



## **On the climate response to zero ozone**

X. Zhu (1), I. Bordi (2), K. Fraedrich (1), and A. Sutera (2)

(1) Klimacampus, University of Hamburg, (2) Department of Physics, Sapienza University of Rome, Rome, Italy

Although ozone appears in the Earth's atmosphere in a small abundance, it plays a key role in the energy balance of the planet through its involvement in radiative processes. Its absorption of solar radiation leads to the temperature increase with height defining the tropopause and the stratosphere. Moreover, excluding water vapor,  $O_3$  is the third most important contributor (after  $CO_2$  and  $CH_4$ ) to the greenhouse radiative forcing. Thus, the total removal of  $O_3$  content in an Earth [U+2010] like atmosphere may cause interesting response of the climate system that deserves further investigation. The present paper addresses this issue by means of a global climate model where the atmosphere is coupled with a passive ocean of a given depth. The model, after reaching the statistical equilibrium under present climate conditions, is perturbed by a sudden switch off of the  $O_3$  content. Results obtained for the new equilibrium suggest that the model gets in a colder state mainly because of the water vapor content decrease. Most of the cooling occurs in the Southern Hemisphere while in the Northern Hemisphere the ice cap melts quite consistently. This process appears to be governed by the northward cross equatorial heat transports induced by changes in the general circulation.