



## **Benchmark study of magnetic induction codes forced by ocean tides**

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We present a benchmark of magnetic induction codes driven by the ocean tidal flows. We concentrate on the principal lunar semi-diurnal tide M2, using the state-of-the-art TPXO8-atlas ocean flow model. We assess the effect of the two-dimensional thin-layer approximation, and the effect of self-induction. Large lateral variations of ocean electrical conductivity are assumed. For the underlying Earth's mantle we consider either a realistic one-dimensional conductivity profile, or use a perfect insulator approximation. Various numerical techniques are compared, including weak formulation in the spherical harmonic domain, contracting integral equations, and finite differences, both in the frequency and time domains. We compare the maps of magnetic field components at the ocean surface, as well as the spherical harmonic power spectra.