Deep Learning based COSMIC-2 Radio Occultation Atmospheric Profile Retrieval

SRTD-RTCG-MISA

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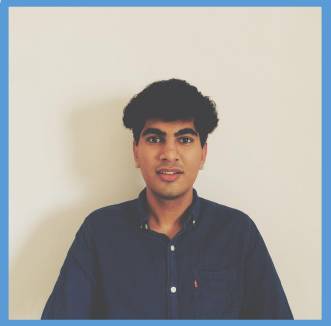

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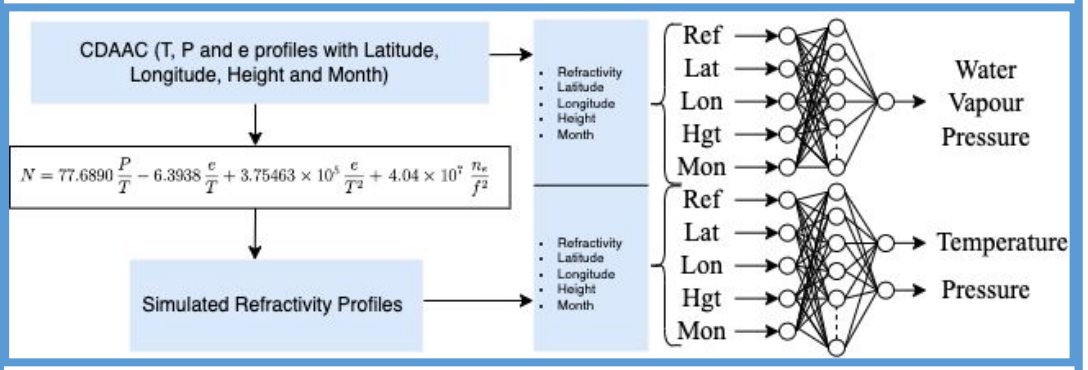
MAJOR OBJECTIVE: Retrieving tropospheric thermodynamic profiles (i.e. temperature, pressure and water vapour pressure) from GNSS-RO refractivity observations by employing deep-learning based algorithms.

METHODOLOGY FLOW CHART:



RESULTS/MAJOR FINDINGS: The model is trained and tested using data from the year 2020, and the results are encouraging. Temperature, pressure, and water vapour pressure have roots mean square errors (RMSE) that are, respectively, 1.28 K, 1.26 hPa, and 0.19 hPa when averaged vertically. Additionally, a completely independent data set obtained in 2021 is used to evaluate the model, and while the retrieval errors are slightly larger, they are still within accepted limits. The vertically averaged root mean square error (RMSE) for the independent data is 1.82 hPa for pressure, 1.64 K for temperature, and 0.24 hPa for water vapour pressure. The retrieval errors for temperature and pressure in this study are comparable to those achieved by the earlier studies, while the retrieval errors for water vapour are substantially lower in this study.

CONCLUSION: While the retrieval errors for water vapour pressure are significantly lower in this study, they are still comparable to those achieved by earlier studies for temperature and pressure.