OZONE IN AMBIENT AIR (VEGETATION, FOREST)

AIR 7

Photochemical pollution, better known as "ozone peaks", can affect human health and vegetation development. It also contributes to strengthening the greenhouse effect. European legislation has laid down indicators for monitoring this type of pollution for various target groups.

Plants are sensitive to the oxidizing properties of ozone (O_3). It disrupts the major physiological processes of plants, which induce a reduction in their growth, resulting in loss of agricultural or forestry yield.

The overloading in O_3 is estimated *via* the AOT40 (accumulated ozone exposure over a threshold), which corresponds to the cumulative hourly doses of O_3 which are above the threshold of 80 µg/m³ (or 40 ppb), measured daily between 8.00 am and 8.00 pm. A distinction must be made between the AOT40 for the protection of vegetation, calculated over a 3-month period (from the beginning of May to the end of July) and the AOT40 for the protection of forest, calculated over a 6-month period (from the beginning of April to the end of September). Values are smoothed (five-year running averages) to mitigate the effect of interannual fluctuations, which can be significant. These are mainly related to weather conditions (sunshine duration, temperature).

More ozone in the countryside than in the city

The overloadings of O_3 are systematically higher in rural areas than in urban areas. This specific phenomenon is primarily explained by the presence of another polluting gas in urban areas, nitrogen monoxide (from exhaust gases in particular), which acts as a destroyer of O_3.

A long-term objective out of reach

In 2014, on average over 5 years, the AOT40 for the protection of vegetation was below the European target value[1] of 18,000 µg/(m³.h) for all air quality stations. However, the long-term objective[1] of 6,000 µg/(m³.h), which is difficult to achieve, was only respected for 2 out of 15 stations (Mons and Lodelinsart peri-urban stations). For the protection of forest, the WHO[2] guideline value of 20,000 µg/(m³.h) for O_3 overloading was met for 4 out of 15 stations in 2014.

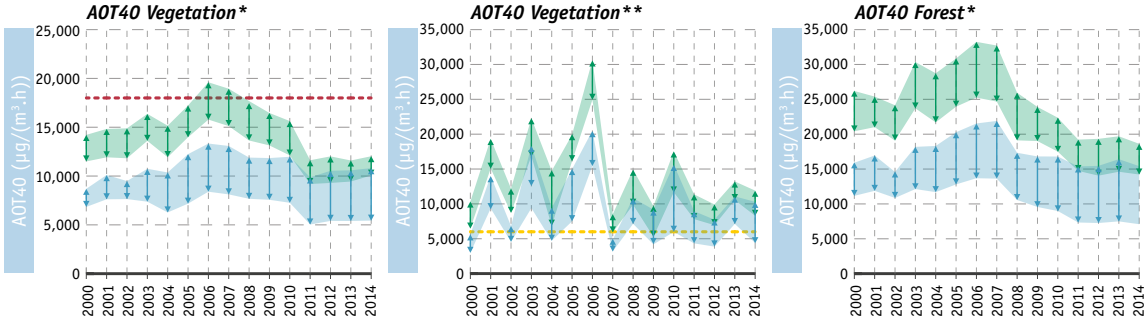
The evolution of the situation since 2000 indicates an increase in the AOT40 (vegetation and forest, in 5-year running averages) over the period 2003-2006 due to numerous peaks of O_3 in 2003 and 2006, two years characterised by exceptionally high levels of sunshine and heat. The situation improved from 2007 onwards with a gradual decline in the AOT40 until 2011. Between 2011 and 2014, years "relatively poor in O_3" (absence of summer heat waves), AOT40 levels remained stable.

Monitoring and communication

While the weather conditions (few prolonged periods of very hot and sunny weather) have undoubtedly favoured these improvements, various measures taken in Wallonia to reduce emissions of O_3 precursor gases[3] may have contributed through (i) the Air-Climate Plan (*Plan air-climat*) (2008-2012) followed by the Air Climate Energy Plan 2016-2022 (*Plan air climat énergie 2016-2022 - PACE*)[4], which defines measures to be implemented by 2022 and (ii) the Programme for the Progressive Reduction of Emissions of SO_2, NO_x, VOCs and NH_3 *(Programme de réduction progressive des émissions de SO_2, NO_x, COV et NH_3)*[5]. These measures are paying off, given the reductions in emissions.

[1] Directive 2008/50/EC transposed into Walloon law by the Walloon Government Decree of 15/07/2010. The target value refers to the AOT40, which is a 5-year running average. The long-term objective (unspecified deadline) refers to the AOT40 over 1 year. | [2] WHO, 2000 | [3] → AIR 3 | [4] → AIR Focus 3 | [5] Walloon Government Decree of 25/03/2004

Fig. AIR 7-1 Ambient air pollution by tropospheric ozone in Wallonia



SOERW 2017 – Sources: SPW - AwAC; ISSeP