Short Term Scientific Mission

Combining Ionosonde and GPS TEC Data to Assess NeQuick Formulation

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STSM consisted of three steps.

1. Data

Using ionosonde and GPS TEC data

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1. Data

   Using ionosonde and GPS TEC data

2. Formulation

   Studying NeQuick intrinsic characteristics

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1. Data

   Using ionosonde and GPS TEC data

2. Formulation

   Studying NeQuick intrinsic characteristics

3. Mission Products

   NeQuick assessment at mid-latitudes

1. Data

2. Formulation

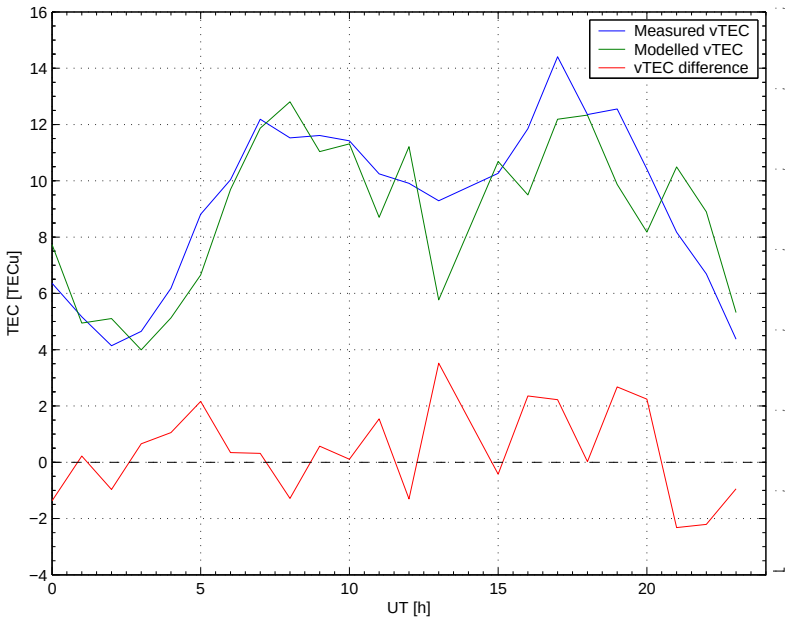
3. Mission Products

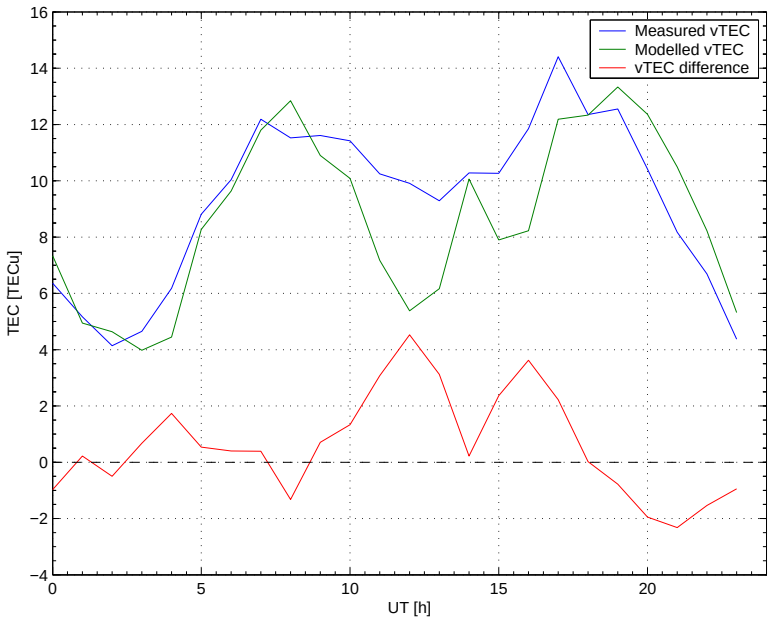
1. Data

We discussed the characteristics of chosen data sets…

- Digisonde issues eg differences between auto-scaled and manually scaled data

foF2 M(3000)F2 vTEC



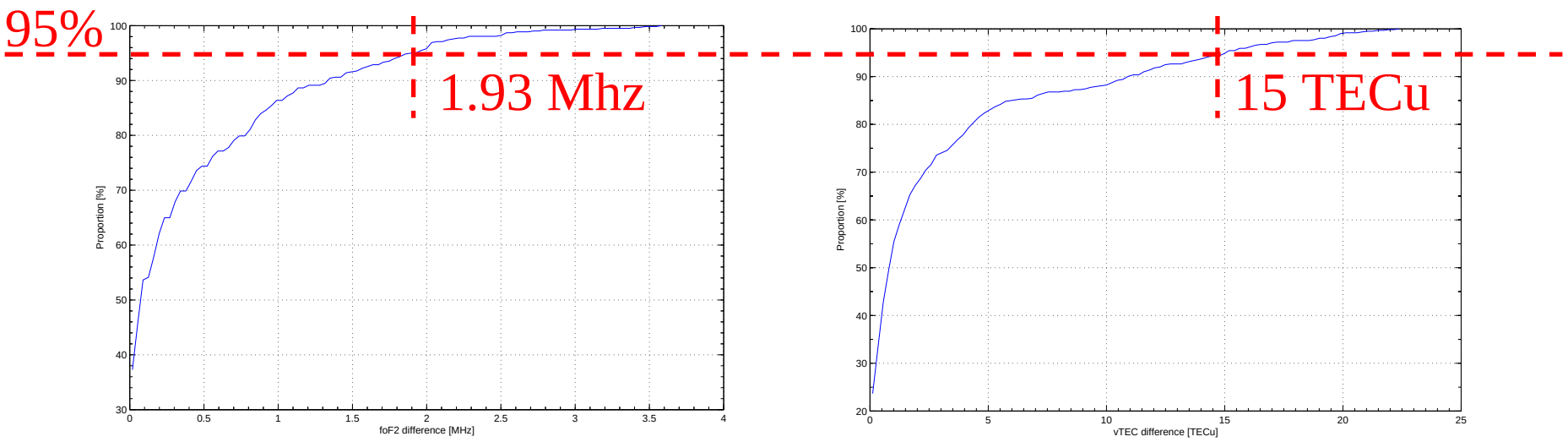


1. Data

We discussed the characteristics of chosen data sets…

- Digisonde issues eg differences between auto-scaled and manually scaled data

→ Examine cumulative distributions of foF2 and ITEC differences (irrelevance of mean and RMS)

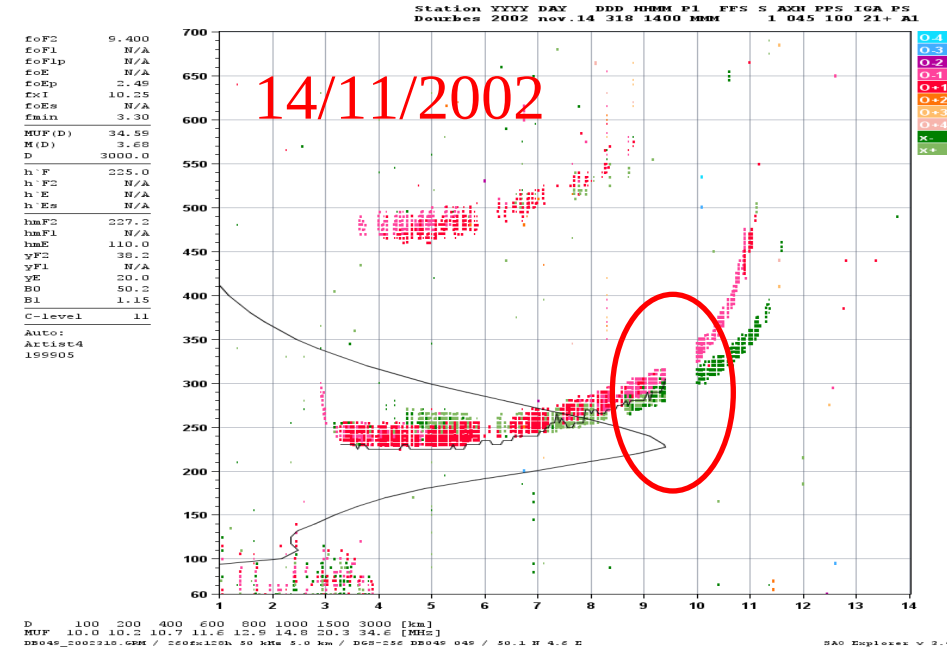


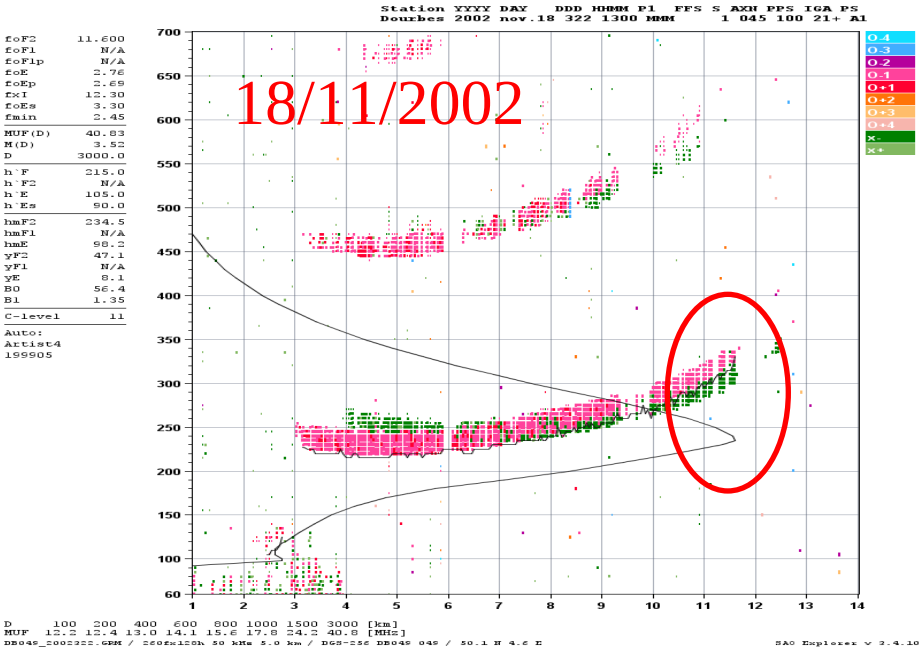
1. Data

We discussed the characteristics of chosen data sets…

- Digisonde issues eg differences between auto-scaled and manually scaled data

→ Identify problematic situations in auto-scaled data



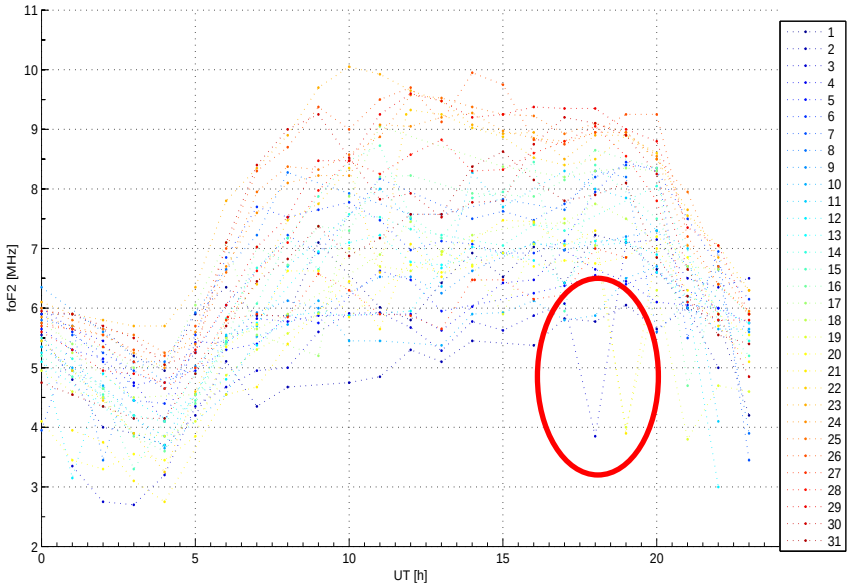


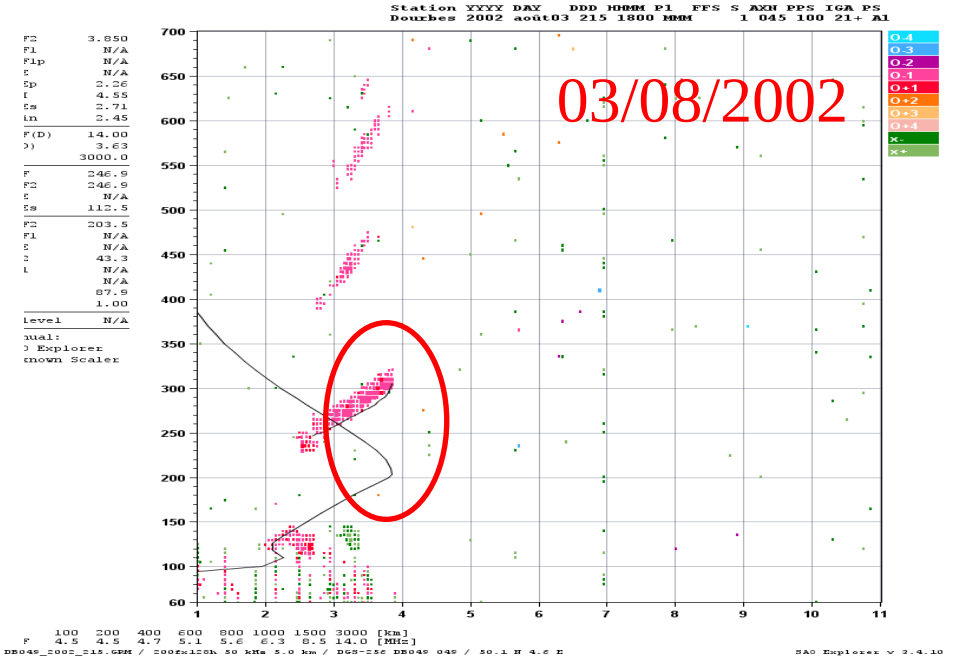
1. Data

We discussed the characteristics of chosen data sets…

- Digisonde issues eg differences between auto-scaled and manually scaled data

→ Highlight remaining problems in manually scaled data





1. Data

We discussed the characteristics of chosen data sets…

- GPS TEC issues eg vTEC computation

→ Potential use of data from only 1 satellite, almost no influence from mapping function, Ciraolo delays estimation

- Define data accuracy and consequences on conclusions

→ OK with considering only reading accuracy (0.1 MHz) for manually scaled foF2, low relevance of M(3000)F2 (cf. definition with curve adaptation and variability), few TECu for GPS TEC leading to more robust conclusions in high solar activity

1. Data

… and how to filter them.

- Effects to filter : geomagnetic active periods, unrealistic values in digisonde data, unrealistic values in TEC data

→ Distinguish between data quality issues and subsets constitution eg considering ionospheric disturbance

→ Identify (and remove) « spikes » ie data points with big derivatives and sign inversion

→ Consider ionospheric disturbance instead of geomagnetic activity (check the latest looking for explanation for the first)

1. Data

… and how to filter them.

- Define method to filter : use geomagnetic indices, use moving average, remove only problematic data or a continuous set of data including problematic ones (eg all a day or sufficiently long periods)

→ Adaptative moving-average filter to eliminate outliers ; identify spikes of more than 1 MHz in foF2 and check the ionograms

→ Use monthly median and quartiles of foF2 to constitute 3 subsets (all data, disturbed and undisturbed days): disturbance if at least 6 consecutive hours outside inter-quartile range

1. Data

2. Formulation

3. Mission Products

2. Formulation

We improved our understanding of NeQuick formulation.

- Bottomside parameters computation eg use of digisonde TEC or other
- Topside evolution eg new k formula determination

→ Lots of modifications by Leitinger…

→ Main points discussed from the questions lists

1. Data

2. Formulation

3. Mission Products

3. Mission Products

We chose actual data sets, …

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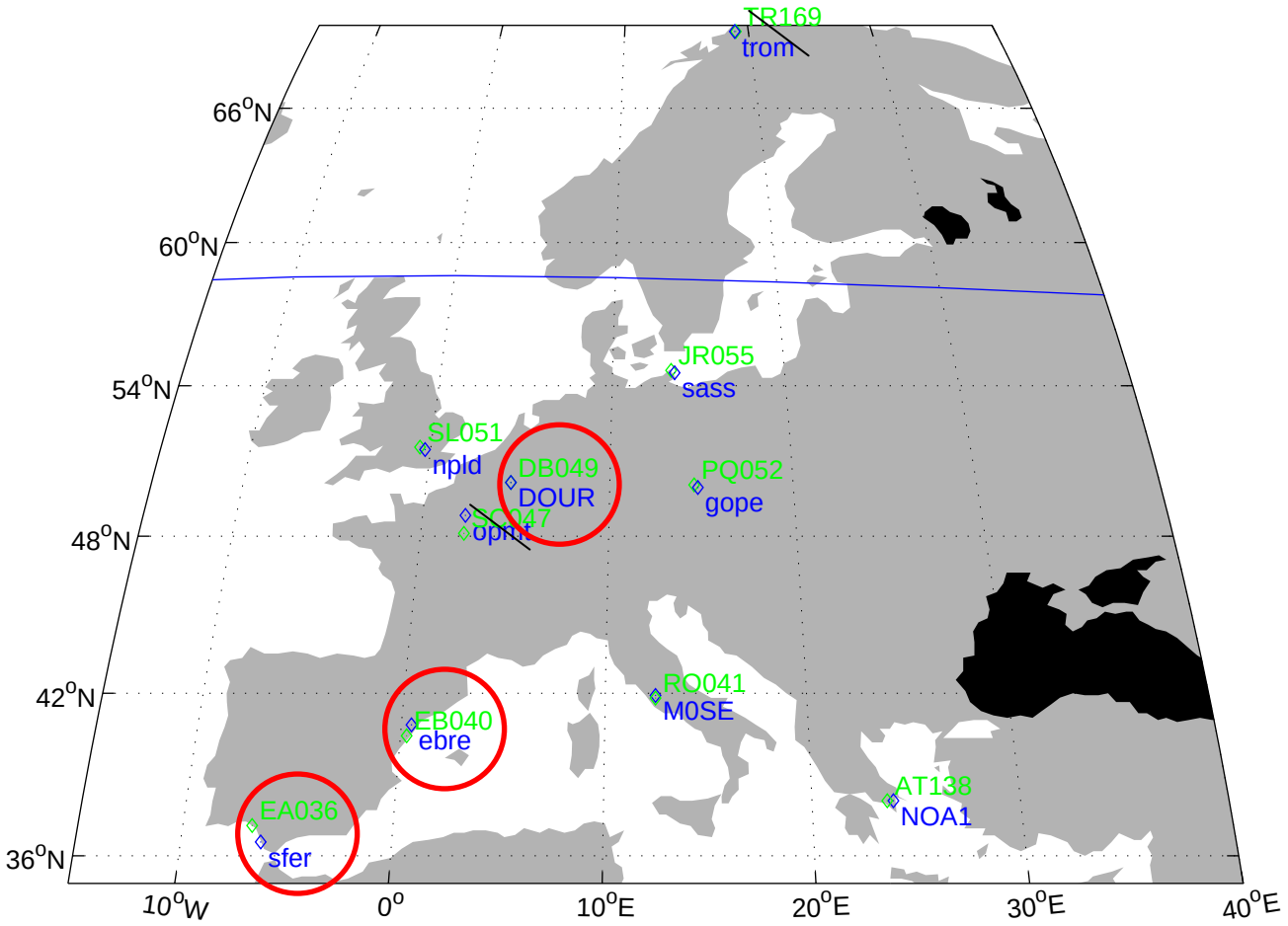

3. Mission Products

… considered tests to perform and discussed results.

- TEC statistics eg refine time scale or not
- Profiles use eg integration consistency for bottomside TEC
- TEC dissociation
- Thickness comparison

→ OK but using absolute values (cf. GPS TEC uncertainty) and repeat for 3 subsets

→ Look afterwards at specific hours such as daily min/max or 5 and 12 UT

STSM consisted of three steps.

1. Data → validation
2. Formulation → discussion
3. Mission Products
   - → Report in January
   - → Publication?

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