



Free air foehn effects on ozone concentration in the Khibiny and Caucasus Mountains

V. Demin (1), N. Elansky (2), I. Senik (2)

(1) Polar Geophysical Institute, Apatity, Russia, (2) Institute Physics of Atmosphere, Moscow, Russia (demin@pgi.kolasc.net.ru / Fax: 8152253559 / Phone: 8155579171)

It is well-known that the ozone concentration increases with height in the troposphere. The descending air causes the foehn in foothills as well as ozone concentration increases. Thus, the foehn effects, known in meteorology, can serve as an indicator of the catabatic mechanism of changes in the ozone concentration.

The altitude of the ozone measurement station located at the top of the Lovchorr Mountain (the Khibiny Mountain range) is 1095 m asl, the altitude of the Kislovodsk high-altitude observatory is 2070 m (the Caucasus). There are free air foehns. These foehns are caused by subsidence inversions in an anticyclone and accompanied by temperature and humidity effects, provided the inversion layer crosses the station level. The free foehns do not reach the surface layer. However, the inversions cross the slopes and tops at the altitude of 1000-3000 m rather frequently.

The analysis of ozone concentration dynamics during free foehn events on the Lovchorr Mountain and at the Kislovodsk high-altitude observatory shows that the occurrence of the foehn in the point of observations is accompanied by simultaneous increase in the ozone concentration by 10-20 ppb. The increase is caused by descending motions and receipt of the air enriched with ozone from higher atmospheric layers.