VIVIANE MENEZES

STATISTICAL ASSESSMENT OF SEA-SURFACE SALINITY FROM SMAP: THE ARABIAN SEA, BAY OF BENGAL AND A PROMISING RED SEA APPLICATION

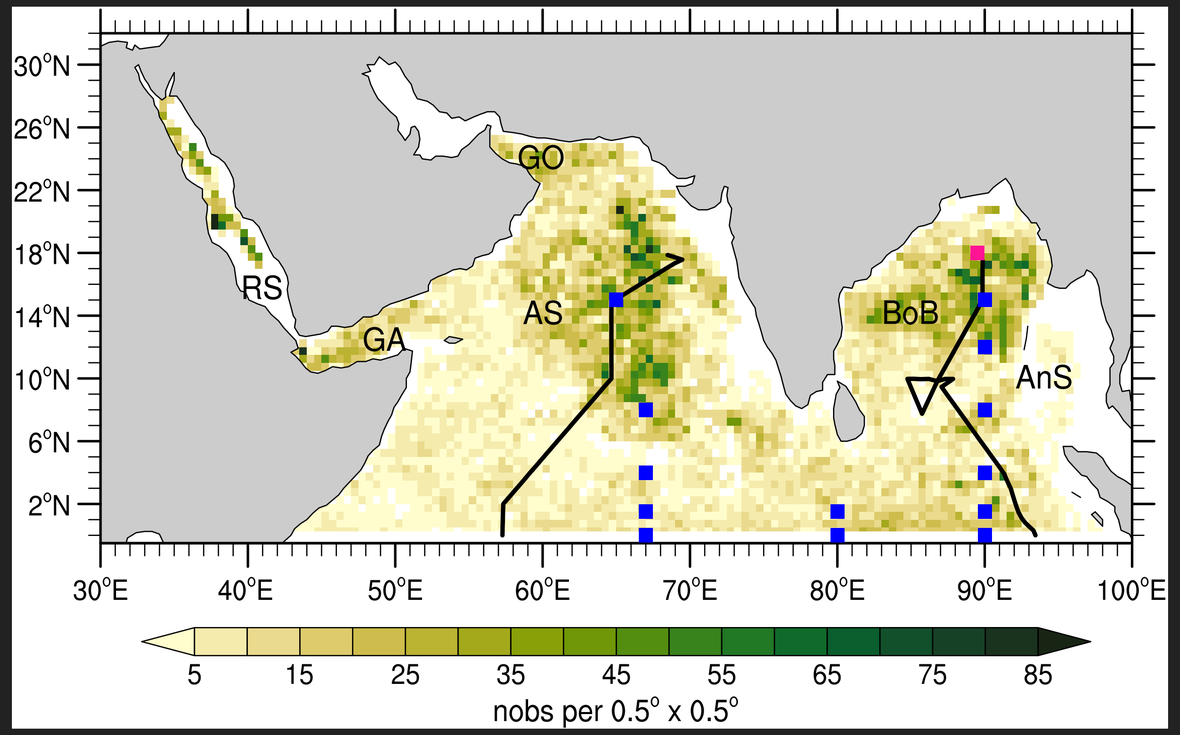
OBJECTIVE

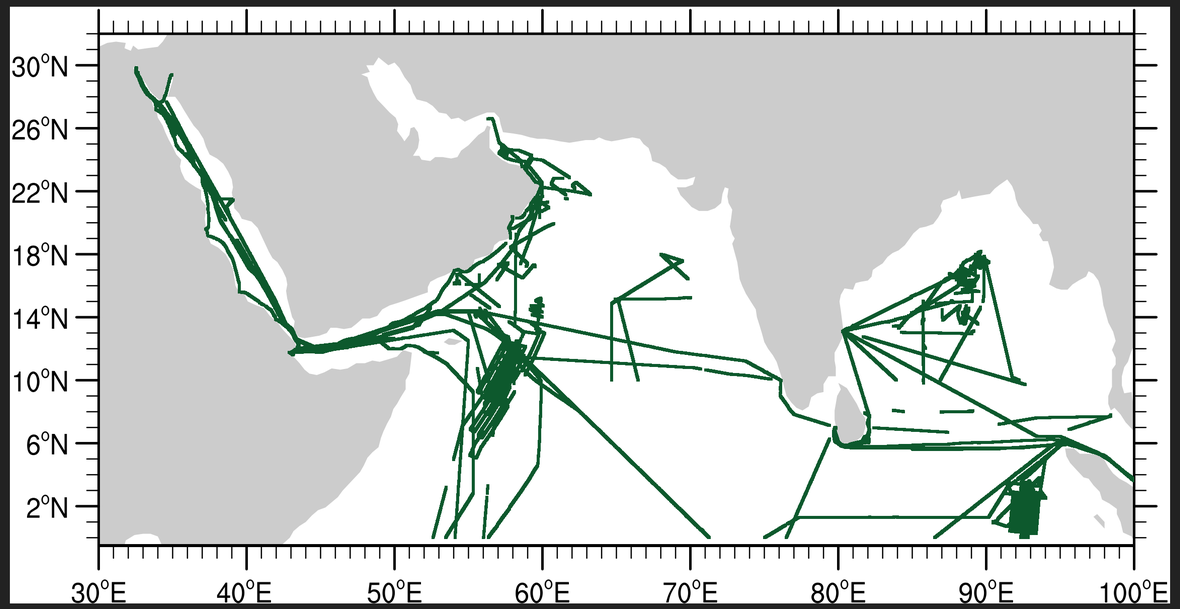
- Assess sea-surface salinity products from SMAP in the North Indian Ocean (RSS v.4 and JPL v4.2). This assessment is the first step to use SMAP to better understand the salinity dynamics of the North Indian Ocean. – Update from previous SCP-SST Meeting
- Evaluate whether SMAP captures sea-surface salinity in the Red Sea given SMAP can retrieve signals, although with limitations, in complex regions such as the Mediterranean Sea and the Arctic Ocean – Exploratory Analysis

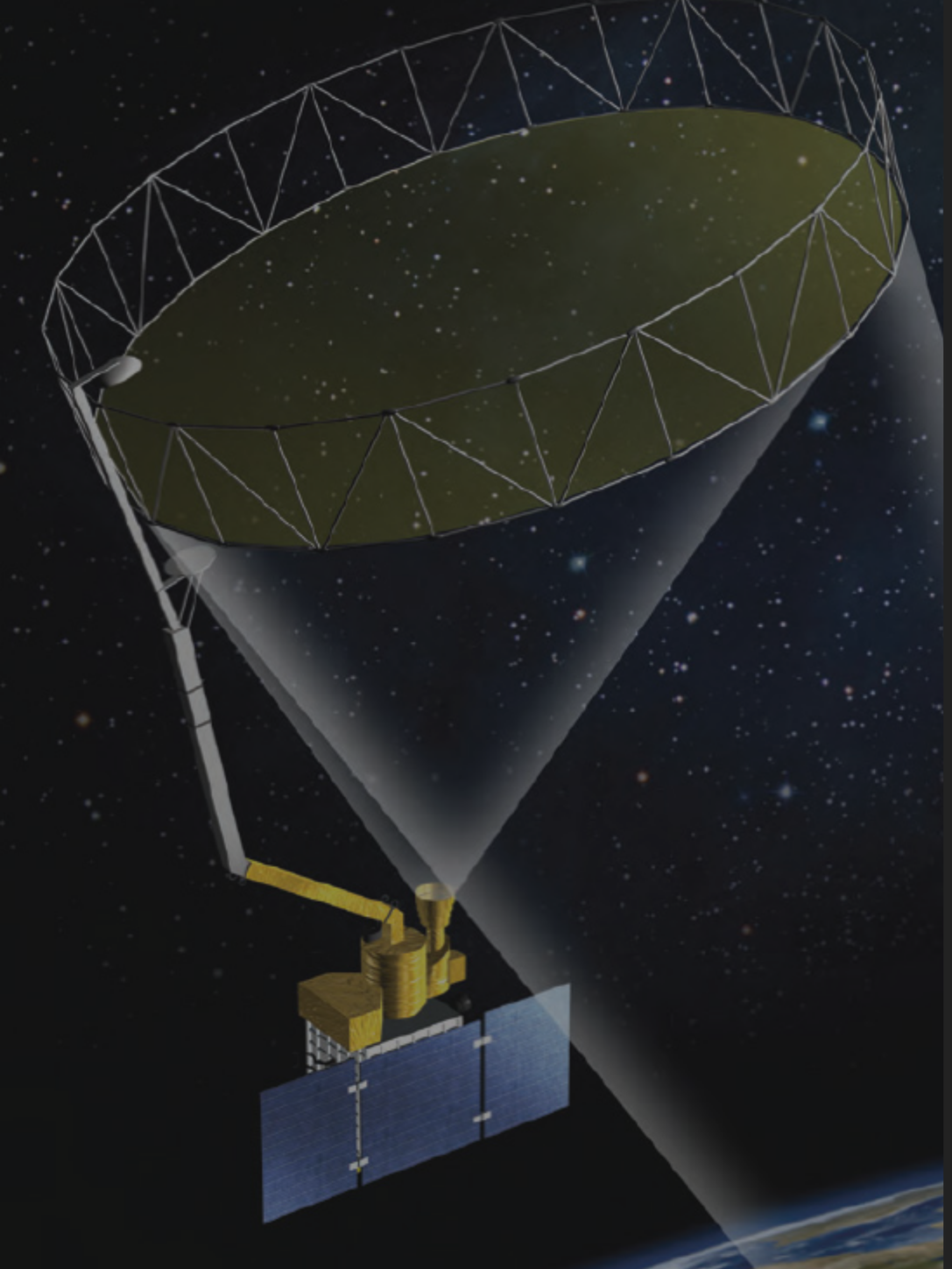
Menezes, V. V. Statistical Assessment of Sea-Surface Salinity from SMAP: Arabian Sea, Bay of Bengal and a Promising Red Sea Application. Remote Sens. 2020, 12, 447.

IN SITU OBSERVATIONS

- Argo observations (< 10 m)
- TSG observations (Coriolis + NOAA)
- RAMA Array mooring (1m; 5/10 m)
- WHOI Mooring
- GO-SHIP Cruises in 2016 (BoB) and 2018 (AS)







SMAP L2 AND L3 PRODUCTS

RSS v4 (40km; 70km) & JPL v4.2

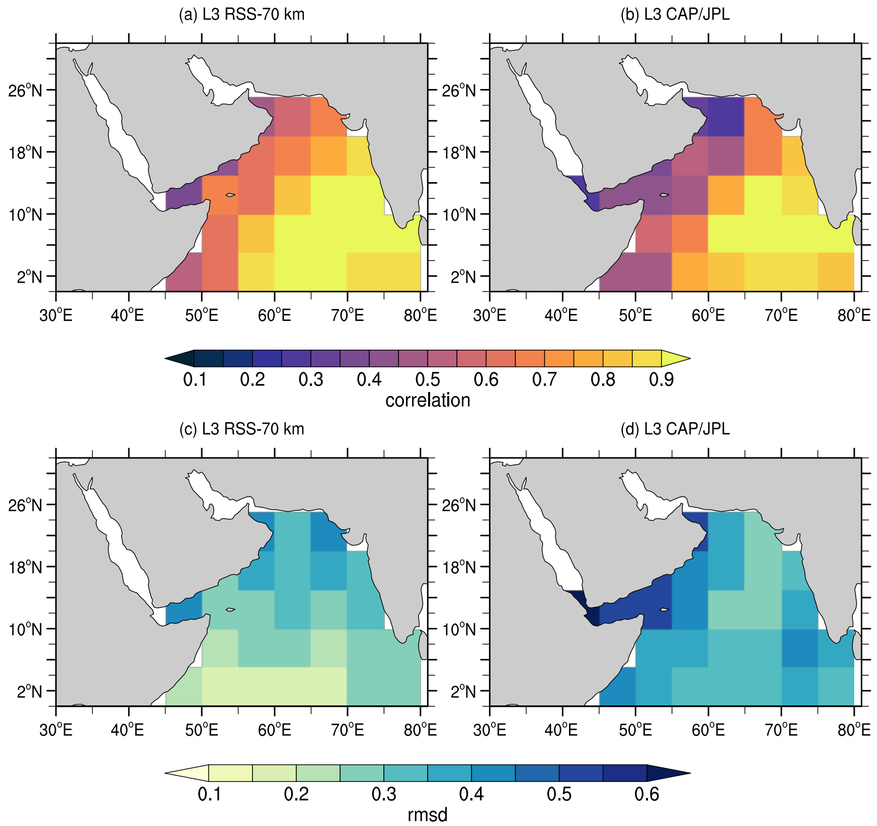
1-Apr-2015 to 30-Sep-2019

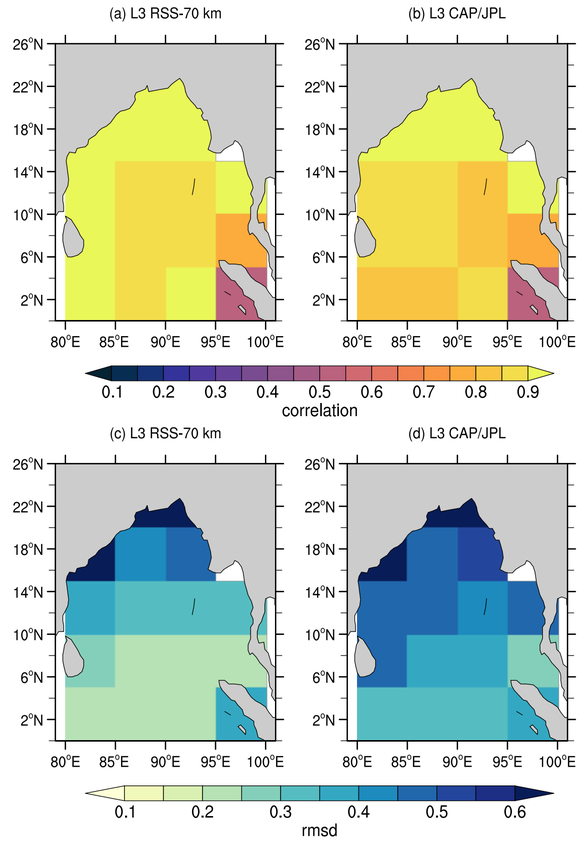
In-situ SSS observations paired with the closest grid cell

(L2: +-12h L2; L3: daily 8-d moving average field)

CORRELATIONS HIGHER IN THE BAY OF BENGAL THAN IN THE ARABIAN SEA, BUT RMSD ALSO TEND TO BE HIGHER

Correlation lower in the western side

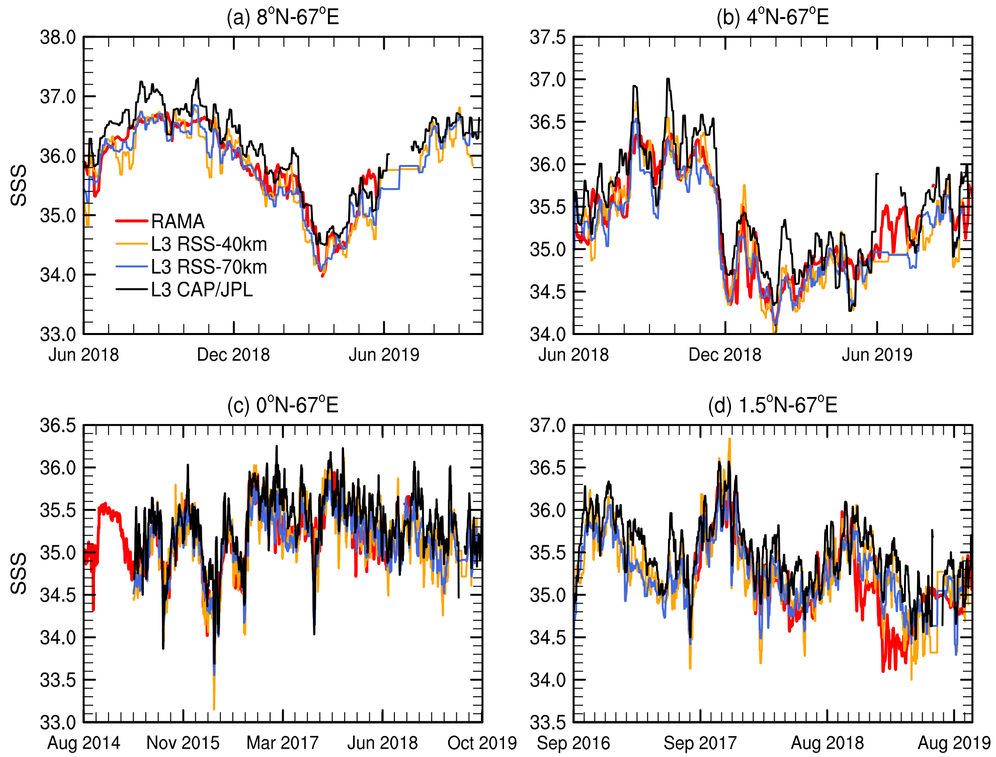




Argo floats

SMAP CAPTURES SSS TEMPORAL VARIABILITY IN THE ARABIAN SEA AND BAY OF BENGAL

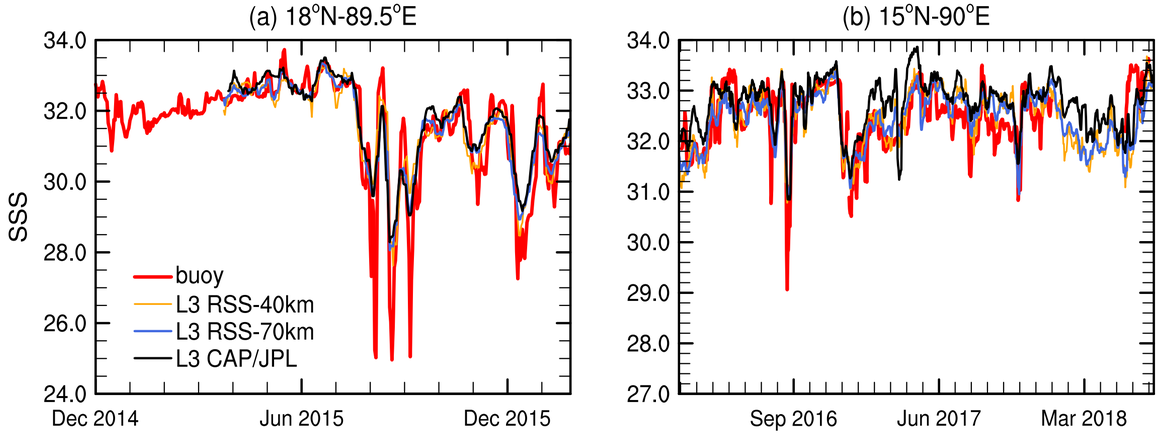
Arabian Sea



correl			
0.0°N	0.79	0.85	0.76
1.5°N	0.84	0.89	0.84
4.0°N	0.89	0.92	0.88
8.0°N	0.79	0.9	0.89

rmsd	RSS-40km	70km	JPL
0.0°N	0.26	0.2	0.3
1.5°N	0.27	0.19	0.28
4.0°N	0.28	0.23	0.41
8.0°N	0.32	0.2	0.34

Bay of Bengal



correl=0.87-0.89

rmsd=0.84-0.91

correl=0.71-0.82

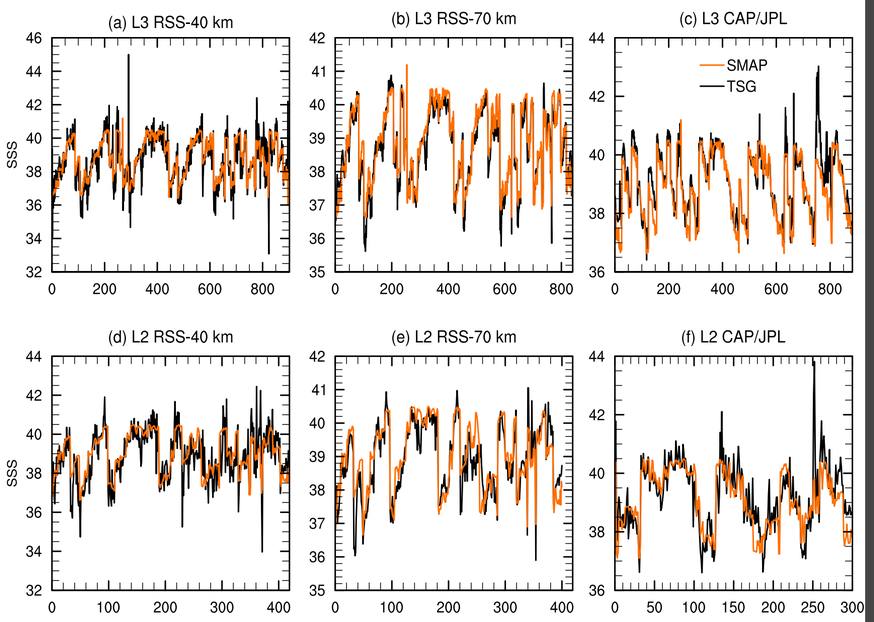
rmsd=0.47-0.58

RED SEA

Maximum width = 355 km

12N-30N

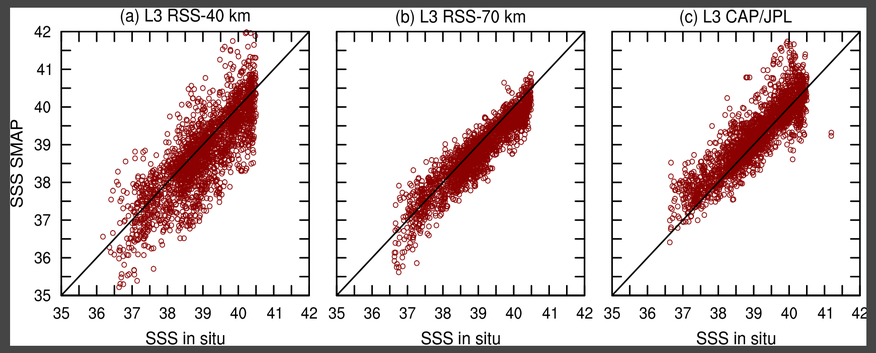
TSG



Statistics L3 Products (all in situ observations)

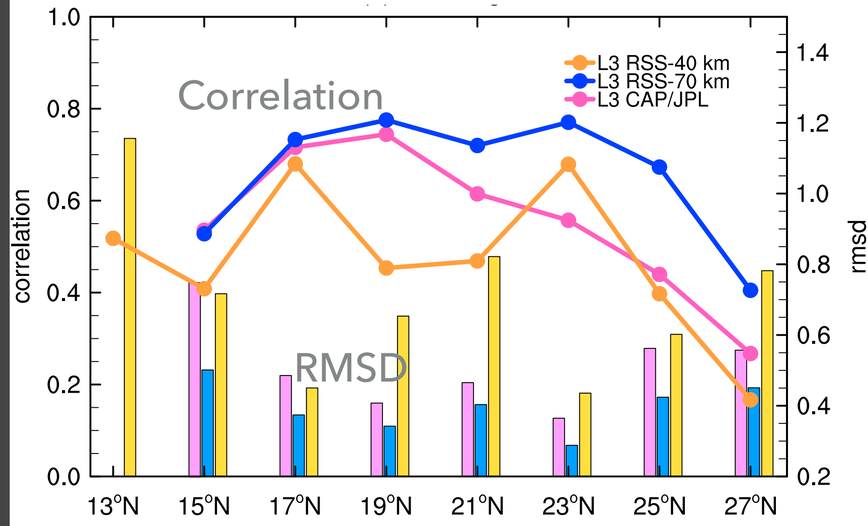
	RSS-40km	RSS-70km	JPL
N	2149	2071	2221
correl	0.81	0.93	0.88
bias	-0.2	-0.18	0.19
rmsd	0.67	0.38	0.49

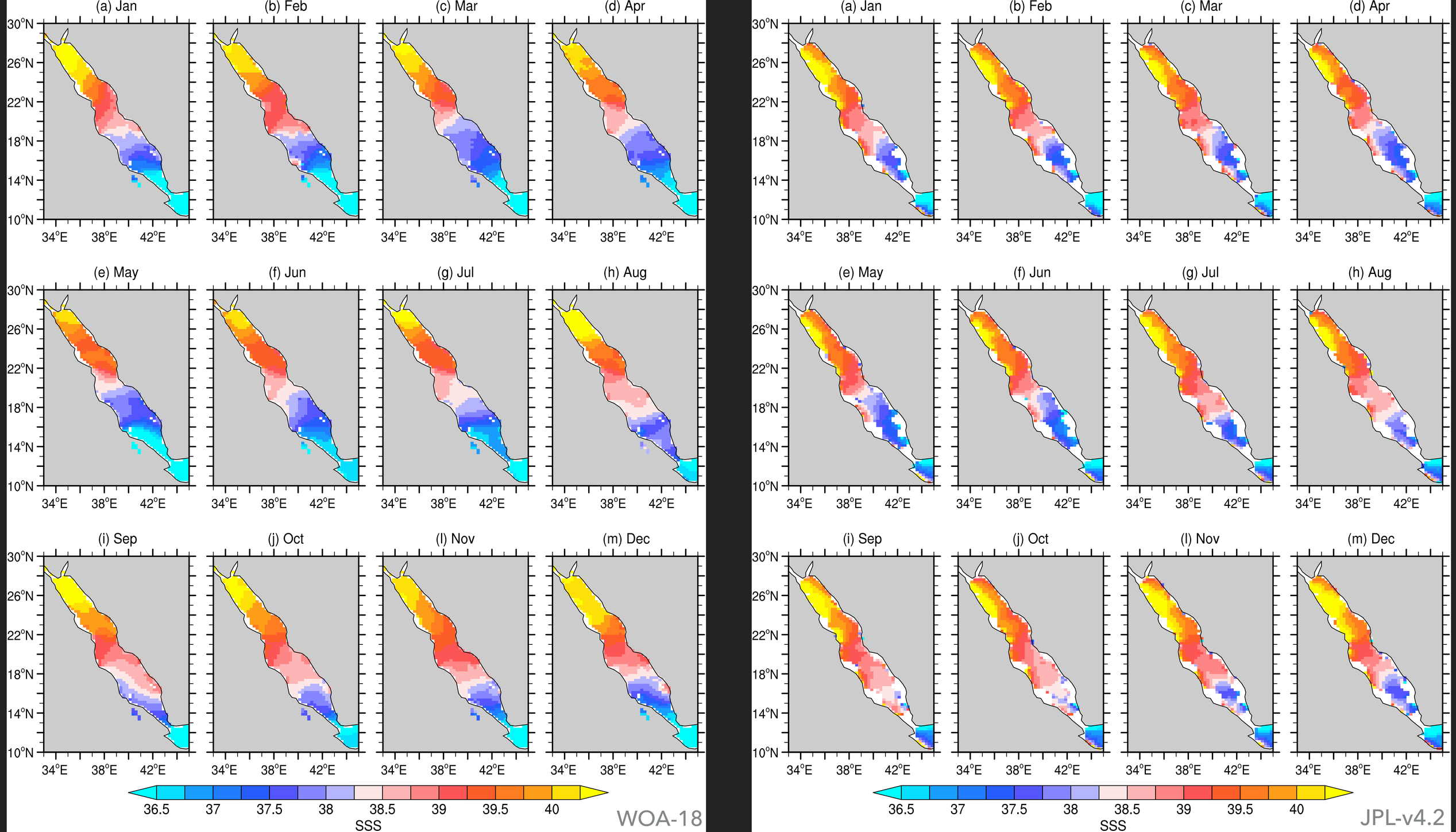
All in situ observations and L3 Products

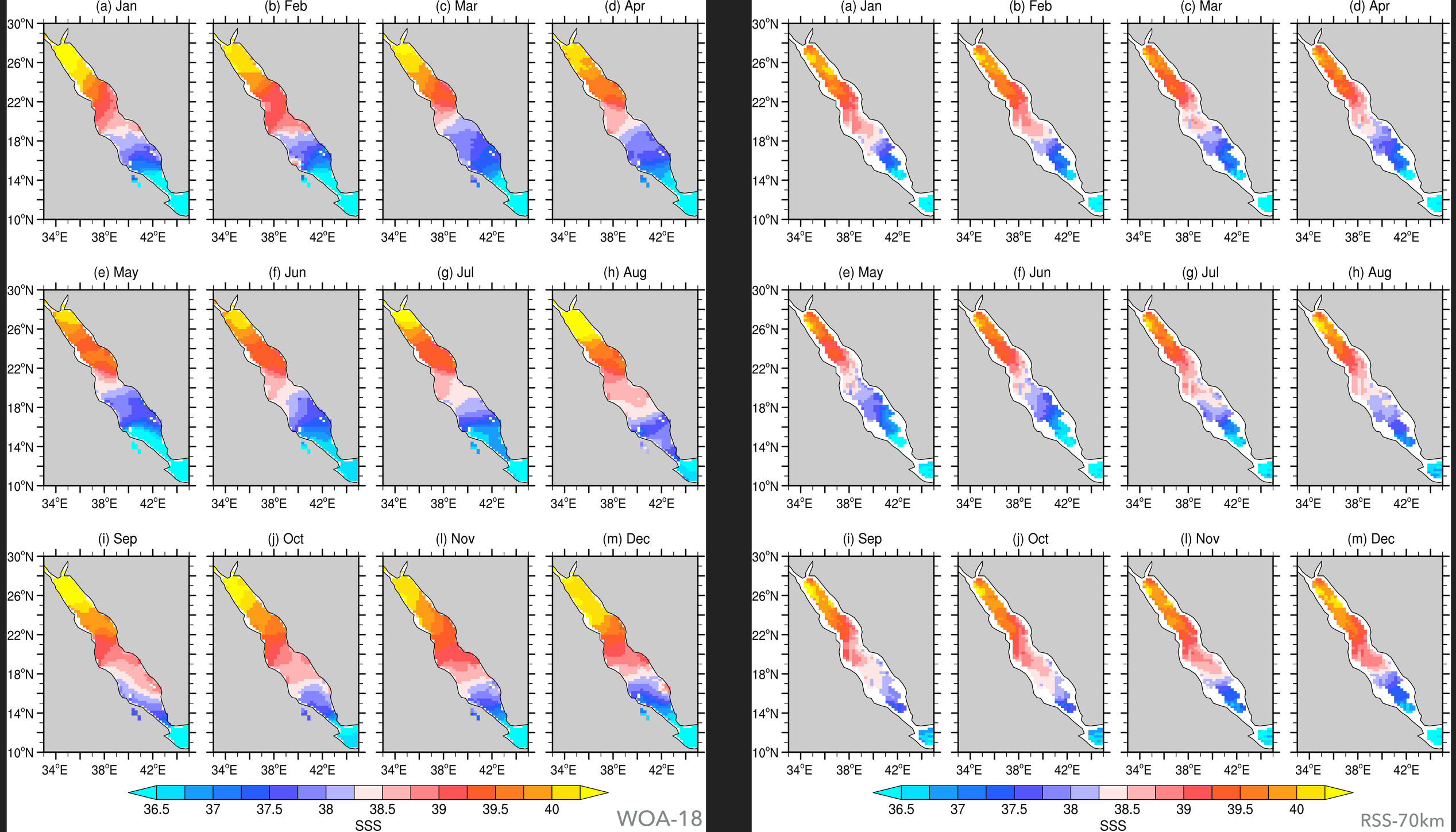


SMAP SSS RETRIEVALS IN THE RED SEA ARE SURPRISINGLY GOOD

Correlation and root-mean-square of differences




(a) Jan
(b) Feb
(c) Mar
(d) Apr
(e) May
(f) Jun
(g) Jul
(h) Aug
(i) Sep
(j) Oct
(l) Nov
(m) Dec
30°N
26°N
22°N
18°N
14°N
10°N
34°E
38°E
42°E
36.5
37
37.5
38
38.5
39
39.5
40
SSS
WOA-18
JPL-v4.2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(j) Oct
(l) Nov
(m) Dec
30°N
26°N
22°N
18°N
14°N
10°N
34°E
38°E
42°E
36.5
37
37.5
38
38.5
39
39.5
40
SSS
WOA-18
RSS-70km

MAIN POINTS

- Overall, a great SMAP signal-to-noise ratio in the Red Sea
- Bias in the Red Sea is consistent with open ocean areas
- SMAP captures the seasonal intrusion of fresher and colder Gulf of Aden water
- Errors are much larger in the extreme north and extreme south parts of the Red Sea
- In the Gulf of Aden and Gulf of Oman, SMAP performance is much worse than in the Red Sea

THANK YOU

prepared by

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