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Modeling the marine gravity field: constraints and limitations

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Although gravimetric measurements are acquired over the oceans since the 60's, the knowledge of the oceanic field of gravity mostly improved with the advent of altimetric satellites. Global models of mean oceanic surface or its derived items (gravity, topography.) have brought a wealth of new information and lead to an acceleration of research in geophysics on the oceans.

Nevertheless, this information does not meet all the needs since it is mainly limited to the medium and long wavelengths of the geophysical signal. The limitations of these models are partly due to ocean waves induced noise and to the altimetric technology, which prevents the exploitation of measurements close to the coastlines and limits the space resolution along the satellite tracks.

In addition, the strategy of measurements adopted for altimetric missions generally favours the study of oceanographic processes and their temporal variability (i.e. repeated orbits) rather than a complete spatial coverage needed for geophysical studies.

Typical examples of the contribution of each data are presented and the constraints of mixed gravity models are pointed out. The future of gravity exploration is also mentioned. An assessment of the possible contribution of the future altimetric satellite mission concludes this study.