MESOSCALE HEIGHT ANOMALIES CAN BE OBSERVED EQUALLY WELL FROM REPEAT AND NON-REPEAT ORBITS

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We compare sea surface height anomalies observed by satellite altimeters in exact repeat mission orbits to anomalies observed by altimeters in geodetic or drifting orbits. We find no distinguishable differences. One experiment compares data from the drift of TOPEX between its Tandem and Interleaved missions to repeat-orbit data from Jason-1, ERS-2 and GFO. A second experiment compares data from the ERS-1 non-repeating Geodetic Phases E and F to the repeating TOPEX data. Both studies cover the North Atlantic from 0° to 82°W and 15° to 55°N in order to sample both the Gulf Stream and quieter regions. Height anomalies are obtained along repeat and non-repeat orbits alike by use of a mean sea surface model. Each experiment is performed twice, once with the EGM2008 and once with the DNSC08 models, showing that the results are model-independent; DNSC08 yields an insignificant 2 mm lower RMS misfit. To compare anomalies between repeat and non-repeat orbits with different spatio-temporal sampling we grid the 1-Hz along-track point data and interpolate the grid to point values. RMS differences between grids and point values are around 4 cm in quiet areas and 6 cm over the entire region, with negligible difference between misfits to repeat and non-repeat data. A grid built solely from ERS-1 geodetic data captures at least 85% of the variance in repeat-track TOPEX point data. Ground tracks of drifting or geodetic orbits can repeat within a mesoscale correlation length at regular intervals. Geosat's geodetic orbit repeated within 50 km every 23 days, and ERS-1's geodetic phases repeat within 82, 66 and 17 km every 17, 20 and 37 days.

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