



## High resolution mass spectrometric study of secondary organic aerosol particles from the Amazon rainforest

Denis Leppla and Thorsten Hoffmann

Institute for Inorganic and Analytical Chemistry, Johannes Gutenberg-University, Mainz, Germany (hoffmant@uni-mainz.de)

The Amazon Rainforest is one of the most important pristine environments for atmospheric chemistry and biodiversity. This region allows the study of organic aerosol particles as well as their nucleation behavior. However, the rainforest is subject to constant change due to human influences. Thus, it is essential to acquire actual climatic and atmospheric data over the next decades. Therefore, the research site Amazon Tall Tower Observatory (ATTO) was established in the central Amazon Basin to perform numerous measurements under almost natural conditions.

Isoprene (2-methyl-1,3-butadiene, C<sub>5</sub>H<sub>8</sub>) represents the largest source of non – methane volatile organic carbons (VOCs) in the atmosphere and is primarily emitted from vegetation. Its global emissions were estimated in the magnitude of about 500 – 600 Tg per year. Originally, the isoprene photooxidation was not expected to contribute to the secondary organic aerosol (SOA) budget, due to the high volatility of resulting oxidation products. However, several studies in the past decades have proven evidence for the importance of isoprene SOA formation. Based on the two double bonds, isoprene is highly reactive towards atmospheric oxidants like OH– and NO– radicals. The subsequent reactive uptake on acidic particles is strongly dependent on the NO concentration. The mechanism under low – NO conditions mainly leads to epoxide diols (IEPOX) as a key intermediate for SOA formation. On the contrary, the high – NO condition pathway predominantly forms methacrylic acid epoxides (MAE). This pathway is enhanced by increasing NO concentrations. Therefore, anthropogenic sources have a substantial impact on the isoprene photooxidation.

For an accurate statement regarding the SOA composition, it is necessary to perform field measurements under both NO conditions to study the isoprene SOA contribution. For that reason, filter samples were collected at ATTO during the wet season with clean air conditions and during the dry season with polluted air conditions, due to biomass burning and anthropogenic emissions. Additionally, the sampling was performed at different heights to analyze the SOA composition emitted both from local and regional sources. The analysis with high resolution mass spectrometry revealed a major fraction of CHO – compounds and important m/z ratios for isoprene derived SOA for both seasons. However, an increased number of compounds with high aromaticity and carbon oxidation state was observed during the dry season, due to biomass burning events.

Upcoming MS/MS experiments for the identification of major tracer compounds and suitable visualization methods for complex high resolution data will give insights into the chemical SOA composition.