

A global data set of canopy resistance over land from 1949-1995

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Abstract

A global coverage of monthly data set for daytime canopy resistance is the first time available to the community. It has 1 degree resolution over land except for Antarctic from 1949-1995. The canopy resistance partitions the fluxes over land and has a longer life time than synoptic time scale (few days). Canopy resistance is found to be 500-20000 s m⁻¹ in desert areas, 50-800 s m⁻¹ in Mediterranean areas and the Near East, 0-500 s m⁻¹ in Polar Regions and Siberia, 20-300 s m⁻¹ in North European plain, Canadian Shield, North America plain and North China, and 30-130 s m⁻¹ in tropical rainforests, South China and the Far East. The canopy resistance is derived according to the energy budget equations of planetary boundary layer and land surface. The first 5 EOFs of the ratio (EPR) between evaporation rate and potential evaporation rate explains 71% of the variance of the monthly EPR. The dominated EOF for 63% of land grids belongs to EOF1, 22% of land grids belong to EOF2, and 8% belongs to EOF3. It shows that the highest solar radiation and leaf area index in summer does not always yield the lowest canopy resistance especially over croplands. In addition, the persistent increase of canopy resistance during the past 50 years has been found in several locations in evergreen broadleaf forests (rainforests).

Keywords: evapotranspiration, boundary layer processes, land/atmosphere interactions.

Index Terms: 0315 Atmospheric Composition and Structure: Biosphere/atmosphere interactions; 1818 Hydrology: Evapotranspiration; 1833: Hydroclimatology; 3307 Meteorology and Atmospheric Dynamics: Boundary layer processes; 3322: Land/atmosphere interactions