

Retrieval of Water Vapor Anisotropy using the Japanese Nationwide GPS Array

SHOJI, Yoshinori^{1*}

¹Meteorological Research Institute

Retrieval procedure of two indexes indicating the degree of inhomogeneity of water vapor using career phase of Global Positioning System (GPS) are introduced. One index describes spatial gradient of water vapor and another denotes higher order inhomogeneity.

Characteristics of water vapor field in August 2011 over Japan were studied, using temporal-spatial variation of those two indexes along with GPS derived precipitable water vapor (PWV). Monthly averaged indexes show distinct diurnal variation in the mountainous region of central Honshu, and these also show clear coincidences with diurnal variation of precipitation frequencies in the area.

The relation between those indexes and precipitation are statistically examined. The results exhibit that the inhomogeneity indexes have stronger correlation with strong rainfall while PWV shows more relation with weak and/or modest precipitation. This suggests that the GPS derived indexes of water vapor inhomogeneity appear to reflect local variation of water vapor associated with convection phenomenon.

Keywords: GPS Meteorology, Slant Path Delay, Gradient, Convective rain