



Correlations between [O3] and main atmospheric parameters.

Highest positives are for air temperature and solar radiation or UVBeff. Most negative correlation is for relative air humidity.

Note that correlations with [NO] or [NO2] are always negative: this suggests an overall VOC sensitive regime [Sillman, 1999].

All shown correlations are significant at the 5% level.

Are peak O3 events always caused by pollution centres located upwind?

The common explication of summer O3 peaks is that they are caused by polluters located upwind.

There are some reasons to question this hypothesis for the Diekirch site.

Most industrial sites are located East of Diekirch; when wind blows from the East, the number of exceed-events ($[O_3] > 120 \mu\text{g m}^{-3}$) is indeed higher than during westerly winds (55% versus 45% of total events). This small difference is not large enough to rule out natural factors.

Negative correlations of [O3] with [NO] and [NO2] suggest an overall VOC sensitive regime. Vast regions of deciduous (isoprene emitters) and coniferous (terpene emitters) forests are located East (Eifel) and West (Ardennes) from Diekirch: **the biogenic extremely reactive VOC's emitted during hot summer days may well be the dominant precursors.**

A polluted air mass is known to have VOC-sensitive chemistry, when it is located close to the emission sources, which would be here the neighbouring forest regions. Overall wind speeds are low (about 7 km/h) and polluting plumes would have a 20 hours transport time from the Wiesbaden region, switching the regime from an eventual VOC sensitive to NOx sensitive, contrary to the observations.

Transboundary measurements of O3, NOx and VOC's will be needed to clarify this situation, and to give a greater confidence in the validity of restrictions imposed to the public during summer ozone events.

One may even question the validity of these restrictions:

"..dass für Nordwest- und Mitteleuropa das zusätzliche Potential besonderer lokaler..Kurzfristnahmen zur Vermeidung der Überschreitung von Ozonschwellenwerten mehr und mehr zu vernachlässigen ist und möglicherweise sogar obsolet geworden ist" [Prof.. P. Bruckmann, Die Ozonepisode im Juli und August 2003, Landesumweltamt Nordrhein-Westfalen]

The role of biogenic VOC's (isoprenes, terpenes) is often neglected and/or unknown in its magnitude. [Sillman,1999].

It is assumed that natural VOC's globally outweigh anthropogenic sources:
isoprene: 675 Tgy^{-1}
aVOC's: 140 Tgy^{-1}
[Royal Society, 2008].

This is in accordance with the observation that despite large anthropogenic nmVOC (-44%) and NOx (-32%) reductions, ozone base-levels have not changed in many parts of Europe during the last years [EEA, 5/2008].