Session Title: Coupled processes in soil-plant-atmosphere systems

Conveners:
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Keynotes:
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Abstract:
There is a continuous exchange of energy and matter between the Earth's biosphere and atmosphere. Many fundamental ecological and atmospheric processes are governed by exchanges and interactions through different interfaces between those two Earth-system-compartments. For example, about 70 – 80% of the solar energy reaching the Earth is absorbed at the surface and partitioned into various channels of heat transfer; greenhouse gases are taken up or released by microorganisms, plants, animals, humans and industries; and water vapour, the most important of all greenhouse gases, is evaporated into the air and globally redistributed forming clouds and precipitation. Therefore, quantitative knowledge about the biosphere-atmosphere exchanges is essential in predicting the evolution of the planet's ecosystems, weather and climate.
One of the major challenges for observing and modelling of biosphere-atmosphere exchange processes is rooted in the magnitude and range of land-surface variability. Spatial heterogeneity of land-cover characteristics and complex terrain is ubiquitous and occurs over a wide range of scales. Daily and seasonal cycles, modulated by weather and extreme events lead to continuous change and non-stationarity. Spatial heterogeneity assures that exchange processes and concentration gradients commonly exhibit a complex three-dimensional structure. Failure of observations and models to capture and account for the effects of this land-surface variability on atmospheric exchanges and concentration fields is recognized as a major source of uncertainty in regional to global greenhouse-gas impact assessments and climate models.

This session invites contributions on modelling and observation of processes at the soil-plant-atmosphere interface with a focus on the interactions between different ecosystem compartments and on interactions between processes on different spatial and temporal scales. Of particular interest are fluxes of energy, water and greenhouse gases.