***Singapore-Delft Water Alliance***

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# WATER -SOLUBLE ORGANIC NITROGEN IN PRECIPITATION AND FINE PARTICLES OVER A SUBURBAN AREA

by


## Elvagris Segovia, Mrs


**Date:** **Wednesday , 18th April 2012**
**Time:** **4.30 to 5.30 pm**
**Venue:** **E1-08-25 SDWA Conference Room**
**National University of Singapore**


## Abstract

Investigations of atmospheric nitrogen have been focused on inorganic forms of nitrogen contained in rainwater and aerosols (nitrite, nitrate, and ammonium). Although recent investigations have shown the ubiquity of organic nitrogen in precipitation and aerosols, their role and contribution in the nitrogen budget and deposition is still unclear. Additionally, organic nitrogen compounds (v. gr. water-soluble organic nitrogen, WSON) may contribute to a significant part of atmospheric water-soluble organic carbon (WSOC) and therefore enhance their influence on aerosol properties, such as radiative force and cloud activation. In this context, the aim of this study was to quantify and characterize the content of inorganic and organic nitrogen compounds in rainwater, gas and fine particles ($PM_{2.5}$) from a suburban section of the Metropolitan Area of Kanto, Japan in order to help to better understand of their sources, transport and deposition. The rainwater samples were collected on event basis in 2004 and 2005, and additionally, during a 9-days field campaign $PM_{2.5}$ was collected in August 2004 in two sites, Saitama City and Tokyo. $NO_3^-$ and $NH_4^+$ in $PM_{2.5}$ and precipitation were analyzed by an ion chromatograph. TN was determined by a total nitrogen analyzer. In parallel to the $PM_{2.5}$ samples, we sampled gaseous ammonia and nitric acid, which were determined as $NH_4^+$ and $NO_3^-$, respectively. The volume-weighted average (VWA) concentrations of dissolved organic nitrogen (DON) varied from 0.01 to 33.1 □M-N depending on the amount of rain, with contributions between 4 and 35% to the TN. In annual base the DON represented 32 and 23% of TN in 2004 and 2005, respectively. The average concentration of WSON in $PM_{2.5}$ was 0.57 □g-N $m^{-3}$ (21% of the TN). The average concentrations of $NH_3^+$ and $HNO_3$ in gaseous phase were 2.52 and 0.18 □g $m^{-3}$, respectively. In addition, results show that WSON and WSOC are an important component in rainwater. Concentrations of WSON and WSOC in aerosols were higher at the suburban area than the urban site, suggesting that local sources and photochemistry process may influence the

concentrations at the suburban site. In August 2005, we measured nitrophenols (NPs) which belong to the ON fraction, in $PM_{2.5}$ and gas phase. NPs were sampled with an annular denuder-filter pack system and analyzed by a high performance liquid chromatography (HPLC) with UV detector. The most abundant NPs were 4-nitrophenol and 2, 4-dinitrophenol. Overall, we found that the ON represents a significant fraction of the TN budget, and that NPs are present in a suburban area of the Saitama prefecture.

## About the speaker

Mrs. Elvagris Segovia is a research assistant with Singapore Delft Water Alliance (SDWA). She has been working on several projects including chemical treatment and physical remediation on water quality, water stress study on plants and remediation efficacy of bioretention systems, and effect of park management practices on catchment water quality. She has a Master in Environmental Engineering from Saitama University, Japan and a BS in Hydrobiology from Autonomous Metropolitan University, Mexico.

## Map

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