SOME ASSESSMENTS OF THE POTENTIAL 2 × CO_2 CLIMATIC EFFECTS ON WATER BALANCE COMPONENTS IN THE EASTERN MEDITERRANEAN

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Abstract. General circulation model (GCM) coarse evaluations of the climatological impact in the Eastern Mediterranean due to global doubling of the atmospheric CO_2 concentration were used as input for a *preliminary* estimation of modifications in local processes affecting the water balance in this region. It is suggested that: (i) in the 2 × CO_2 climate the *average* regional change of precipitation associated with typical mid-winter cyclonic systems is relatively small, however, it is associated with redistribution of the regional rainfall; (ii) in the elevated terrain in the northern part of the region, daytime snowmelt due to warm air advection may be enhanced, as much as 2.8 cm per day; and (iii) transpiration in the coastal area of the Eastern Mediterranean may increase by ~ 13% of its current level in the summer and somewhat more in the winter.

1. Introduction

Considerable attention has been given in the last two decades to the evaluation of the impact of the predicted increase in the atmospheric CO_2 concentration on the global climate (e.g., Manabe, 1983; Bolin *et al.*, 1986, Schneider, 1989). Most studies estimate the effect of doubling the atmospheric CO_2 concentration (denoted 2 × CO_2) on the global climatic pattern to occur no earlier than 2050 (e.g., Bolin *et al.*, 1986). General circulation models (GCM) estimate that the average global surface air temperature will consequently increase by ≈ 2–4 K (e.g., Manabe, 1983; Bolin *et al.*, 1986; the bibliography in Handel and Risbey, 1992). In the Northern Hemisphere, warming in high latitudes is predicted to be about double that in the low latitudes. These models also suggest a global increase in the sea surface temperatures (SST) and an increase in the average global rate of evaporation. However, there is a need to refine various components of the GCM, including the

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