

SUESS EFFECT IN POLAND, CENTRAL EUROPE, ON THE BASIS OF RADIOCARBON INVESTIGATIONS IN TREE RINGS

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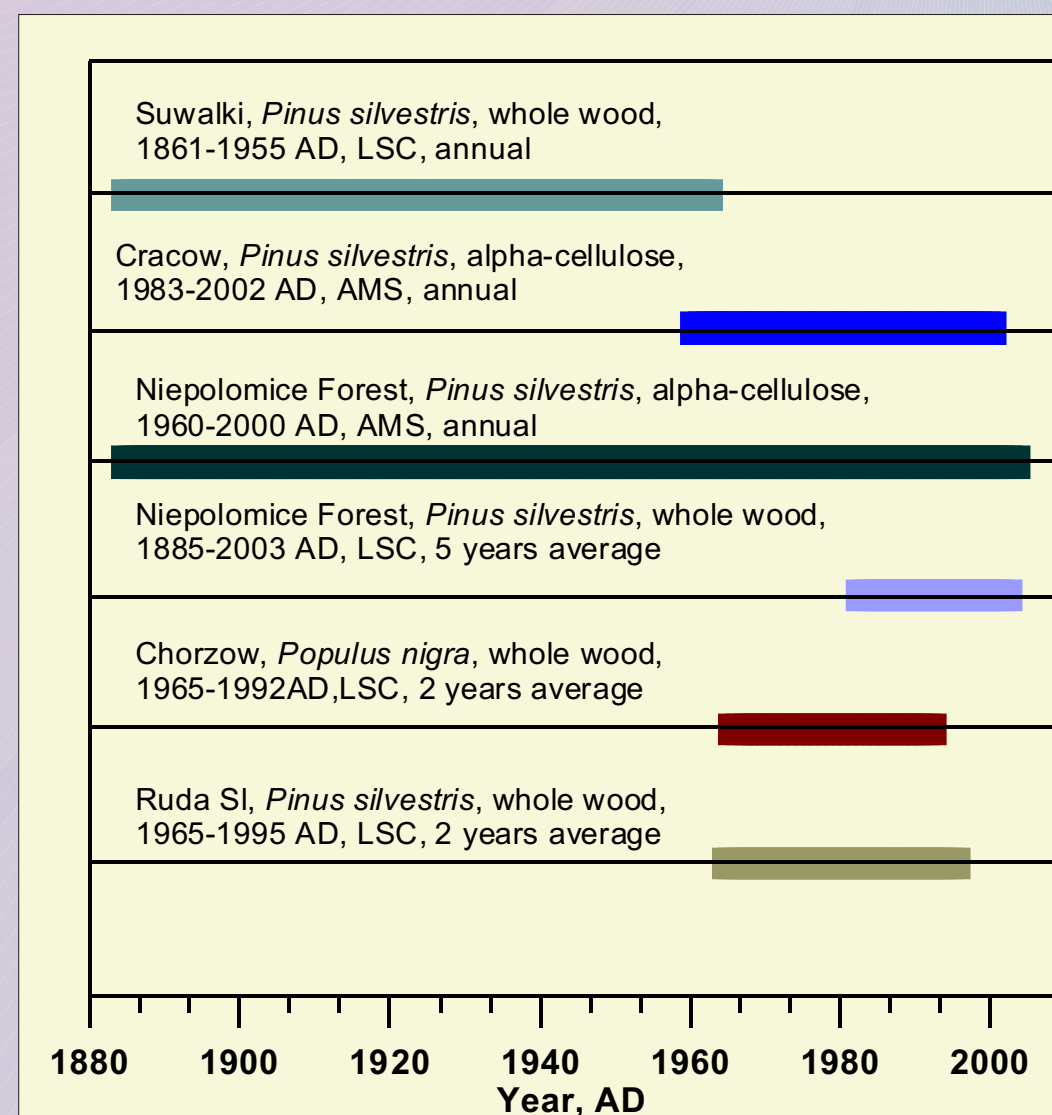
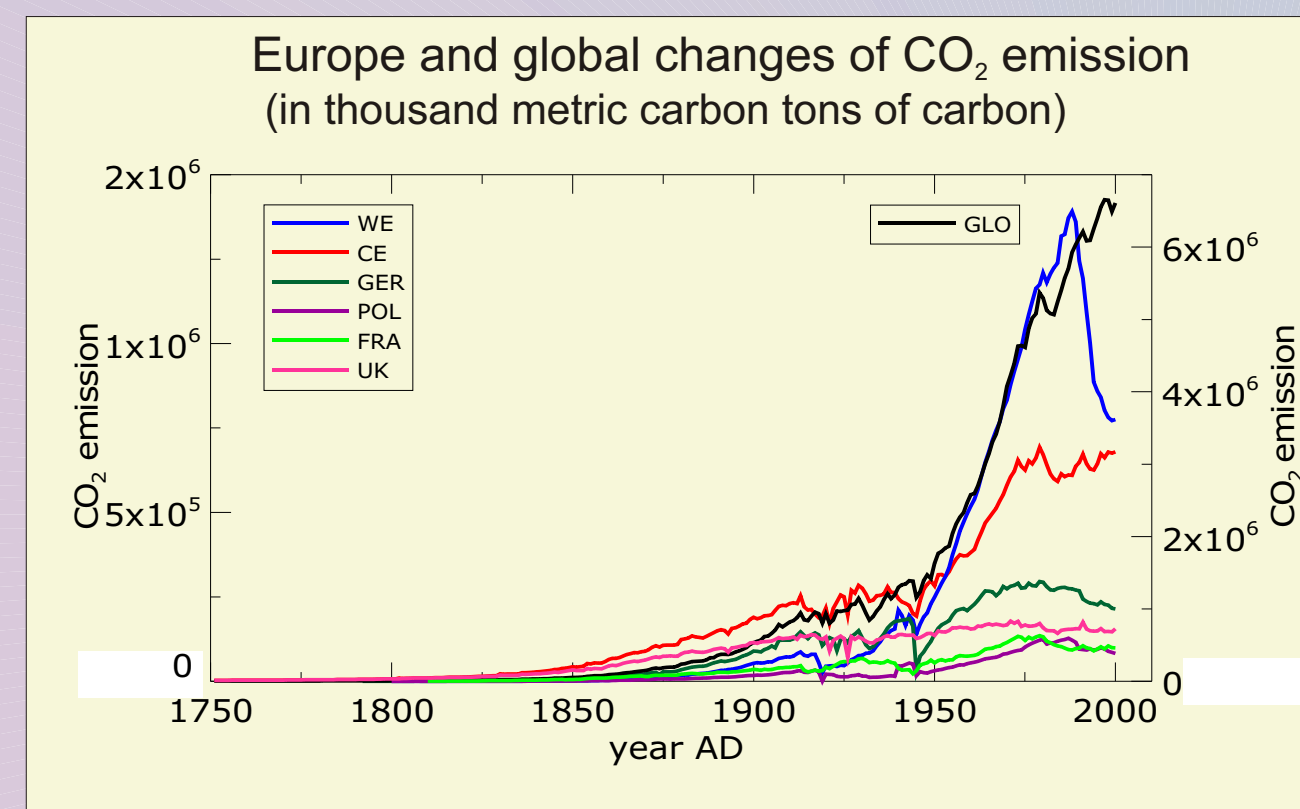
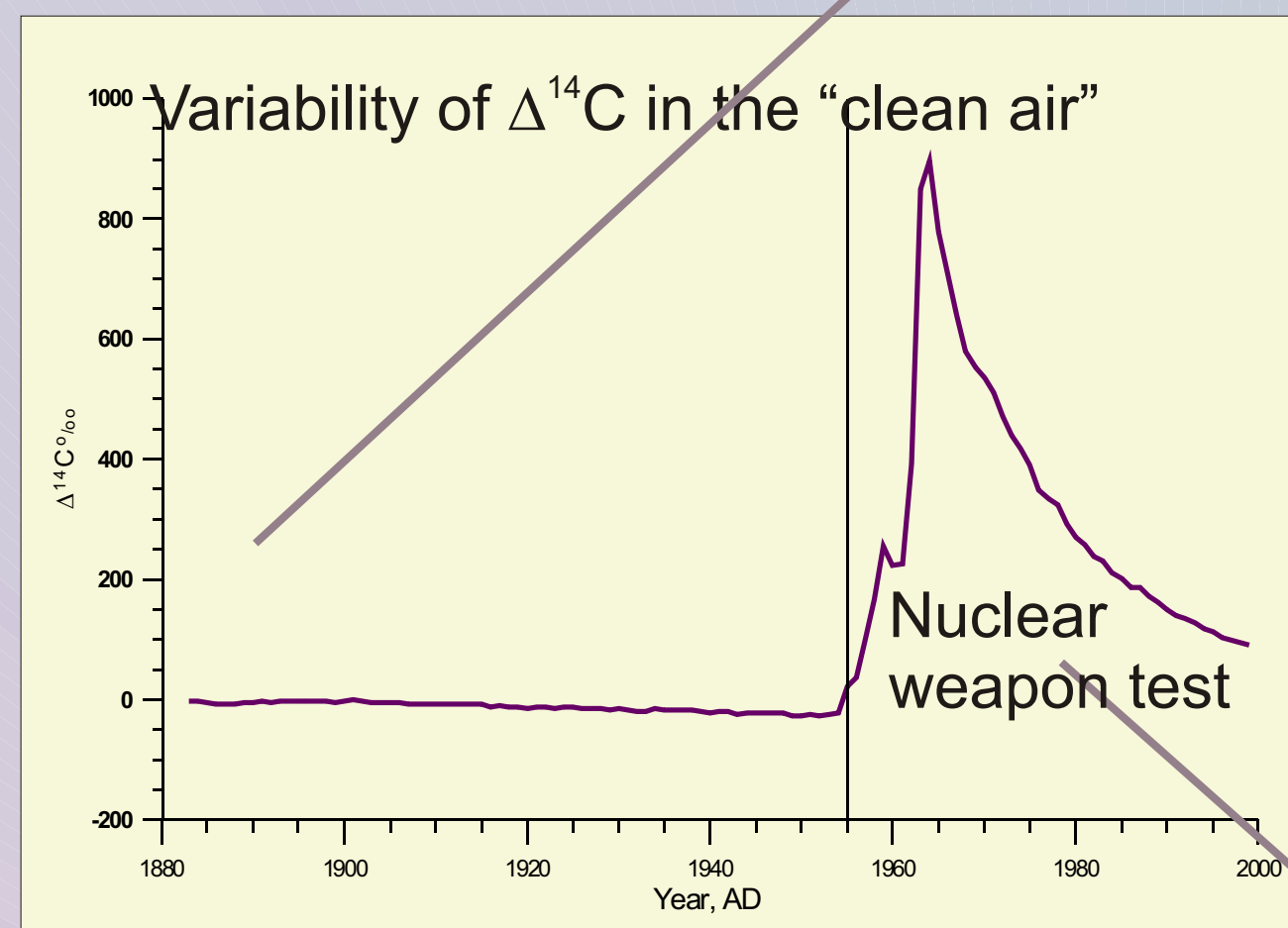
Suess effect is an effect of increase of fossil fuels effect emissions on the radiocarbon concentration curve; it has been the object of research in our laboratory for many years.

Increasing of mining and combustion of fossil fuels like coal, petroleum, natural gas in the industrial area caused emission of carbon dioxide to the atmosphere and changes of carbon isotopic composition in the atmosphere and other carbon reservoirs.

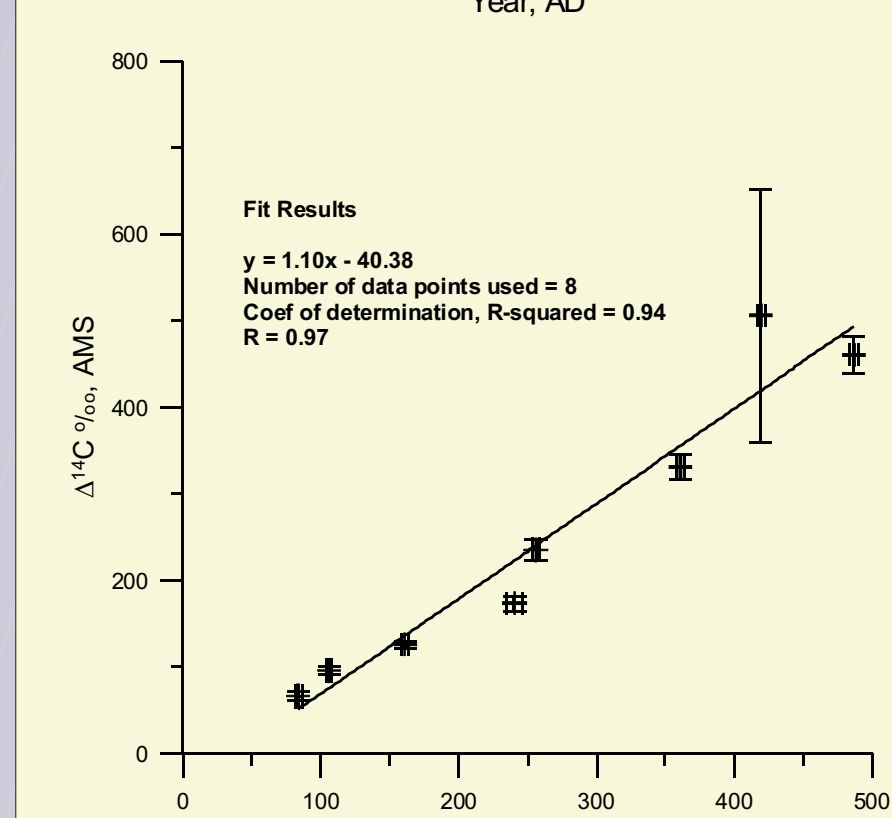
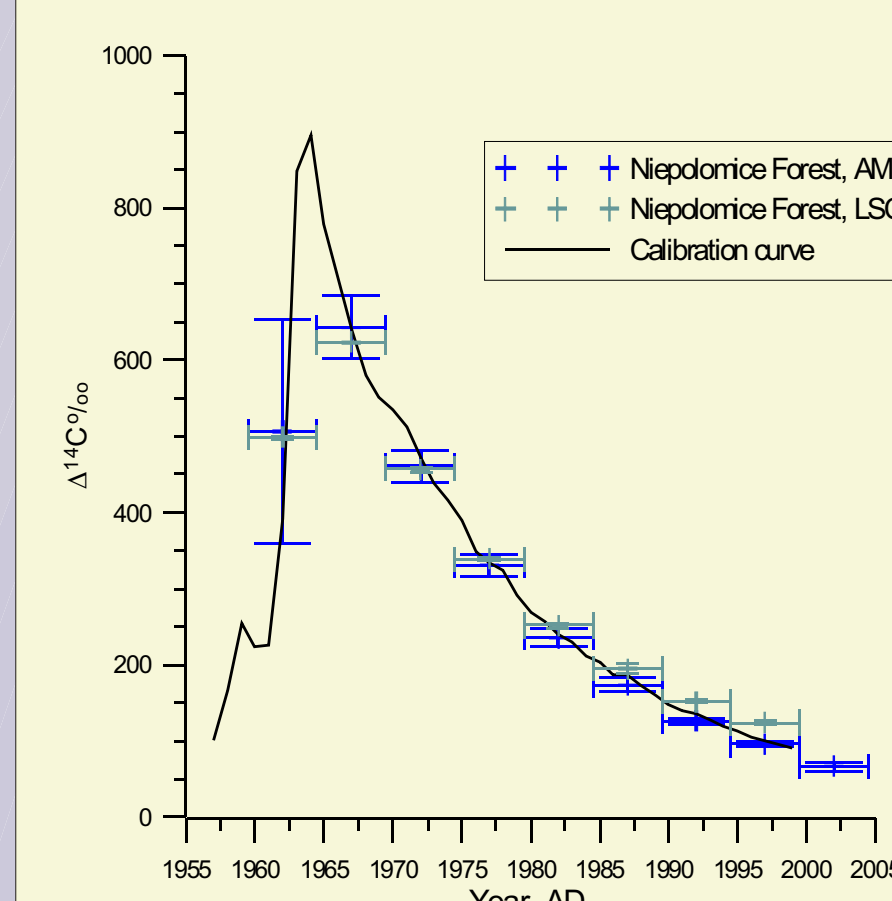
The variability of radiocarbon concentrations in tree rings is useful for analysing climate and anthropogenic changes over the last 150 years. Dendrochronology gives a chance to detect these changes with a high resolution.

We compared trees from 2 areas: in the first trees were not exposed to fossil fuel emission (a natural forests), and in the second, trees grew with such an exposure (industrial areas).

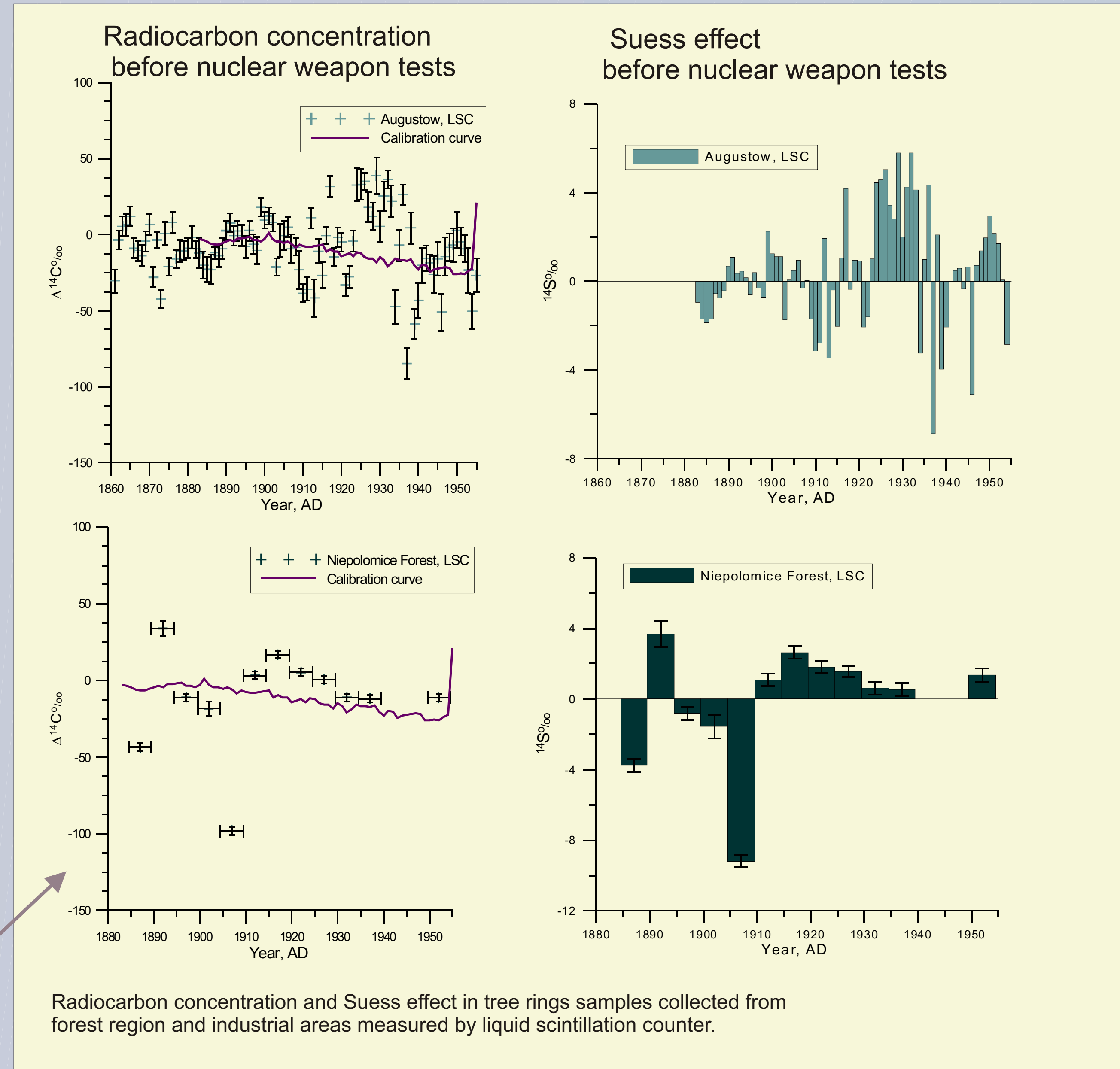
Tree ring samples were collected from industrial areas, Ruda Slaska, Cracow, Chorzow, and from the forest regions, Augustow and Niepolomice Forest. In this research, we used wholewood and alpha cellulose. Radiocarbon measurements were performed using the liquid scintillation counter (LSC) in the Gliwice Radiocarbon Laboratory, Poland and accelerator mass spectrometer (AMS) in Nagoya University, Japan.



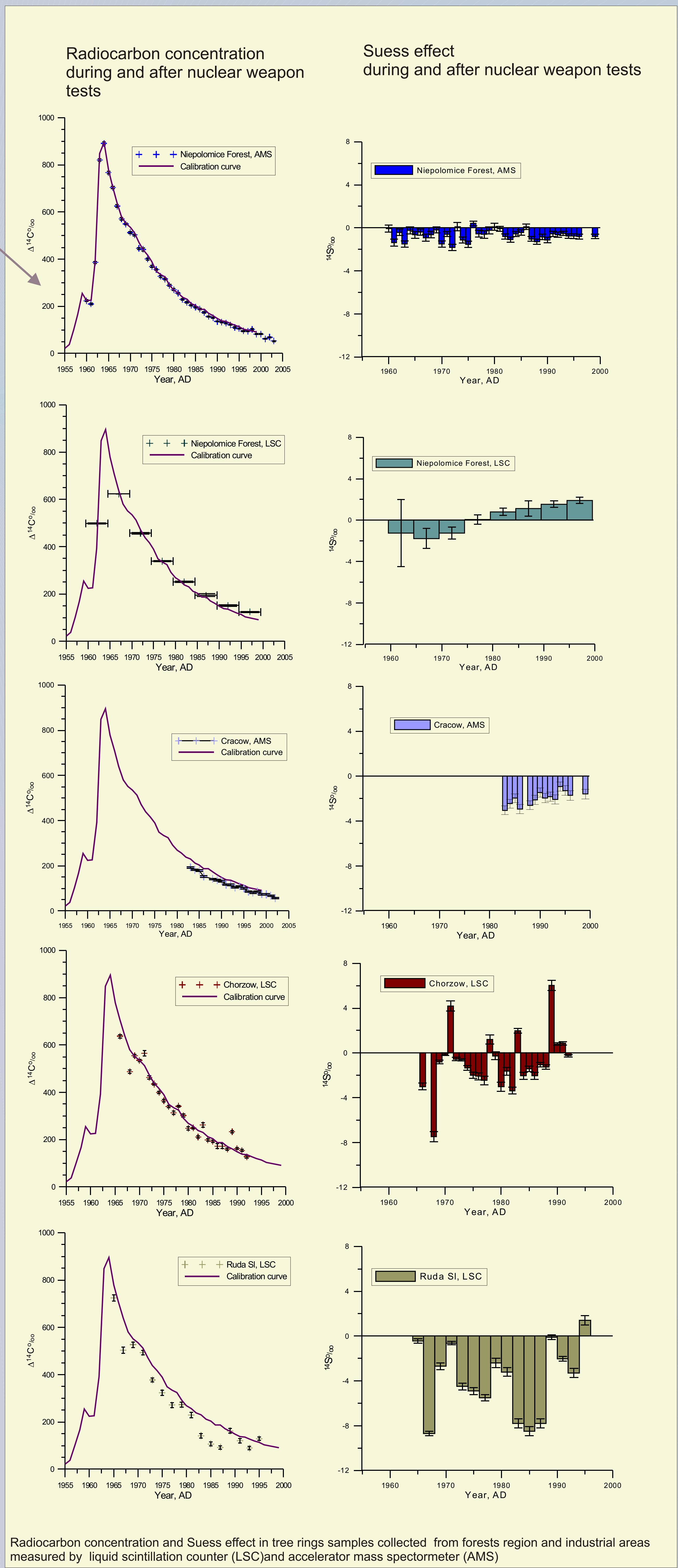
Comparison of methods AMS and LSC



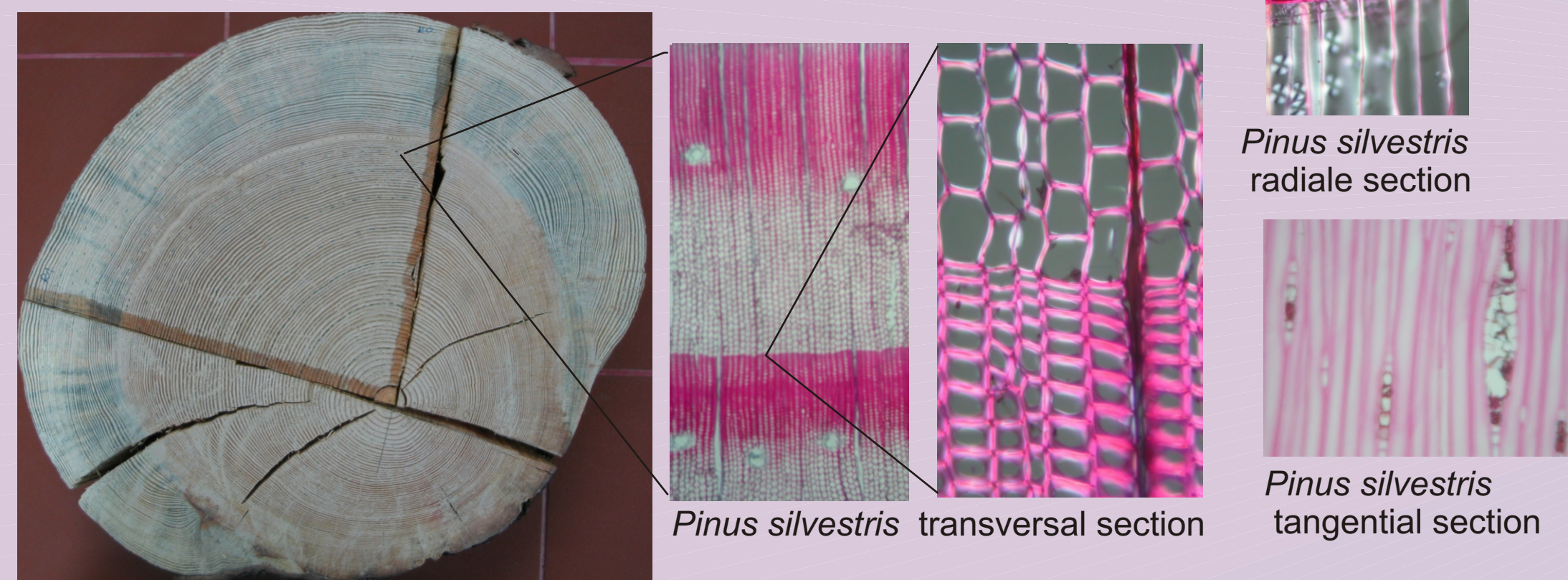
Comparison of results obtained for the AMS and LSC methods. The AMS values were obtained by calculating the average of results for five consecutive, annual samples, whereas the LSC values were obtained from a single measurement of material spanning the respective five years.



Radiocarbon concentration and Suess effect in tree rings samples collected from forest region and industrial areas measured by liquid scintillation counter.



Radiocarbon concentration and Suess effect in tree rings samples collected from forests region and industrial areas measured by liquid scintillation counter (LSC) and accelerator mass spectrometer (AMS)



Tree rings (*Pinus silvestris*) and its microsections visible in medium and high magnification

$$S = \frac{\Delta^{14}\text{C}_{\text{sample}} - \Delta^{14}\text{C}_{\text{backgr}}}{1000 + \Delta^{14}\text{C}_{\text{backgr}}} \cdot 100$$

Suess effect has a global character that is the consequence of air masses mixing in the atmosphere and it is reflected in annual tree rings.

We replicated the Suess effect in our samples: the radiocarbon activities of contemporary samples are lower than those from the middle age of the 19th century.

We also observed regional variability and the difference between industrial and forest areas.

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