Geophysical Research Abstracts
Vol. 16, EGU2014-16904, 2014
EGU General Assembly 2014

Analysis of SWOT spatial and temporal samplings over continents

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The future Surface Water and Ocean Topography (SWOT) satellite mission, collaboratively developed by NASA, CNES and CSA, is a joint oceanography/continental hydrology mission planned for launch in 2020. In June 2013, a new SWOT orbit has been selected with a 77.6° inclination, a 21 days repeat cycle and a 891 km altitude. The main satellite payload (a Ka-band SAR Interferometer), will provide 2D maps of water elevation, mask and slope over two swaths, both having a 50 km extent. These two swaths will be separated by a 20 km nadir gap.
Most of the studies concerning SWOT published since 2007 have considered a former orbit with a 78° inclination, 22 day repeat orbit and a 970 km altitude and a 60 km extent for each swath. None of them have studied the newly selected orbit and the impact of the 20 km nadir gap on the spatial coverage has not been much explored. The purpose of the work presented here is to investigate the spatial and temporal coverage given this new orbit and the actual swath extent (2*50 km swaths with the 20 km nadir gap in between) and compare it to the former SWOT configuration. It is shown that the new configuration will have almost no impact on the computation of monthly averages, however it will impact the spatial coverage. Because of the nadir gap, the orbit repeatitivity and the swaths extent, 3.6% of the continental surfaces in between 78°S and 78°N will never be observed by SWOT (which was previously equal to 2.2% with the former SWOT configuration). The equatorial regions will be the most impacted, as uncovered area could go up to $\sim$14% locally, whereas it never exceeded 9% with the previous SWOT configuration.