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GPS Preciptable Water Research Project (GRASP)
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A novel project (GPS pRecipitable wAter reSearch Project) GRASP has been launched to investigate variations of precipitable water vapor caused by the climate change. The water vapor is one of the greenhouse gases, which is more effective than CO2, so it is important to observe water vapor change for a long period.

More than 1,000 points stationary data of GPS were collected globally from International GNSS Services and GPS Earth Observation Network System (GEONET) in Japan over 15 years from 1996 through 2010. Atmospheric zenith total delay (ZTD) caused by refractivity of pressure, temperature, and water vapor pressure is estimated by the GPS processing software RTNet (Rocken et al 2006, Iwabuchi et al. 2006), where fiducial coordinate of GPS position is estimated periodically in a month to absorb any un-modeled and site-specific biases. Sophisticated seamless processing is performed every month to prevent jumps of ZTD solution in day boundary as observed in historical ZTD database. The estimated ZTD is converted to precipitable water vapor by metrological data derived from Japan Meteorological Agency or reanalysis data of NOAA with high-temporal resolution (CFSR) that have been performed altitude correction. The temporal resolution of some product is relatively high with 10 min, which is applicable to climate research within a day such as diurnal circulation of water vapor.

The greatest advantage of GPS precipitable water includes high temporal resolution and high accuracy of absolute value, comparing with other data of water vapor (Radiosonde, water vapor radiometer, lidar, SSM/I, etc.). Furthermore, the dataset of GPS precipitable water will be released to public by WWW. It could not only be important information to understand behavior of long-term water vapor variability and circulation, but also to be helpful to further explain mechanism of heavy rainfall cases affected by the climate change with addition of the high quality precipitable water vapor information.

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