Contribution ID: **67** Type: **60s-Pitch + Scientific Poster**

Satellite-Based Monitoring of Global Ocean Circulation: Assimilating Electromagnetic Signals

Ocean circulation plays a crucial role in redistributing heat and carbon globally, influencing climate dynamics. While satellite altimetry and in-situ observations provide valuable data, a comprehensive understanding of three-dimensional ocean circulation, particularly at deeper levels, remains a significant challenge.

Ocean-induced magnetic fields (OIMF) are generated by the motion of conductive seawater through Earth's geomagnetic field. These electromagnetic signals, potentially observable by future satellite missions, contain valuable information about depth-integrated ocean flows, including deep ocean currents that are difficult to monitor with traditional methods. While current satellites like Swarm can detect OIMF from tides, circulation-induced signals remain challenging to observe. The assimilation of these signals into ocean circulation models remains largely unexplored.

This work focuses on developing an assimilation framework to integrate OIMF observations into high-resolution ocean models. An electromagnetic forward modeling approach has already been established, and work is underway to couple the Max Planck Institute Ocean Model (MPIOM) with the Parallel Data Assimilation Framework (PDAF) using Kalman filter-based methods to conduct Observing System Simulation Experiments (OSSEs) with synthetic OIMF data. The goal is to assess whether OIMF assimilation can improve estimates of depth-integrated oceanic variables such as transport, temperature, salinity, and bottom pressure, with a particular emphasis on enhancing the representation of deep currents in observation-limited regions.

Author: SCHRODER, Janina

Co-authors: SAYNISCH-WAGNER, Jan; HORNSCHILD, Aaron (GFZ German Research Centre For Geoscience)

Presenter: SCHRODER, Janina