Geophysical Research Abstracts
Vol. 12, EGU2010-15536, 2010
EGU General Assembly 2010


# Traffic pollution affects *P. pinea* growth according to tree ring width and C and N isotopic composition

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Urbanization and industrialization are rapidly growing, as a consequence roads and their associated vehicular traffic exerts major and increasing impacts on adjacent ecosystems.
Various studies have shown the impact of vehicle exhausts on road side vegetation through their visible and non-visible effects (Farmer and Lyon 1977, Sarkar et al., 1986, Angold 1997, Nuhoglu 2005) but, presently there is little known about the long term effect of air pollution on vegetation and on trees, in particular.
Developing proxies for atmospheric pollution that would be used to identify the physiological responses of trees under roadside car exhaust pollution stress is needed.
In this context we propose a novel method to determine the effect of car exhaust pollution on tree growth, coupling classical dendrochronological analyses and analyses of $^{15}$N and $^{13}$C in tree rings, soils and leaves with tree ring radiocarbon ($^{14}$C) data.
*Pinus pinea* individuals, adjacent to main roads in the urban area of Caserta (South Italy) and exposed to large amounts of traffic exhausts since 1980, were sampled and the time-related trend in the growth residuals was estimated. We found a consistent decrease in the ring width starting from 1980, with a slight increase in $\delta^{13}$C value, which was considered to be a consequence of environmental stress. No clear pattern was identified in $\delta^{15}$N, while an increasing effect of the fossil fuel dilution on the atmospheric bomb-enriched $^{14}$C background was detected in tree rings, as a consequence of the increase in traffic exhausts. Our findings suggest that radiocarbon is a very sensitive tool to investigate small-scale (i.e. traffic exhaust at the level crossing) and large-scale (urban area pollution) induced disturbances.

References

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