Tyler
Sutterley
University of Washington, Applied Physics Laboratory
Brooke Medley, NASA Goddard Space Flight Center
Matt Siegfried, Colorado School of Mines
Oral
Global ice mass loss is the largest contributor to modern sea-level rise; however, its future contribution remains highly uncertain given our limited understanding of the mechanisms that drive change. Identification of regional ice mass changes is critical for precise quantification of spatially varying global sea-level change. Knowledge of regional signatures of major drivers may prove useful for understanding ice sheets' role in future sea-level changes. Here, we present a
novel approach fusing satellite gravimetry (GRACE-FO) and altimetry (ICESat-2) observations using existing surface-process models to better constrain poorly understood processes like firn densification and provide the first observationally constrained partitioning of ice mass change into surface mass balance (SMB) and ice dynamics. We generate spatial fingerprints of SMB and firn air content variability through empirical orthogonal function analysis, then invert for their associated principal components using monthly GRACE-FO mass and ICESat-2 volume measurements as observational constraints (December 2018-December 2024). This fusion approach reconciles altimetric and gravimetric mass estimates while enabling high spatial resolution attribution of change drivers.
Presentation file
sutterley-tyler.pdf
Meeting homepage
GRACE-FO 2025 Science Team Meeting
Download to PDF