# Updated Results from the In Situ Calibration Site in Bass Strait, Australia


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Cascais Tide Gauge, Portugal

IMOS Integrated Marine Observing System

UTAS

CSIRO

ANU THE AUSTRALIAN NATIONAL UNIVERSITY

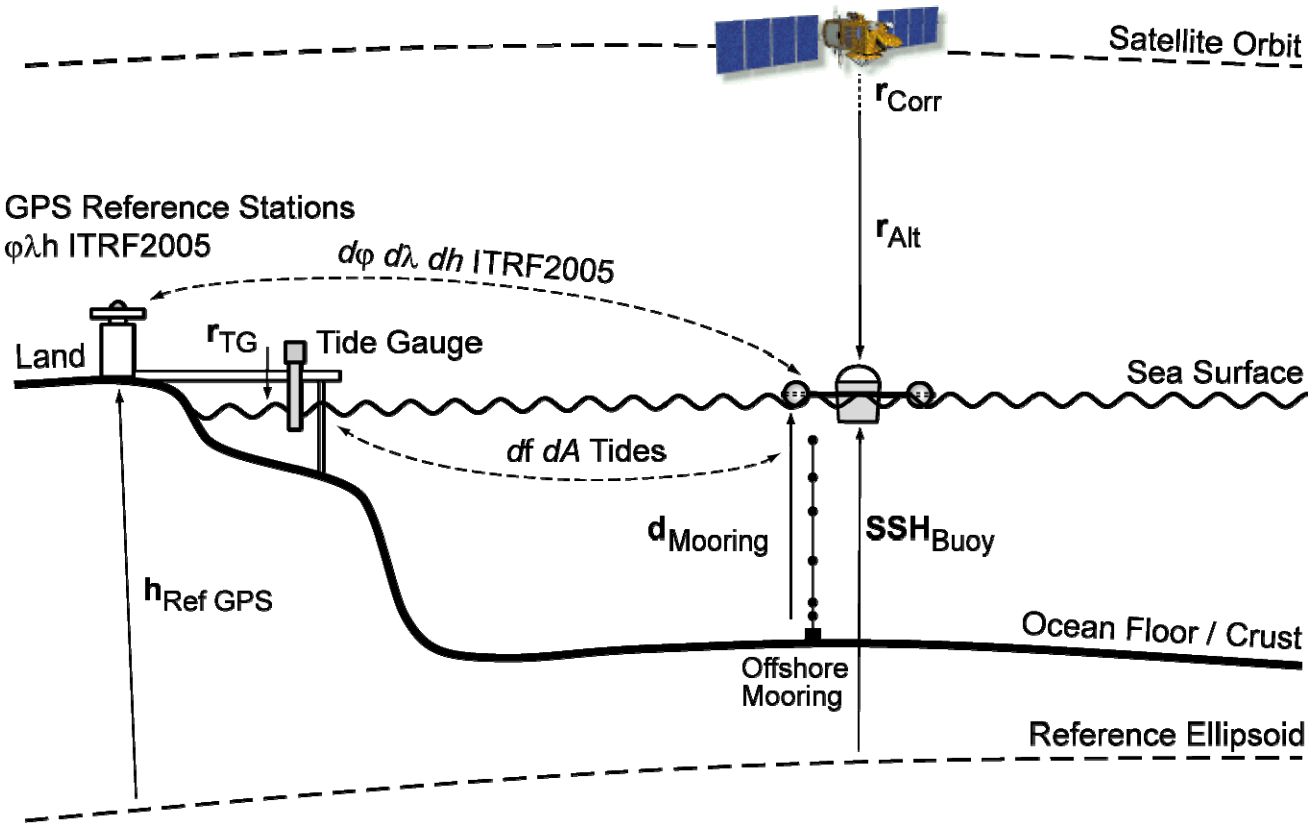
IMAS

***Jason-1 and OSTM/Jason-2 OST Science Team Meeting***

Updated Data Stream Presentation
Lisbon OSTST Meeting
October 2010

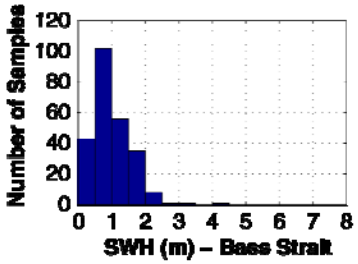
# Methods Recap

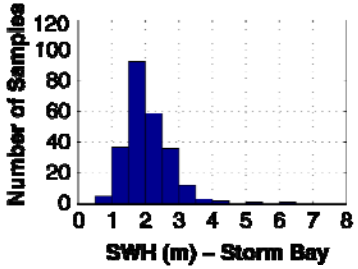
- We adopt a purely geometric technique for determination of absolute bias.
- The method is centred around the use of GPS buoys to define the datum of high precision ocean moorings.
- Outside of the mooring deployment, the mooring SSH is used to correct tide gauge SSH to the comparison point. Thus no reliance on a geoid.

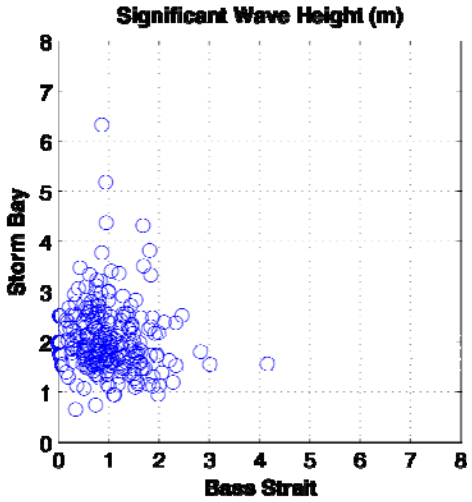


# Methods Recap

- To further understand the important SSB correction, we have extended our calibration activities to Storm Bay, ~350 km along track from Bass Strait.
- The two sites share any orbit error, and have an identical analysis approach. Wind speeds are comparable at both sites, yet Storm Bay experiences ~double the SWH given its exposure to the south west.
- Come and see our poster...



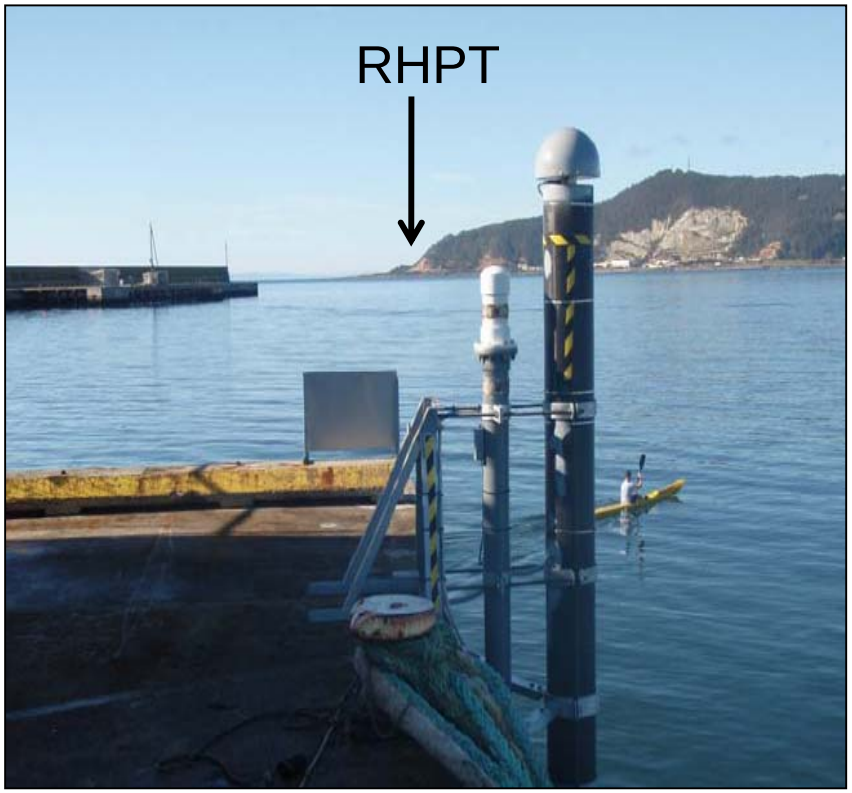

Instrumentation (Bass Strait):

# Tide Gauge and CGPS

- Tide gauge part of the Australian baseline array, located in Burnie.
- Approaching two years of data at bedrock CGPS – vertical velocity not significantly different from zero.
- No significant differential motion observed b/w bedrock and tide gauge sites.


**RHPT**

Bedrock CGPS site (~5km)



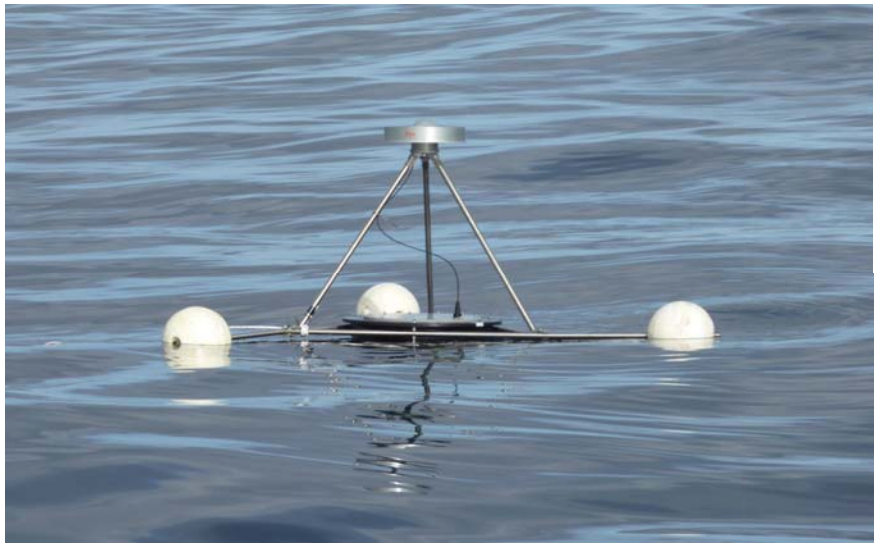

**BUR 2**

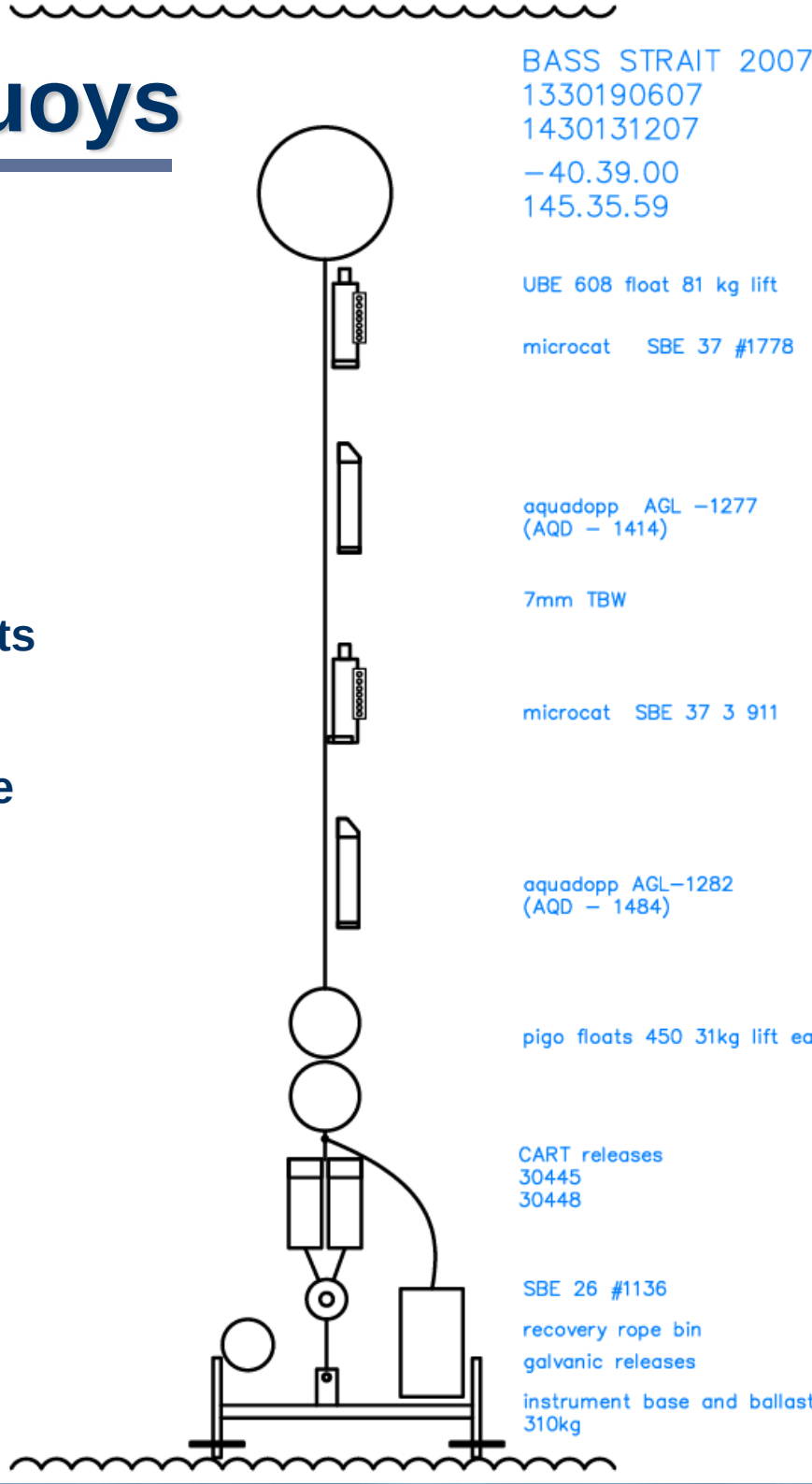
CGPS at tide gauge

Instrumentation:

# Ocean Moorings & GPS Buoys

- We derive a precise SSH directly at the altimeter comparison point using an array of moored oceanographic instruments (high accuracy pressure gauges, Seabird TS meters and current meters).
- The datum of the mooring-derived SSH is determined using episodic GPS buoy deployments (8 deployments in this case).
- Outside the mooring deployment window, the tide gauge data can be tidally corrected to best fit the mooring series.





Results:

# GPS Buoy / Mooring / Tide Gauge

- **Defining the datum of the mooring:**
  - From 8 buoy deployments, we compare Buoy SSH vs Mooring SSH. The difference defines the datum w.r.t ITRF2005.
  - The RMS of the residual time series, Buoy SSH – Mooring SSH = 21 mm. Assuming independent estimates each hour, N = 70, std err of mean = 2.5 mm.

- **Transforming the Tide Gauge onto the mooring datum:**
  - The RMS of the residual time series Mooring SSH – Tide Gauge SSH = 98 mm which is dominated by differences in tidal amplitude and phase.
  - Following the removal of the tidal signal in this residual, RMS = 28 mm.
  - The tide gauge can be transformed onto the mooring datum by adding a tidal prediction of the difference, Mooring SSH – Tide Gauge SSH.

- **Take home points:**
  - RMS absolute bias series (mooring) ~30 mm
  - RMS absolute bias series (tide gauge) ~40 mm
  - Import to consider the 'absolute' noise floor associated with realising a reference frame. Likely to be at least at the ~10 mm level.

Results:

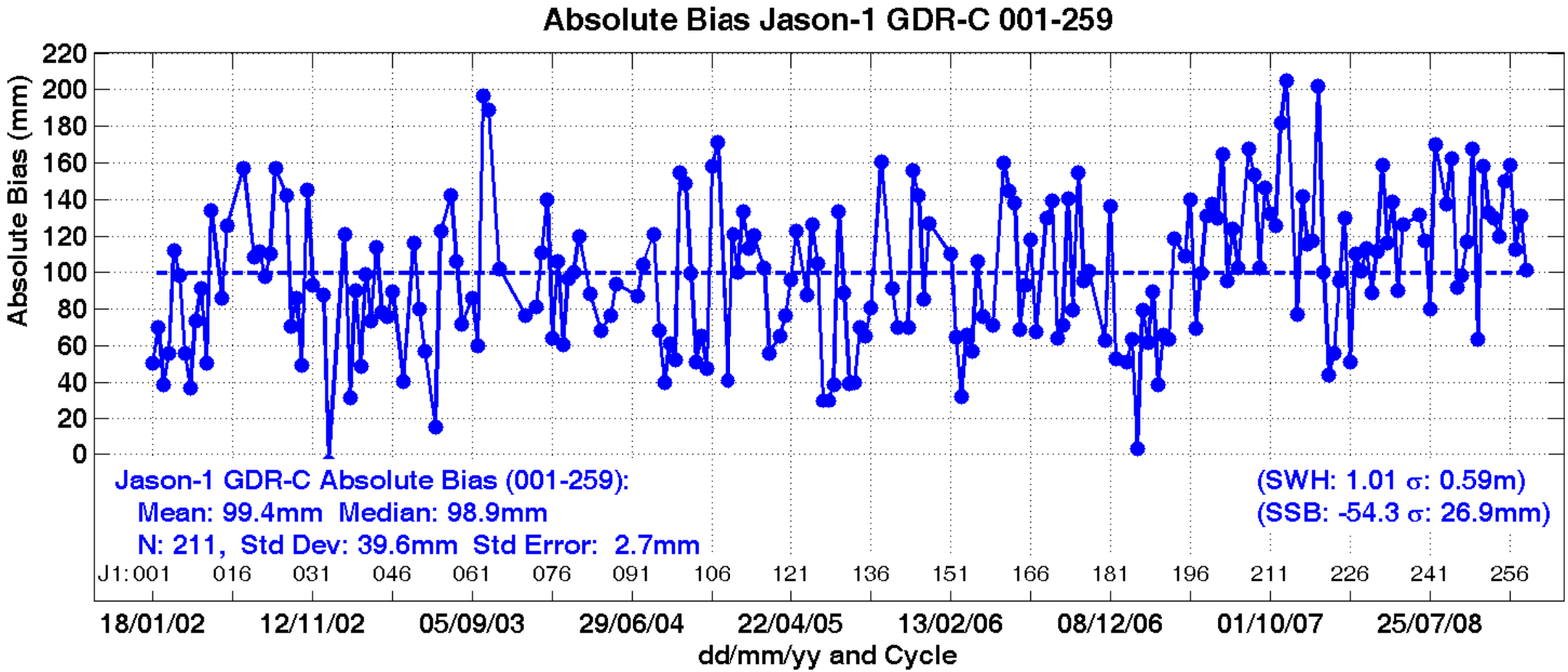
# Preview

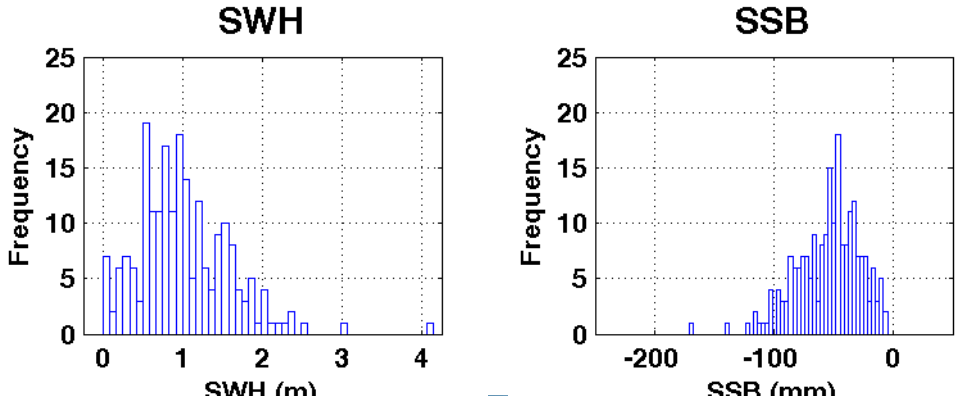
1. **Jason-1 (cycles 001-259)**
   - GDR-C 001-259, using the JMR “update” from cycles 228-259
   - Impact of JMR “enhanced” product, cycles 120-259 (with gaps)

Notes:

1. JMR “update” refers to the globally calibrated JMR product
2. JMR “enhanced” refers to the recently improved near-coast product from S.Brown (JPL)

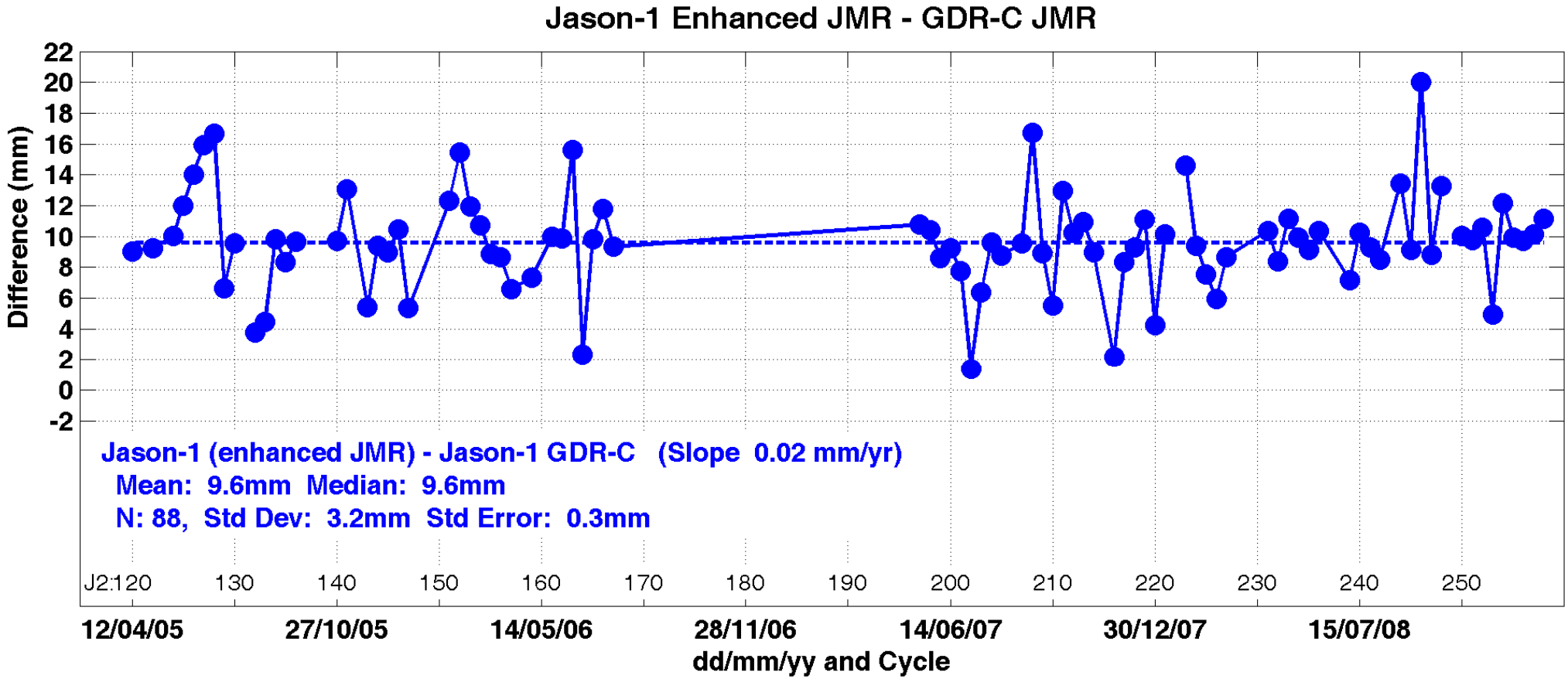
# J-1 GDR-C cycles 001-259



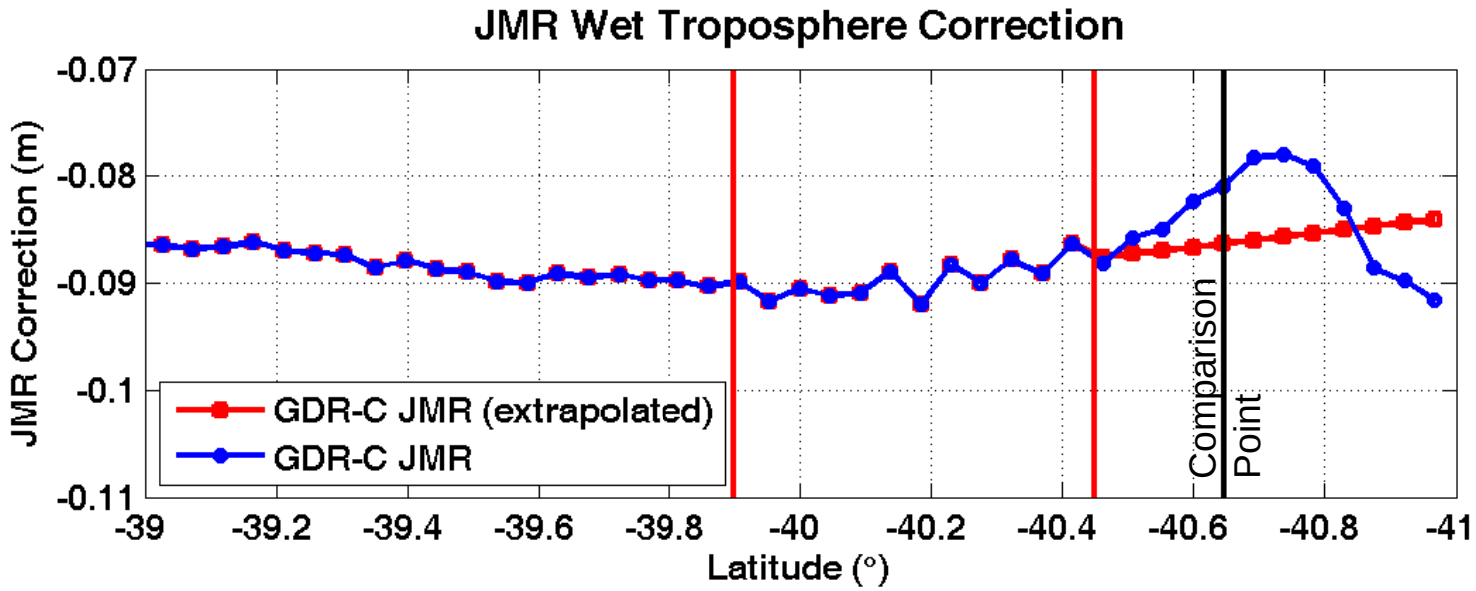

**Note:** updated JMR used from cycle 228

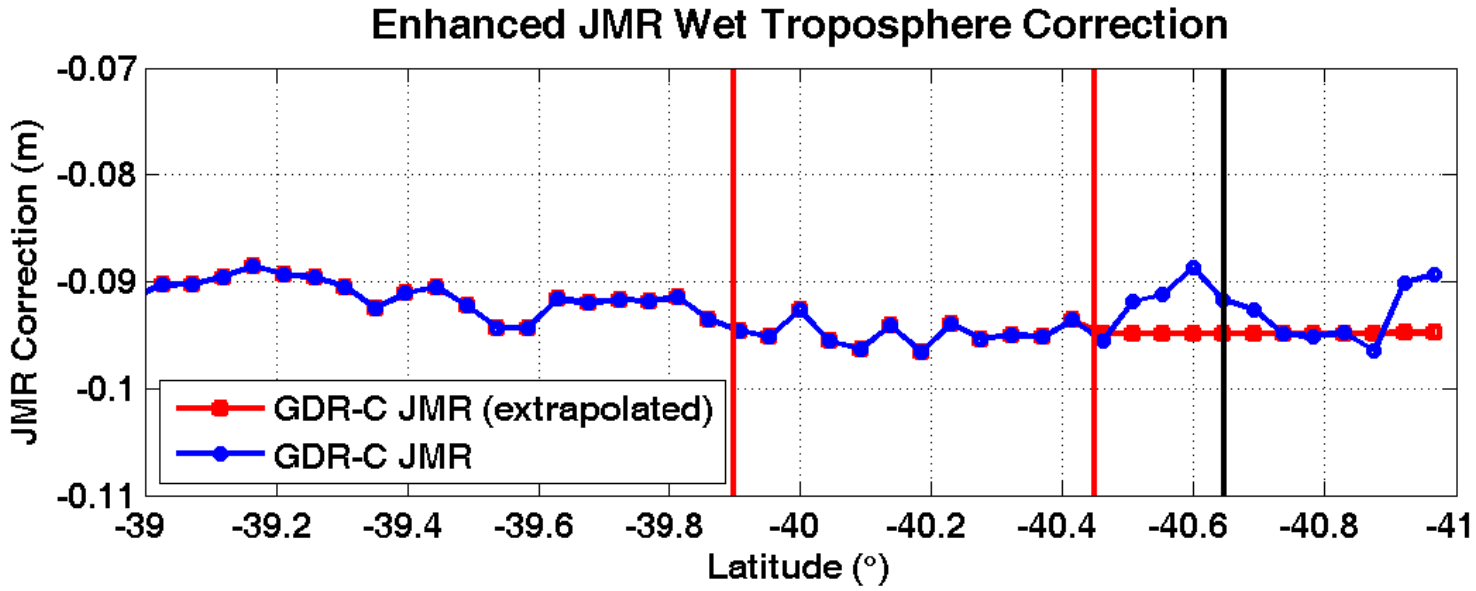
# J-1 JMR: 'Enhanced' vs GDR-C



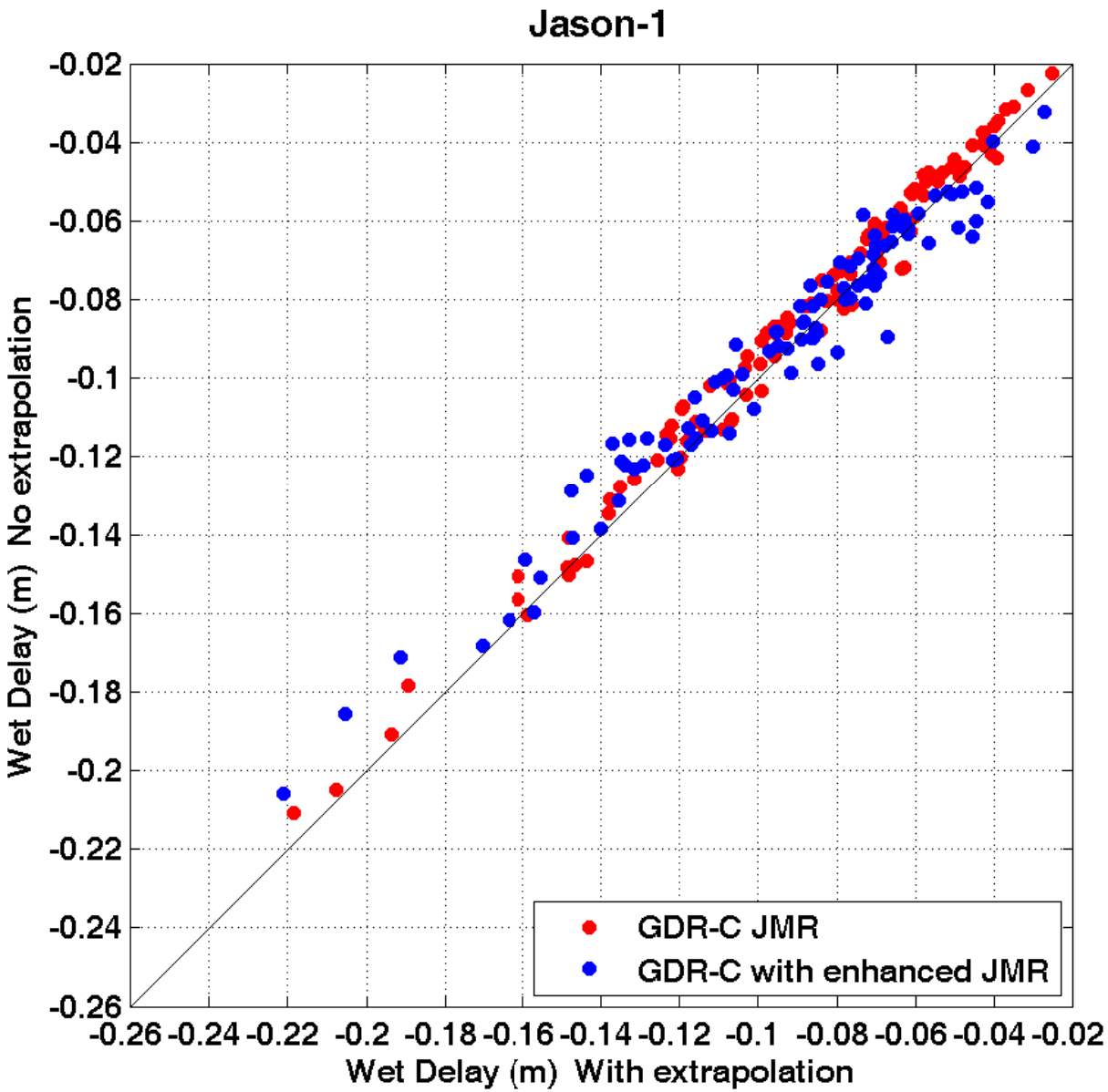

- Using the "enhanced" JMR near-coast product (S. Brown / JPL) in our standard analysis increases absolute bias by ~ 10 mm

# J-1 JMR: 'Enhanced' vs GDR-C



# J-1 JMR: 'Enhanced' vs GDR-C



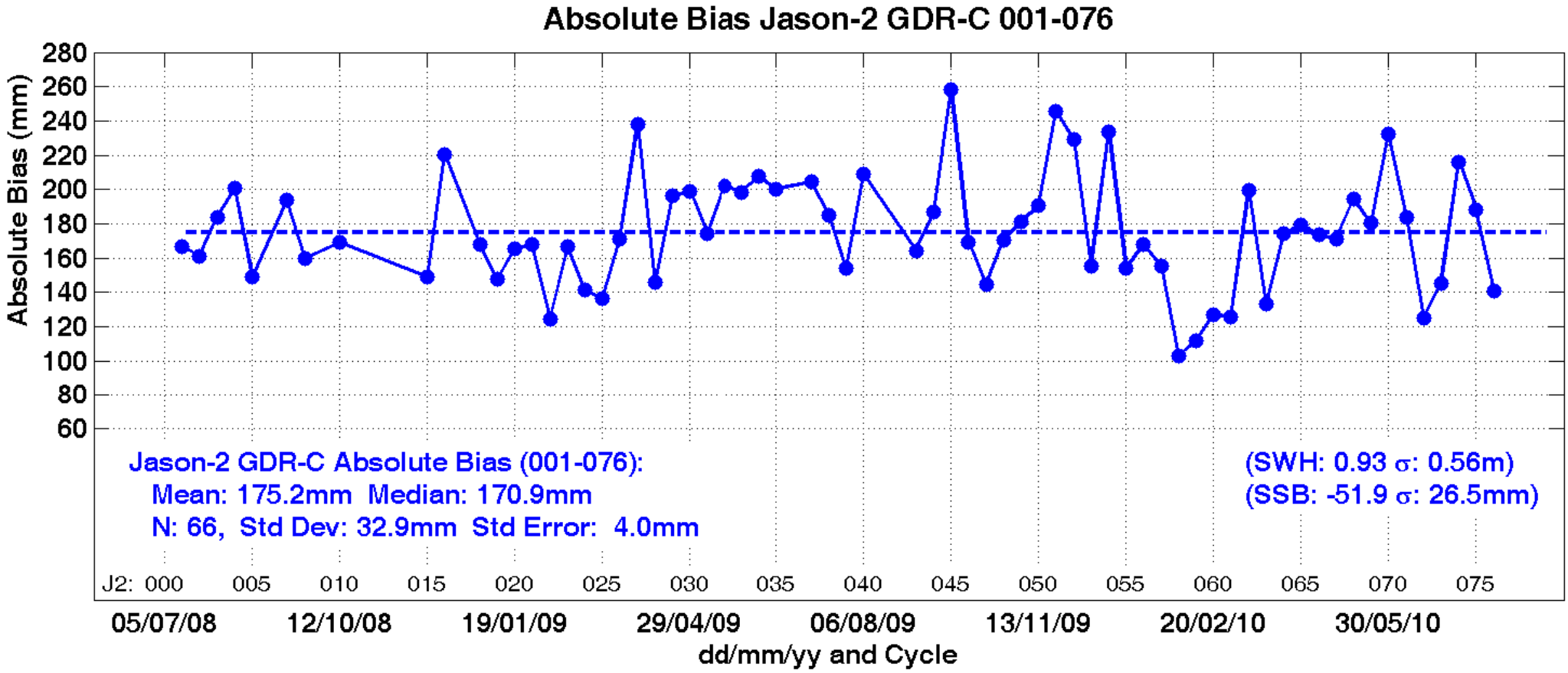
# Preview

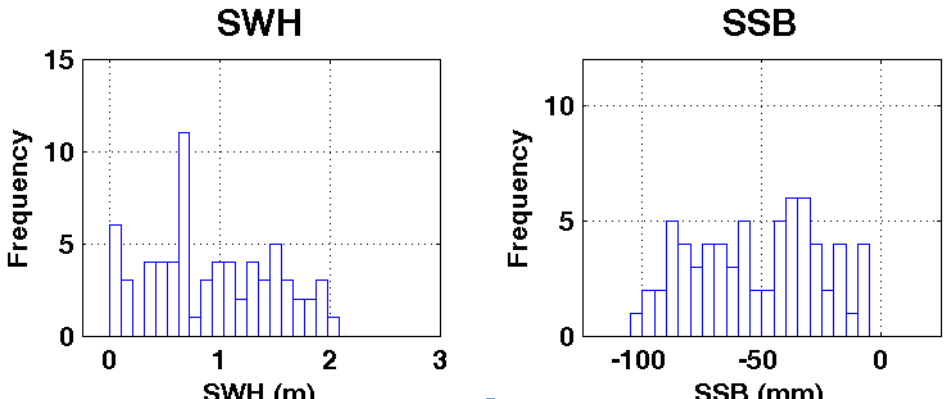
2. **OSTM/Jason-2 (cycles 001-076)**
   - GDR-C 001-076
   - Impact of the AMR “enhanced” product over the same cycles

Notes:

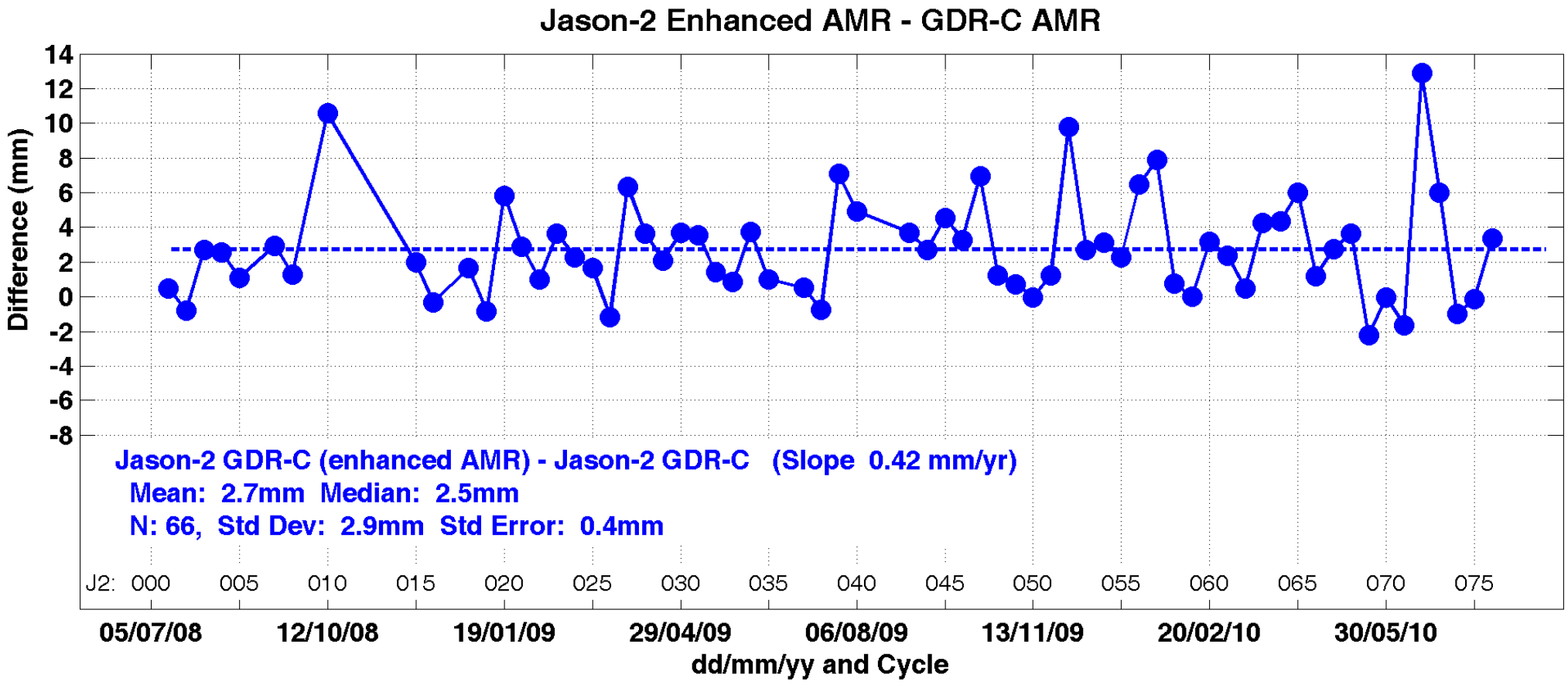
- AMR “enhanced” refers to the near-coast product from S.Brown (JPL)

# J-2 GDR-C cycles 001-076



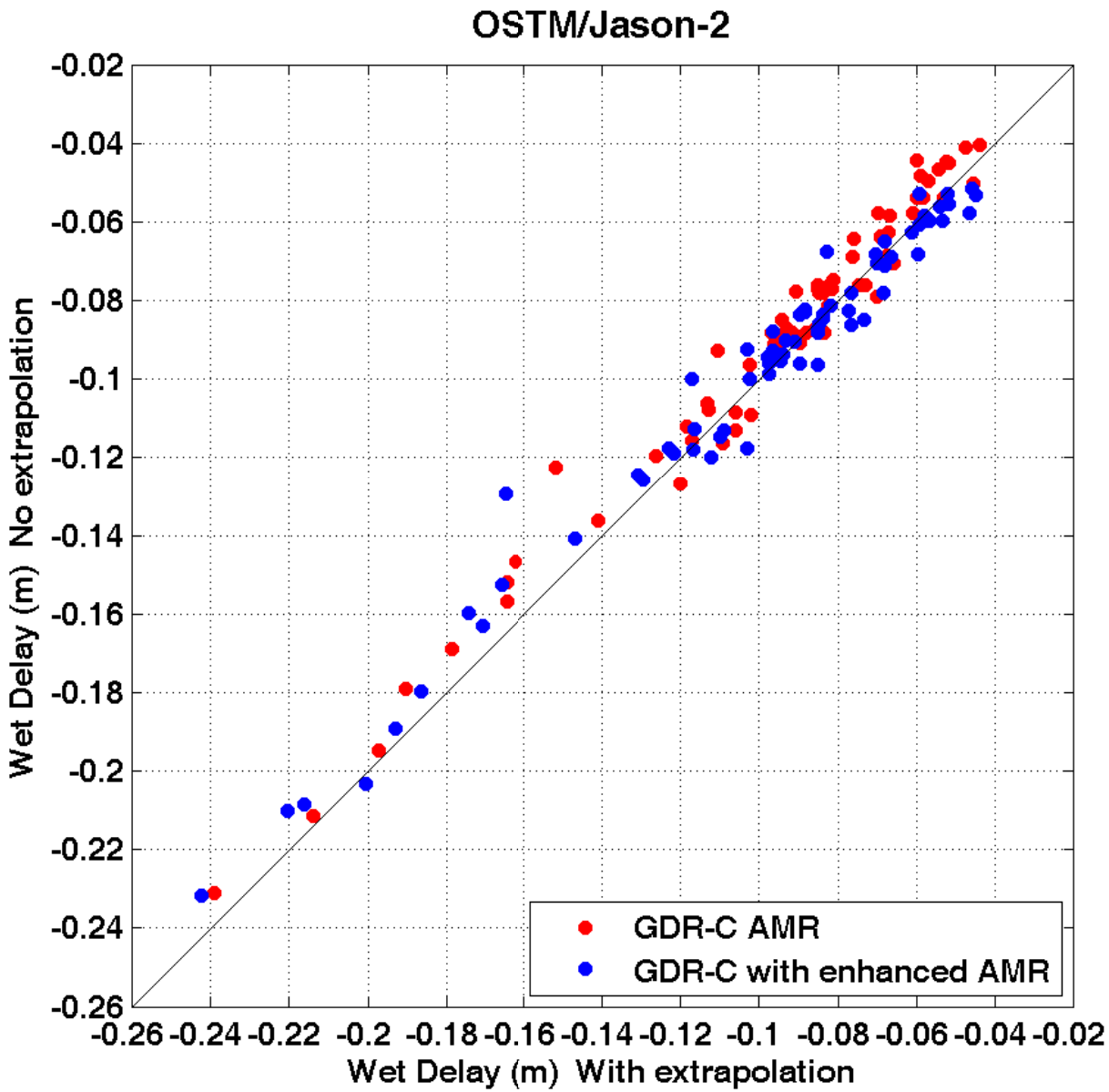



# J-2 AMR: 'Enhanced' vs GDR-C




- Using the 'enhanced' AMR product in our standard analysis increases absolute bias marginally (~2.7 mm)

# J-2 AMR: 'Enhanced' vs GDR-C

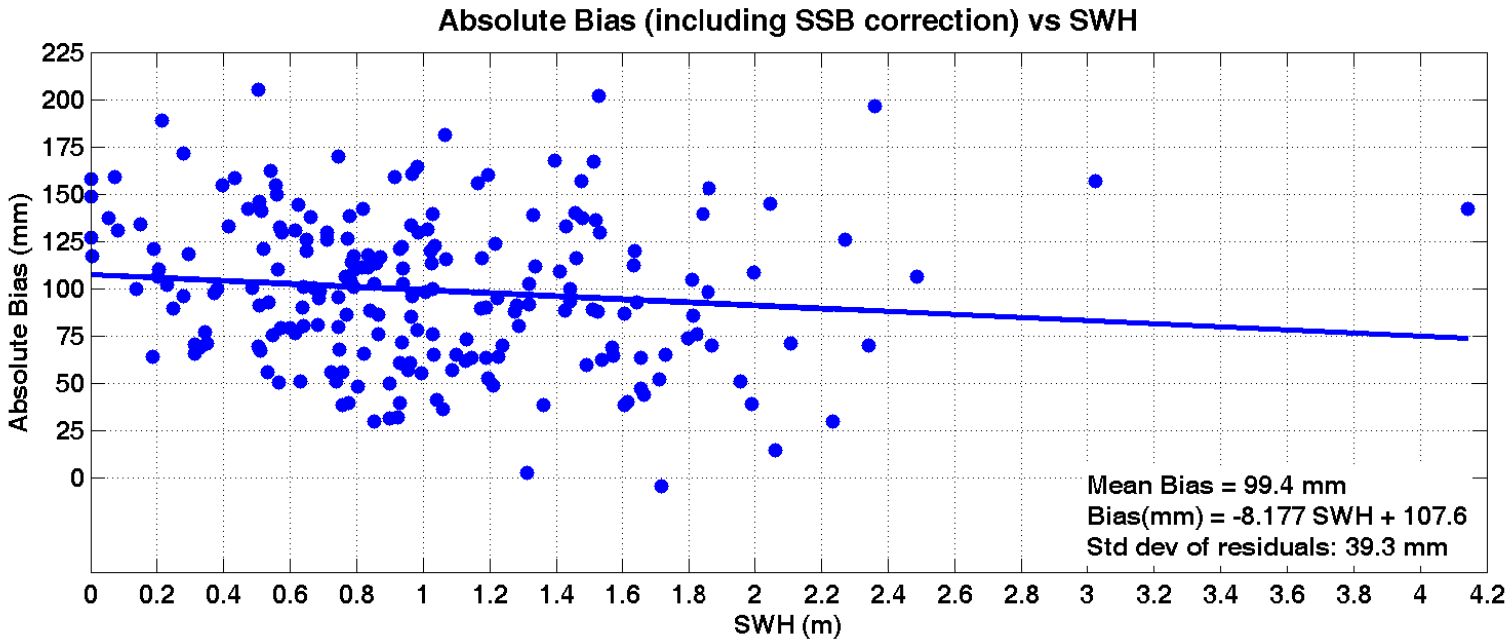


# Preview

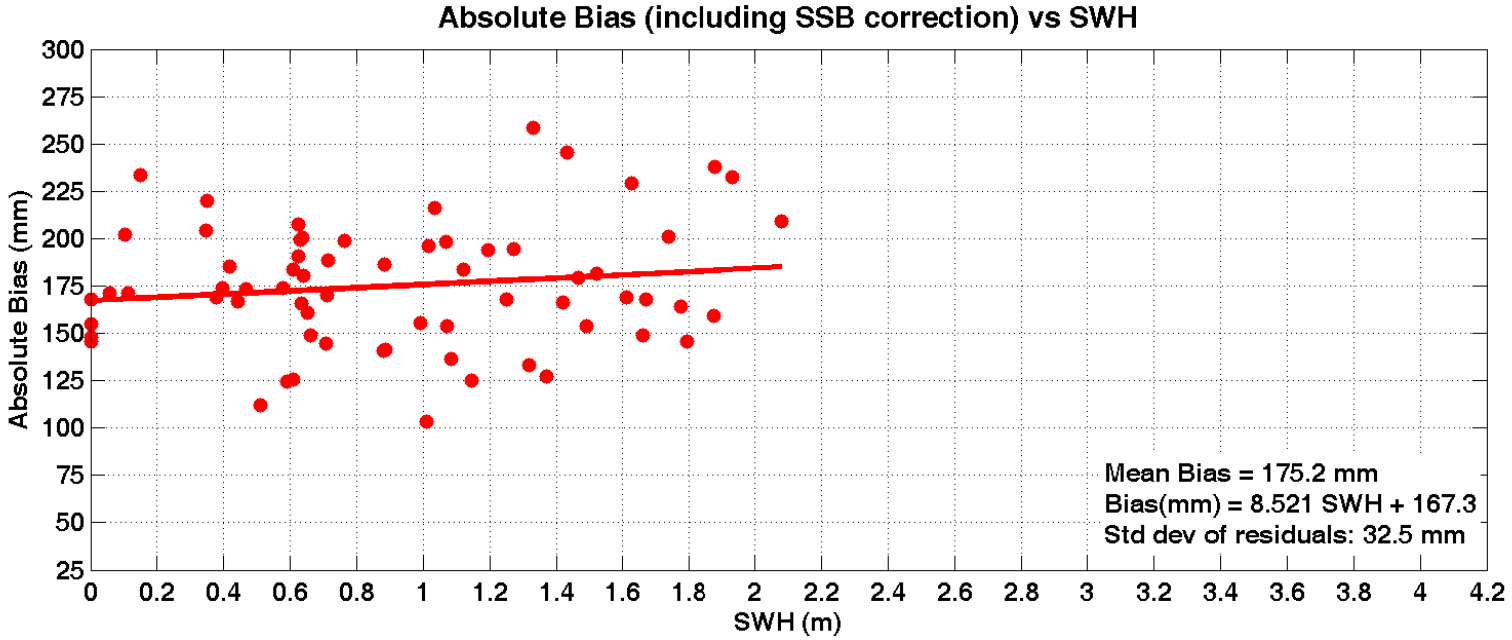
3. **Jason-1 and OSTM/Jason-2**
   - Absolute bias (including SSB) vs SWH
   - Absolute bias (not including SSB) vs SWH

# Absolute Bias (inc SSB) vs SWH

Jason-1

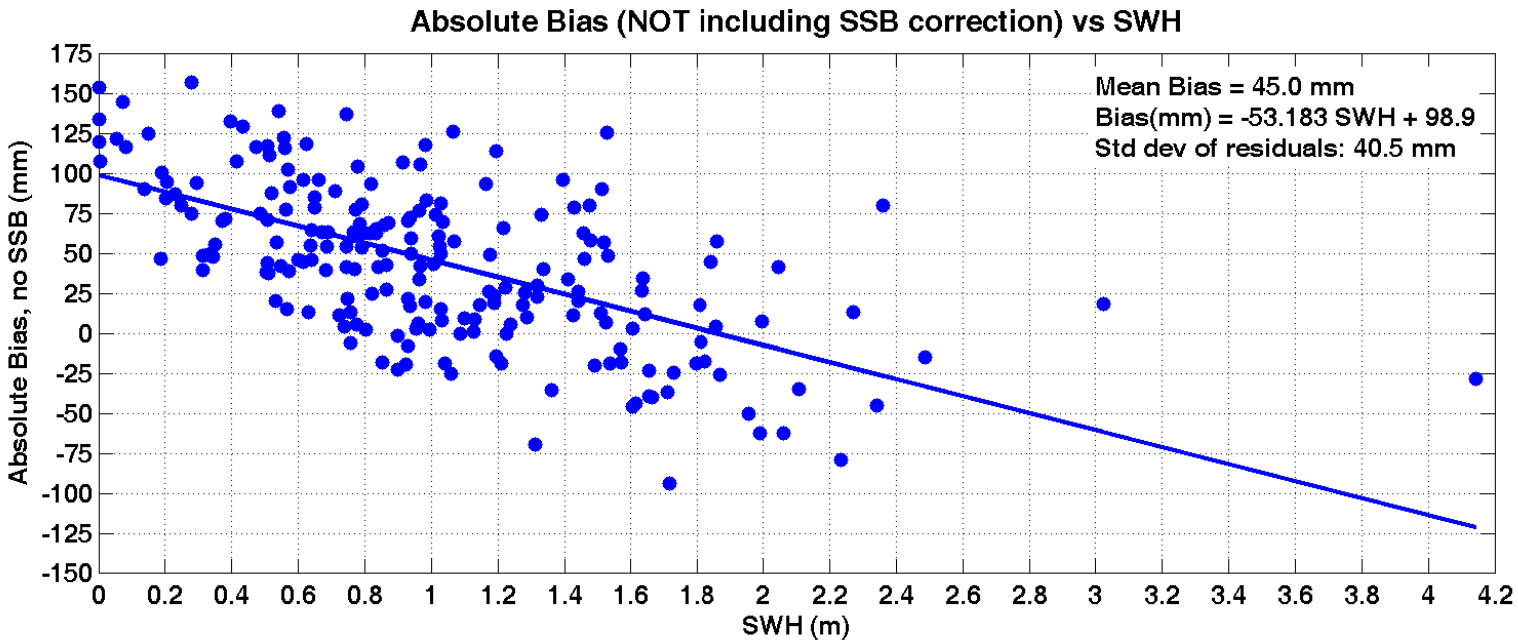



OSTM / Jason-2

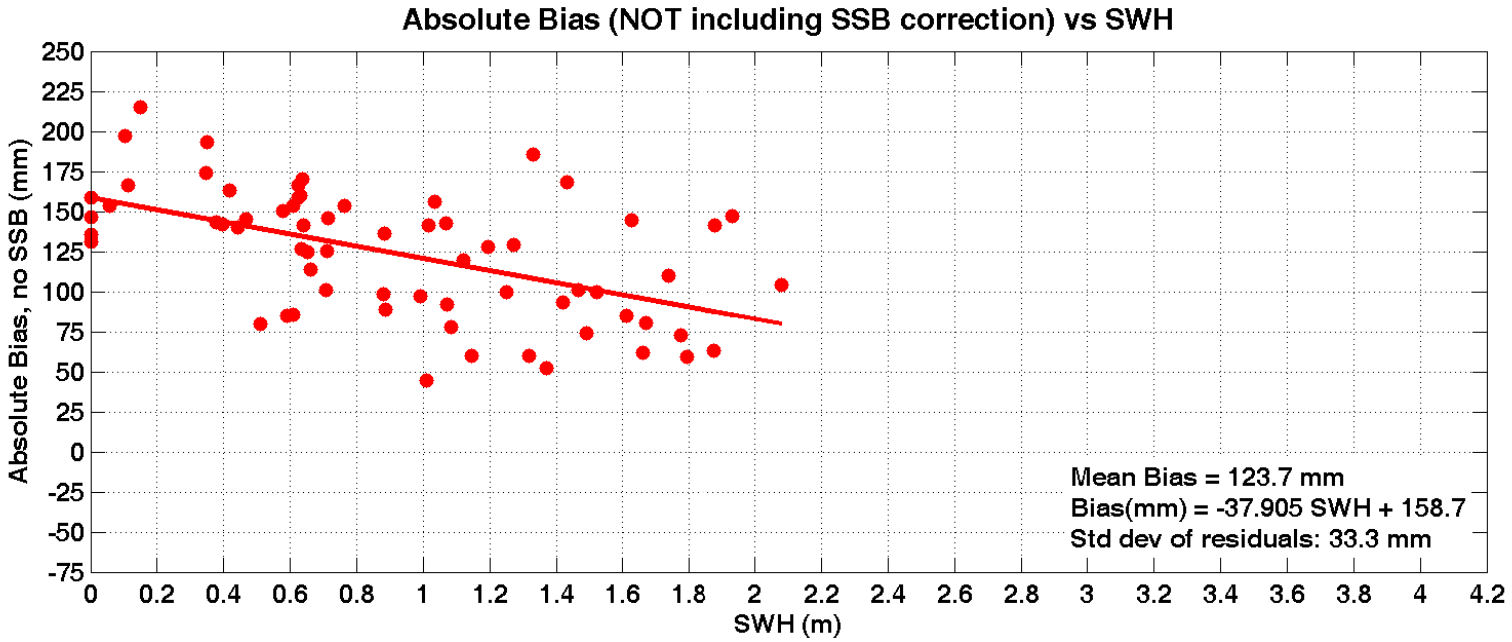


# Absolute Bias (not inc SSB) vs SWH

Jason-1




OSTM / Jason-2



# Conclusions

| Data | Cycles | N | Mean Bias ± Std Error |
|---|---|---|---|
| Jason-1 GDR-C | 001-259 | 211 | **+99.4 ± 2.7 mm** |
| Jason-1 GDR-C (enhanced JMR) | 120-259* | 88 | increase by 9.6 mm |
| Jason-2 GDR-C | 001-076 | 66 | **+175.2 ± 4.0 mm** |
| Jason-2 GDR-C (enhanced AMR) | 001-076 | 66 | increase by 2.7 mm |

- **Recall that systematic error contributions likely dictate that the "absolute" error is at the 10 mm level**
- **With support from IMOS, our contribution over the next three years:**
  1. **Simultaneous deployments at Bass Strait and Storm Bay to generate an improved absolute bias data stream, and further investigate the influence of the SSB correction.**
  2. **Generation of a regular bias drift data stream from our global analysis of tide gauge and CGPS data.**

# Questions?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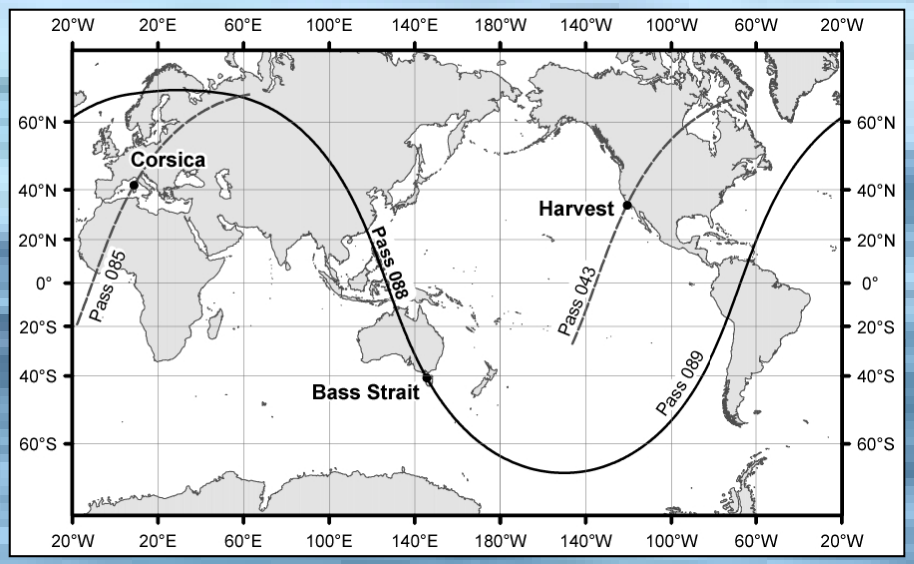


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