Benjamin
Gaubert
NSF NCAR
Britton Stephens (NSF NCAR)
Oral
Tropical lands play an important role in the global carbon cycle yet their contribution remains uncertain owing to sparse observations. Satellite observations of atmospheric carbon dioxide (CO2) have greatly increased spatial coverage over tropical regions, providing the potential for improved estimates of terrestrial fluxes. Despite this advancement, the spread among satellite-based and in-situ atmospheric CO2 flux inversions over northern tropical Africa (NTA), spanning 0–24°N, remains large. Satellite-based estimates of an annual source of 0.8–1.45 PgC yr?1 challenge our understanding of tropical and global carbon cycling. Here, we compare posterior mole fractions from the suite of inversions participating in the Orbiting Carbon Observatory 2 (OCO-2) Version 10 Model Intercomparison Project (v10 MIP) with independent in-situ airborne observations made over the tropical Atlantic Ocean by the National Aeronautics and Space Administration (NASA) Atmospheric Tomography (ATom) mission during four seasons. We develop emergent constraints on tropical African CO2 fluxes using flux-concentration relationships defined by the model suite. We find an annual flux of 0.14 ± 0.39 PgC yr?1 (mean and standard deviation) for NTA, 2016–2018. The satellite-based flux bias suggests a potential positive concentration bias in OCO-2 B10 and earlier version retrievals over land in NTA during the dry season. Nevertheless, the OCO-2 observations provide improved flux estimates relative to the in situ observing network at other times of year, indicating stronger uptake in NTA during the wet season than the in-situ inversion estimates.
Presentation file
Gaubert-IWGGMS20.pdf
Meeting homepage
IWGGMS-20 Workshop
Download to PDF