Thursday 18 October 2018 – 16:00 AMGC Seminar:

“Environmental effects of volcanic eruptions: a multidisciplinary study of tephra impacts on plant and soil”

By Dr Inga Tarasenko, Earth & Life Institute (UCL)

Volcanic active regions are often intensively cultivated and densely populated as they are typically endowed with fertile soils developed from volcanic eruption products. However, these regions often receive tephra deposition, including ash (< 2 mm) and scoria (> 2 mm), which threaten the natural and cultivated ecosystems. My PhD study aimed at unravelling some of the complex interactions that drive the impacts of tephra on soil physical properties, soil microorganisms and crop plants.

Surface crusting of fresh ash deposits impedes water infiltration in soils and increases runoff. Using an original laboratory experiment, I highlighted that structural crust formation is the result of particle reorganisation at the surface of the ash deposit subjected to raindrop impact. The grain size distribution of the ash material exerts a strong control on crust development. In a second study, I investigated the early stage colonization of tephra by fungi. Using various techniques, I showed that freshly-deposited tephra represent an attractive ecological niche for ectomycorrhizal fungi from the underlying soil. Such colonization may accelerate revegetation and soil formation of a tephra-affected area. Finally, the effects of an ash deposit on the growth and physiology of tomato and rice plants were examined for the first time. Experiments conducted in a phytotron revealed that ash deposition on foliage alters photosynthesis and decreases plant biomass. Multiple applications of ash produce a stronger and longer effect on plants than a single event. The intensity of the ash effects is likely plant-specific.

Overall, my PhD study provides novel insights into the role of ash as an agent of environmental disturbances. It paves the way for further investigations aimed at informing the development of adequate agricultural practices that can decrease the vulnerability of rural communities exposed to volcanic tephra.