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Performance of water vapor sensors in the tropical upper troposphere (Surinam; 5.8ºN, 55.2ºW)

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There is a large interest in accurate water vapour profile measurements in the upper troposphere in the tropics. Transport processes in the tropical tropopause layer (TTL) determine the input of water vapour into the stratosphere, but the exact mechanisms are not yet fully understood. Research on this issue is hampered by a lack of accurate observations, partly due to the difficulties involved in measuring at the cold temperatures that exist in the upper part of the troposphere in the tropics. In Paramaribo, Surinam (5.8ºN and 55.2ºW), we studied the performance of 3 types of humicap water vapour sensors from Vaisala (RS80A, RS80H, RS90) by comparing the profiles with the more accurate chilled mirror sensor 'SnowWhite' from Meteolabor. 28 Balloon soundings were made, each carrying the chilled-mirror sensor and two humicap sensors. Different types of errors are found and quantified. Bias corrections and response-time error corrections are tested.