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Interactive comment on "Episode of unusual high solar ultraviolet radiation in central Europe due to dynamical reduced stratospheric ozone in May 2005" *by* C. Stick et al.

Anonymous Referee #2

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This article examines the occurrence of a low-ozone, high-UV episode over Europe in May 2005.

The paper is concisely written and covers a topic that has been little studied. While winter miniholes have been studied in great detail, their spring or summer counterparts have received scant attention, despite the fact that their UV biological impact is potentially higher, as noted by the authors.

There have been a couple of studies of such "warm season" ozone miniholes though. The paper lacks a thorough review of such existing literature. It should also include a

more detailed description of the stratospheric circulation in the spring 2005.

In summary, I find this paper well worthy of publication in ACP, provided that the minor revisions described below (points 1 and 2) are carried out.

1) The paper lacks thorough review of existing literature. There have been studies of summer ozone minihole events. Orsolini et al. (QJRMS, vol 129, p3265,2003) studied such an event over Northern Europe in the summer 2000, and demonstrated an increase in erythemal UV dose at the ground of 15%.

Also, recent papers from 2005 (Koch et al., Wolhtman et al.) are quoted to ascribe the importance of meridional advection of ozone-poor air from lower latitudes in the ozone decrease. This is not new science. Such processes have been understood for a long time. Several case studies from the EASOE campaign in 1992 (and earlier studies) demonstrated that the column ozone lowering partially results from low-latitude transport. (Orsolini et al, 1995 and earlier references therein).

2) The stratospheric circulation should be described in more detail. This is done in section 3, but supporting figures would help the reader. Some indication of the stratospheric circulation at the time of the event should be included as geopotential height maps in the lower and mid stratosphere. This should help clarifying the mechanisms behind the ozone reduction. In the strong summer minihole events, one finds air with low-ozone content in the mid stratosphere overlaying the anticyclonic, high-tropopause disturbances (Orsolini et al., 2003). This resulted from the equatorward displacement of the pool of low-ozone air from the Arctic toward mid-latitudes. This is probably not the case in May, but it is of interest to know whether there is a contribution from the mid stratosphere, or whether the entire ozone column reduction arises in the UTLS region.

I have one additional suggestion: the authors should consider using an (existing) assimilated ozone dataset to examine the role of ozone advection and ozone anomalies at various altitudes. This may not require that much additional work, provided that an appropriate dataset (e.g. from ENVISAT data assimilation) can be found.

ACPD

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Minor points:

1) The e-folding seems to be 3 days, but the life-cycle of the event is more like 7-10 days 2) At various places, care has to be taken using “ozone column” rather than “stratospheric ozone concentration”. 3) In my copy, Figure 1 labels on the right side are cut. 4) Fig 3. The 2 PVU-“niveau” is not commonly used language. 5) Abstract : “natural low total ozone from the tropics” is unclear.

Interactive comment on Atmos. Chem. Phys. Discuss., 5, 10409, 2005.