Numerical study of fog deposition onto a mountainous forest using atmosphere, aerosol chemical transport, and land surface models: Estimation of water and matter deposition by fog deposition

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Water and matter input via fog deposition onto a mountainous forest (Mt. Rokko, Japan) was investigated using detailed land surface model that includes fog deposition onto vegetation (SOLVEG). Simulations using SOLVEG were carried out under meteorological and chemical fields produced by off-line coupled meso-scale meteorological/aerosol chemical transport model (WRF/EMTACS). The SOLVEG clearly underestimated the cumulative fog deposition calculated from throughfall data. This suggests that an enhancement of fog deposition by 'edge effect' which is the phenomenon that fog droplets introduced from the side are captured by leaves due to the canopy clustering and inhomogeneity. The matter deposition of atmospheric pollutants onto the forest floor due to fog deposition was estimated from the fog deposition by SOLVEG and chemical concentrations in fog water predicted by WRF/EMTACS.