Title: “MINe: a machine learning based **M**artian **I**onospheric Electron Density ($\mathbf{N_e}$) prediction model”

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Abstract:

The electron density (N_e) is extensively used to study planetary ionospheres. In this presentation, I will discuss the development of a machine learning based model for the prediction of electron density of Martian ionosphere. This study evaluates five machine learning models, namely, i) Decision tree, ii) Random Forest (RF), iii) Bagging, iv) Gradient Boosting (GB), and v) Xtreme Gradient Boosting (XGBoost) for the electron density prediction. Performance metrics considered for the comparison of the proposed algorithms are Root Mean Square Error (RMSE), Root Mean Square Log Error (RMSLE), Mean Absolute Error (MAE), and Coefficient of Determination (R^2). The results showed that out of all algorithms considered, GB regression performed best in terms of the performance metrics mentioned above. Hence, we have developed GB based model named as **M**artian **I**onspheric Electron Density ($\mathbf{N_e}$) (**MINe**). Furthermore, MINe model's prediction of electron density was compared with the observations of the MAVEN Radio Occultation Science Experiment (ROSE) and MGS mission. The model performs better at predicting ROSE observations; however, it overestimates when predicting the MGS profiles.