

Ambient ozone: a factor of oxidative stress in mountain forests

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Ambient ozone (O_3) belongs to one of the most important environmental problems in Europe. Due to its phytotoxicity, O_3 is still considered to be the most important air pollutant for forests. We present results of the five-year measurements and observations in a medium-altitude mountain range in Central Europe. During 2006–2010 ambient O_3 concentrations were measured at 11 sites of different altitudes (714–1000 m a.s.l.) in the Jizerske hory Mts., Czech Republic, to analyse the spatial pattern and temporal changes of O_3 . The Jizerske hory Mts. have belonged to regions recording permanently the highest O_3 concentrations within the Czech Republic since O_3 monitoring began in 1993 (Hůnová et al., 2003; Hůnová, Schreiberová, 2012). We applied diffusive samplers Ogawa and measured two-week O_3 means during five vegetation seasons (Hůnová et al., 2016). The association between O_3 levels and its impacts on vegetation were studied on Norway spruce (*Picea abies*), the dominant tree species of the region. Spruce needles were sampled for macroscopic, microscopic and biochemical analyses. An association was found between altitude, O_3 concentrations and needle injury. Site exposure to solar radiation was indicated as another important factor in needle injury formation. The injury indicators were generally increasing with increasing altitude with one exception – the site Predel situated in the middle altitude under medium O_3 concentrations. We assume that higher injury on spruce needles at this site was caused by co-occurrence with other factors, like high solar radiation. Out of the three forms of injury detection, microscopic analysis was apparently the most relevant for the assessment of O_3 -induced oxidative stress injury.

We can conclude that O_3 concentrations in the Jizerske hory Mts. are high enough to cause the O_3 -induced injury even in less sensitive species, such as Norway spruce.

References:

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