



Vegetation response to climate, eco-hydrological modeling at basin scale in water-limited ecosystems

g. ceccherini (1) and f. castelli (2)

(1) European Commission, DG Joint Research Centre, Inst. for Environment and Sustainability, Global Environment Monitoring Unit, TP 272, via E. Fermi, 21020 Ispra (VA), Italy (guido.ceccherini@jrc.ec.europa.eu), (2) Dipartimento di Ingegneria Civile e Ambientale, Università degli Studi di Firenze, Via S. Marta,3 - 50139 Firenze, Italy (fabio@dipolo.dicea.unifi.it)

Issue of interactions between vegetation and hydrological cycle is crucial for both science and assessing impacts of climate change on water resources. In this study we pursue the objective of identifying vegetation response to climate at basin scale for a small tributary of Arno river with an eco-hydrological model that employs a low number of parameters and forced by a limited number of climate variables.

The proposed approach is based on a vegetation dynamic model coupled to a hydrological dynamic model, with the vegetation dynamic model providing phenological cycle evolution through time, and the hydrological dynamic model using phenological cycle to compute evapotranspiration flux and update soil water content.

Capabilities of the model has been explored to develop quantitative estimates of vegetation responses to climate, that include representation of soil moisture controls on vegetation growth and concurrently, vegetation controls on soil moisture and ultimately runoff. Given a rise in atmospheric CO₂ and associated changes and shift in solar radiation and precipitation, we are interested how vegetation dynamics, soil moisture and runoff might change.

A comparison between current and estimated future climate scenarios reveals a significant shift towards different seasonal effects. Results suggest that identifying of vegetation responses to climate should be a focus of climate change assessment.