Coastal Altimetry in the Maritime Continent: assessing SSH data from Jason 2 and Altika/SARAL and directions for future regional improvements

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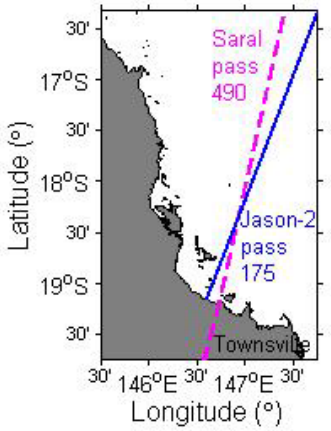
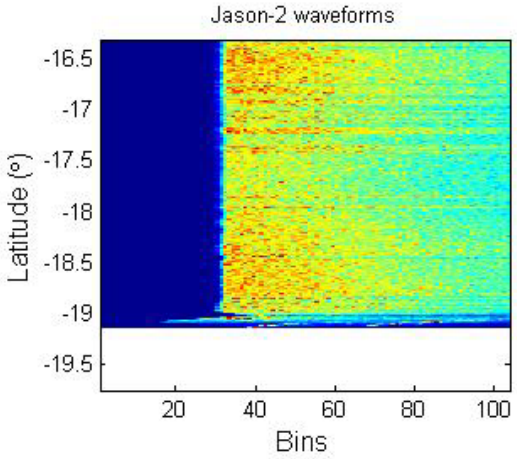
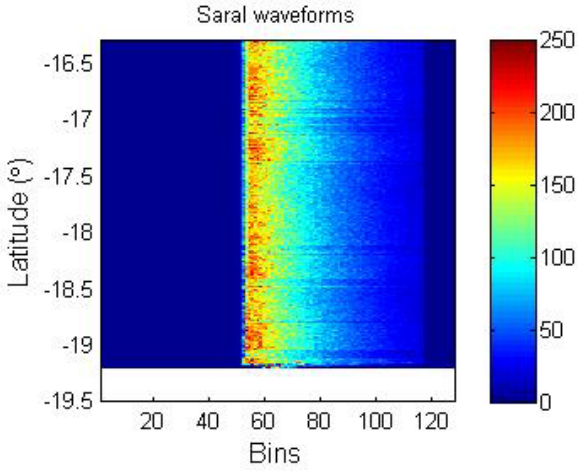
Introduction

- SARAL/AltiKa Satellite mission (2013) promises significant improvements with smaller footprint size (~4 km) compared to Jason-2 (~10 km) to achieve improved data coverage.
- Current goal: To Identify the performance of SARAL/AltiKa compared with Jason-2 over the Maritime Continent region.
- Long term goal: a regional SSH dataset sufficiently optimised for the MC region to examine regional ocean (mesoscale) variability

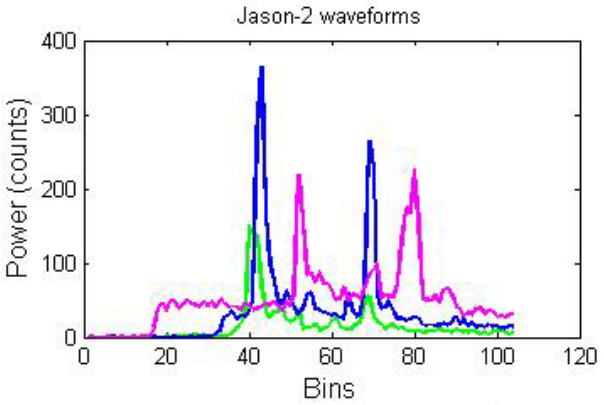
Jason -2 vs. Saral: near parallel tracks

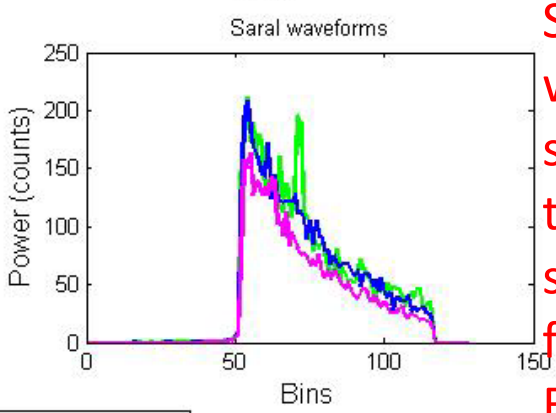






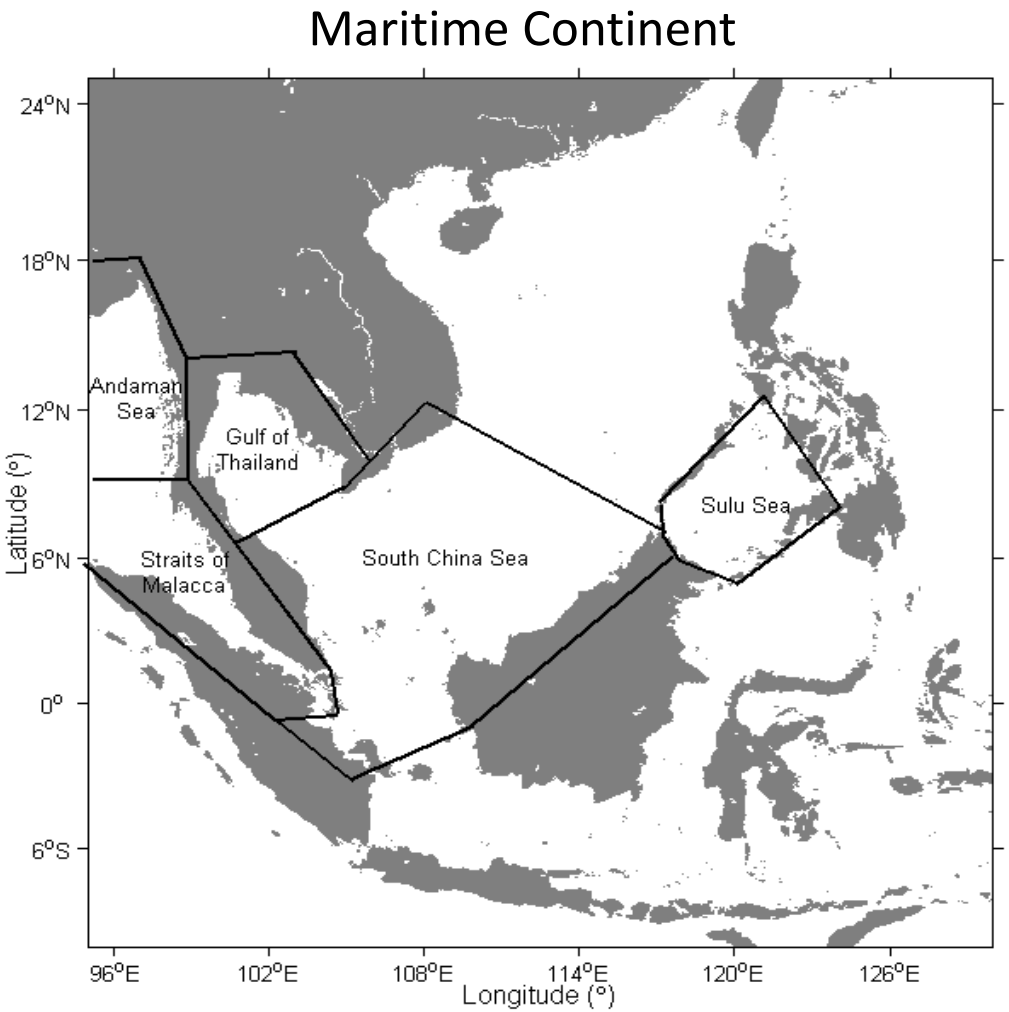
Jason-2: Impact of land is shown by the high peak in the waveform trailing edge. Non-brown like waveform even at 7 km from the coastline





SARAL: Ideal waveform shapes over the ocean surface following the Brown (1977) model.

Study Domain

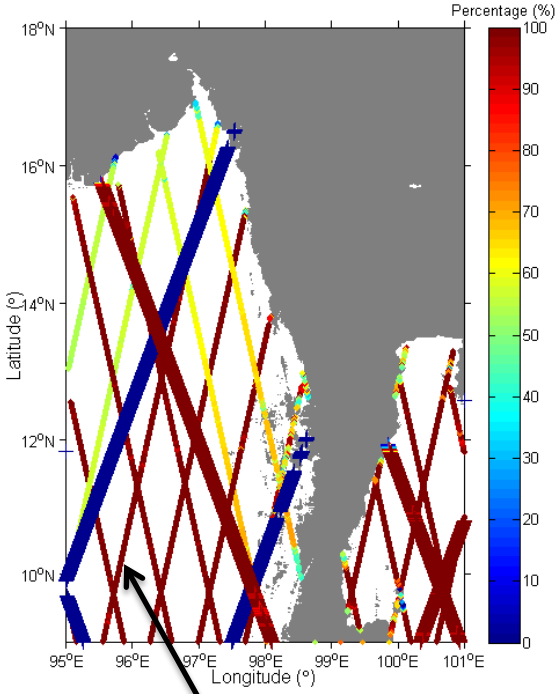


Focus area

- ❑ Andaman Sea
- ❑ Gulf of Thailand
- ❑ Straits of Malacca
- ❑ South China Sea
- ❑ Sulu Sea

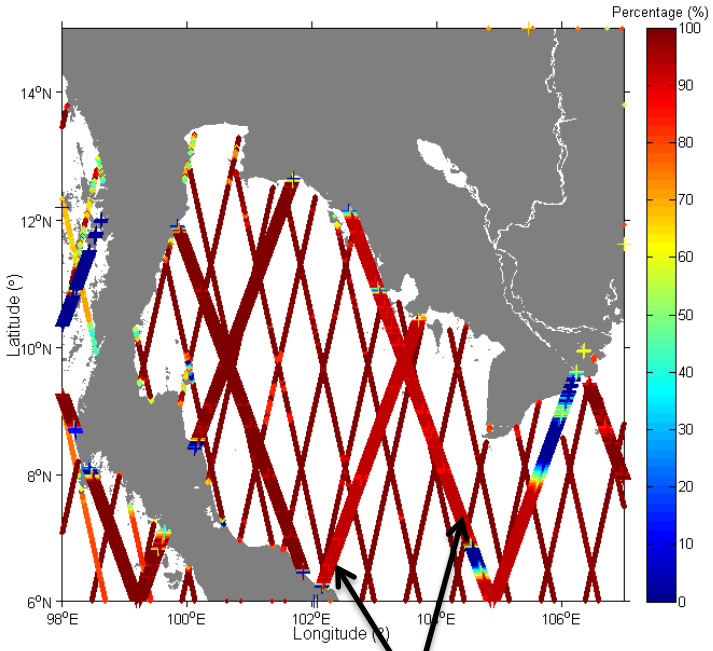
Example of Data Availability (MLE-4 retracker)

Andaman Sea



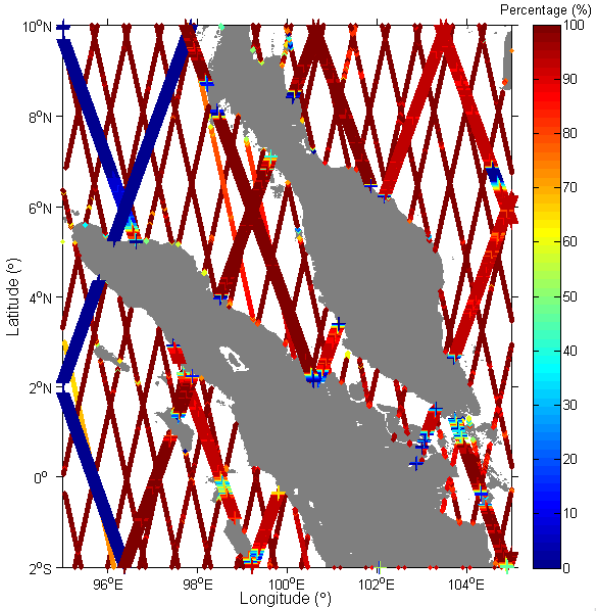
SARAL/AltiKa

Gulf of Thailand



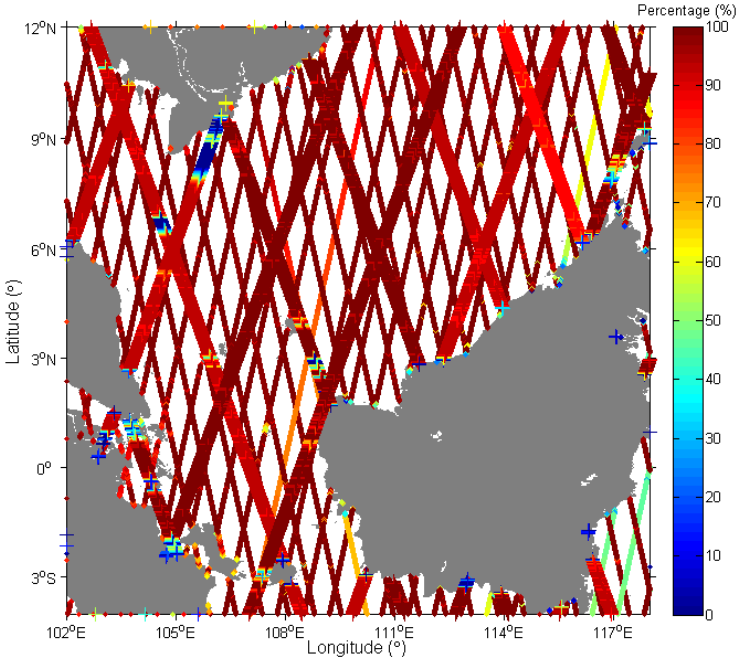
Jason-2

Straits of Malacca

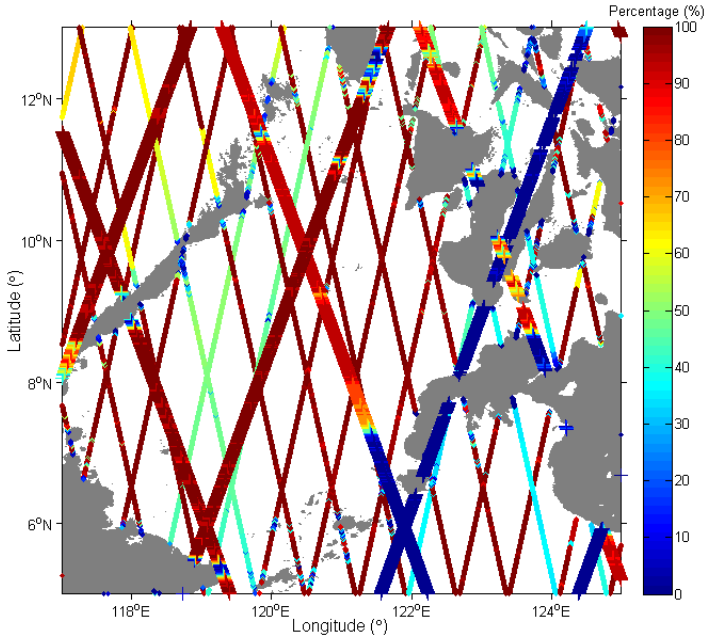


Example of Data Availability (MLE-4 retracker)

South China Sea



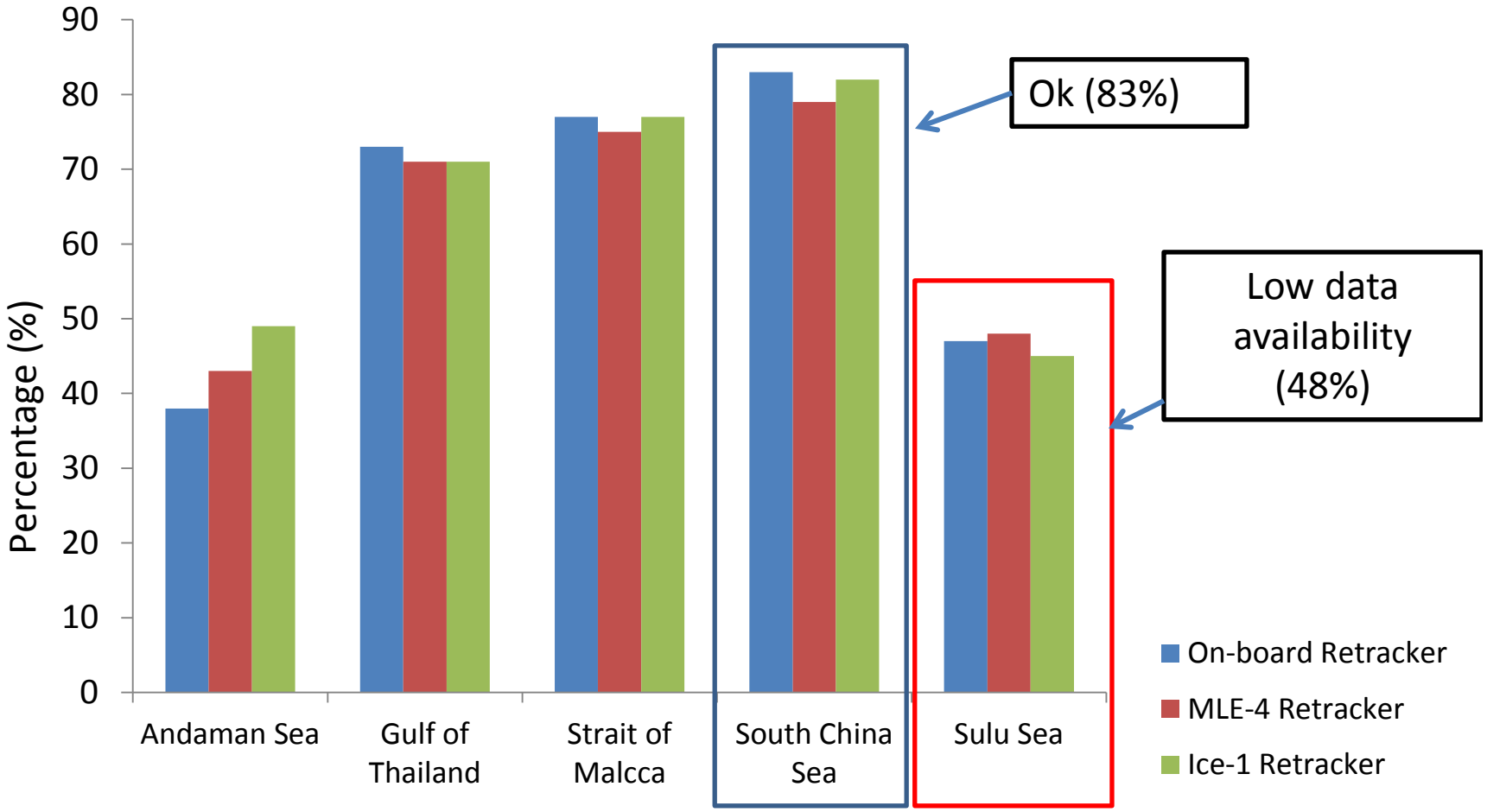
Sulu Sea



Data Availability of SARAL/AltiKa is higher compared to Jason-2

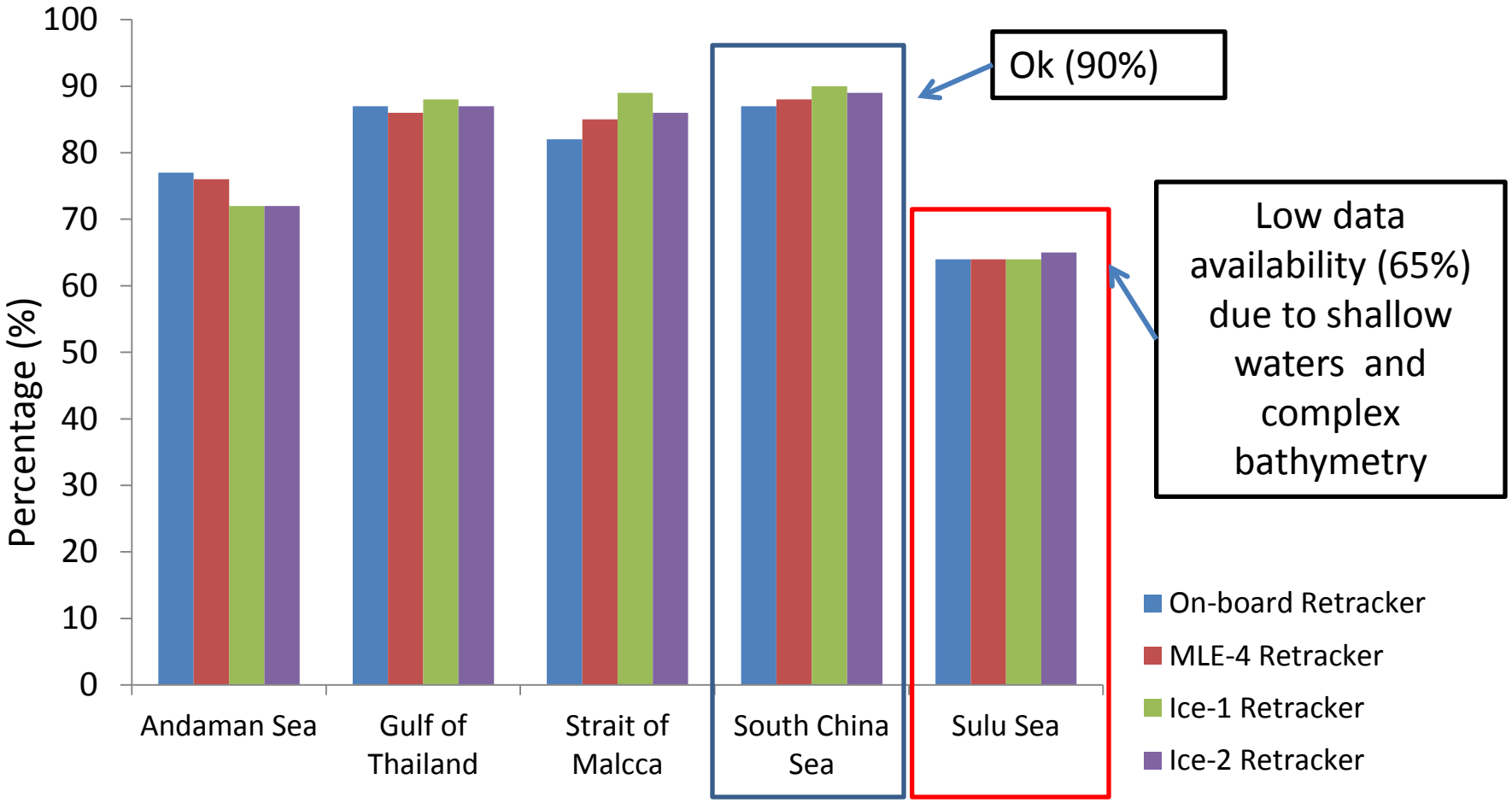
*MLE-4 = Standard retracked product on oceans

Jason-2:
Percentage of Data Availability



*Ice-2 retracker unavailable on AVISO at time of analysis

SARAL/AltiKa:
Percentage of Data Availability

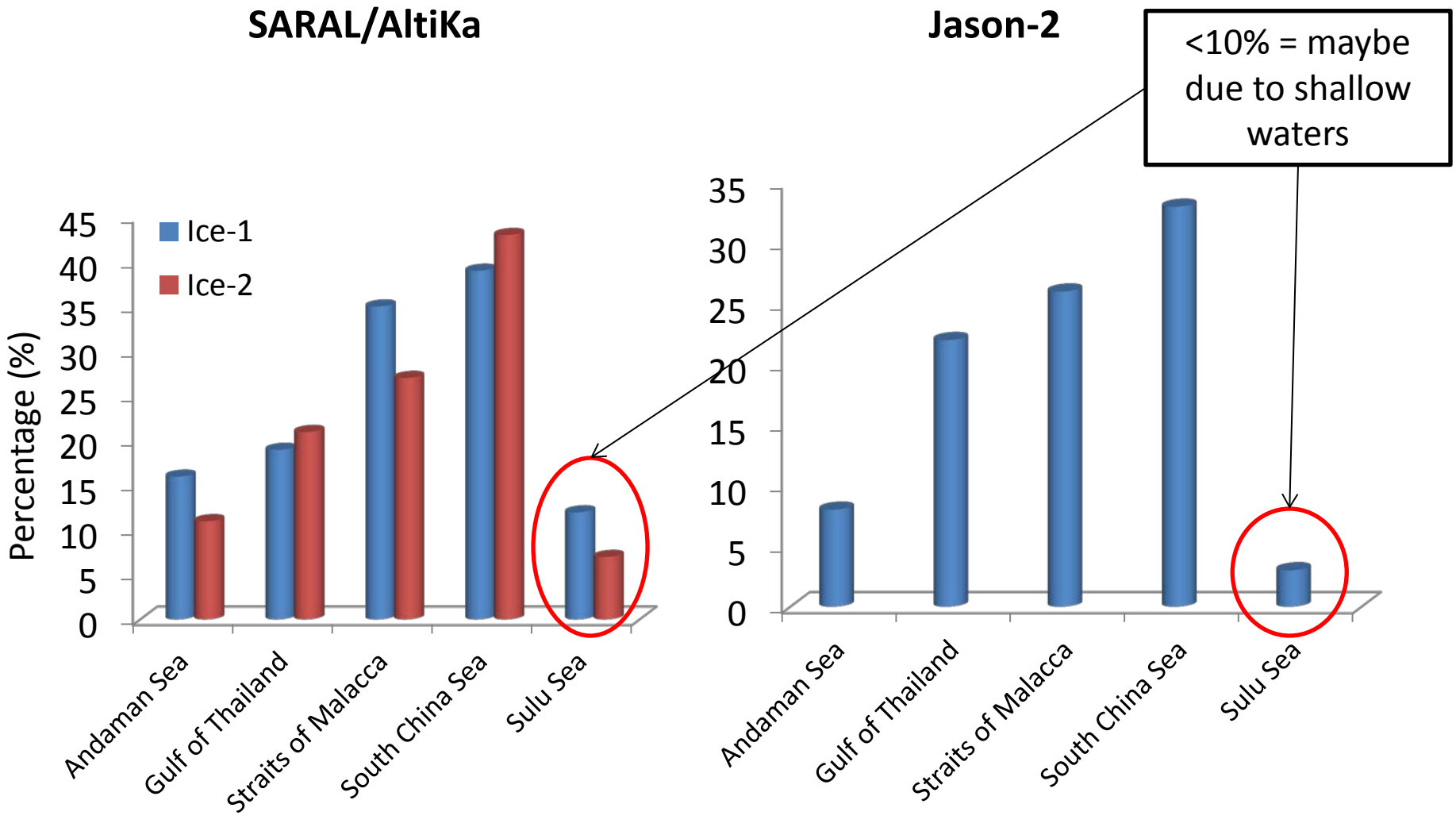


Improvement of Percentage (IMP)

$$IMP = \frac{\sigma_{MLE-4} - \sigma_{retracked}}{\sigma_{MLE-4}} x\ 100$$

- SSH is compare with the geoid height (EGM2008).
- The standard deviation of difference (STD) between the geoid and the retracked SSHs, and the improvement percentage (IMP) are computed to assess the quality of the retracked SSHs
- Computed over ~30 km from the coastline

Improvement of Percentage (IMP)



Take home message

- Saral will provide cleaner data closer to the coast (3-5km from coastline) so less reliant on choice of retracker.
- Jason-2 sensitive to retracker in region.
- Current dataset not likely to be optimised for MC but may be possible to build a more bespoke dataset for the region by selecting retrackers and tide model: PEACHI?

Year of the Maritime Continent (2017-2019)

- http://www.bmkg.go.id/ymc/
- ***One main outcome of the YMC would be a data archive that includes diverse observations needed to advance our understanding of detailed processes of the atmosphere, ocean, and their interaction that govern the variability in the MC region and must be properly simulated and predicted by climate and NWP models.***
- Good opportunity to leverage possible field obs in the region for altimetry validation.

Further Research

- Extended the focus areas to
  - Celebes Sea
  - Java Sea
  - Banda Sea
- Validate the retracked SLA with in-situ tide gauge data → identify gaps in tide gauge locations and other regions for opportunistic sampling: YMC?
- Examine sensitivity to tidal model
- Examine ocean circulation sensitivity

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