

An experimental study of an Artificial Neural Network (ANN) algorithm to retrieve Precipitable Water (PW) using AHI data

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The next Geostationary Korea Multi-Purpose SATellite (GEO-KOMSAT-2A) equipped with the new Advanced Meteorological Imager (AMI), which has improved performance in the spectral (16 spectral bands covering the spectral ranges of 4 visible, 2 near-IR and 10 IR), spatial (2 km at in nadir for the IR channels) and temporal (every 10 min), is scheduled to launch in 2018. It is expected that the finer spatial and temporal distribution of the Total precipitable Water (TPW) product will play an important role in the short-term weather forecast. Current study investigates the possibility of Artificial Neural Network (ANN) approach to retrieve TPW without compensating spatio-temporal resolution of the raw observation data nor the first guess information such as from numerical weather prediction (NWP) model. A multilayer (3 layers; input, hidden and output) perceptron (MLP) feedforward backpropagation algorithm is trained using a training dataset carefully prepared to have general, extensive, and comprehensive representation of real world. The dataset consists of input variables of the simulated Advanced Himawari Imager (AHI) brightness temperatures (9 channels centered at 6.25, 6.95, 7.35, 8.60, 9.63, 10.45, 11.20, 12.35, 13.30 micrometer), 6 dual channel differences, day, time, latitude, longitude, satellite zenith angle and altitude (only land) and the corresponding TPW as output variable. The trained ANN algorithm is applied to the actual AHI data and the results are analyzed to demonstrate the possibility of the ANN TPW for an outbreak of severe convections.

Keywords: Artificial Neural Network, Total Precipitable Water