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Title : The Global variation of Water vapor using COSMIC and Aqua satellites
COSMIC 及び AQUA 衛星により得られた水蒸気の全球分布

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Abstract :

The spatial and temporal variations of water vapor are most important in understanding both abnormal weather and climate change, because water vapor is one of the greenhouse gases and it releases latent heat through condensation. The water vapor distribution varies sharply in the vertical direction as evident in the many forms of stratiform cloud system. The convective and stratiform clouds are most important in the tropical region. Tropical precipitation provides three fourths of the energy that drives the atmospheric wind circulation through latent heat release.

The COSMIC mission is Global Positioning System (GPS) radio occultation (RO) which is launched on April 15, 2006 and it includes six microsattellites. The main purpose of this mission is to provide ~2500 real-time soundings per day with homogenous global coverage. This can potentially have major impacts on weather, climate, space weather research and forecasting. The COSMIC satellite data is most useful to study the variation of water vapor and temperature because of global coverage with high spatial resolution of about 100 m in the troposphere.

Aqua is another satellite mission of the NASA's Earth Observing System (EOS) which was launched on May 04, 2002, consists of six distinct earth-observing instruments. Aqua satellite is in a sun-synchronous orbit at an altitude of 705 km, with a track that takes it north across the equator at 1:30 PM and south across the equator at 01:30 AM. The three components of the aqua sounding suite are AIRS (atmospheric infrared sounder), AMSU (advanced microwave sounding unit), HSB (humidity sounder for Brazil). AMSU is a 15 channel sounder consisting of two physical units AMSU-A1 and AMSU-A2. Twelve of AMSU's channels measure radiation with frequencies between 50 and 60 GHz and are used primarily for temperature sounding, the other channels measure radiation at frequencies of 23.8, 31.4 and 89 GHz and are used mainly for water vapor and precipitation measurements. The horizontal resolution of the AMSU data at nadir is 40.5 km, this is three times as coarse as the AIRS data.

The observational technique is different for both COSMIC and Aqua satellite. The COSMIC mission provides high vertical resolution data with limb technique but Aqua satellite provide high horizontal resolution data with nadir technique. By combining these two the global variation of water vapor can be studied extensively both vertically and horizontally. The objectives of the study are as follows. To retrieve the water vapor from the RO satellite data and to study the annual, year to year variability of water vapor, with special emphasis over the Indonesia over the latitude $\pm 20^\circ$ and longitude 90° - 140° E. At present we have collected the both Cosmic and Aqua satellite data and the global variation of water vapor will be discussed.