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

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

Bay of Bengal

| 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 |

correl=0.87-0.89

rmsd=0.84-0.91
**RED SEA**

Maximum width = 355 km

12N-30N

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SMAP SSS RETRIEVALS IN THE RED SEA ARE SURPRISINGLY GOOD

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All in situ observations and L3 Products

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### 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 |

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Correlation and root-mean-square of differences

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![Graph showing correlation and root-mean-square of differences](image)
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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