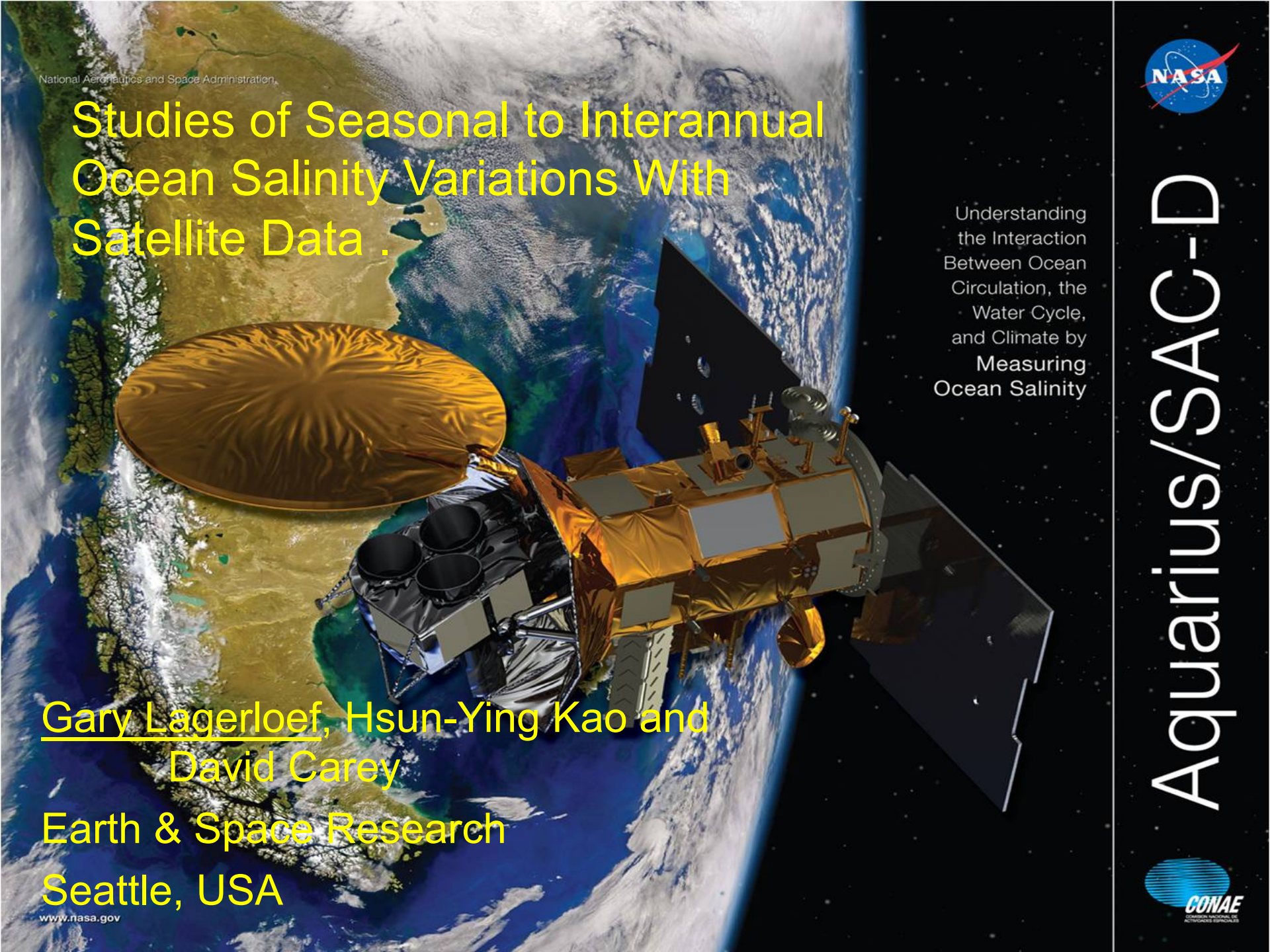


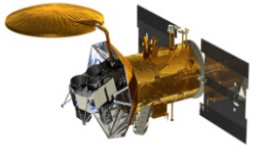
Studies of Seasonal to Interannual Ocean Salinity Variations With Satellite Data .

Gary Lagerloef, Hsun-Ying Kao and David Carey

Earth & Space Research

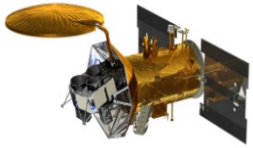
Seattle, USA

Purpose of this Presentation

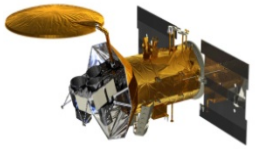


- A major science objective is to build a long term satellite salinity climate data record (CDR) to measure climatic trends in ocean salinity and marine water cycle.
  - Requires decadal measurement records; long-term calibration stability.
  - Stretches the present data to its limits.
- *What trends are observable with our present satellite record ?*

Objective: Detect SSS Trends



- Analyse for trends in current satellite SSS data records.
- Very preliminary results are presented here.
- Question: What trends are detectable in the current data sets?
- A null result is meaningful.



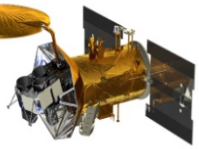
1. Aquarius V4.0; Standard monthly L3 fields
2. Aquarius OISSS from U. Hawaii; large-scale biased adjusted with Argo fields (Melnichenko et al 2015, JGR).
   http://apdrc.soest.hawaii.edu/datadoc/oisss.php
3. SMOS CATDS CEC-LOCEAN v2013 L3 product

All fields are interpolated to 1°x1° monthly grid

Time Intervals:

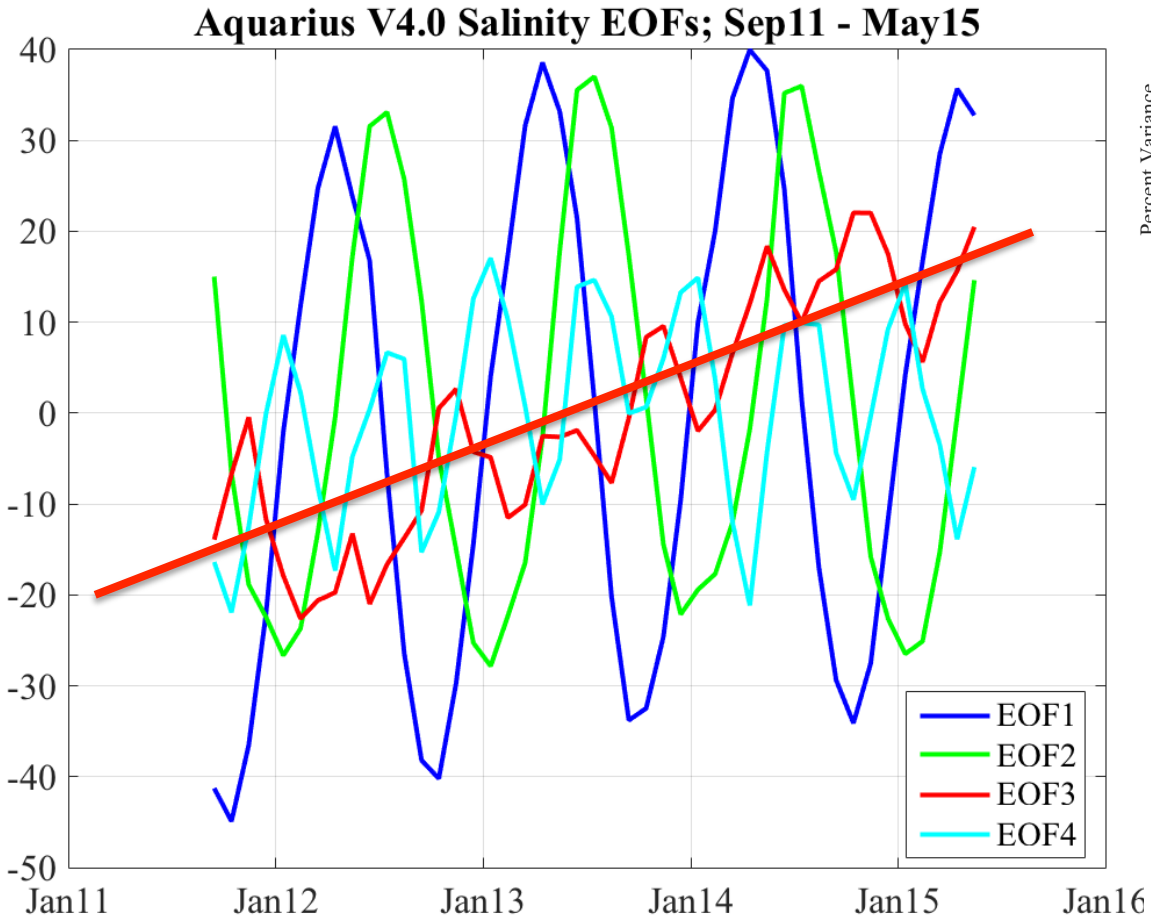
Sep 2011 – Jan 2015; Aquarius/SMOS overlap

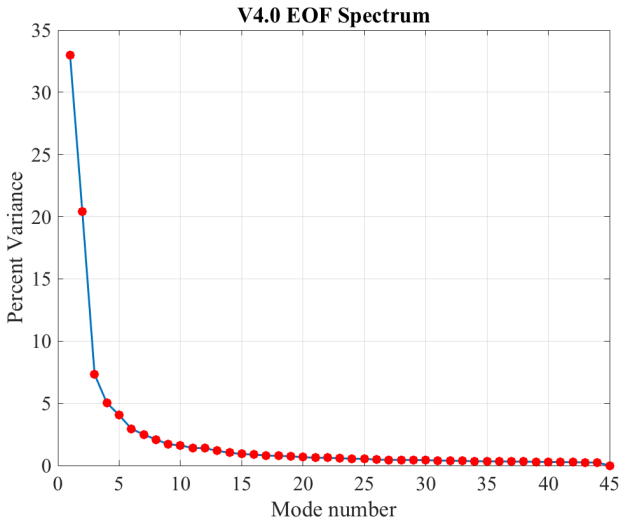
Jan 2010 – Jan 2015; SMOS

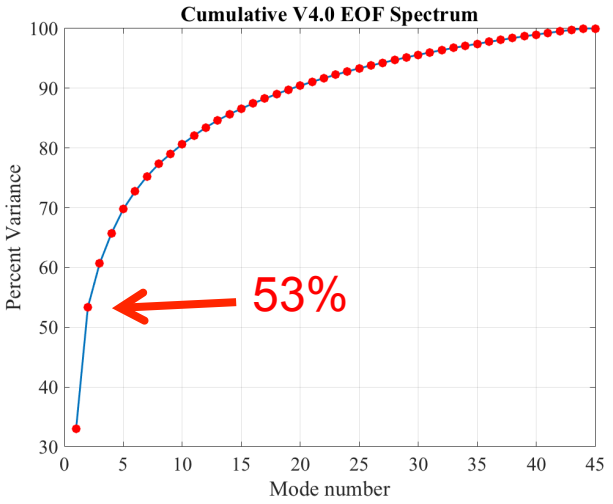


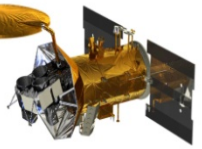
EOFs 1 & 2: Seasonal cycle
EOF 3: Trend
EOF4: Semi-annual cycle

Aquarius V4.0



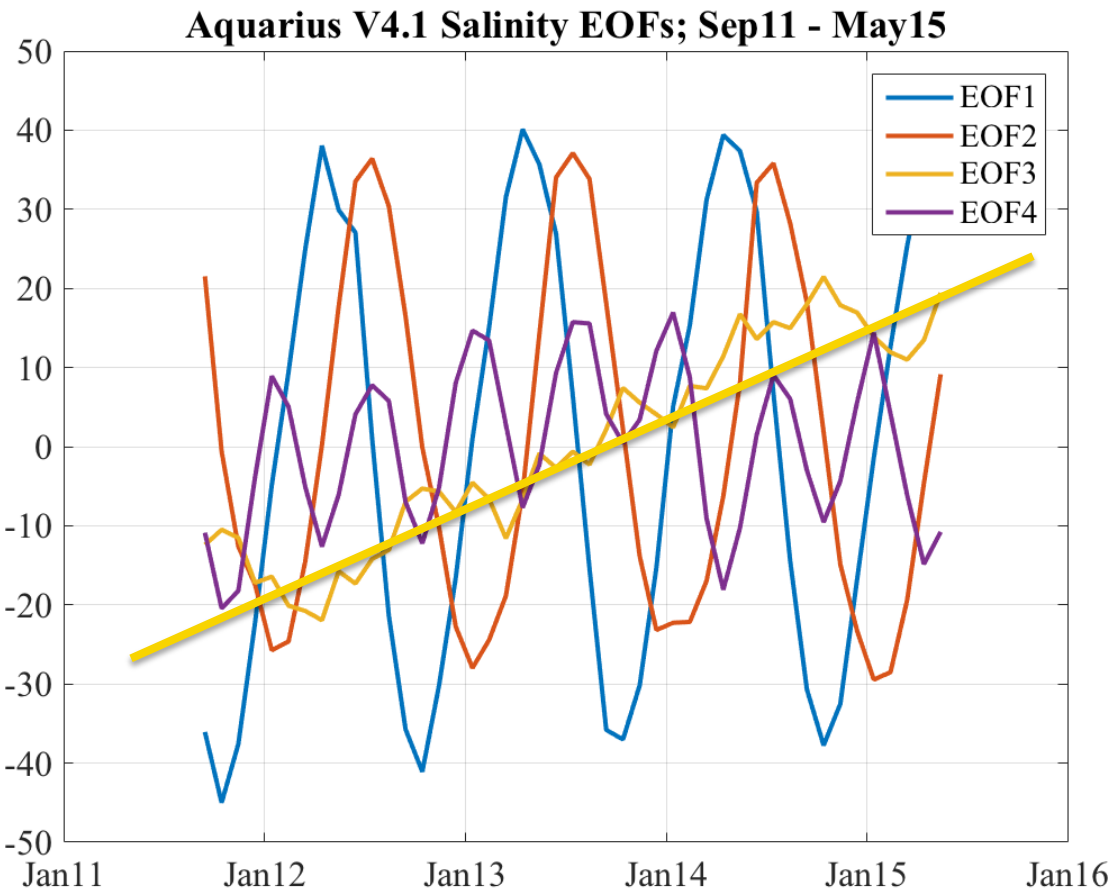


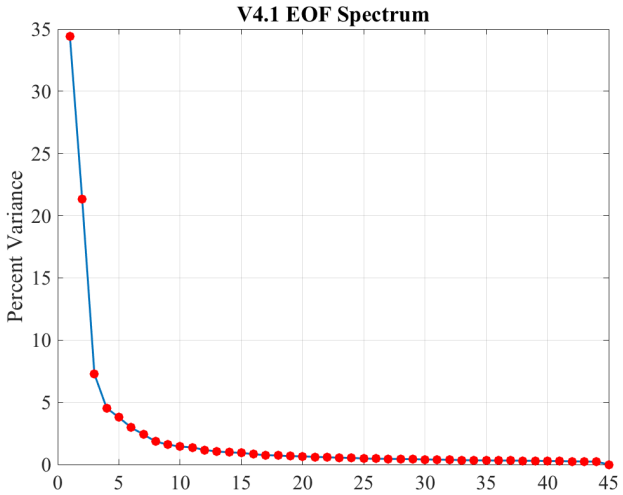


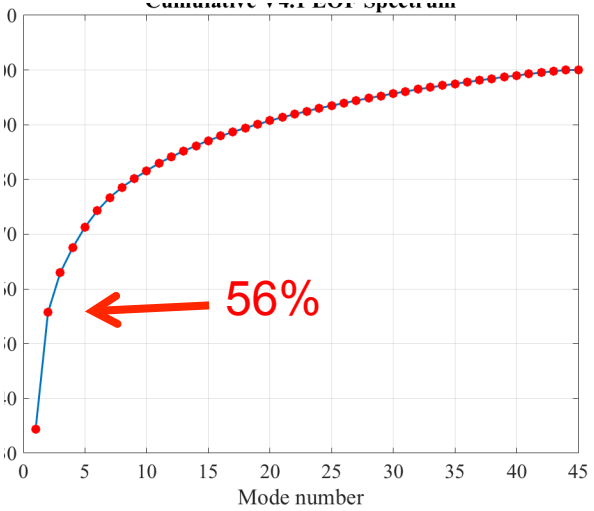


EOFs 1 & 2: Seasonal cycle
EOF 3: Trend
EOF4: Semi-annual cycle

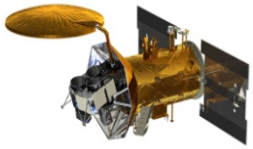
Aquarius V4.1

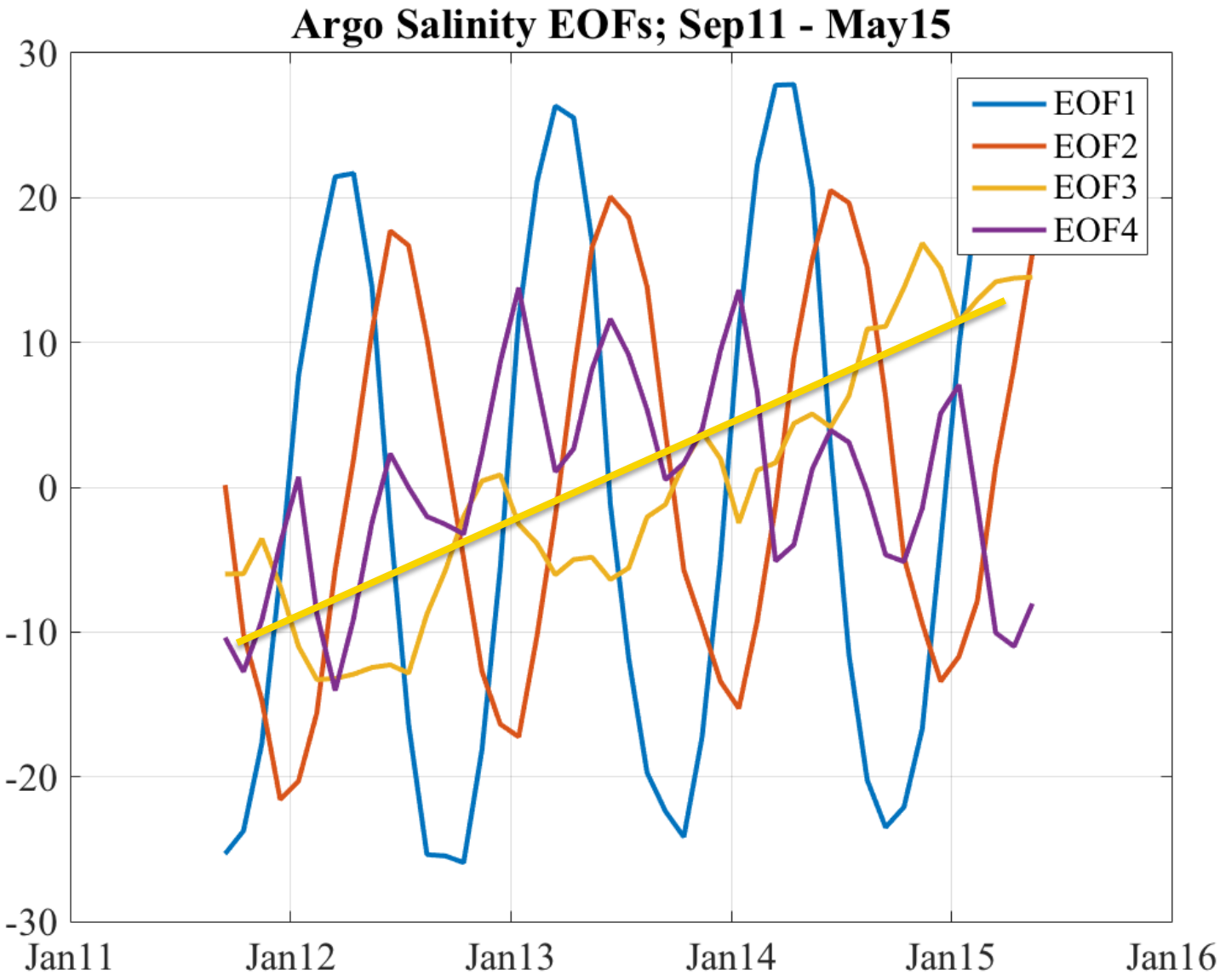


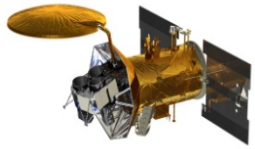


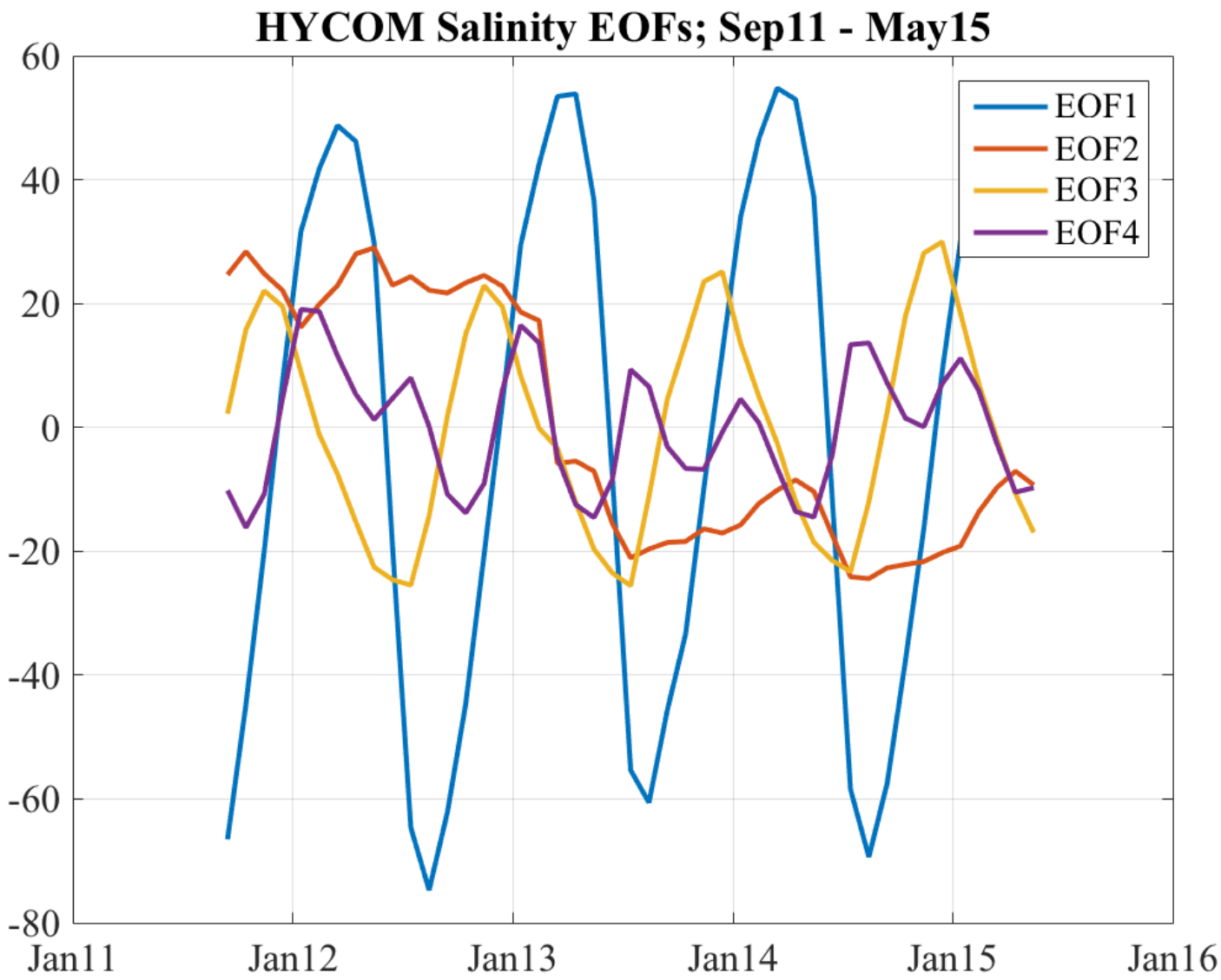


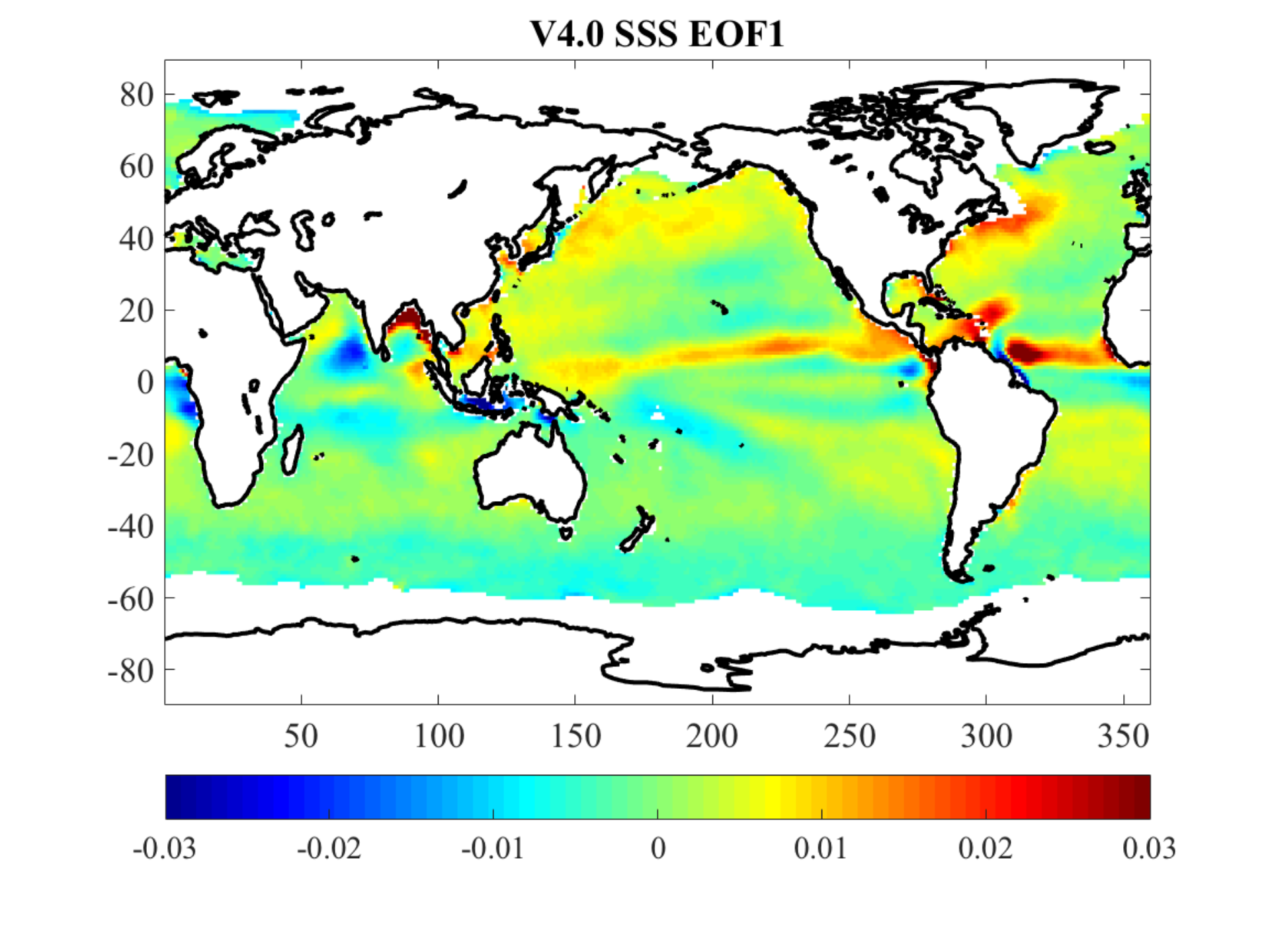
Argo (SIO Analysis Product)

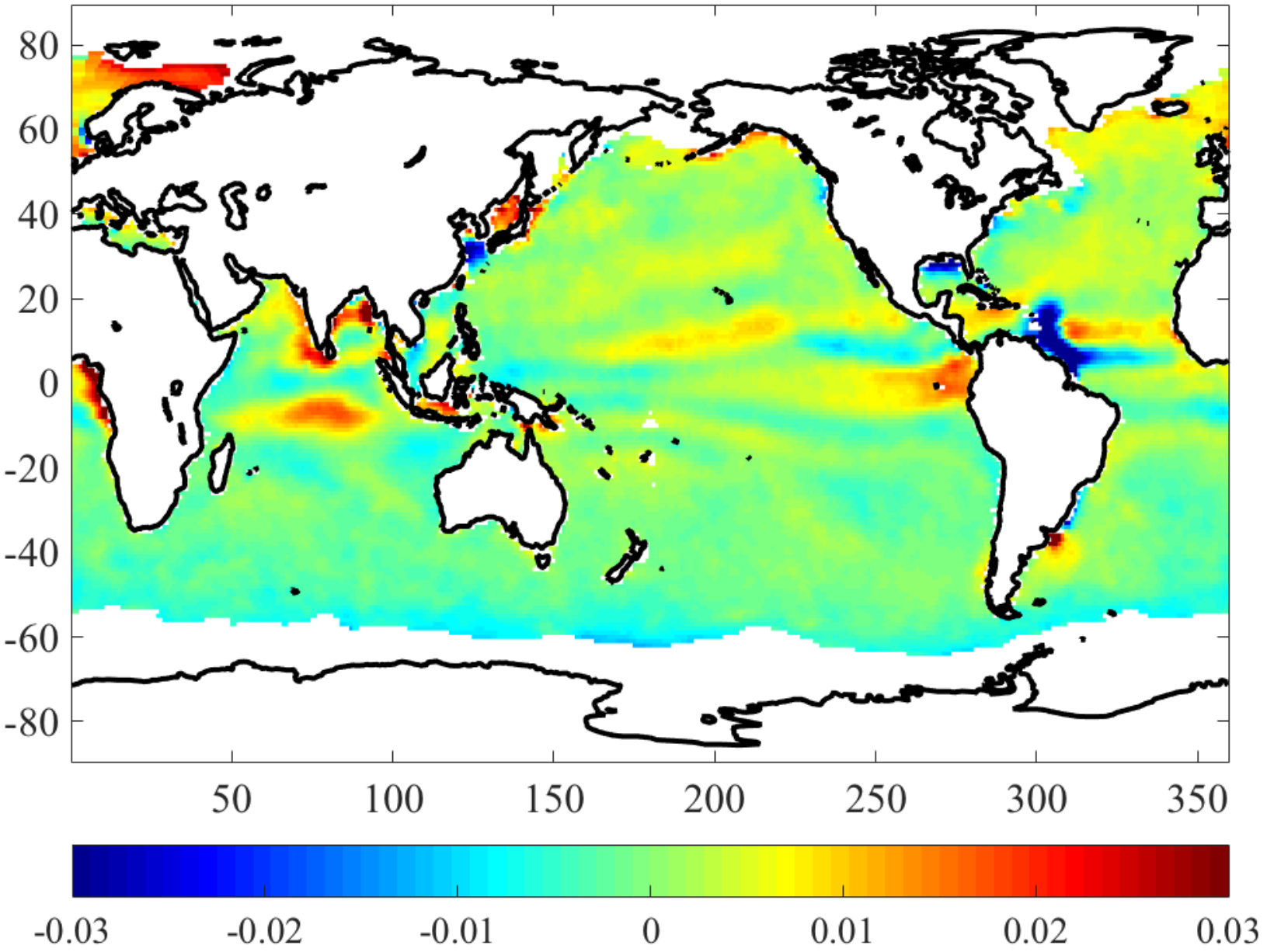




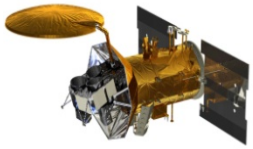


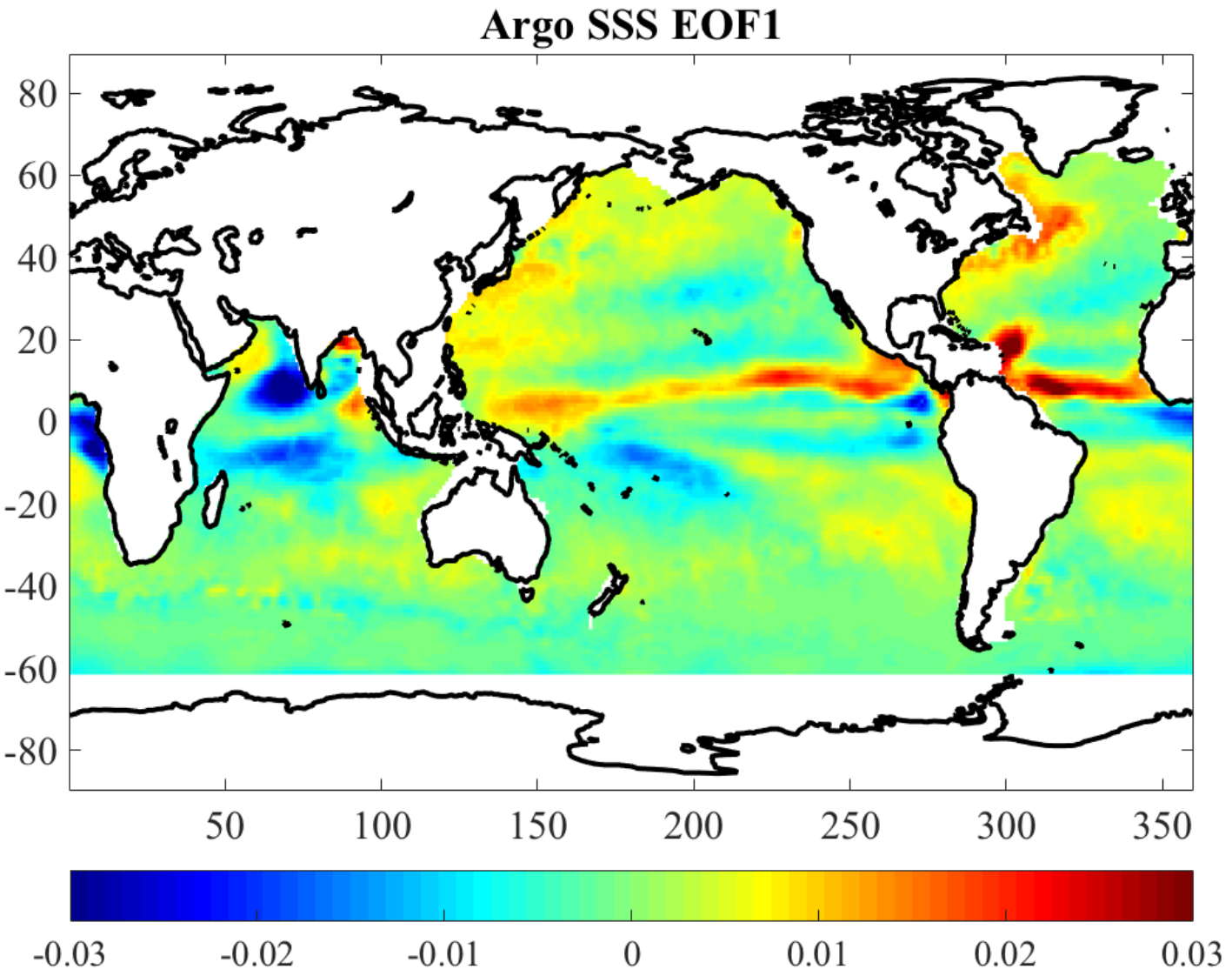

HYCOM Salinity EOFs; Sep11 - May15
60
40
20
0
-20
-40
-60
-80
Jan11
Jan12
Jan13
Jan14
Jan15
Jan16
EOF1
EOF2
EOF3
EOF4


V4.0 SSS EOF1
80
60
40
20
0
-20
-40
-60
-80
50
100
150
200
250
300
350
-0.03
-0.02
-0.01
0
0.01
0.02
0.03

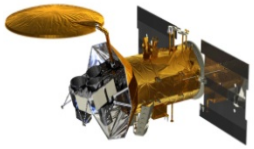

V4.0 SSS EOF2
80
60
40
20
0
-20
-40
-60
-80
50
100
150
200
250
300
350
-0.03
-0.02
-0.01
0
0.01
0.02
0.03

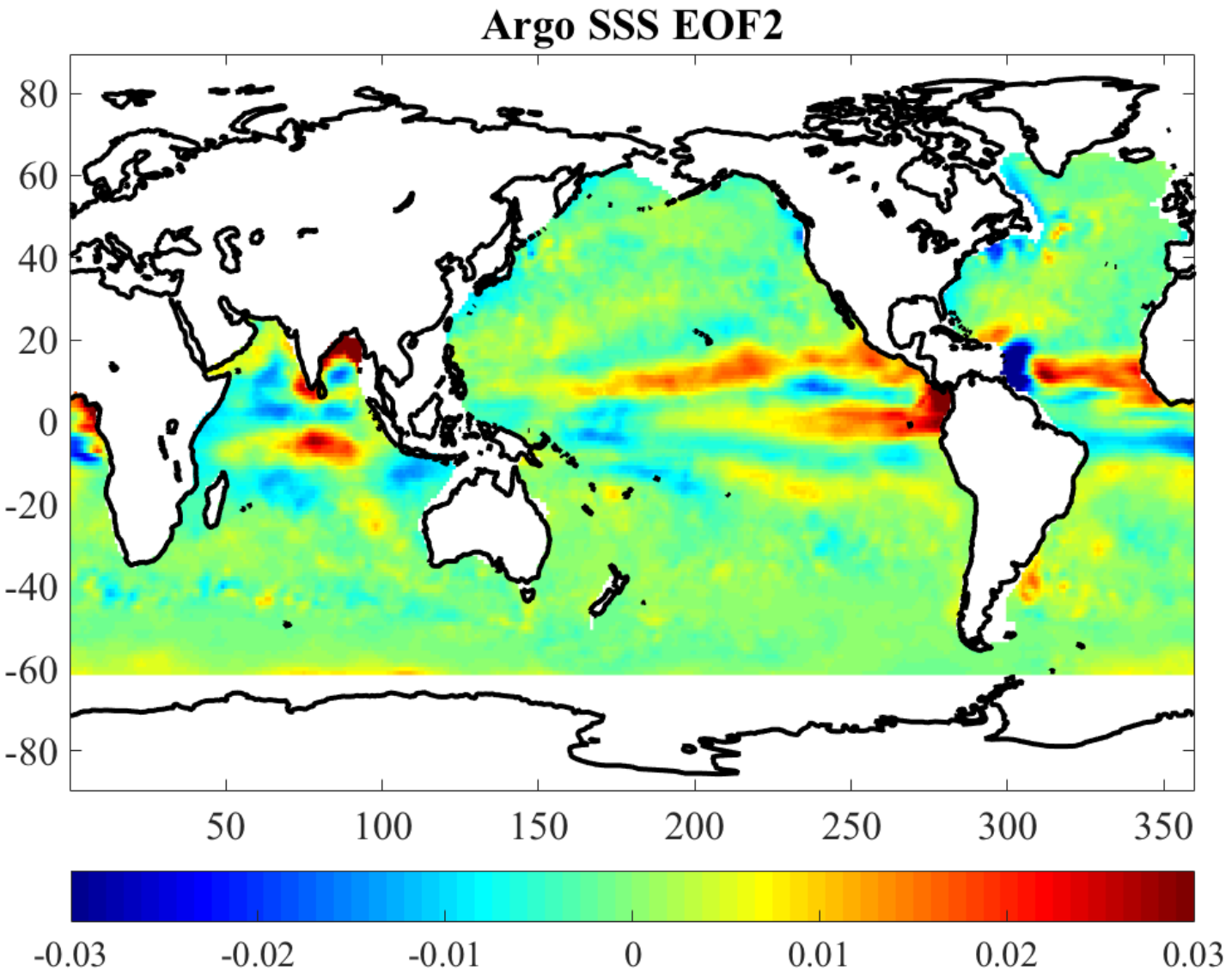
Argo



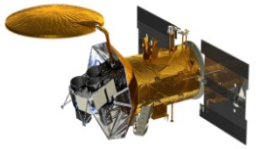

Argo SSS EOF1
80
60
40
20
0
-20
-40
-60
-80
50
100
150
200
250
300
350
-0.03
-0.02
-0.01
0
0.01
0.02
0.03

Argo




Argo SSS EOF2
80
60
40
20
0
-20
-40
-60
-80
50
100
150
200
250
300
350
-0.03
-0.02
-0.01
0
0.01
0.02
0.03

Summary



- Annual SSS cycle dominates EOFs for V4.0, V4.1 and Argo.
- HYCOM EOFs are distorted relative to the others.
  - Annual cycle appears in EOFs 1 & 3 rather than EOFs 1 & 2.
  - HYCOM EOF2 has a “jump” in 2013
- Recommendation: Discontinue HYCOM use as calibration target.
- Use Argo in areas where Argo EOFs 1&2 are minimum variance.
- Individual Argo (L2 swath) matchups for channel calibrations.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