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Introducing a regional three-dimensional ionospheric and tropospheric model based on the nationwide Korean GPS Network

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We present a GPS-derived regional ionosphere tomography model, which estimates Total Electron Content (TEC) in several layers over Korea. The GPS data are from the nationwide Korean GPS Network sites, the number of which totals over 70 as of January 2005. The pseudorange data were phase-leveled by a linear combination of pseudoranges and carrier phases. During a quiet day of solar activity, the regional ionosphere map indicated 30-45 Total Electron Content Unit (TECU) at the peak of the diurnal variation. In comparison with the Global Ionosphere Map of the Center for Orbit Determination in Europe, RMS differences were at the level of 3-5 TECU. In the second part of the paper, we introduce a three-dimensional troposphere model based on line-of-sight slant wet delays between the GPS satellites and the KGN stations. The accuracy of the regional model was tested with respect to the Water Vapor Radiometer measurements at the level of a few centimeters, which translates into a few milimeters of Precipitable Water Vapor.