

On the presence and elimination of stripes on GRACE geopotential models using Moiré interference fringes

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The Gravity Recovery and Climate Experiment (GRACE) mission gravity models display highly disturbing signatures in form of ‘stripes’ extending longitudinally and around the globe. Despite that these ‘stripes’ contaminate useful geophysical signals, their origin has not been explained since the launch of GRACE in 2002; they have been always perceived as an artifact that can be removed by means of filtering with the trade-off of geophysical signal loss. Analysis of the spatiotemporal structure of the stripes shows that their dominant half-wavelengths are at 168.1km, 202.9km and 210.5km and that the stripes are spatially non-stationary. The location of stripes follows a travelling-wave pattern that shifts proportionally to the ground track eastward drift. We show that the stripes are caused by the GRACE tracks that “bundle” in a wave-like travelling pattern creating constructive and destructive Moiré fringes. Following this, we perform precise data-driven modelling of stripes using Moiré fringes and eventually we attempt to eliminate them without damaging geophysical signals.