Ocean Data Products Splinter Summary

Sarah Gille, Nathalie Steunou, Tom Farrar, Gerald Dibarboure and others
Highlights

• Waves, tides, flagging, mean sea surface and geoid
• Algorithm Theoretical Basis Document
• Science Requirements Document Updates
Waves, flagging

- Waves (Esteban Fernandez): significant wave height from coherence at resolution of 1 km along-track by 60 km cross-track; nadir altimeter will also provide SWH
- EM Bias (Chapron): support sea state bias research; need for technical paper on KaRIn EM Bias/sea state bias effects
- Flagging anomalies (Soulat): “robustness” algorithm best handled on ground, implies value for 250-m product
Tides working group (Arbic et al)

• Barotropic tide in good shape (but coastal/estuarine/high-latitude work needed pre-launch)

• Internal tide (small-spatial scales) 1/3 non-stationary (see Zaron, in press)
  – Stationary part: empirical correction possible now
  – Non-stationary: work in progress (process studies underway now)
  – Emerging idea: internal wave continuum contributes to ssh variance (non-trivial to remove through empirical correction)
Mean sea surface and geoid

• Mean sea surface (Dibarboure): exact locations of measurements help to define MSS
• Geoid (Sandwell): work with small-scale slopes, particularly significant in shallow water
• Recommendations:
  – Pre-launch: workshop and research towards best possible MSS/geoid models. Essential to minimize geoid leakage into SSH.
  – Support geodetic phase for Jason-2 and AltiKa
  – Post-launch: archive/release a product at highest-possible resolution
what is expected signal? – upward continuation

\[ g(k,z) = g(k,0) e^{-2\pi k z} \]

gravity at altitude \quad gravity at seafloor \quad \times \quad \text{upward continuation}

<table>
<thead>
<tr>
<th>margin</th>
<th>( \lambda = 1/k )</th>
<th>( z )</th>
<th>gain</th>
</tr>
</thead>
<tbody>
<tr>
<td>shallow</td>
<td>8 km</td>
<td>1 km</td>
<td>.46</td>
</tr>
<tr>
<td>deep</td>
<td>8 km</td>
<td>4 km</td>
<td>.043</td>
</tr>
<tr>
<td>GOCE</td>
<td>8 km</td>
<td>200 km</td>
<td>( 10^{-68} )</td>
</tr>
</tbody>
</table>

Sandwell, SIO
what is expected signal? – upward continuation

\[ g(k, z) = g(k, 0) \cdot e^{-2\pi k z} \]

gravity at altitude

\[ \lambda = \frac{1}{k} \]

\[ z \]

\[ \text{gain} \]

shallow margin

\[ 2 \text{ km} \]

\[ 1 \text{ km} \]

\[ 0.043 \]

deep ocean

\[ 8 \text{ km} \]

\[ 4 \text{ km} \]

\[ 0.043 \]

GOCE altitude

\[ 8 \text{ km} \]

\[ 200 \text{ km} \]

\[ 10^{-68} \]

Sandwell, SIO
OBP ATBD Review

- Main conclusions and recommendations

- The overall approach is sound
- No issues identified that compromise the OBP feasibility
- No significant disagreement on the described/implemented algorithms
- Many requests for clarification and more detailed explications (to improve readability, facilitate understanding, avoid confusion)
- Some typos and errors that should be corrected
- Some open points that need to be clarified

- Recommendation: provide response to reviewer's comments and update ATBD (if possible by PDR)

- Beyond the ATBD review, there is a considerable joint effort to test OBP on simulated data, using both JPL's "golden model" and the CNES/CLS simplified prototype (cross-comparison needed)
SRD changes discussed regarding ocean product:

2.6.2.a [Requirement] The following Level-2 standard data products shall be produced for the ocean data in a **swath-oriented, geographically-fixed** grid covering the entire measurement swath and the nadir gap:

1. Ocean sea surface heights (SSH) (including the nadir measurements according to 2.3.3).
2. Estimated sea surface height uncertainties (1σ) on the same grid as the SSH measurements.
3. Radar ơ0 measurements on the same grid as the SSH measurements.
4. Wind speed (but not direction) estimates derived from the radar ơ0 on the same grid as the SSH measurements.
5. Standard deviation of SSH performed prior to averaging from the high resolution onboard processor data to the Level 2 resolution, on the same grid as the SSH measurements.
6. Estimated Sea Surface Slope vector performed during the re-gridding and geolocation of the onboard processor data to the Level 2 resolution, on the same grid as the SSH measurements.
7. Nadir altimeter data products consistent with the Jason-series Geophysical Data Records (GDR’s).

Also:

**2.7.3 2.6.2.d [Requirement]** The height postings A Level 2 product shall also be provided on a geographically fixed grid, and independent of spacecraft position and attitude.

The measurement geographic grid needs to remain constant over the mission to minimize geoid errors and enable the construction of a mean sea surface and variability studies.