

Program file for dry deposition velocity estimation based on the inferential method (Ver. 4-2)

1. This file is able to calculate dry deposition velocity (Vd) of SO₂, HNO₃, O₃, NH₃, NO₂, NO, HONO and aerosol components based on the inferential method.
2. The author, Izumi Noguchi of the Hokkaido Institute of Environmental Sciences, programmed the file under the editorship of the Japan Environmental Laboratories Association (JELA).
3. This file was supervised by Dr. Kazuhide Matsuda of Tokyo university of Agriculture and Technology.
4. Methodology of this file is mainly based on “K. Matsuda (2008) Estimation of dry deposition for sulfur and nitrogen compounds in the atmosphere -Updated parameterization of deposition velocity-. Journal of Japan Society for Atmospheric Environment, Vol.43, p332-339.” as following.
5. Procedures of the calculations:
 - (1) Fill the yellow cells of the "Observation parameter" sheet in appropriate data .
 - (2) Fill the yellow cells of the "Meteorological data" sheet in appropriate data (maximum 2 months).
 - (3) If there are any empty cells (no data) in the meteorological data area, it makes errors. In this case, fill predicted values in the cells.
 - (4) Interpolated data or the data from nearby weather stations could be used for the predicted values.
 - (5) Dry deposition velocity is shown in right above area in the “Meteorological data” sheet.
 - (6) The daily deposition amount in “nmol m⁻² day⁻¹” can be calculated based on the product of dry deposition velocity in “m day⁻¹” units multiplied by concentration in “nmol m⁻³” units.
 - (7) Reference height for Vd estimation was set at 20 m high above the ground according the report of Ministry of Environment (2009).
6. Theories and basic parameters in this program will be updated taking the latest scientific information into account, so the outputs may be different from version to version.
7. The factor of "Wetness" was estimated from relative humidity (threshold value: 85%).
8. In vesion 4, the fatcor of "Canopy height" followed that of Matsuda (2008). And resistance coefficients of gaseous components were corrected in version 4-2.
9. The equation of cuticle resistance (Rcut) of NH₃ followed that of Smith et al. (2000) according to Matsuda (2008).
10. The equation of aerosol deposition on grass field followed that of Wesely et al.(1985) according to Matsuda (2008).
11. The equation of aerosol deposition on forest followed that of Erisman et al.(1997) according

to Matsuda (2009).

Note 1): Estimation height was defined 20 m according the report of Ministry of Environment (2009).

Note 2): In winter with snow, Wind velocity measurement height is calculated by deducting the snow depth.

Note 2): Zero height was defined the 0.7 times of canopy height. Canopy height was defined 10 m at forest, 1m at agriculture field and 2m at grass field. In winter with snow, canopy height is calculated by deducting the snow depth (minimum value =0).

References

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