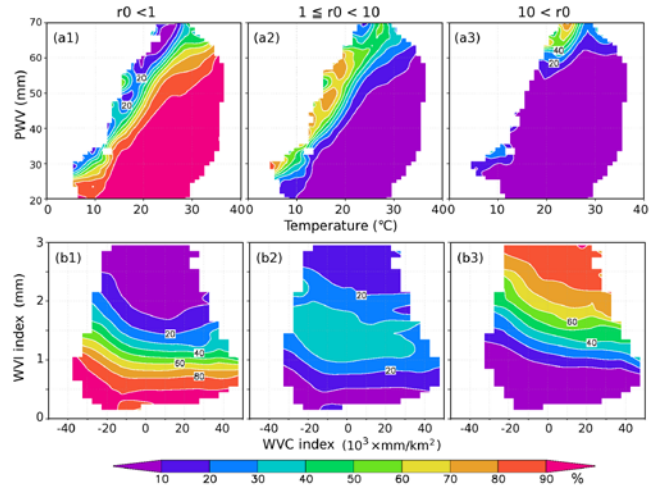
Shoji, Y. 2013: Retrieval of Water Vapor Inhomogeneity Using the Japanese Nationwide GPS Array and its Potential for Prediction of Convective Precipitation. *J. Meteor. Soc. Japan*, **91**, 43-62. http://dx.doi.org/10.2151/jmsj.2013-103



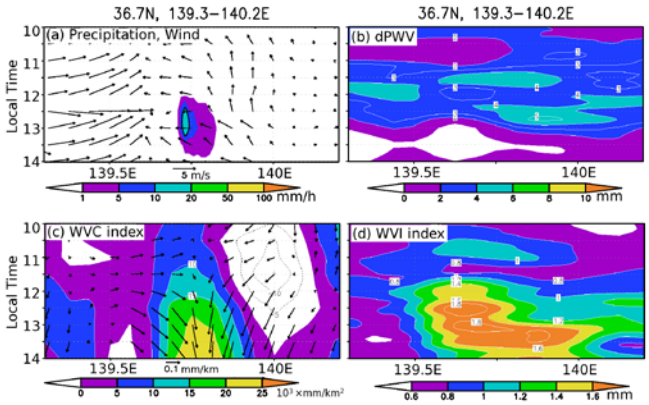


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Figure 1. (a) Frequency distribution of 1-h precipitation (FD1P) as a function of temperature (abscissa) and PWV (ordinate). In (a1), (a2), and (a3), precipitation is less than 1 mm, between 1 and 10 mm, and more than 10 mm, respectively. (b) FD1P as a function of WVC index (abscissa) and WVI index (ordinate).

↓Figure 2. Longitude-time cross sections for an isolated cumulous convection case on August 11, 2011. (a) 1-h precipitation, (b) PWV deviation from one month average, (c) WVC index, and (d) WVI index

- Procedures for retrieving two indices indicating the degree of inhomogeneity of water vapor using the carrier phase of a global positioning system (GPS) have been introduced. One index (WVC) describes the spatial concentration of water vapor, while the other (WVI) indicates higher-order water vapor inhomogeneity. Horizontal scales of the two indices are approximately considered to be 60 km and 2-3 km, respectively.
- The relations between these indices and precipitation were examined statistically. The results indicate that the inhomogeneity indices are more strongly correlated with strong rainfall than PWV. PWV seemed to relate to precipitation of less than 10 mm /h, but did not exhibit much of a relation with precipitation greater than 10 mm/h (Figure 1). These relations hold true for both present and imminent precipitation.
- The spatiotemporal variations in the indices of a thunderstorm on August 11, 2011, were also examined. Both WVC and WVI indices indicated an increase ahead of the initiation of convective precipitation (Figure 2).