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Ground-Based Millimeter-Wave Observations of Water Vapor Emission (183 GHz) at Atacama, Chile

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A number of observations suggest that the stratospheric water vapor had increased at a rate about 1%/yr since 1950s (e.g., SPARC Report 2000), whereas in 2000s, it decreases at $\sim$ -0.1%/yr (e.g., Nedoluha et al.2003). We push a plan of observing a mm-wave water vapor spectrum (183.310 GHz) at Atacama (northern part of Chile at an altitude of 4, 800 m) in order to study the mechanism of temporal validations of stratospheric water vapor. In December 2005, we succeeded in obtaining water vapor spectra at Atacama with the mm-wave radiometer equipped with a superconductive (SIS) receiver developed by Nagoya University and NAOJ. In this paper, we will report the current status of the mm-wave observing system at Atacama and will discuss the retrieval results for the spectra obtained by test observations. In addition, we will also present the development of dual-frequency mm-wave radiometer system which allows us to observe water vapor and its isotopomers (H2-18O, HDO) simultaneously.