



CFC-emission, UV-exposure and skin-cancer: global scenarios for the 21-st century

A. van Dijk (1), H. van Wijnen (2) and H. Slaper (1)

(1) Laboratory for Radiation Research, RIVM, Bilthoven, The Netherlands, (2) Laboratory for Ecologic Risk Assessment, RIVM, Bilthoven, The Netherlands. (Arjan.van.Dijk@RIVM.nl)

Anthropogenic emissions of ozone depleting substances (ODS) have led to a thinner ozone layer and an increased UV-exposure at the Earth's surface. For each month of the year, we have constructed ozone-trend maps from satellite-measurements for the period of 1980 to 2006. With these trend maps we have calibrated a simple climate model, which includes parameterizations for climate change. Ozone scenarios have been constructed for the 21-st century for two ODS emission scenarios from WMO [1999 and 2006]: the “best-guess scenario” and the “no-protocol scenario”. With an atmospheric transfer model, we have estimated global, yearly UV-dose maps for each scenario.

An increased UV-dose has been related to increased risks for skin-cancer by Slaper et al. [1996]. Their model, which has been calibrated for white caucasians, has been implemented by Kelfkens et al. [2001] to make risk-maps for Europe. We have generalized and extended this model to global, high-resolution scenario analysis, including a detailed population scenario and a global sensitivity model. The globally integrated skin-cancer incidences in the two ODS emission scenarios have been compared with the no-emission scenario.

Contributions to skin-cancer incidence in the 21-st century by anthropogenic ODS-emissions are quantified. Inaccuracies in these numbers and suggestions for improvement are discussed.

WMO (World Meteorological Organization), “Scientific Assessment of Ozone Depletion: 1998”, Global Ozone Research and Monitoring Project-Report No. 44, Geneva, Switzerland, 1999.

WMO (World Meteorological Organization), “Scientific Assessment of Ozone Depletion: 2006”, Global Ozone Research and Monitoring Project–Report No. 50, 2006.

Slaper, H., G. J. M. Velders, J. S. Daniel, F. R. De Gruijl, and J. C. Van der Leun, “Estimates of ozone depletion and skin cancer incidence to examine the Vienna convention achievements”, *Nature* 384(6606), 256-258. 1996.

Kelfkens, G. P.N. den Outer, H. Slaper, Project report “Risks and Ultraviolet Budgets using Earth Observation (RUBEO): Including a non-standard atmosphere and geographic ozone trend differences in risk assessments”, USP-2 01-33, USP-2 project 4.1/DE-02, ISBN 90 54 11 378 2, Netherlands Remote Sensing Board (BCRS), Delft, The Netherlands, 2001.