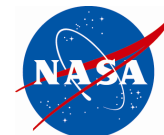
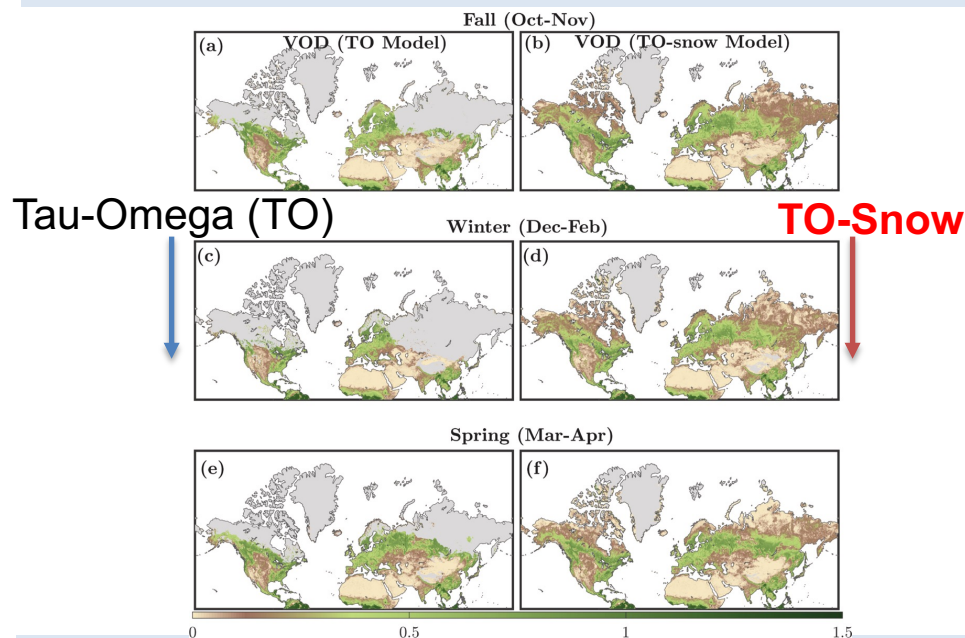


Understanding the Soil and Vegetation Water Content over Snow-covered Boreal Forests and Permafrost



Problem: The permafrost and boreal forest regions are snow-covered for over 50% of the year, limiting SMAP L-band Vegetation Optical Depth (VOD) and ground permittivity retrievals for more than six months. Despite these challenges, L-band data offers a unique opportunity to monitor these critical, often inaccessible ecosystems over the Arctic landscape.



Finding:

The study developed the TO-Snow emission model, expanding the classic tau-omega radiative transfer model used in SMAP and SMOS retrievals to account for the impacts of snow cover. Vegetation Optical Depth (VOD) and soil permittivity over Arctic landscape were successfully retrieved with standard deviations below 0.1 and 3.5, respectively, using SMAP data.

Impact: The new global dataset (2015-2020) expands our understanding of cold season vegetation phenology and carbon cycle in Arctic regions. The results promises that in near future official SMAP Level-3 and 4 products can be extended to the higher latitudes fostering the use of SMAP satellite for deepening our knowledge of the Arctic's contribution to the global carbon cycle in a warming world.

Kumawat, D., Ebtehaj, A., Schwank, M., Li, X. and Wigneron, J.P., 2024. Global estimates of L-band vegetation optical boreal forests and permafrost landscape using SMAP satellite data. *Remote Sensing of Environment*, 306, p.114145.

TO-Snow Model: <https://github.com/aebtehaj/SM-Snow-L-band>; Dataset availability: NSIDC DAAC (in process)