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We study the primary oceanic contributions to seasonal and interannual Earth rotation from 2002 to 2024, using data from the GRACE and GRACE-FO (hereafter GRACE/FO) missions. A newly released set of mascons produced by the University of Texas Center for Space Research that separates ocean mass into dynamical ocean and geodetic components is used. Some pertinent results found so far are:

1) A significant trend in the chi-1 excitation function is explained by a combination of the gravity, rotation, and deformation signals (GRD) and global ocean mass and ocean dynamic mass redistribution in the Atlantic Ocean.

2) 35% of the variance in the oceanic Chi-2 excitation function is explained by large-scale mass redistribution between the Pacific and Indo-Atlantic Oceans, with primary peaks in the spectra at 1-year and between 1 and 2 years.

3) Internal mass redistribution from ocean dynamics in the Pacific Ocean explains another 60% of the variance in Chi-1 and nearly 44% for Chi-2, and contributes significantly to variance at periods longer than 3 years.

4) The spectral peaks at less than 1.5-years in Chi-1 may be related to the Chandler Wobble excitation, noting that the length of the time series is not sufficient to fully separate the annual from the Chandler Wobble period (1.2 years). This suggests that much of the chandler Wobble excitation may be related to large-scale mass exchanges between the Pacific and Indo-Atlantic Oceans.
Presentation file
chambers-don.pdf
Meeting homepage
GRACE-FO 2025 Science Team Meeting