

SIGNS OF CLIMATE VARIABILITY IN DOUBLE TROPOPAUSE GLOBAL DISTRIBUTION FROM TWO DECADES OF RADIO OCCULTATION DATA

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From GPS radio occultation observations between 2001 and 2018, a detailed record of well-resolved, accurate and globally distributed double tropopause (DT) occurrences was retrieved at the Wegener Center in Graz. A multiple linear regression analysis is applied at each latitude-longitude grid point to relate the distribution of monthly TDs (response variable) with several predictor variables and model coefficients. Different features are proposed, in particular, the variability expected from the first annual harmonics, SOI, solar flux, OLR, QBO, SAM and tradewind indexes. Data at each grid point are separated into two sets (training and test). The model performance of both sets is evaluated from the mean square error, as the difference between the observed and predicted values, normalized by the number of observations. A heuristic approach is applied to select the appropriate features, checking the correlations between the response variable and the explanatory variables. Different transformations, base expansions and interactions of the predictors are tested to improve the predictive power of the model. The combination of features that provides the best model performance while counteracting overfitting problems is evaluated. In addition to the different mechanisms proposed so far of possible DT generation, the radiation of inertia gravity waves by the geostrophic imbalance in the presence of the subtropical jet is analyzed. This is accomplished by considering the cross stream Rossby number as an additional feature.