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# Fog collection and deposition modelling – EcoCatch Lunz

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The area of Lunz am See (N 047.855˚, E 015.068˚, 650 m a.s.l.) in Lower Austria has been subject to long term monitoring of meteorological parameters as well as wet deposition. Even though Lunz is known for its good air quality, with about 200 days of precipitation per year reaching an annual average of 1500 mm deposition, immission fluxes reach levels of critical loads. For instance, nitrogen input from wet deposition of nitrate and ammonium is $>$ 14 kg ha$^{-1}$ a$^{-1}$, and sulphur input from sulphate is 5 kg ha$^{-1}$ a$^{-1}$.

In the framework of the EcoCatch project[1)] wet, dry and occult deposition have been investigated in detail in an alluvial forest near the Biological Station (Lunz/See) since September 2008. The overall contribution of dry and occult deposition was expected to be comparably low and only of importance in times of decreased wet deposition.

Collection of fog samples was performed with an active fog sampler, regulated by a Vaisala PWD-12 sensor monitoring visibility. Temperature, relative humidity, wind speed and direction were logged by a HOBO weather station. Filter stacks were used for sampling of aerosol particles and gaseous components and a Wet And Dry Only Sampler (WADOS) was used to sample precipitation. Solute analysis was carried out via ion chromatography. Alkali and earth alkali metals, chloride as well as ammonium, sulphate and nitrate were quantified in rain, aerosol and fog samples on an event basis. In addition dry deposition included nitrogen oxide and dioxide, sulphur dioxide and ammonia measurements. A site specific relation of liquid water content (LWC) to visibility was established using the collection rate and the known collection efficiency of the fog sampler. A modified version of the fog deposition resistance model devised by G.M. Lovett was used to quantify occult deposition onto the alluvial forest. The surface area index of local vegetation was measured with a SunScan System and tree height was determined using a Vertex IV/GS.

Between September 2008 and October 2009 roughly 560 hours of fog were observed and about 380 hours thereof were sampled. Duration, frequency as well as density of fog events showed strong seasonal variations. As expected, spring and autumn seasons exhibited the highest frequencies and durations of fog events. Concentrations of nitrate in fog samples during the cold season (Nov-Mar) were 10-fold higher than in rain, reaching monthly averages of 50 mg L-1 in January and February. With 15-25 mg L$^{-1}$, sulphate was 11-fold higher in fog compared to rain. Ammonium reached on average 14 mg L$^{-1}$ in fog samples and was thus 15-fold higher than in rain.

[1)]EcoCatch – Understanding the effects of global change on ecosystem processes and services at catchment scale (funded by Amt der Niederösterreichischen Landesregierung, and Clean Air Commission, Austrian Academy of Sciences).