Ionospheric scintillation observations by a digital beacon receiver in Tromsø

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Digital beacon receiver observations in Tromsø Norway have been conducted since October 2011. The digital beacon receiver consists of the open-source hardware called Universal Software Radio Peripheral (USRP) and the open-source software toolkit for the software defined radio (GNU Radio) [Yamamoto, 2008]. The digital beacon receiver receives radio beacon signals transmitted from Low Earth Orbit Satellites (LEOS) and enables us to measure the ionospheric total electron content (TEC) and ionospheric scintillation. We have investigated a detailed relationship between ionospheric scintillation and auroral arcs by using the digital beacon receiver and all-sky/narrow field-of-view imagers with high time resolution (1-4 Hz). Our initial results show that the ionospheric scintillation frequently occurs at the boundary of an auroral arc and in the region between auroral arcs, not in an auroral arc. The results imply that enhanced electric fields near auroral arcs may contribute to the formation of the ionospheric scintillation.

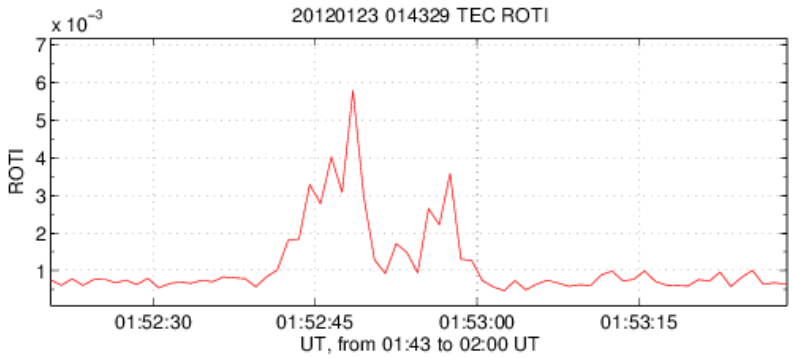

Figure 1: Time variation of ROTI (the standard deviation of the rate of change of TEC) derived from TEC data of the digital beacon receiver in Tromsø on January 23, 2012.

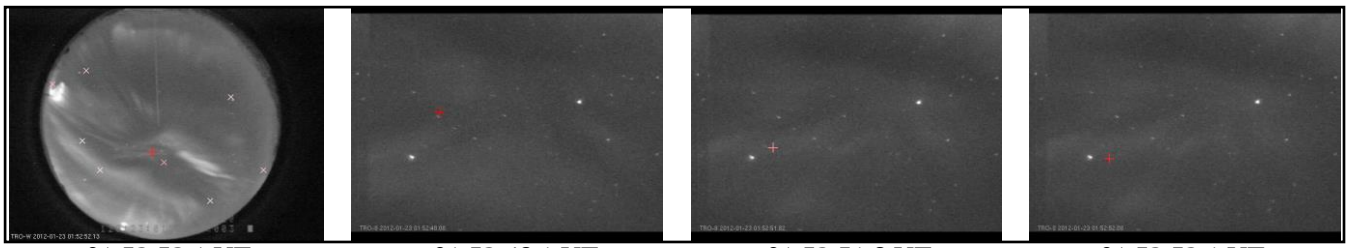

Figure 2: Selected all-sky and narrow field-of-view images together with the locations of the beacon satellite (marked '+') and GPS satellites (marked '×') obtained on January 23, 2012. The ROTI increased at 01:52:48 and 01:52:52 UT when the beacon satellite was located near auroral arcs.

Reference

Yamamoto, M., Digital beacon receiver for ionospheric TEC measurement developed with GNU Radio, *Earth Planets Space*, 60, e21–e24, 2008.