Application of IGS Data to GPS Sensing of the Atmosphere for Weather and Climate Research (paper, 1995)

177 Beth Bartel December 23, 2008 Atmospheric Effects and Measurements 1774

Application of IGS Data to GPS Sensing of the Atmosphere for Weather and Climate Research

C Rocken, F S Solheim, R H Ware, M Exner, D Martin
UNAVCO/UCAR, POB 3000,
Boulder CO 80307-3000, USA

M Rothacher
Astronomical Institute, University of Bern,
CH-3012, Bern, Switzerland

Abstract

Water vapor is one of the most important constituents of the atmosphere as it is the principal mechanism by which moisture and latent heat are transported. Consequently, accurate and sufficiently frequent and dense sampling of water vapor is needed for weather and climate research as well as operational weather forecasting. It has been demonstrated that GPS data can be used to measure atmospheric water vapor. The worldwide International GPS Service (IGS) network of GPS tracking stations can be used to sense global atmospheric water vapor if adequate pressure and temperature data are available at these sites. Addition of pressure sensors accurate to 0.3 mbars and temperature sensors accurate to several degrees Kelvin at IGS stations would allow sensing of precipitable water vapor (PWV) over 30 minute intervals with an accuracy better than 2 mm. This paper describes the main ground and space-based applications of GPS to atmospheric sciences and discusses current and future developments and the important role of the IGS. Specifically we will discuss: (a) importance of global water vapor measurements for climate studies; (b) accuracy considerations and suggested design of pressure, temperature and humidity sensors for installation at IGS sites; (c) suggested solutions for meteorological data flow and download issues; (d) conversion of estimated GPS path delay to zenith water vapor; (e) a suggestion for combining delays from all IGS processing centers; and (f) PWV time series - a new IGS product?

[See attached .pdf file for more.]

Online URL:
https://kb.unavco.org/article/application-of-igs-data-to-gps-sensing-of-the-atmosphere-for-weather-and-climate-research-paper-1995-177.html