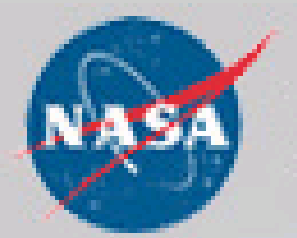

Jet Propulsion Laboratory
California Institute of Technology

A comparison of SST gradients and the impact of going to higher resolution

GHRSST XiV June, 2013

Woods Hole, Massachusetts

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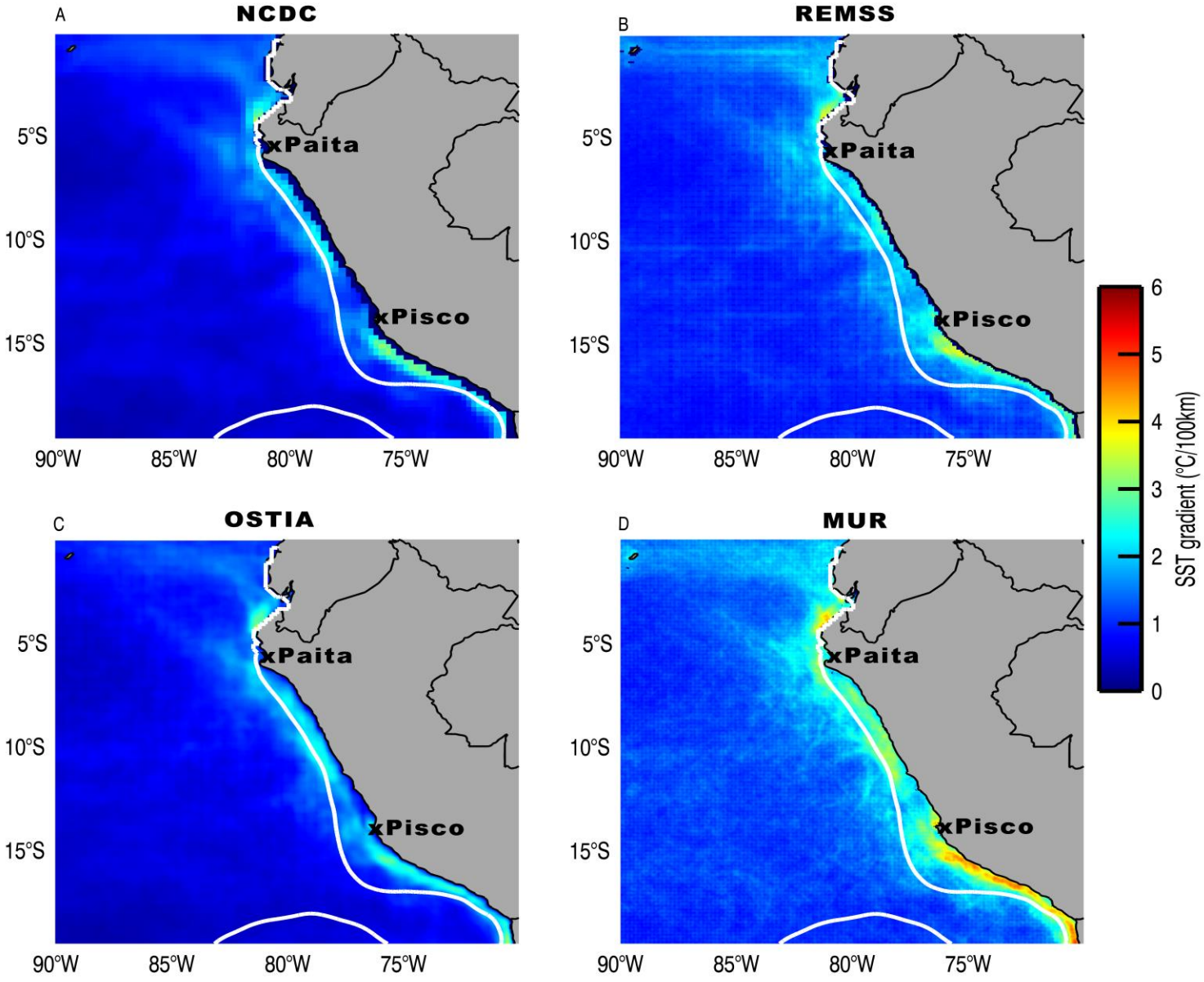
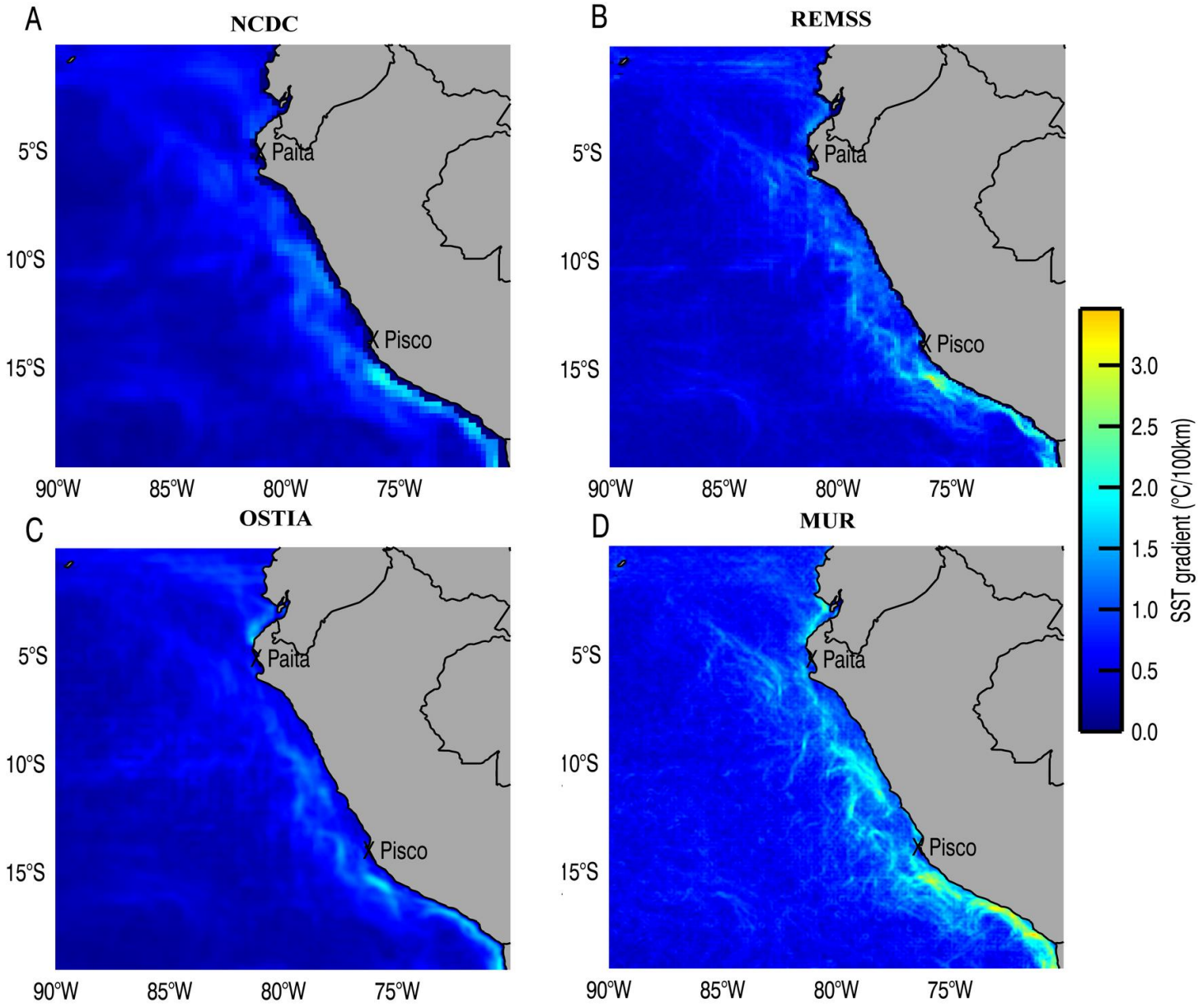
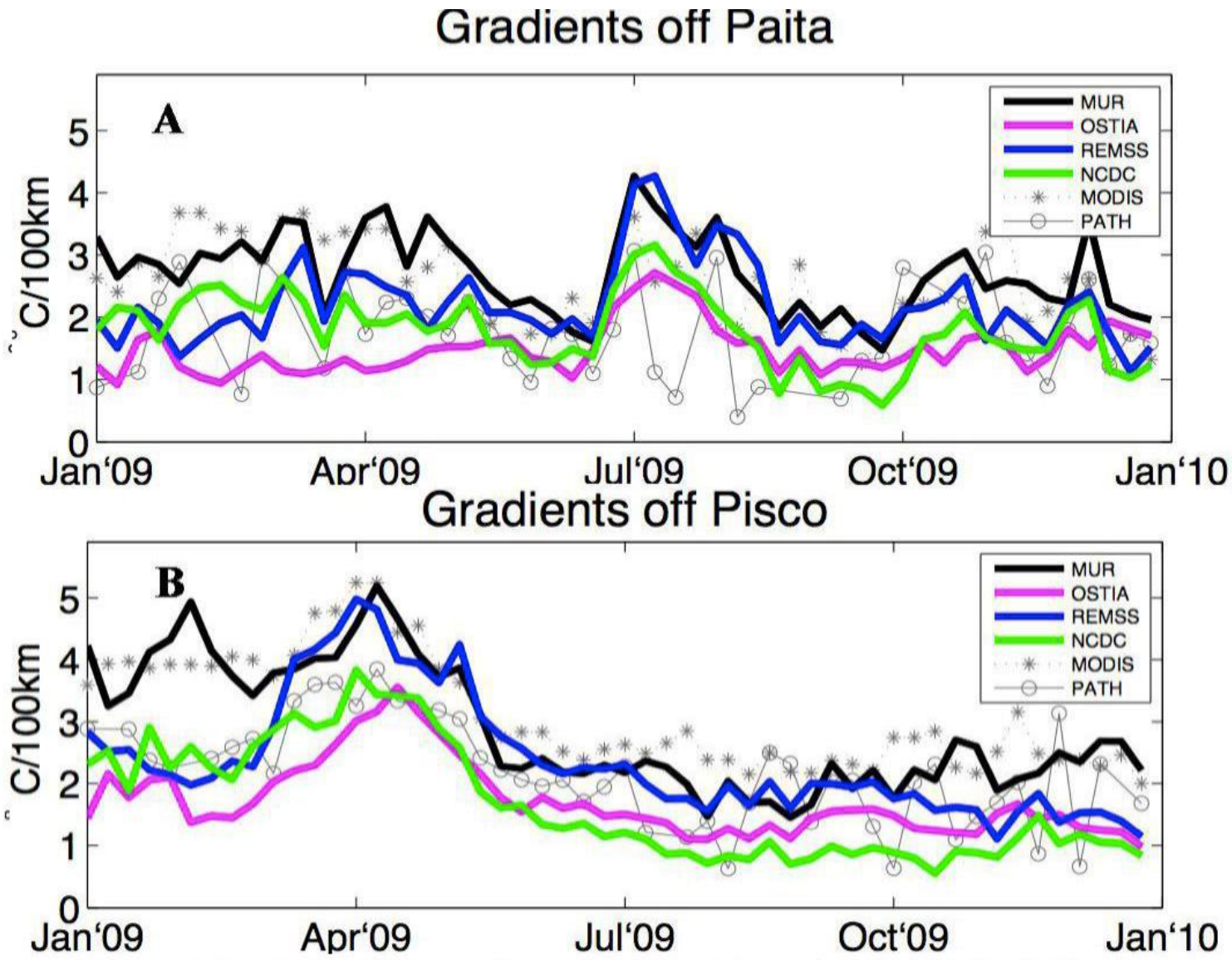
Outline

- Compare 4 (NCDC, OSTIA, REMSS, MUR) GHRSST Level 4 analyzed (no gaps) products in two areas (Paita and Pisco) off the Peruvian Coasts. These data sets all gridded at different spatial resolutions: NCDC-=0.25 degrees, OSTIA=5km, REMSS=9km, and MUR=1km
- Use simple strategy to define and compare upwelling scales.
- Do a preliminary analysis in the Gulf Stream and Gulf of California areas.

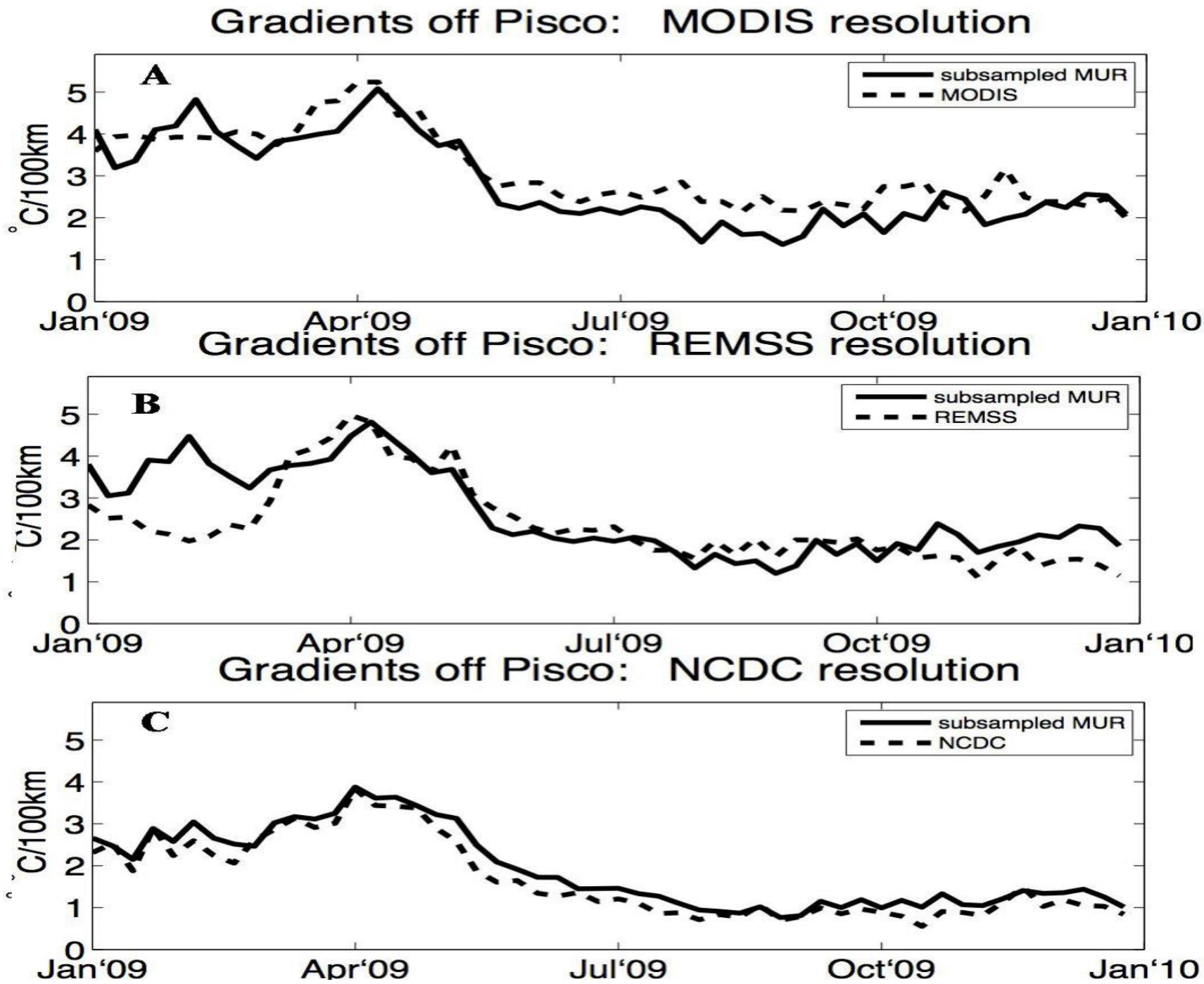

A
NCDC
B
REMSS
C
OSTIA
D
MUR
Paita
Pisco
5°S
10°S
15°S
90°W
85°W
80°W
75°W
SST gradient (°C/100km)
0
1
2
3
4
5
6


A
NCDC
B
REMSS
C
OSTIA
D
MUR
Paita
Pisco
5°S
10°S
15°S
90°W
85°W
80°W
75°W
SST gradient (°C/100km)
0.0
0.5
1.0
1.5
2.0
2.5
3.0


Gradients off Paita
A
°C/100km
0
1
2
3
4
5
Jan'09
Apr'09
Jul'09
Oct'09
Jan'10
MUR
OSTIA
REMSS
NCDC
MODIS
PATH
Gradients off Pisco
B
°C/100km
0
1
2
3
4
5
Jan'09
Apr'09
Jul'09
Oct'09
Jan'10
MUR
OSTIA
REMSS
NCDC
MODIS
PATH

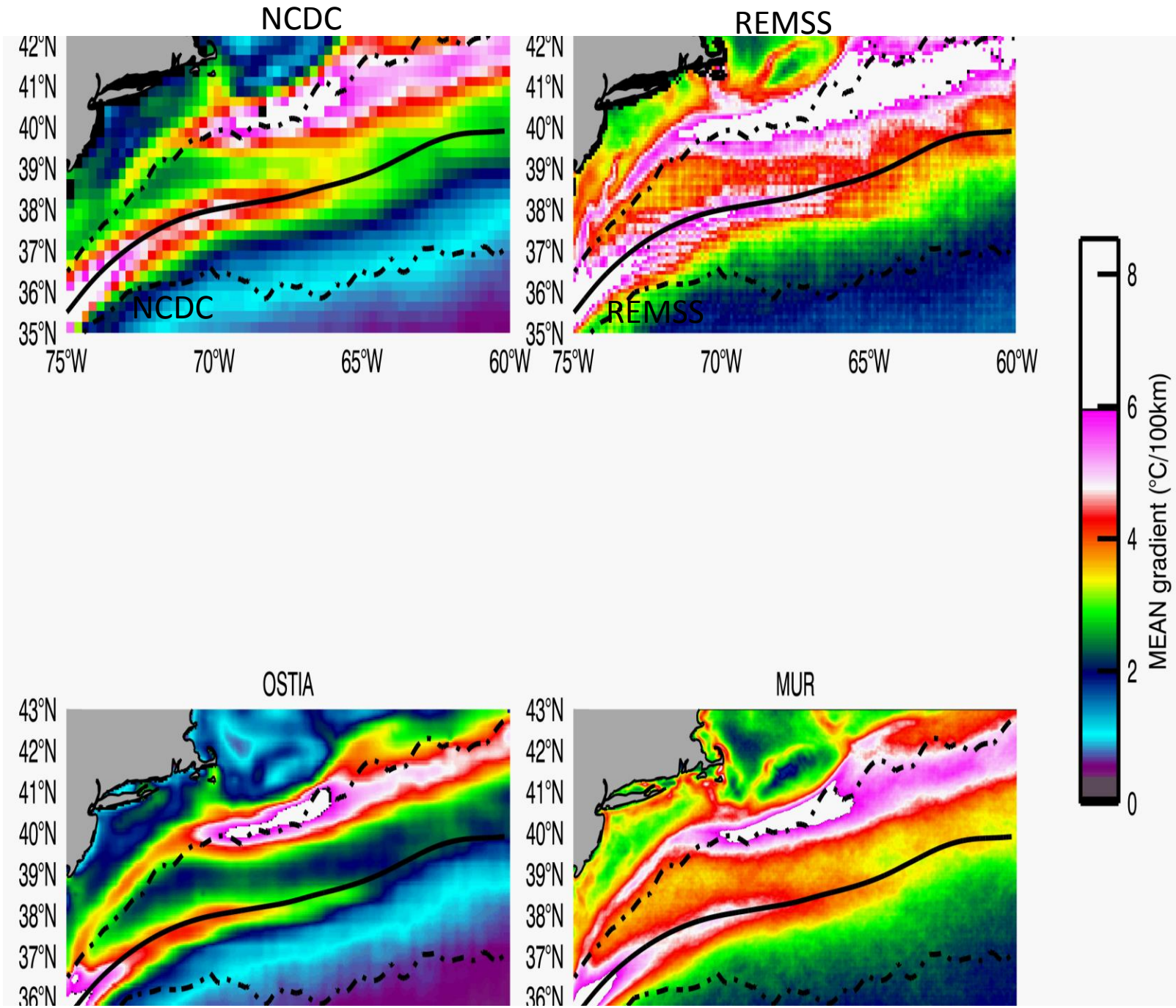
14.5°S

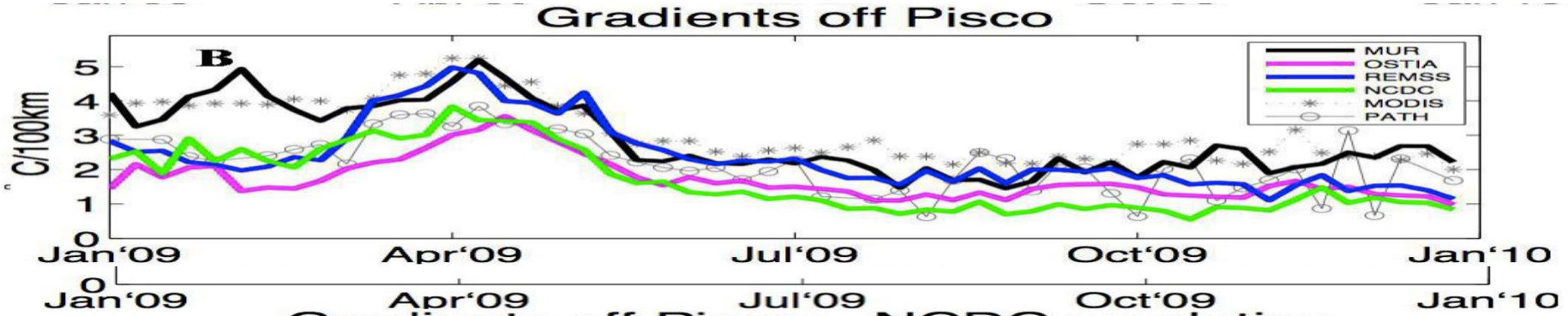
DATA SET	U pwelling Scale	Magnitude of Cross-shore Gradient
NCDC	20km	-0.05 degrees/100km
OSTIA	40km	-1.5 degrees/100km
REMSS	27km	-1.5 degrees/100km
MUR	20km	-2.5 degrees/100km

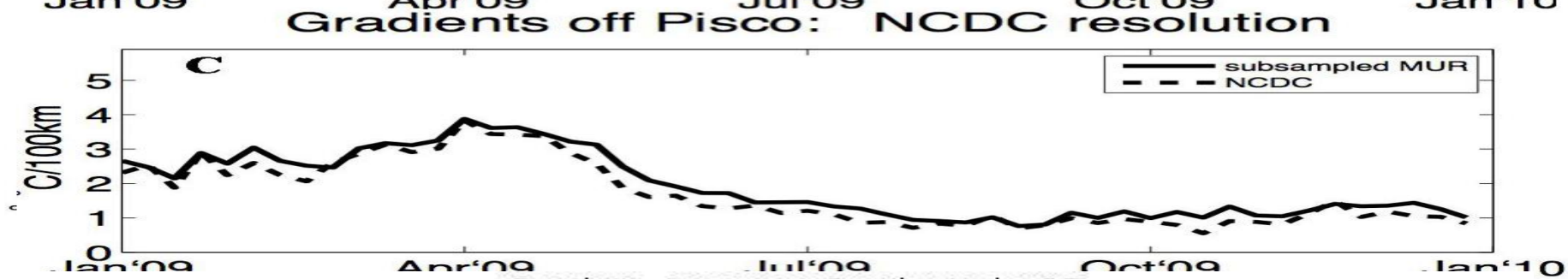

Gradients off Pisco: MODIS resolution
A
subsampled MUR
MODIS
°C/100km
0
1
2
3
4
5
Jan'09
Apr'09
Jul'09
Oct'09
Jan'10
Gradients off Pisco: REMSS resolution
B
subsampled MUR
REMSS
°C/100km
0
1
2
3
4
5
Jan'09
Apr'09
Jul'09
Oct'09
Jan'10
Gradients off Pisco: NCDC resolution
C
subsampled MUR
NCDC
°C/100km
0
1
2
3
4
5
Jan'09
Apr'09
Jul'09
Oct'09
Jan'10

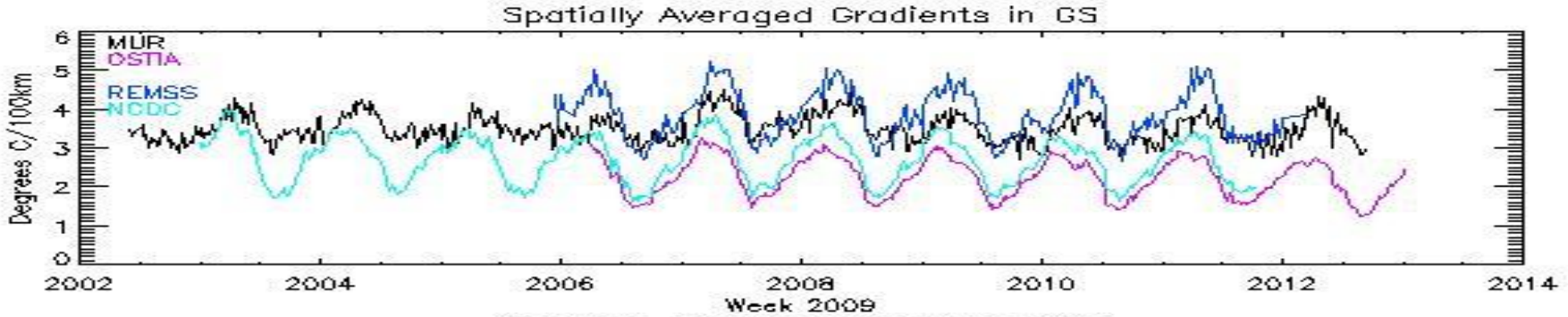
Gulf Stream and Gulf of California

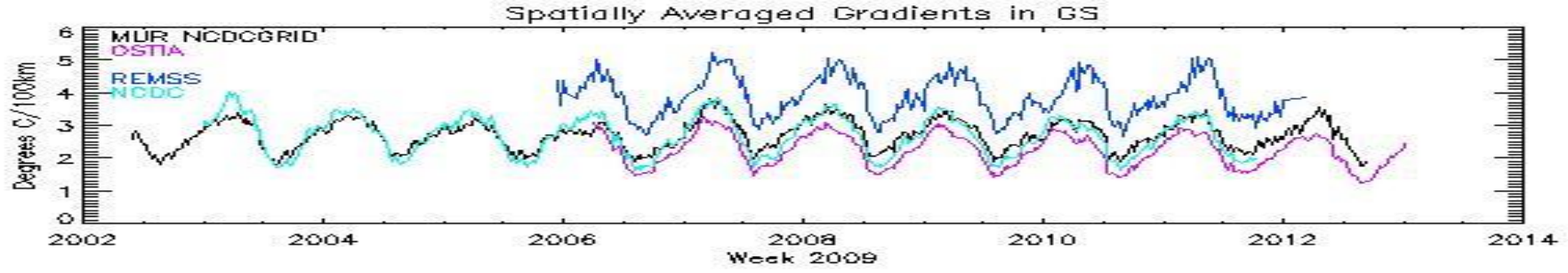
- Future Work and Preliminary Results

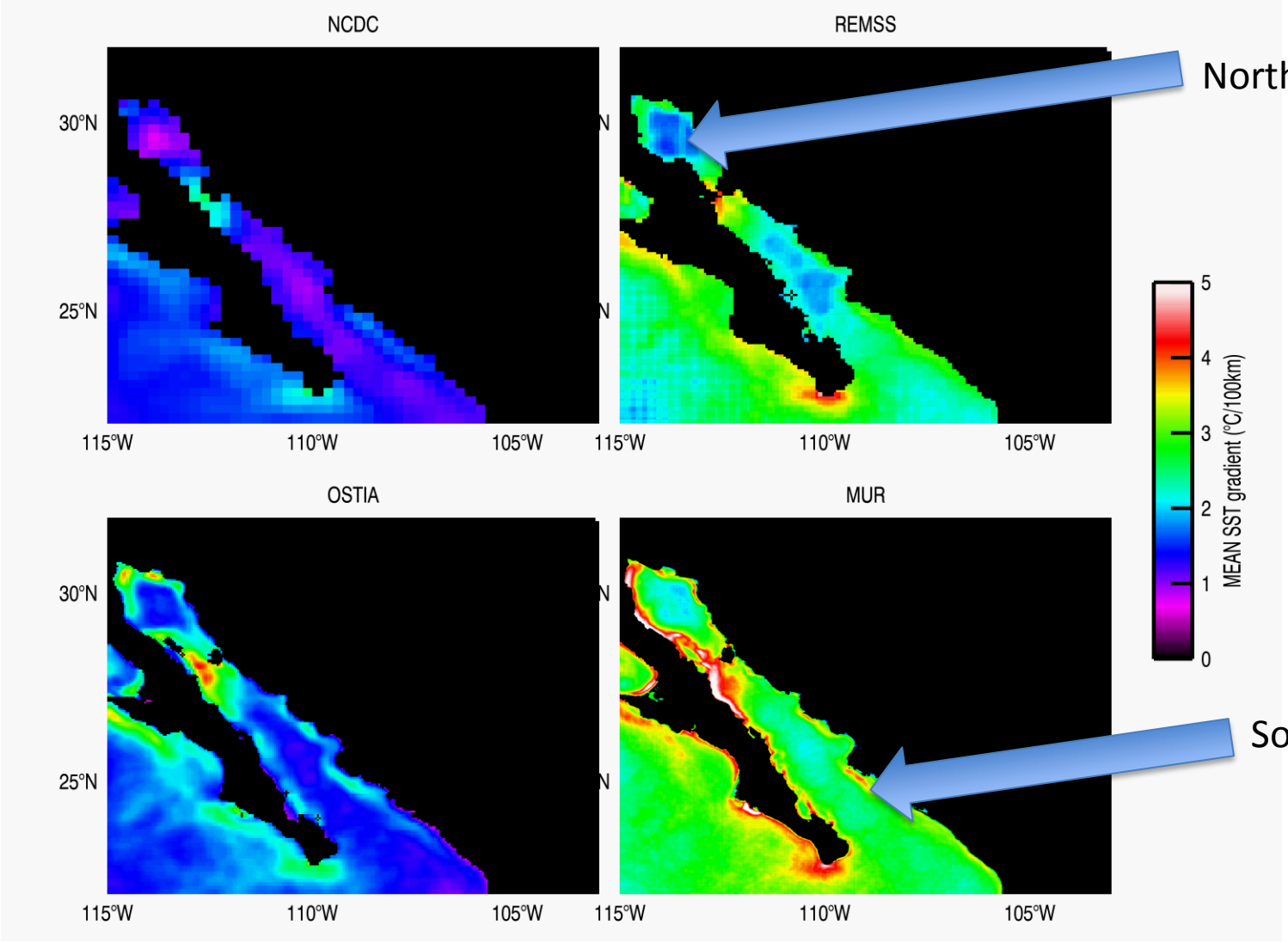

NCDC
REMSS
OSTIA
MUR
NCDC
REMSS
42°N
41°N
40°N
39°N
38°N
37°N
36°N
35°N
43°N
75°W
70°W
65°W
60°W
MEAN gradient (°C/100km)
0
2
4
6
8

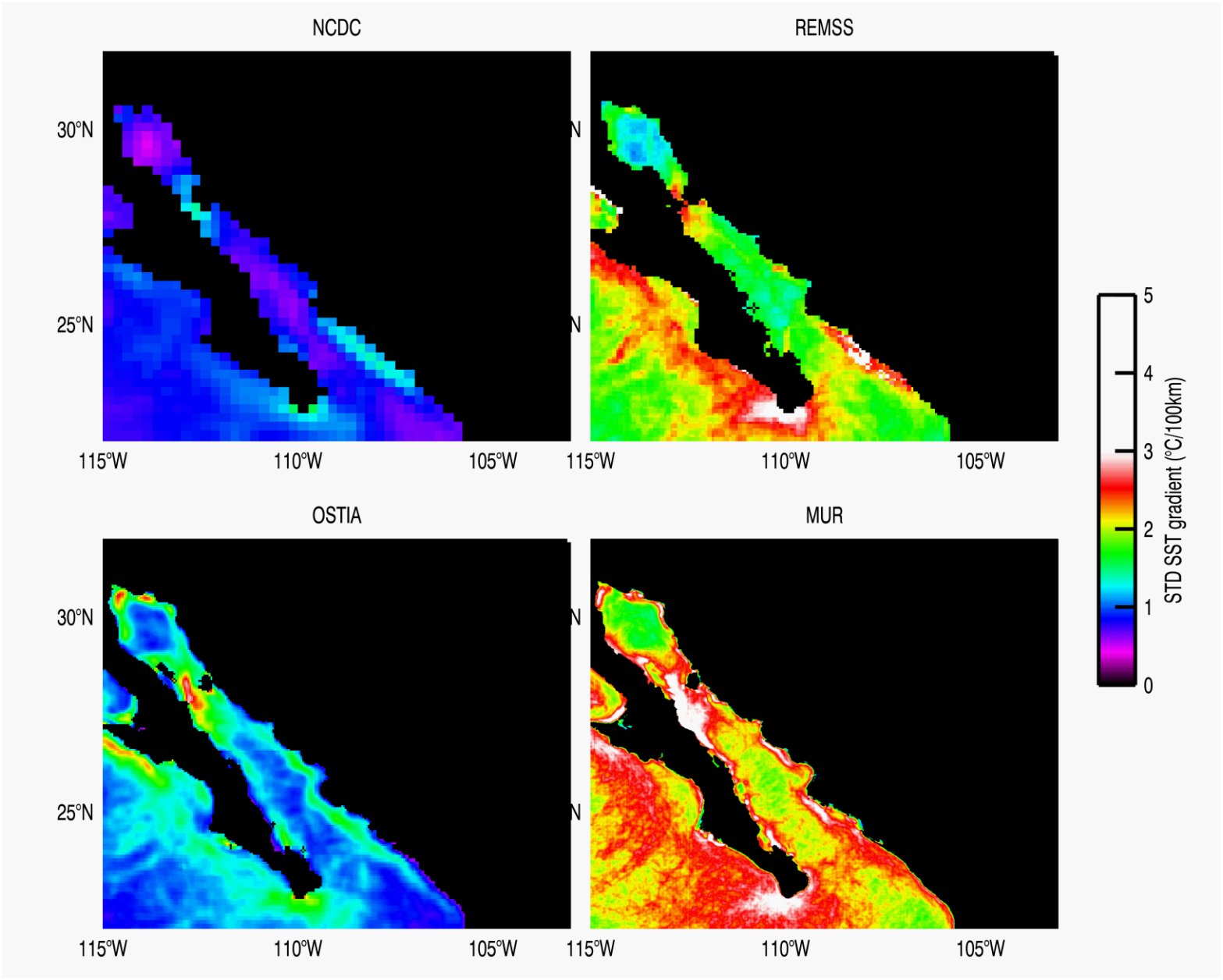

Gradients off Pisco
B
°C/100km
MUR
OSTIA
REMSS
NCDC
MODIS
PATH
Jan'09
Apr'09
Jul'09
Oct'09
Jan'10

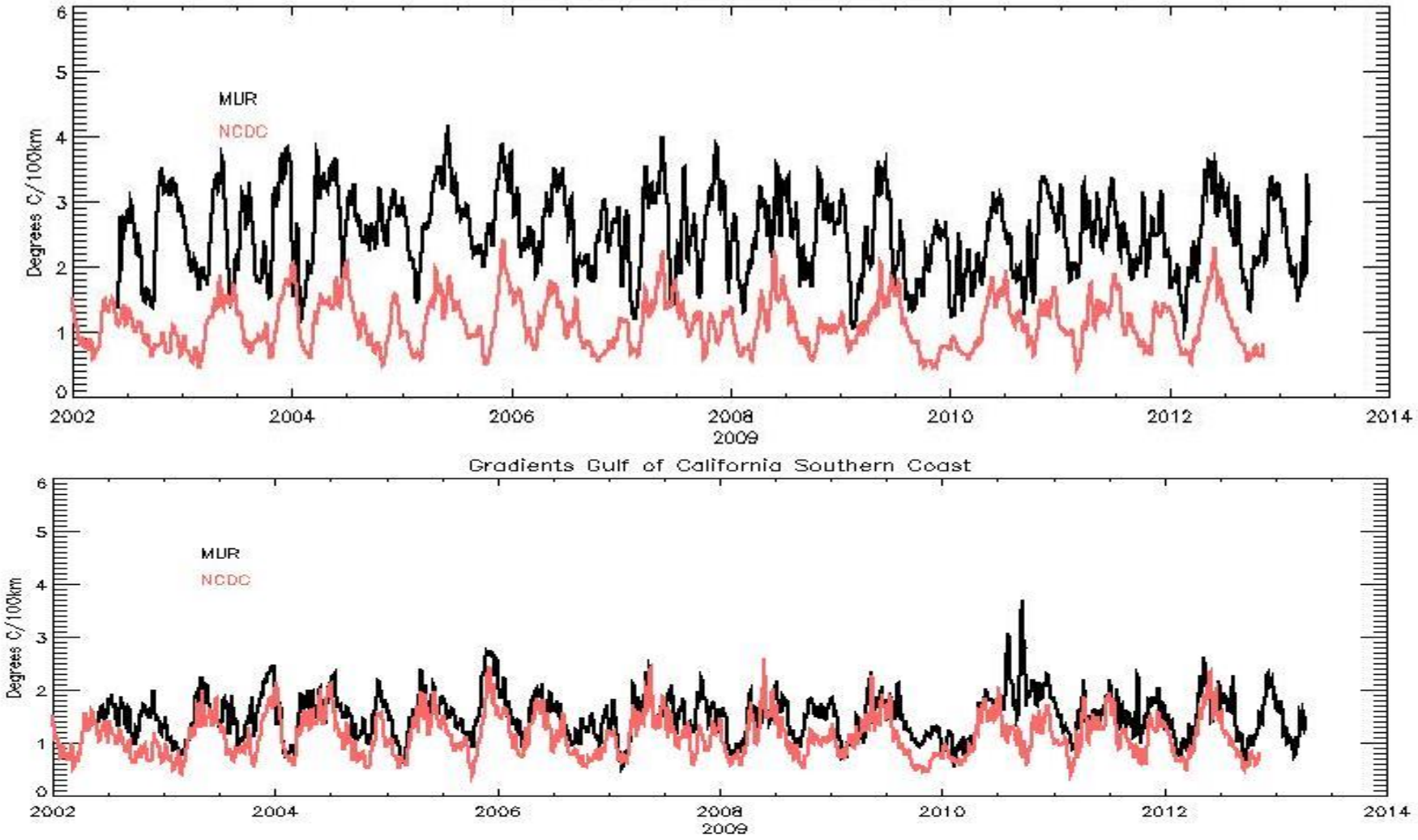

Gradients off Pisco: NCDC resolution
C
°C/100km
subsampled MUR
NCDC


Spatially Averaged Gradients in GS
MUR
OSTIA
REMSS
NCDC
Degrees C/100km
2002
2004
2006
2008
2010
2012
2014
Week 2009

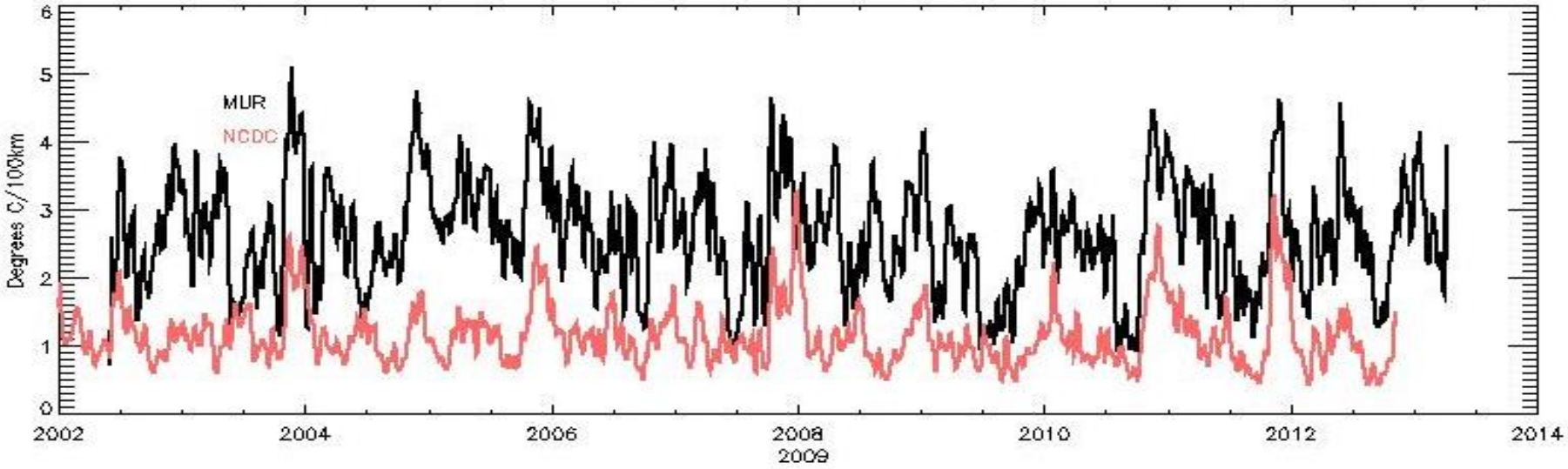

Spatially Averaged Gradients in GS
MUR NCDCGRID
OSTIA
REMSS
NCDC
Degrees C/100km
2002
2004
2006
2008
2010
2012
2014
Week 2009

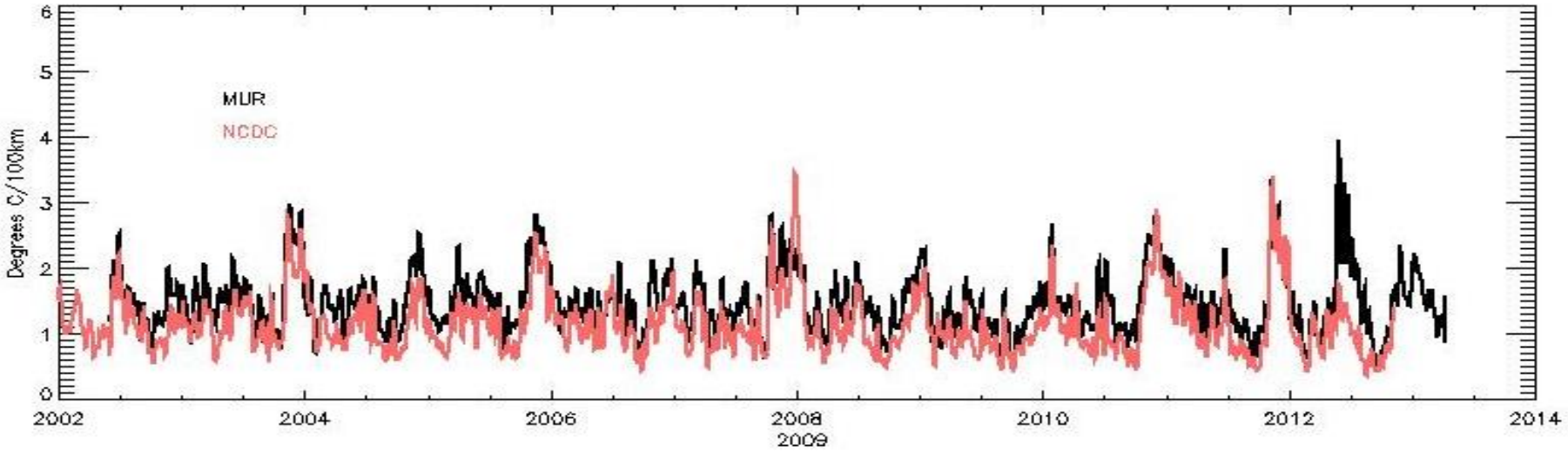

NCDC
REMSS
OSTIA
MUR
30°N
25°N
115°W
110°W
105°W
MEAN SST gradient (°C/100km)
0
1
2
3
4
5
Northern GOC
Southern GOC


NCDC
REMSS
OSTIA
MUR
30°N
25°N
115°W
110°W
105°W
STD SST gradient (°C/100km)
0
1
2
3
4
5



Northern Gulf of California





Southern Gulf of California

Conclusions

- MUR 1km SST is consistently identifying higher resolution features in three different regions, upwelling region off the coast of Peru, Gulf Stream, and Gulf of Califronia.
- A simple strategy for calculating upwelling spatial scale indicated that MUR consistently shows a smaller scale off the Peruvian Coast.
- A simple scheme where MUR is sub-sampled to the resolution of NCDC, REMSS, and OSTIA, indicates that MUR is not adding noise at the pixel-pixel level.
- A similar analysis done in the Gulf Stream and the Gulf of California shows consistent results. Future work needs to quantify results in different regions. Question to answer? Quantify possible signals in high spatial resolution data sets not seen in lower res data.