

Prof. Nadia Ursino

University of Padova, Italy

Email:nadia.ursino@unipd.it

Proposed scientific work

As a potential host of STMS, we can offer two research lines for development of cooperation with other participants to COST ACTION ES1306. The aim of the collaboration could be improving existing models and/or comparing modeling outcome and experimental evidences collected by scientists to be hosted .

Research line 1) Modeling fire regime and fire impact on ecosystem in Mediterranean area under land use change scenarios.

Research line 2) Modeling vegetation patterns in arid environments.

Research line 1) is focused on fire as an integral component of the ecosystem functioning. Modeling exercises may be used to advance our comprehension of the mechanisms underlying fire dynamics, fire control and prevention. We formulated a model that predicts the wildfire regime in humanized fire-prone Mediterranean eco-regions. The model is based on the positive feedback between forest expansion following cropland abandonment, fuel abundance, and fire.

There are challenging opportunities to account for the dynamics of sediments, nutrients and ash by further developing the modeling approach in order to capture relevant processes of interest within the framework of COST ACTION ES1306, and advance our comprehension of the connectivity of sources and sinks of the most important variables.

References

Ursino N. and Romano N. Wild forest fire regime following land abandonment in the Mediterranean region, *GEPHYSICAL RESEARCH LETTERS*, accepted for publication DOI: 10.1002/2014GL061560 (2014)

Ursino N., M. C. Rulli, 2010, Hydrological minimal model for fire regime assessment in a Mediterranean ecosystem , *Water Resour. Res.*, 47, W11526 DOI: 10.1029/2011WR010758

Research line 2) concerns the facilitation mechanisms that lead to the spatial organization of vegetation in arid and semiarid zones. Patterns of vegetation in arid and semiarid lands are more or less connected island of fertility functioning as water harvesting systems. Facilitation often results from the interaction between plant and plant physical environment. Differentiation may lead to further inter-specific facilitation or competition, that concur in shaping the aspect of the vegetated land and the balances of water and sediments. There are opportunity to characterize and further improve the existing models in order to advance our comprehension of species interaction, harsh ecosystem dynamics and the connectivity of those paths that sustain positive biotic-abiotic feedbacks.

References

Ursino N., 2009, Above and below ground biomass patterns in arid lands. *Ecological Modelling*, vol. 220; p. 1411-1418, ISSN: 0304-3800, doi: 10.1016/j.ecolmodel.2009.02.023.

Ursino N., 2007, Modeling banded vegetation patterns in semiarid regions: Interdependence between biomass growth rate and relevant hydrological processes, *Water Resour. Res.*, 43, W04412, doi:10.1029/2006WR005292.

Ursino N., S. Contarini, 2006, Stability of banded vegetation patterns under seasonal rainfall and limited soil moisture storage capacity, *Adv. Water Res.*, 29 (10), 1556-1564.

N. Ursino, 2005, The influence of soil properties on the formation of unstable vegetation patterns on hillsides of semiarid catchments, *Adv. Water Res.*, 28(9), 956-963.