

XXV Meeting of Physics



Contribution ID : 71

Type : **Short communications**

Dense GNSS Mapping of Equatorial Ionospheric

Friday, 21 August 2026 09:30 (20)

The Instituto Geográfico Nacional of Peru operates a network of about 70 GNSS receivers distributed across a region that includes the magnetic equator and the Jicamarca Radio Observatory. This network provides dense sampling of total electron content in the space above Perú, where incoherent scatter radar and Digisonde measurements offer detailed information on the vertical structure and electrodynamics of the equatorial ionosphere. We present preliminar regional TEC products derived from the IGN observations and evaluate them through comparisons with vertical TEC estimated from Jicamarca radar electron density profiles and Digisonde measurements.

We also compare TEC time series produced from the IGN network with latitude and longitude bin products available through the Madrigal database. The larger number of simultaneous satellite receiver links allows the regional bins to be populated at shorter time intervals, reducing the temporal averaging required in areas with sparse coverage. This preserves variations that can be attenuated when observations are integrated over five minute intervals. The analysis focuses on data from 2025, while the available archive extends back approximately ten years. These observations provide spatial context for Jicamarca measurements and establish the preliminary results to a basis for regional studies of irregularity development and future nowcasting efforts.

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Session Classification : Energías renovables & Física del Clima