Project: **1428**

Project title: **Joint inversion of gravimetric and electromagnetic satellite observations to infer global time series of oceanic volume transport (GREMLIN)**

Principal investigator: **Jan Saynisch**

Report period: **2024-05-01 to 2025-04-30**

The project started with the hiring of a PhD in September 2024, Therefore, the report period covered here represents only the 6 month: 10.2024 – 3.2025.

In this time, the PhD conducted many preliminary studies and updates at DKRZ. The oceanic magnetic fields of recent oceanic reanalyses (ECCO & GLORYS) have been calculated using the x3dg Maxwell-Equation solver (Kuvshinov et al., 2009). The calculations with and without realistic secular variations from the updated geomagnetic model IGRF -14 and with and without realistic decadal oceanic electric conductivity changes.

We estimated decadal M2 tidal variations of the magnetic space-borne Swarm measurements with our KALMAG Kalman-Filter tidal assimilation approach (cf., Saynisch-Wagner et al., 2023).

In addition, we started to assess the usefulness of marine ocean bottom magnetometers from K. Baba et al., 2010 and K. Baba et al., 2017 into our tidal assimilation. It would be a breakthrough if we could include these (and the many other available) observations into our inferences. We hope to increase both local resolution and ionospheric separation this way.

We published one article in this time:

Baerenzung, J., Holschneider, M., Saynisch-Wagner, J. et al. Correction: Kalmag: a high spatio-temporal model of the geomagnetic field. Earth Planets Space 76, 91 (2024). https://doi.org/10.1186/s40623-024-02029-0