

Working meeting report

ON THE WAY TO STANDARDIZE IONOSPHERIC INDICES AND SCALES

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Introduction

A working meeting on the standardization of ionospheric indices and scales was held on Tuesday 15th November, 15:00-16:30 in the Ridderzaal meeting room. The meeting was organized by Norbert Jakowski (NJ) and was the forth in a series of discussion meetings that have been convened at the US space weather week and COSPAR. The meeting was chaired by Matthew Angling and the number of participants was approximately 30.

Objective of the meeting

Ionospheric disturbances are a key aspect of space weather and are important to a wide range of radio frequency (RF) system users (i.e. communications, navigation and radar). There are many ways to characterize the degree of perturbation degree of the ionosphere in a space weather event: for example, the Space Weather Prediction Center (SWPC) in Boulder has space weather scales (levels 1 to 5) for Geomagnetic Storms and Radio Blackout. Other space weather services rely on geomagnetic indices such as Kp, or Dst and/or several ionospherically derived approaches such as S4, ROTI, AATR or DIX. Although all these scales relate (directly or indirectly) to changes in the ionosphere in some way, they may not be sufficiently specific to fulfil RF users' needs.

The objective of the meeting was to discuss, as a community, some practical aspects of ionospheric indices:

- Is standardization desirable?
- Should we use indices or alerts?
- Can indices/alerts be applicable to multiple RF systems?
- Are existing indices/alerts useful/sufficient?

Some discussion highlights

The meeting was opened by MJA with a set of introductory slides provided by NJ. Initial discussions focused on whether indices/alerts are useful. HF users and GNSS users were discussed, though the meeting did lack a strong participation from users rather than space weather service providers.

Subsequent short contributions were made by participants with apticular experience of generating indices. These included the DIX index (from DLR, Germany), the W index (from the Space Research Center, Poland) and ROTI (as used by the Norwegian Mapping Authority, NMA). It should be noted that there are many other proposed measures.

Main conclusions

The main conclusions of the meeting were:

- The meeting felt that it was not possible to have a single index for users as diverse as HF comms and GNSS positioning. Further, there was little certainty that a single index could be used within GNSS to cover applications from single frequency users to PPP users.
- The meeting agreed that standardization of indices/alerts would be a good thing
- It was felt that it would be necessary to have at least two indices/alerts – one indicating divergence of the ionosphere from its median state, and one to indicate the rate of change of the ionosphere.
- NMA has undertaken work to compare ROTI with PPP errors. MJA proposed that this should be expanded to allow inter-comparison of different indices/alerts