

VARIATIONS IN THE SOLAR FLUX DEPENDENCE OF MESOPAUSE TEMPERATURES OVER TWO SOLAR CYCLES

J. OBERHEIDE 1, D. Offermann 1, P. Knieling 1, R. Koppmann 1, W. Steinbrecht 2, K. Höppner 3

1 Physics Department, University of Wuppertal, Wuppertal, Germany, joberh@uni-wuppertal.de

2 German Weather Service, Hohenpeissenberg, Germany

3 German Aerospace Center (DLR-DFD), Wessling, Germany

Assessing average properties, regular variations, and long-term trends in Earth's middle and upper atmosphere was one of the Theme 4 foci in SCOSTEP's CAWSES program. This paper specifically addresses variations in the solar flux dependence of mesopause temperatures during the different phases of solar cycles 22 and 23 and how this affects long-term temperature trend analysis.

Mesopause temperature is derived from OH*(3,1) Meinel emission over two ground-based stations in Germany, Wuppertal (51°N) and Hohenpeissenberg (48°N). Continuous observations in Wuppertal are now available for 21 years. Long-term accuracy over the last 15 years is verified by comparison with three satellite instruments (CRISTA, SABER, SCIAMACHY). Temperature trend and temperature sensitivity to solar 10.7cm radio flux are decomposed iteratively. It is found that the sensitivity strongly depends on the length of the analysis interval and -even more so- on the specific phases of the solar cycles covered. Temperature trends are discussed on a monthly basis and an explanation for the increasing (1 day per year) “length of summer” in the mesosphere during the past 21 years is presented.

space climatology, solar cycle, mesopause temperature, long-term trends

Jens Oberheide, Physics Department, University of Wuppertal, D-42097 Wuppertal, Germany, phone: +49-202-439-2750, fax: +49-202-439-2680, email: joberh@uni-wuppertal.de