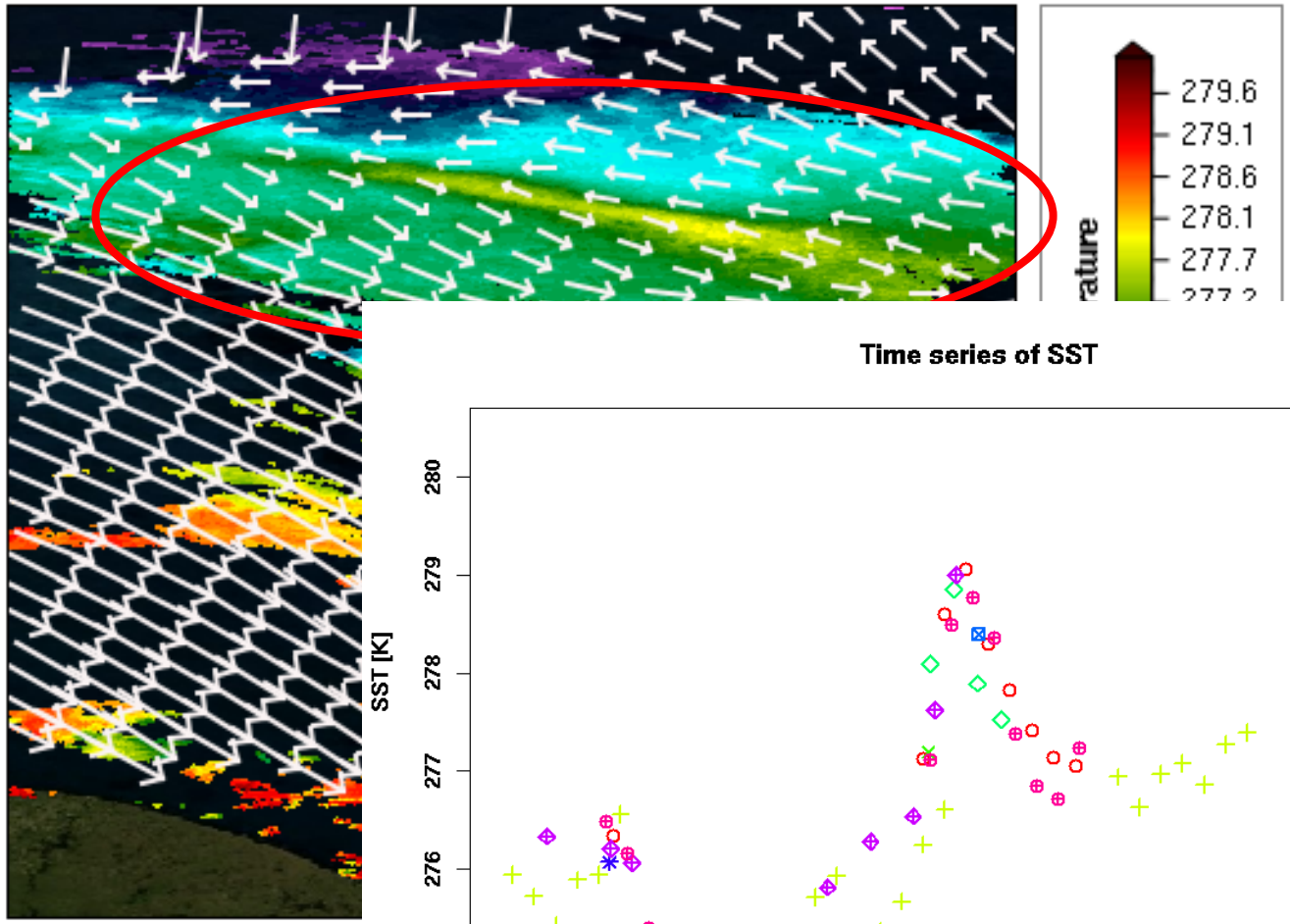


WASPARC SST – nightime reference, no gaps (K)

(Unexpected) Challenges: Diurnal Warming

21st of June 0740 UTC

METOP AHRR SST + ASCAT wind field

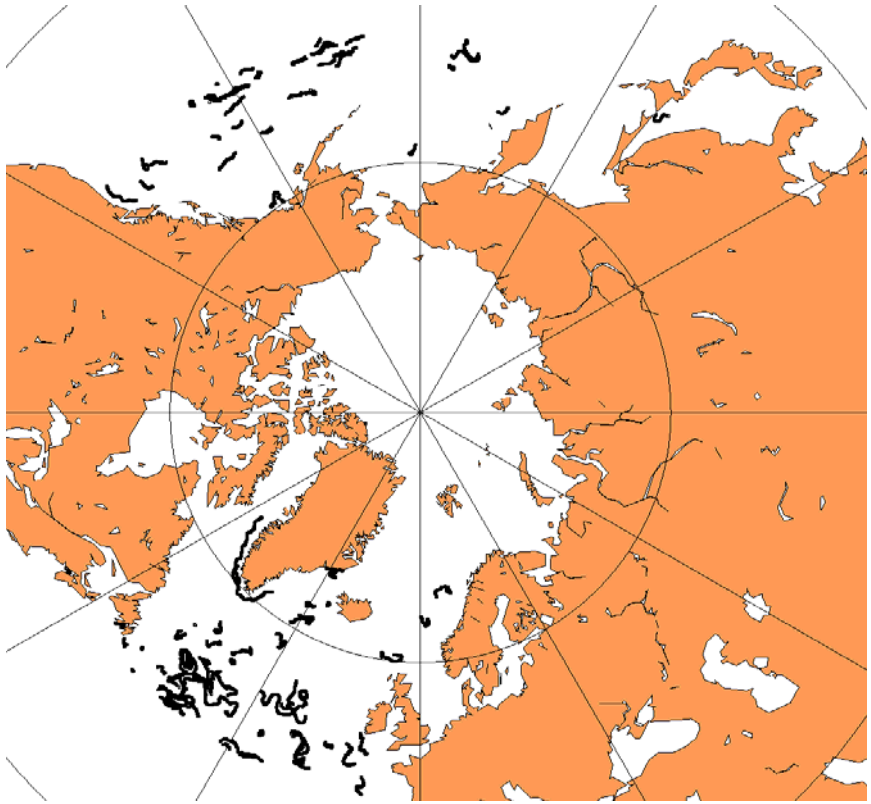


Naiad

2009

Validation

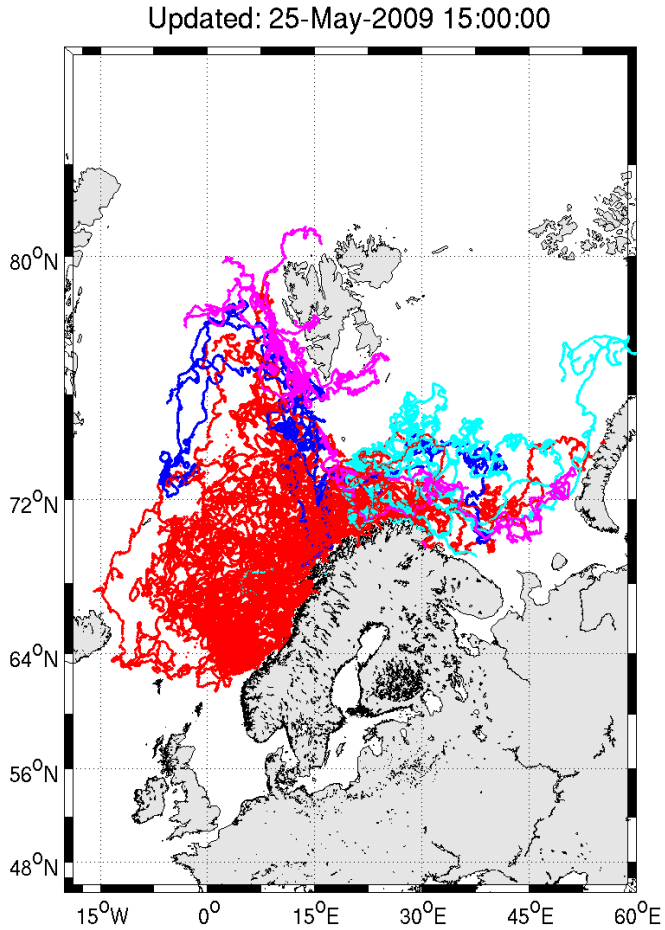
- Usually very few drifting buoys visit the Arctic



Drifting buoys during 2006-08

Validation

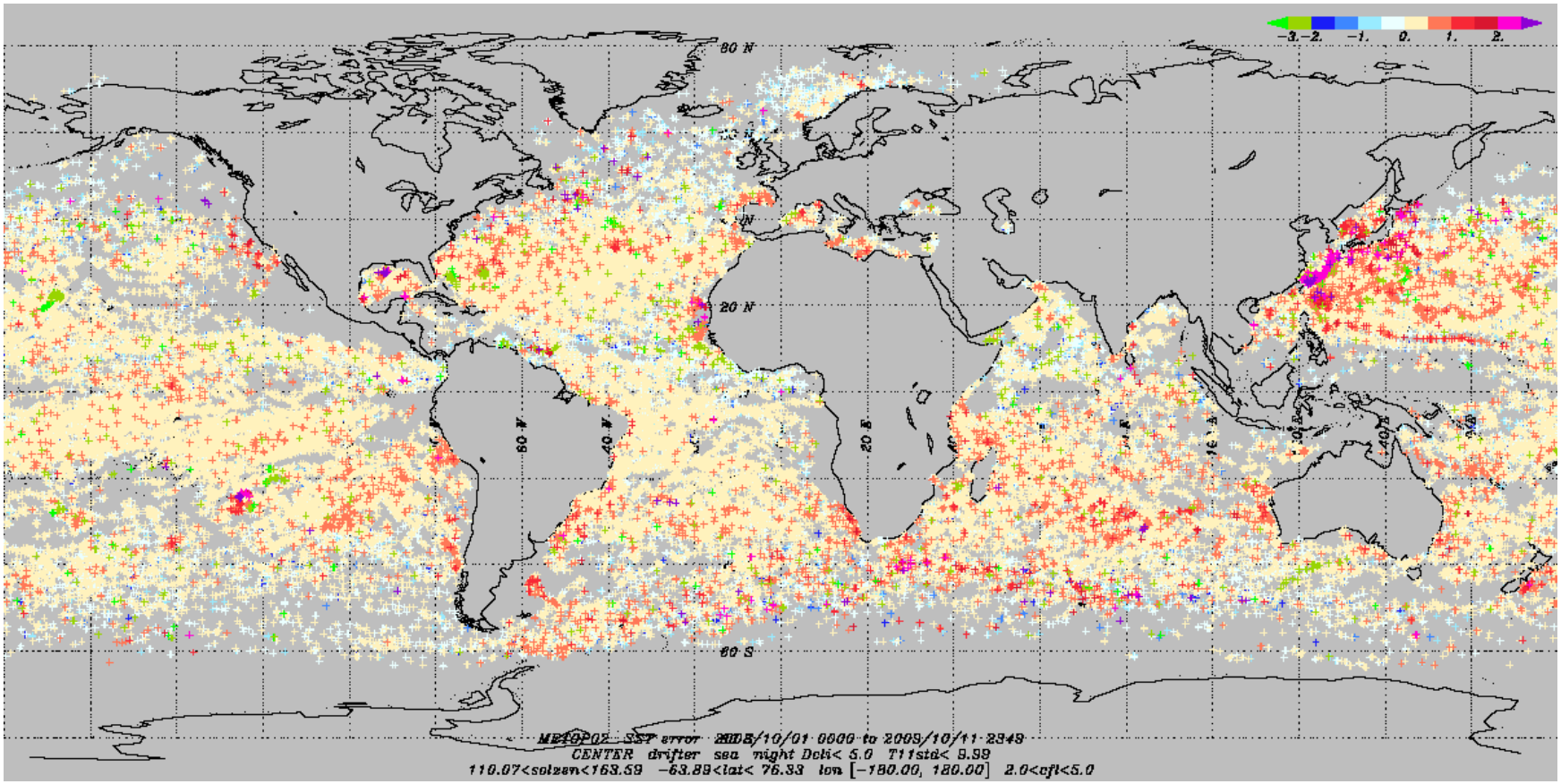
- Usually very few drifting buoys visit the Arctic
- “Poleward” (met.no +University of Oslo)
  - Deployed 150 drifting buoys 2007.07-2009.07
  - Very good opportunity for SST validation in the Arctic
  - Will not last...
- A few SST drifters in the inner Arctic summer 2009



Drifters trajectories since deployment (in 2007). Courtesy of Inga Koszalka, University of Oslo, Norway.

Validation results (Oct. 2008- Oct.2009)

Global nighttime validation results



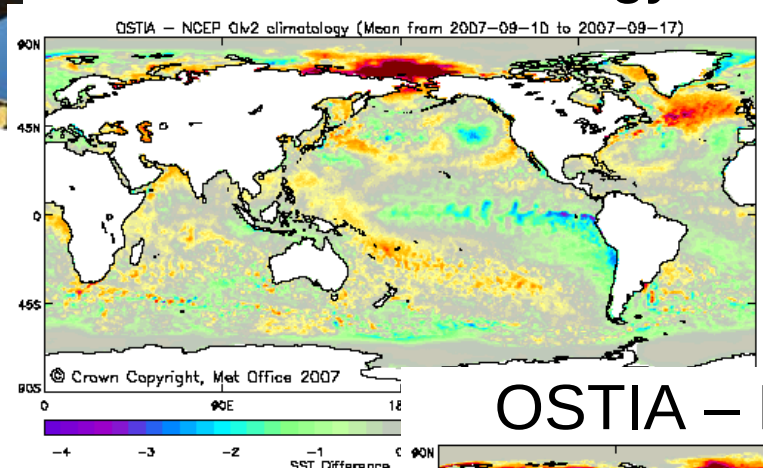
Validation results (Oct. 2008- Oct.2009)

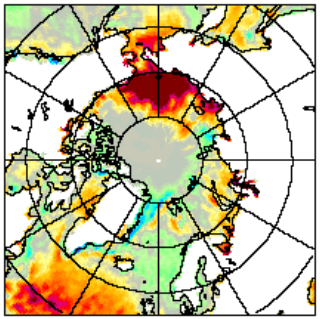
DAYTIME	N	δ (K)	σ (K)
GLOBAL	263244	0.12	0.56
ARCTIC	10955	**0.19**	**0.54**

NIGHTTIME	N	δ (K)	σ (K)
GLOBAL	210932	-003	0.48
ARCTIC	1300	**-0.32**	**0.36**

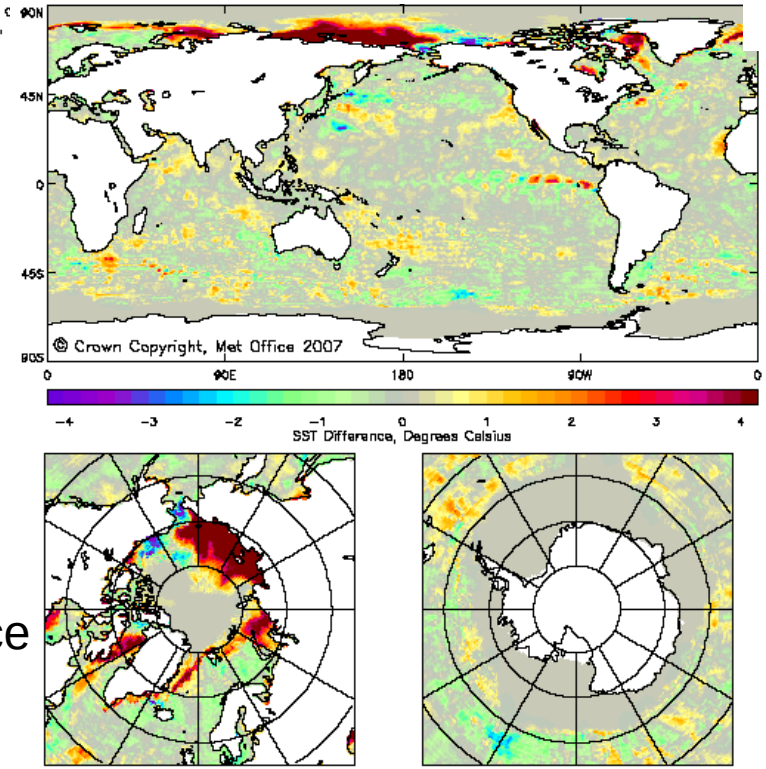
Meteorological applications

OSTIA - climatology



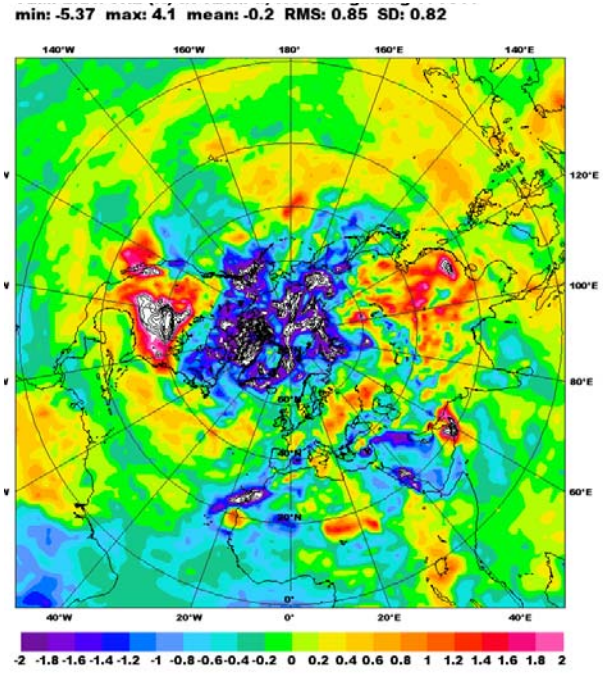


OSTIA – NWP SST



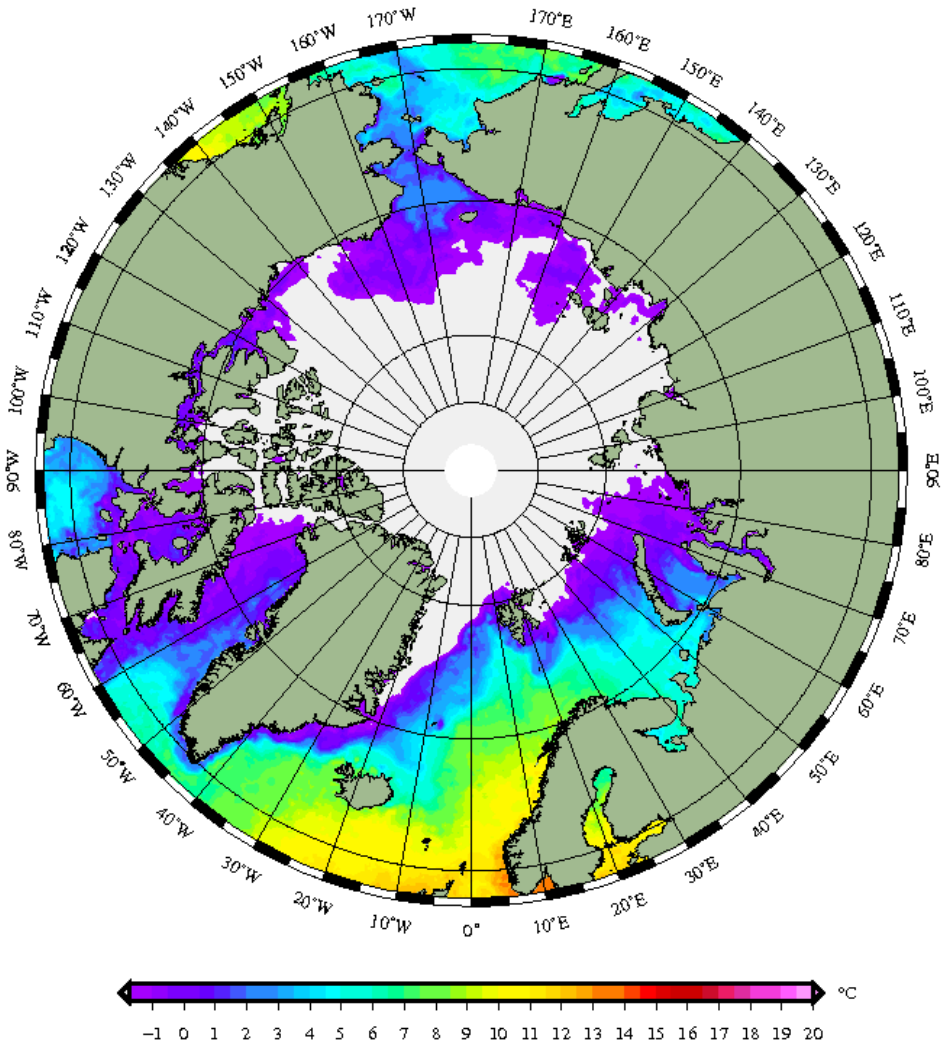
- Old NWP SST didn't capture the warming.

NWP Bias 925hPa, 48hr forecasts



From J. Stark
GHRSST meeting
June 2008
Perros-Guirec, France

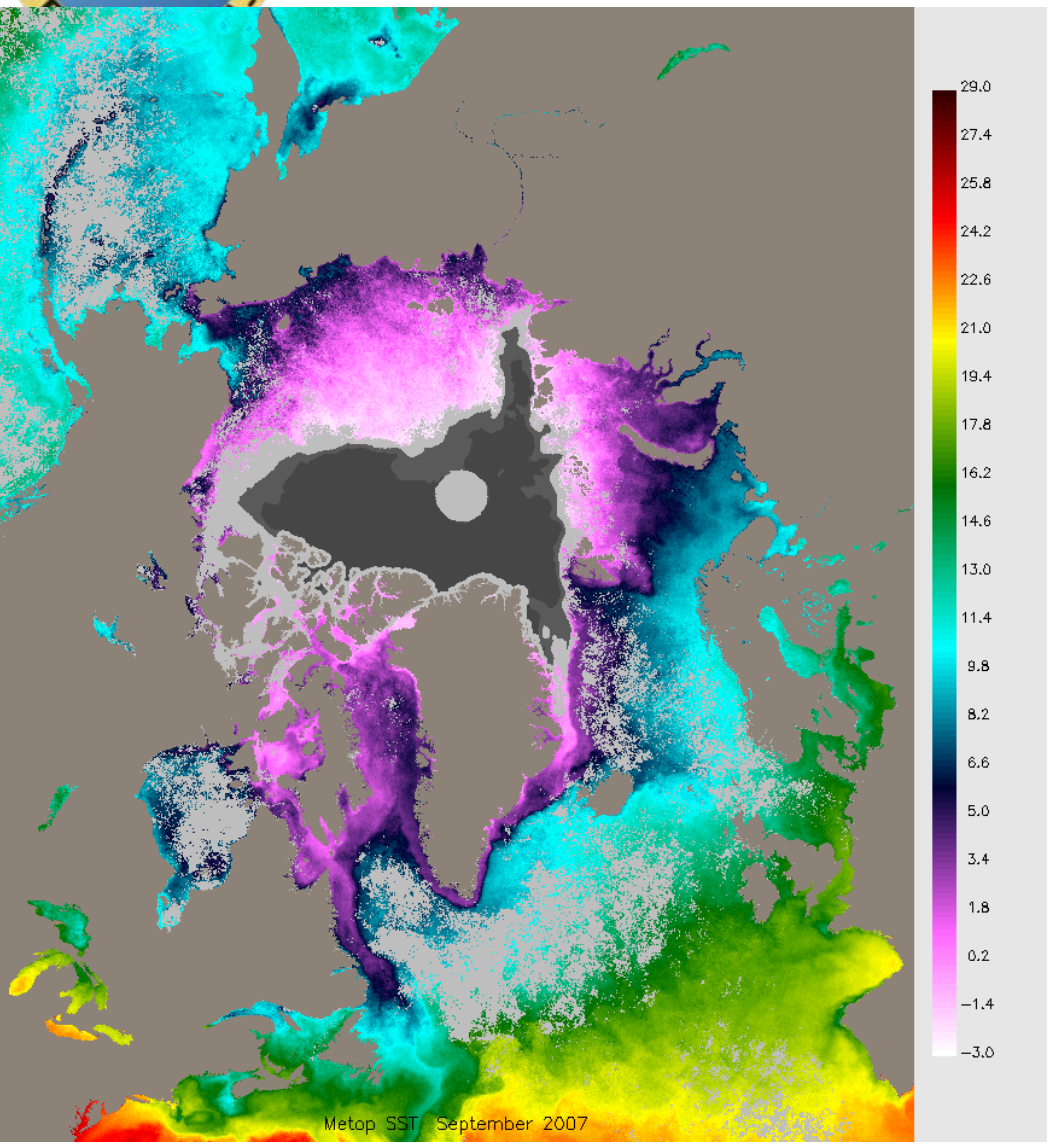
Oceanographic applications



Analyzed SST fields from
15th October 2008
till
15th October 2009

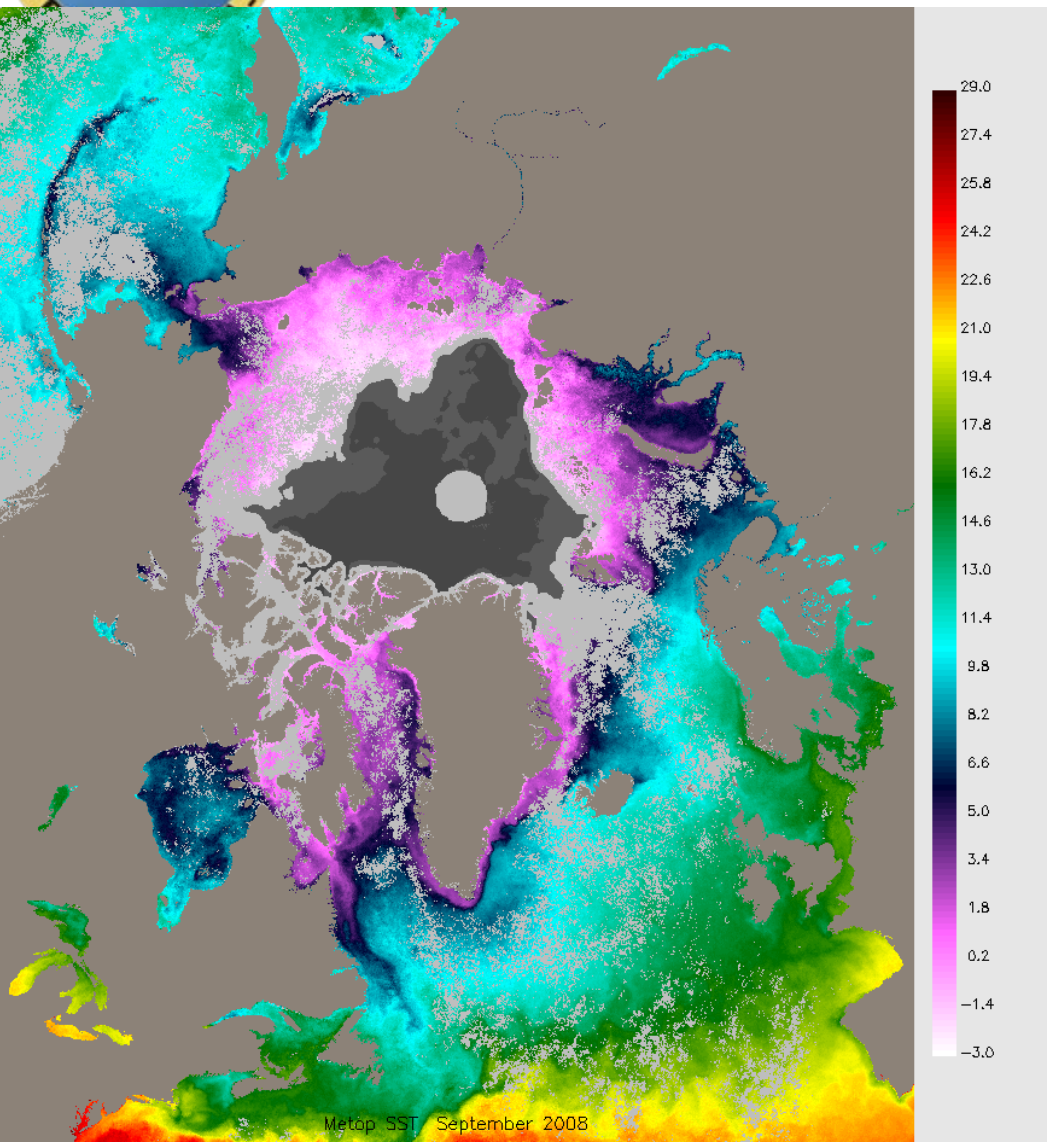
Work done within the GMES/MyOcean project
As inputs to the Arctic Marine Forecast Center

Climate?



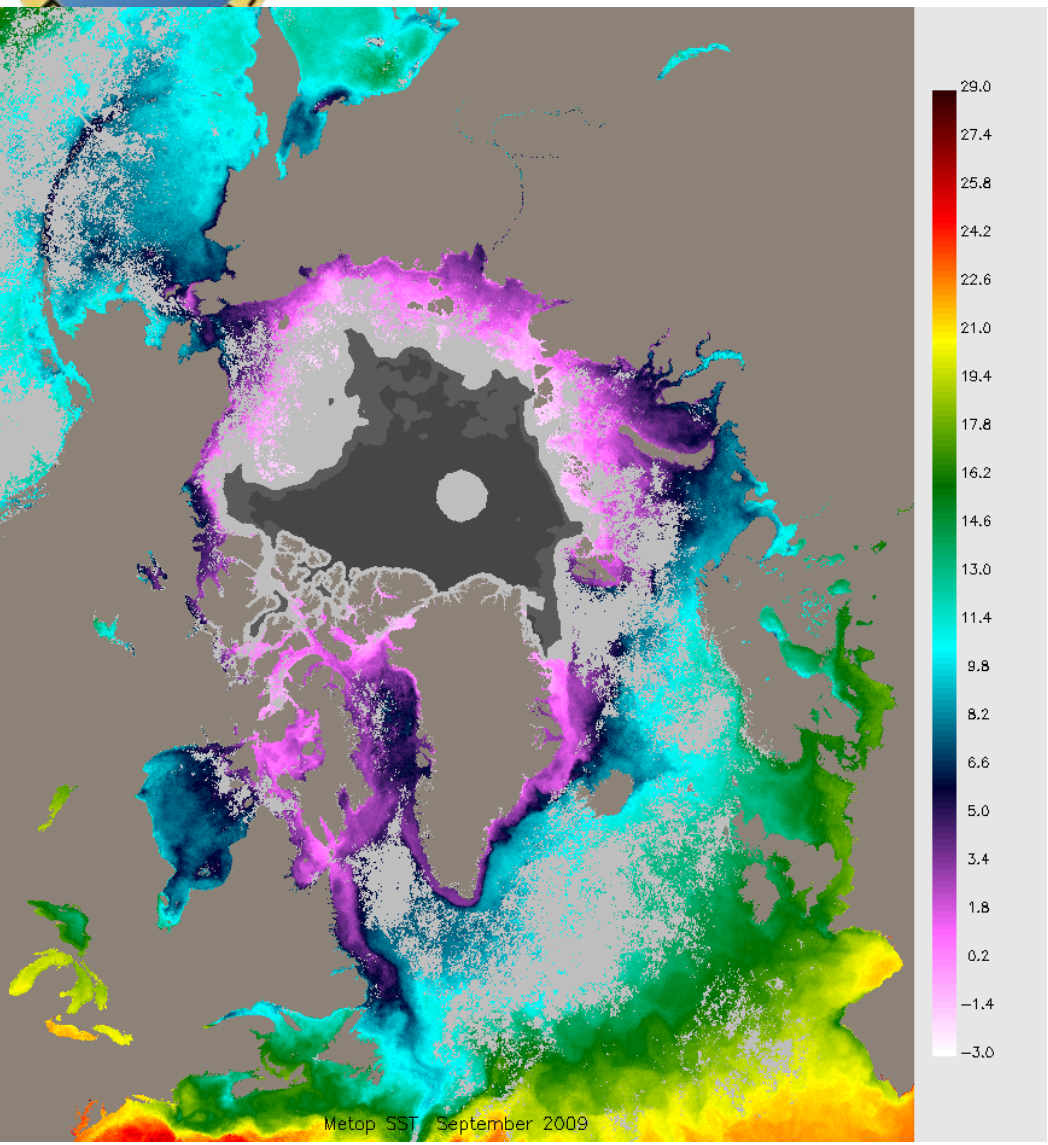
Mean METOP SST field in September 2007
Over the Arctic Ocean

Climate?



Mean METOP SST field in September 2008
Over the Arctic Ocean

Climate?



Mean METOP SST field in September 2009
Over the Arctic Ocean

Conclusions

- A significant effort has been made within the OSI SAF to develop, produce and validate SST products over the Arctic.

- This effort will continue:
  - in the OSI SAF (algorithms, real time production)
  - in GMES/MyOcean project
    (merging and analysed SST field production)
  - in the ESA CCI project (re-processing; in discussion)