EGU2020-12821
https://doi.org/10.5194/egusphere-egu2020-12821
EGU General Assembly 2020
© Author(s) 2021. This work is distributed under
the Creative Commons Attribution 4.0 License.

# On the earthquake detectability by the Next Generation Gravity Mission (NGGM)

**Gabriele Cambiotti**[1], Karim Douch[2], Stefano Cesare[3], Alberto Anselmi[3], Nico Sneeuw[2], Anna Maria Marotta[1], and Roberto Sabadini[1]

[1]University of Milan, Department of Earth Siences , Milano (MI), Italy (gabriele.cambiotti@unimi.it)
[2]Institute of Geodesy of Stuttgart, Stuttgart, Germany
[3]Domain Exploration & Science Italy, Thales Alenia Space Italia S.p.A, Torino Torino, Italy

We perform Next Gerataion Gravity Mission (NGGM) simulations over a 12-year operational period by including in the background gravity field the time-dependent gravity anomalies caused by different earthquake scenarios and considering different sources of error on 28-day mean gravity field solutions: the instrumental errors of the interferometer and accelerometers, the time dependenent background model and the atmosphere-ocean dealiasing. In order to assess whether the observational errors mask or not the earthquake-induced gravity signals, we assume known the background gravity field and the spatial and temporal pattern of the earthquake-induced gravity anomalies. Then, for each earthquake, we estimate the amplitude of its gravity anomaly by inverting the NGGM synthetic data time series and we check its consistency with the expected amplitude, as well as with the null hypothesis. In order to investigate case studies representative of the main earthquake characteristics and their compliance with the NGGM specifications, we have considered normal, inverse and strike-slip focal mechanisms striking with different angles with respect to the polar orbit, reaching the Earth surface and in depth, occurring inland, off-shore and close to the coastlines and at the beginning (2-4 years), at the middle (5-7 years) and at the end (8-10 years) of the 12-year operational period. The fault dimensions and slip distribution vary with the seismic moment magnitude and are prescribed according to the circular fault model by Eshelby (1957). Furthermore, we also consider two different rheological stratifications with asthenospheric viscosity of $10^{18}$ and $10^{19}$ Pa s. In order to discuss whether the earthquake signal can be discriminated from other geophysical processes (like atmosphere, ocean, hydrology and glacial isostatic adjustment), we also perform the same inversion but, this time, its amplitude is estimated jointly with the time dependent background gravity field, which we simply model using static values, trends and periodical functions.