Global Statistical Jason-2 assessment and cross-calibration with Jason-1 Parameter Analysis

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Overview
The OSTST/Jason-2 (JA2) satellite was successfully launched on June, 20th 2008. From July 4th 2008 to January, 26th 2009, Jason-2 was flying in tandem with Jason-1 (JA1), only 55 km apart, before JA1 went to its new interleaved orbit. This posture assesses the JA2 data quality. Missing and edited measurements are monitored (part 2). Furthermore relevant parameters derived from instrumental measurements and geophysical corrections are analyzed (part 3 to 8). Analyses are focused on Jason-1/Jason-2 cross-calibration since both missions were on the same orbit during the Calibration/Validation phase. This allows us to precisely assess parameter discrepancies between both missions in order to detect systemically correlated biases, jumps or drifts. The SLA performances and consistency with JA1 are described in poster (B).

Used data
The study is conducted for JA2 cycles 1 to 20, corresponding to JA1 cycles 240 to 259. For both satellites GDR (Geophysical Data Records) 1 Hz data are used. For some parameters results from IGDR (Integrated GDR) are also presented.

IGDR/GDR
The main differences between Jason-2 IGDR and GDR products are:

<table>
<thead>
<tr>
<th>Parameter</th>
<th>IGDR</th>
<th>GDR</th>
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<tbody>
<tr>
<td>Orbit</td>
<td>MOC</td>
<td>FOE</td>
</tr>
<tr>
<td>DAC (Dynamic Atmospheric Correction)</td>
<td>Non-centered window for filtering</td>
<td>Uses centered window for filtering</td>
</tr>
<tr>
<td>Radiometer wet troposphere correction</td>
<td>New AMR characterization file since cycle 023</td>
<td>Same AMR characterization file for entire period</td>
</tr>
<tr>
<td>Poseidon 3 ASC tracks</td>
<td>New Poseidon 3 characterization file since cycle 023</td>
<td>Same Poseidon 3 characterization file for entire period</td>
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Parameter Analysis

3 Backscattering coefficient
The JA2 backscattering coefficient (\(\sigma_0\)) shows good agreement with JA1 in Ku and C bands as plotted in map of mean differences (fig. 1) and in daily monitoring (fig. 2). The global bias between JA1 and JA2 is weak (0.14 dB in Ku-band and 0.2 dB in C-band). Bias is slightly higher for GDR than for IGDR, as AMR characterization file has changed (part 1). In comparison, the global bias between JA1 and T/P was about 2.4 dB. Notice that a small signal (0.1 dB) in both Ku- and C-band differences is detected in daily monitoring (fig. 2). It is correlated to increased JA1 miss-pointing (fig. 9).

4 Wet troposphere correction

JA2 radiometer wet troposphere correction in GDR product is very stable and without drift versus ECMWF model, as visible on fig. 3. Behavior of AMR (JA2) and JMR (JA1) can be seen from cycle 3 to 20 (fig. 4). AMR stays more stable than JMR when approaching coast related to different antenna properties.

After the Jason-1 safehold, difference of JMR - AMR radiometer wet troposphere correction (fig. 5) shows a signal up to 7 mm amplitude. The reason is unknown, but caused by JMR, as visible when comparing with ECMWF model (fig. 3). In GDR, the difference showed a drift, which was probably caused by AMR 34 GHz channel (fig. 6). 34 GHz JA1 - JA2 difference shows jumps which are often, but not always correlated with yaw maneuvers. In GDR products, a different AMR characterization file than for 22 first IGDR (fig. 1), as well as ARCS system was used. Therefore drift of 34 GHz channel is removed and AMR radiometer wet troposphere correction put at the level of JMR. But there might be a risk that real geophysical signals are removed, when correcting AMR in GDRs.

Conclusion
This study, using 20 cycles of Jason-2 flying in tandem with Jason-1, shows the very good consistency between altimetric parameters of JA1 and JA2. Thanks to new AMR characterization files and ARCS system, drifts in JA2 radiometer (AMR) are corrected in GDRs, improving the stability of radiometer wet troposphere correction. Nevertheless, there is a risk that real geophysical signals might be removed. Furthermore, the new J2 DEM tracking mode (used during cycles 3, 5, and 7) shows no impact on parameter analysis of 1 Hz ocean measurements. The very small differences observed do not impact the SSH computation (poster B).

Finally, from the Cal/Val parameter analysis point of view, JA2 has excellent data quality.

References
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