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Initial stages of carbonate weathering – climate chamber studies under realistic pollution conditions

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Climate chamber studies how to be a reasonable tool for the investigation of alteration processes of natural stones, especially of carbonates.
Even though the concentration of SO2 in the atmosphere is decreasing since years, until today, most of the studies focused on the role of S-compounds which had to be considered the major damaging immission component.
Contrary to SO2 the concentrations of NOx and especially ozone, primarily due to traffic exhaust, is still increasing today. The role of ozone as an oxidant of NO to NO2 and SO2 to SO3 as well as its role at the formation of sulphate on calcitic materials has already been subject of some studies.
Typically these experiments were performed at accelerating testing conditions by using gas concentration considerably above realistic immission values.
In this study we pursued a different experimental strategy. The concentrations of NO2, SO2 and O3 employed have been oriented on realistic average values (corresponding to the max. mean half hour value in Austria measured in 2003): 0.150 to 0.200 ppm for NOx and SO2 and about 0.120 ppm for ozone.
The major aim of this contribution is answering the following questions:

- Is it possible to detect a reaction of carbonaceous materials to air born pollutants within a reasonable short time of some weeks, when realistic concentrations of damaging gases are used?
- Can the accelerating effect of the oxidation of SO2 by NOx and O3 be proved in short time experiments?
- Can the reaction of nitrogen compounds be detected and defined?
- Is the investigation of elutes of the samples by ion chromatography suited to yield reliable results under this kind of experimental conditions?