



A low-ozone episode during the European heat wave of August 2003

Y. Orsolini (1) and G. Nikulin (2)

(1) Norwegian Institute for Air Research, Norway), (2) Swedish Institute for Space Research, Sweden (orsolini@nilu.no)

An intense low-ozone episode (LOE) was observed over Scandinavia and the North Sea in the middle of August 2003, when the summer (June-July-August) column ozone minimum was reached. The LOE occurred during exceptional meteorological conditions, associated to a severe heat wave over Europe.

Using meteorological analyses, satellite ozone observations from TOMS and ENVISAT MIPAS, we demonstrate that the LOE results from the conjunction of a deep tropospheric blocking over Europe, and a displaced Arctic pool of low-ozone air in the stratosphere, aloft of the anticyclone. The anticyclonic anomaly is part of a Rossby wave-train, that is apparent throughout the troposphere, and whose influence is felt up to 50 mb. In the mid-stratosphere (e.g. 30 mb), long-period westward-propagating planetary waves dominate, a ridge extending over northern Europe in mid-August.

We band-passed the geopotential field to isolate sub-monthly fluctuations, and calculated three-dimensional wave activity fluxes for quasi-stationary, quasi-geostrophic disturbances to a zonally asymmetric basic state. Results clearly indicate that upward wave fluxes in the lower stratosphere originate from the Atlantic sector, upstream of the maturing blocking.