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**DISSERTATION TITLE:** *Reactive Nitrogen: Transport to and deposition at the high Arctic site Ny-Ålesund, Svalbard.*

The Arctic region has a rich flora and wildlife despite the limited supply of nutrients to the region. Amongst the important nutrients to the Arctic ecosystems are the nitrogen carrying components nitrate and ammonium. The mass of available nutrients to the Arctic ecosystems on Svalbard in a year is dependent on the transport and deposition of nitrate and ammonium to the region. In this PhD work, the nitrate- and ammonium budget at the high Arctic site Ny-Ålesund, Svalbard is explored. The budget is controlled by episodic and strong deposition events. This indicates the analysis of precipitation observations covering the past 20 years. Despite the short number of these events, about 10% of all precipitation events, they deliver on average half of all the nitrate and ammonium deposited in Ny-Ålesund.

The analysis of air masses connected to the deposition events showed that the most probable source of the reactive nitrogen is the European continent. The strong deposition events occur when moist nitrate- and ammonium enriched air masses are transported rapidly to Svalbard, where deposition through snow- and rain takes place. The events seem to occur preferable during weather situations in which a strong high pressure system over the European continent blocks all air mass movement to the east and diverts the air masses to the north and the Arctic region.

Reactive nitrogen compounds like nitrogen oxides and ammonia, the precursors of nitrate and ammonium, are released to the atmosphere during energy and food production in the mid latitudes. The developments of reactive nitrogen emissions in the future are unclear in the perspective of increasing demands for food and energy. In addition, recent studies suggested that precipitation amounts in the Arctic will increase over the next decades. The development of future deposition events controlling the reactive nitrogen budget is therefore unclear, nevertheless an important factor in the fate of Arctic ecosystems.

The studies were carried out at the Norwegian Polar Institute (NPI) under affiliation with the Department of Geosciences at the University of Oslo (UiO) and were part of the interdisciplinary and international project "Sources, sinks and impacts of atmospheric nitrogen deposition in the Arctic" (NSINK).

