

On the quality of real-time altimeter gridded fields: comparison with in situ data

A. Pascual¹, C. Boone², G. Larnicol², P.-Y. Le Traon³

e-mail: ananda.pascual@uib.es

¹ IMEDEA (CSIC-UIB) · Balears · SPAIN

² CLS Space Oceanography Division · Toulouse · FRANCE

³ IFREMER · Brest · FRANCE

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Institut Mediterrani d'Estudis Avançats



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1. Aim of this work

The timeliness of satellite altimeter measurements has a significant impact on their value for operational oceanography. In this work, we use an OSE (observing system experiment) approach to assess the quality of near real time (NRT) altimeter products, a key issue for a correct monitoring and modeling of the ocean state.

The impact of merging 2 or 4 missions and of using of different atmospheric corrections will be also analyzed.

2. Altimetry data sets



• Old vs new geophysical corrections:

➢ **OLD** geophysical corrections: IB, GOT-99

➢ **NEW** geophysical corrections: MOG2D, GOT-00

• Delayed-time vs real-time maps:

➢ **DT**: Delayed time maps: Centered time window

➢ **NRT**: Near-real-time maps: Uncentered time window

• **Period**: October 2002 – September 2003

3. Comparison of altimetry products

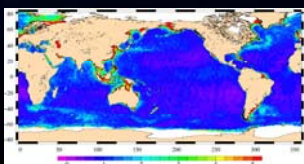


Figure 1: Rms of C4 SLA differences between old and new corrections. Units are in cm.

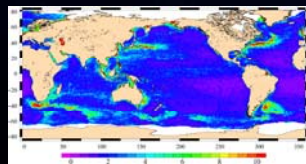


Figure 2: Rms of C4 SLA differences between DT and NRT. Units are in cm.

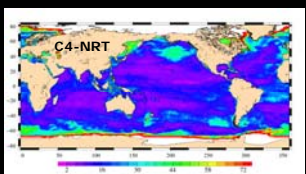
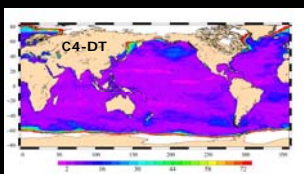
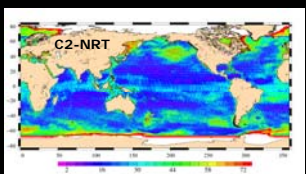
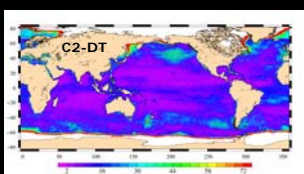


Figure 3: Statistical errors obtained from the optimal interpolation analysis. Errors are expressed in percent of signal variance.

4. Comparison with TG data

- 86 tide gauge (TG) stations from GLOSS/CLIVAR near-real time data.
- Processing: filtering of tides (Demerliac filter) and IB correction.
- The altimetric maps are interpolated onto the position of the TG stations.

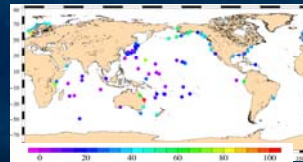


Figure 4: Mean square differences between tide gauge and DT C4 new-SLA [Var(TG-alt)]/Var(TG). Units are percent of TG variance.

Figure 5: C4 SLA vs TG SL at Andenes site (North Atlantic). Left: SLA old corrections. Right: SLA new corrections.

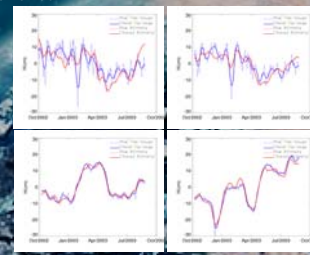


Figure 6: as in Figure 5 but for Point La Island (Equatorial Indian), on the left and Guam Island (Tropical Pacific) on the right. Only results with new corrections are shown.

	Delayed-time (old)		Delayed-time (new)		Real-time	
	C2	C4	C2	C4	C2	C4
	46.7%	35.3%	36.7%	29.7%	45.2%	37.1%

Table 1: Rms differences between TG and altimetry sea level. Units are percent of TG variance.

5. Comparison with drifter data

- Absolute velocities are compared by adding to the geostrophic anomaly velocities, the mean currents, and an Ekman component.
- Absolute currents maps are compared with drifter data (total of 673,000 measures).

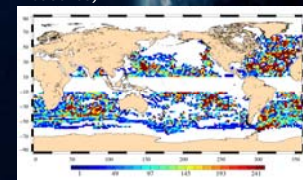


Figure 7: Number of 6 hourly drifter observations into 2°x2° boxes for the period October 2002 - September 2003.

Table 2: Root mean square differences between drifter and altimetry velocities in areas of intense variability (rms > 20 cm s⁻¹) and out of the Equator. Units are cm/s and % of drifter variance (in brackets).

	Delayed-time (old)		Delayed-time (new)		Real-time	
	C2	C4	C2	C4	C2	C4
U	11.24 (26.7)	10.72 (24.3)	11.23 (26.6)	10.72 (24.2)	12.06 (31.0)	11.30 (26.9)
V	10.68 (33.0)	9.99 (28.4)	10.70 (33.1)	9.97 (28.1)	11.63 (41.2)	10.69 (33.4)

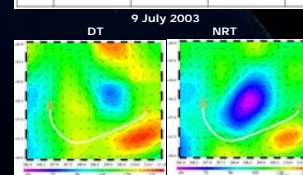


Figure 8: Comparison of C2 altimetry and drifter data in a cyclonic eddy in the Brazil-Malvinas Confluence Region. The white line represents the trajectory followed by a buoy between 4 July 2003 (A) and 13 July 2003 (B). The vectors correspond to the absolute velocity field and the background color field is the SLA+MDT (in cm) on 9 July 2003.

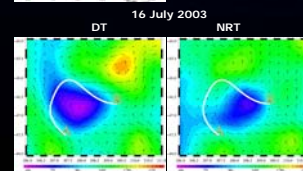


Figure 9: As in Fig. 8 but one week later. The vectors and the background color field correspond to 16 July 2003. The white line represents the trajectory followed by the surface float between 11 July 2003 (A) and 21 July 2003 (B).

6. Conclusions

It has been highlighted: (1) the importance of a continuous improvement of the altimetric data processing, (2) the degradation of real-time products in contrast with the delayed mode and (3) the impact of the number of merged altimeters (two vs four missions).

In a nominal real-time situation, 4 altimeters are needed to get the observing capability of 2 altimeters in delayed-time products.

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