

Traveling ionospheric structures of total electron content over Japan detected by the GPS receiver network

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We have studied the ionospheric structures around Japan using the GPS total electron content (TEC) data. The ionospheric observation by the GPS receiver has higher temporal resolution than the traditional ionospheric observational techniques, and provides continuous data set. The number of the observational sites enables to detect the horizontally two-dimensional structures of the ionosphere with high spatial resolution and wide coverage. This two-dimensional observation has revealed several features of the ionospheric phenomena, which cannot be achieved with the other instruments. The ionospheric features around Japan that have been studied are the equatorial ionization anomaly, large-scale traveling ionospheric disturbances, medium-scale traveling ionospheric disturbances, plasma bubble, the positive and negative TEC variations associated with the geomagnetic disturbances, and the amplitude scintillation of the GPS radio waves caused by the ionospheric irregularities. The solar activity gets lower in these years, and the activity of the geomagnetic disturbances, plasma bubbles, and GPS scintillations get lower. On the other hand the activity of the medium-scale traveling ionospheric disturbances gets higher than that in the high solar activity period around 2001. The ionospheric structures whose horizontal spatial scale is from 300m to 2,000km and their temporal variations whose temporal scale is from day-to-day to solar cycle will be introduced.