Machine Learning Based TPW Retrieval for the 22 GHz Radiometer

Zhuoyu Yang || Mentor: Dr. Xingming Liang

cisess
Cooperative Institute for Satellite Earth System Studies

Objective:

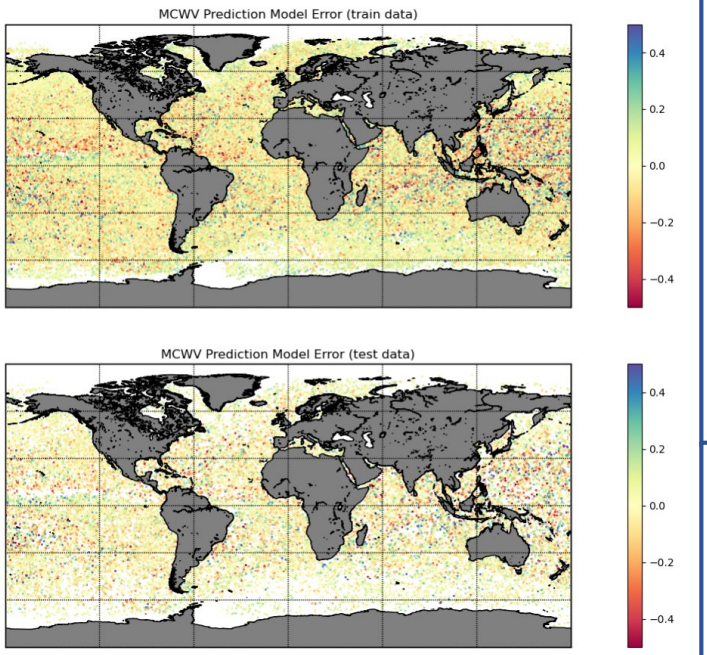
- Relationship between GMBTs and TPW can be modeled with radiative transfer equation:

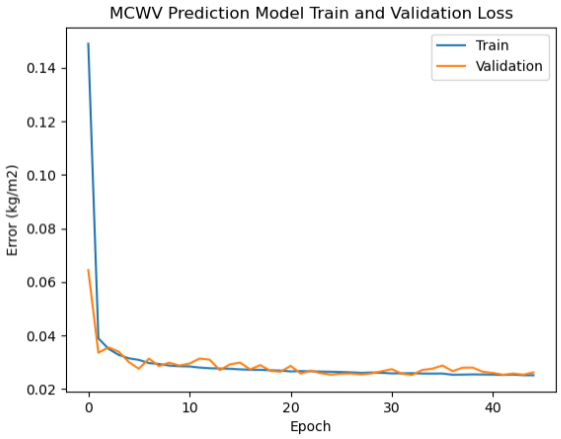
$$I_\nu(s) = I_\nu(s_0)e^{-\tau_\nu(s_0,s)} + \int_{s_0}^{s} j_\nu(s')e^{-\tau_\nu(s',s)}\,ds'$$

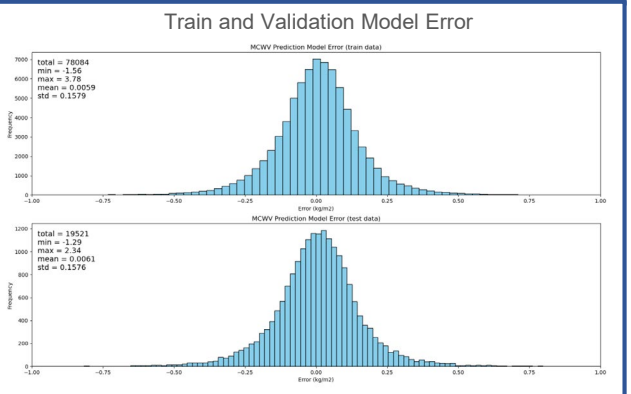
- Implement deep learning instead of a standard physical model in a TPW retrieval algorithm for the 22 GHz radiometer, using GMBTs with other related data as model inputs.

Results:

- Built working ML model trained on ground measurements simulated with MonoRTM/ECMWF
- Performed data preprocessing to reduce data and model bias
- Ground measurements taken in the future can be input into the model to predict TPW







Train Error:	Total: 78084	SD: 0.1579
Min: -1.56	Max: 3.78	Mean: -0.0059
Test Error:	Total: 19521	SD: 0.1576
Min: -1.29	Max: 2.34	Mean: -0.0061