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Looking for efficient and accurate ways of computing the global ionospheric electron density distribution from huge amounts of GNSS observations

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In this work the authors will explore different potential ways of estimating efficiently and accurately the global number density of ionospheric free electrons from the most part of nowadays available GNSS measurements, taken from ground based GPS receivers (IGS network) and LEO on-board GPS receivers (such as FORMOSAT-3/COSMIC constellation).

It is basically designed as a bootstrapping approach, from a first determination of VTEC global maps based on the ground data, to a final electron density extrapolation process aided by simple first-principle conditions, and passing by an optimal error decorrelation treatment in the VTEC interpolation and corresponding application to improve the inversion of the GPS occultation measurements.

The performances against external reference data, including dual frequency altimeters and ionosonde measurements, will be also shown to support the conclusions in different Solar Cycle conditions.