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# Regional VTEC Modeling over Turkey Using MARS (Multivariate Adaptive Regression Splines)

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It is generally known that spherical harmonic representation of the Ionosphere is not suitable for the local and regional applications. Additionally, irregular data and gaps cause also numerical difficulties in the modeling of the ionosphere. We propose an efficient algorithm based on the Multivariate Adaptive Regression Splines (MARS) to represent a new non-parametric modelling for regional spatio-temporal mapping of the ionospheric electron density. MARS can generally process very large data sets of observations and is an adaptive and flexible method, which can be applied to both linear and non-linear problems. The basis functions are derived directly from the observations and have space partitioning property, which results in an adaptive model. This property helps avoid numerical problems and computational inefficiency caused by the number of coefficients, which has to be increased to detect the local variations of the ionosphere. The model complexity can be controlled by the user via limiting the maximal number of coefficients and the order of products of the basis functions. In this study the MARS algorithm is applied to real data sets over Turkey for regional ionosphere modelling.