Geophysical Research Abstracts,
Vol. 11, EGU2009-3705, 2009
EGU General Assembly 2009

The Relationship between Decadal Changes in Surface Shortwave Radiation,Cloud Cover and other Atmospheric Processes in Europe

M. Chiacchio and M. Wild
ETH, IAC, Zurich, Switzerland (marc.chiacchio@env.ethz.ch)

This study is an analysis of the surface long-term solar radiation variability in Europe beginning in 1970 through 2000 using surface observations from the Global Energy Balance Archive (GEBA). The time series of their annual and seasonal means are presented with a major focus on the seasonal dependence of their variations. Based on the 1970-1985 period from the annual means, there is a statistically significant decline of -3.0% decade-1 (-3.8 Wm-2 decade-1) followed by a rise of 0.3% decade-1 (0.4 Wm-2 decade-1) during 1985-2000. For the winter mean time series a trend close to zero is reported but does give some indication for a slight overall increase. The behavior of the solar radiation for spring is similar to the annual series and has the strongest increases of 1.6% decade-1 (2.5 Wm-2 decade-1) during 1985-2000. In summer the changes show a similar evolution to the annual and spring time series but are slightly greater with a trend of -3.2% decade-1 (-6.8 Wm-2 decade-1) for 1970-1985. The autumn series shows a statistically significant downward trend of -2.5% decade-1 (-2.1 Wm-2 decade-1) from 1970-2000. While the annual mean evolution over Europe as a whole is in line with reported changes in aerosols, circulation and associated cloud cover changes play a major role to explain the seasonal mean variations. Further discussion is made with regard to the circulation pattern to explain the seasonal mean trends.