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Spatial resolution from repeat orbit configurations: the Colombo-Nyquist rule revisited

N. Sneeuw (1), E.J.O. Schrama (2), P.N.A.M. Visser (2), and M. Weigelt (1)

(1) Institute of Geodesy, Universität Stuttgart, Stuttgart, Germany (sneeuw@gis.uni-stuttgart.de, ++49 711 68583285), (2) Department of Earth Observation and Space Systems, Delft University of Technology, Delft, The Netherlands

The groundtrack of a repeat orbit configuration limits the spatial resolution of gravity recovery. Colombo (1984) formulated a Nyquist-type rule-of-thumb that states that a gravity recovery up till degree L requires a repeat orbit with at least $2L$ revolutions. This rule, however, contradicts our experience in gravity field simulations and recovery from CHAMP and GRACE. In this contribution we revisit the the Colombo-Nyquist rule and scrutinize its rationale. We argue that, under certain conditions, the rule can be relaxed significantly. For instance, L or even less revolutions may already suffice for a recovery till degree L.