Database oriented system for analysing small and medium scale TEC irregularities.

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Available models, for example IGS, offer TEC values, but their temporal and spatial resolution is not sufficient to analyse low and medium-scale irregularities responsible for formation of ionospheric scintillations. On the other hand, EUREF and IGS data are available online and can be used for these purposes. For example, both of these networks offer measurements for over 300 receivers, which gives a good data coverage. Unfortunately, this amount of data is difficult to handle manually. For this reason in SRC PAS dedicated system for archivization and visualisation was developed.The system can download files available for a given time period, read them in RINEX format, convert them and place in the database in the appropriate format. During this process, the geometry of the observation and the approximate pierce points locations are calculated. The database approach makes it possible to apply various criteria and find the required data. For example, we can find TEC values for a given region and time. It is also possible to create a map of TEC or other parameter for example deviation from mean value. These data due to limited number of measurements and the simple model used can be noisy, nevertheless can provide a useful information in the case of the analysis of ionospheric disturbances.

This work presents basic principles standing behind creation of described databases. System designed in SRC was implemented in non relational database - Mongo DB. This database engine has unique features of a documented database with the scalability and flexibility of JSON-like structures, easily used by advanced computing environments like Matlab, R and numeric Python. The distributed feature of the database allows for easy expansion in disc space and computation power as well.

Our experience shows that the system is useful in the case study of disturbances related to magnetic storms as well as in TID analysis. We will present its use in both of these cases.