Geophysical Research Abstracts,
Vol. 11, EGU2009-10009, 2009
EGU General Assembly 2009

Ecophysiological responses of trees to long- term N deposition: a multi isotopes approach

G. Battipaglia (1,2), C. Lubritto (2), S. Altieri (2), F. Marzaioli (2), P. Cherubini (1), M.F. Cotrufo (2,3)

(1) WSL, Swiss Federal Institute for Forest, Snow and Landscape Research, CH-8903 Birmensdorf, Switzerland (giovanna.battipaglia@wsl.ch), (2) Dept. Environmental Sciences, Second University of Naples, Via Vivaldi 43, 81100 Caserta, Italy, (3) Dept. Soil & Crop Sciences, Colorado Sate University, CO, USA

Anthropogenic emissions of nitrogen compounds, principally derived from the burning of fossil fuels, have lead to regional changes in atmospheric and precipitation chemistry. The fate and environmental consequences of these changes on ecosystems functions and on forest growth has attracted considerable research. The d15N measurements have been used successfully for detecting changes in N deposition and incorporation of atmospheric N into leaves (Siegwolf et al,2001) and tree rings (Poulson et al.,1995; Saurer et al.,2004, Guerrieri et al.2009).
We show main results arising from a study of mature Pinus pinea individuals exposed to large amount of traffic exhaust for 20 years. Specifically, we examined the time-related trend in the growth residuals through dendrochronological analysis and C and N isotopes.
A consistent decrease in the ring width starting from 1980 with a slight increase in 13C value has been found as a consequence of environmental stress event. More over the effect of the fossil source 14C dilution on the atmospheric bomb enriched background has been detected in tree rings over the last decades, as a consequence of the increase in uptaking of traffic exhaust. The great variability in 15N values of tree rings with time underlines the difficulties we encountered in using N as an environmental tool and open new questions and research avenues.

Guerrieri M.R., Siegwolf R.T.W., Saurer M., Jäggi M., Cherubini., Ripullone F., Borghetti M., (2009)"Impact of different nitrogen emission sources on tree physiology as assessed by a triple stable isotope approach" Atmospheric Environment 43:410-418
Pearson J., Wellis D.M., Seller K.J., Bennet A., Soares A., Woodall J., Ingroulle M.J. (2000). Traffic exposure increases natural 15N and heavy metal concentrations in mosses. New Phytologist 147: 317-326.
Siegwolf R.T.W., Matyssek R., Saurer M., Maurer S., Günthardt-Georg M.S., Schmutz P. and Bucher J.B. "Stable isotope analysis reveals differential effects of soil nitrogen and nitrogen dioxide on the water use efficiency in hybrid poplar leaves" (2001) New Phytologist 149, 233-246.
Saurer, M., P. Cherubini, M. Ammann, B. De Cinti, and R. T. W. Siegwolf, (2004)" First detection of nitrogen from NOx in tree rings: a 15N/14N study near a motorway". Atmospheric Environment, 38, 2779-2787.