Geophysical Research Abstracts,
Vol. 11, EGU2009-7280, 2009
EGU General Assembly 2009

Climate changes effects on vegetation in Mediterranean areas

F. Viola, D. Pumo, and L.V. Noto
Università di Palermo, Dipartimento di Ingegneria Idraulica ed Applicazioni Ambientali, Palermo, Italy (viola@idra.unipa.it)

The Mediterranean ecosystems evolved under climatic conditions characterized by precipitations markedly out of phase with the growing period for the vegetation there established. In such environments, deep and shallow rooted species cohabit and compete each other. The formers, being characterized by deeper root, are able to utilize the water stored during the dormant season, while the conditions of shallow rooted plant are closely related to the intermittence of the precipitations.
A numerical model has been here used in order to carry out an analysis of the potential climate changes influence on the vegetation state in a typical Mediterranean environment, such as Sicilian one. The most important consequences arising from climate changes in the Mediterranean area, due to the CO2 increase, are the temperatures raise and the contemporaneous rainfall reduction. Probably, this reduction could be accompanied by an increase in events intensity and, at the same time, by a decrease in the number of annual events. There are very few information about possible changes in the distribution of the rainfall events over the year. However, according to the analysis of the recorded trend, it is possible to predict that the rainfall reduction will be mainly concentrated during the autumnal and wintry months.
The goal of this work is a quantitative evaluation of the effects due to the climatic forcing changes, on vegetation water stress. In particular, great attention is paid to the effects that rainfall decrease may have on vegetation, by itself or coupled with the temperature increase. A detailed investigation on the influence of the variations in rainfall seasonality, frequency and intensity is carried out. In this work two vegetation covers, with shallow and deep rooting depth (grass and tree) laying on three different soil types (loamy sand, sandy loam and clay) are considered.
Simulations on Mediterranean ecosystems have lead to recognize the role of the rainfall amount, frequency and temporal distribution. Rainfall decrease increases the vegetation water stress much more than temperature increase do. Intense and rare rainfall events, as they are expected to be, could attenuate the effects of rainfall reduction because of the less interception correlated to them.
The future rainfall distribution over the year is also crucial for vegetation water stress. If the current ratio between the growing season and the dormant season rainfall will be kept, trees and grasses will suffer a common increase of water stress, which seems more severe for trees than for grasses. Otherwise, if the rainfall reduction will be concentrated during the wintry periods, as emerges from literature, grasses will have some advantages over the trees species. In this conditions grasses will keep the water stress similar to the nowadays value, while trees will suffer for the lack of the winter recharge increasing their water stress.