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## Considering ecological formulations for estimating deposition velocity in air quality models

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**Abstract:** A dry deposition modelling approach that includes surface feedback through photosynthesis relationships was recently developed. A canopy photosynthesis model is dynamically coupled to an atmospheric model with prognostic soil hydrology and surface energy balance. The effective surface resistance is calculated for a realistic and fully interactive estimation of gaseous deposition velocity (V<sub>d</sub>). The model was able to correctly estimate observed ozone V<sub>d</sub> over agricultural fields. The same model was tested for its ability to simulate ammonia V<sub>d</sub> near an animal agricultural facility. The scheme did not reproduce the bi-directional exchange and had a much smaller range as compared to observations. The model was modified to include a simple ammonia compensation point formulation and the results were much closer to the observations. Study concludes that ecological approaches with default parameterisation and biophysical constants are convenient and effective in estimating V<sub>d</sub> for air quality models.

**Keywords:** ammonia; bi-directional exchange; biosphere-atmosphere interaction; compensation point; deposition velocity; photosynthesis model.