Tree Species Effects on the Export of Fine Particulate and Dissolved Organic C and N to Soyang Lake

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INTRODUCTION

NOM (Natural organic matter)

DOM < 0.45 µm (Dissolved organic matter)
- **DOC** (Dissolved organic carbon)
- **DON** (Dissolved organic nitrogen)

f POM 0.45 µm < - < 500 µm (Particulate organic matter)
- **POC** (Particulate organic carbon)
- **PON** (Particulate organic nitrogen)

The **transport of organic C and N from terrestrial to aquatic system**s can occur in the form of DOM, but also in the form of particulate organic C and N (POC, PON) of different size (Junet et al. 2009; Bartels et al. 2012).

As much of the DOM in aquatic systems originates from terrestrial organic matter, **the transport of terrestrial C and N into aquatic environments is a significant link** between these systems (Jeong et al. 2012; Canham et al. 2012). Previous studies have shown that the terrestrial organic matter is mostly exported to the aquatic environments during **high precipitation events**, like monsoon (Kim and Kim 2010; Schmidt et al. 2010). **Tree species effects** on the fluxes of DOC, DON, POC and PON in runoff may result from different litter and humus quality which might influence the composition and reactivity of DOC in soil solutions and runoff (Yamashita et al. 2011; Kalbitz et al. 2004).

HYPOTHESES

1. Export of DOM and fine POM from coniferous forested catchments during monsoon rainfalls differs from broadleaf dominated catchments.
2. The quality of DOM and POM in throughfall and runoff reflect the forest type.
3. Export of f PON is the dominating form of N loading of runoff.
4. The concentration response to discharge and precipitation intensity during monsoon events is similar for C and N (DOC vs. DON; POC vs. PON).

MATERIALS & METHODS

Where

Coniferous and broadleaf forests in the Soyang Watershed

When and What

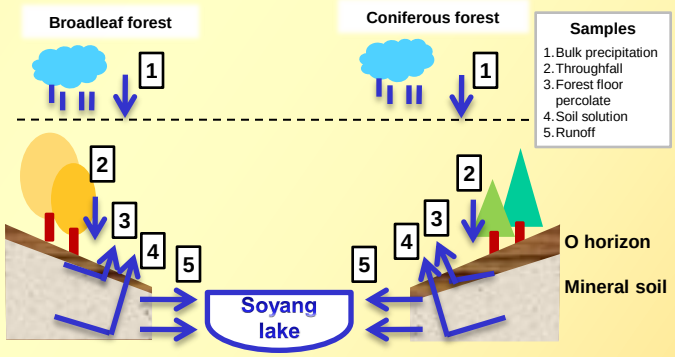
In March 2013: Installation
- Bulk precipitation collector
- Throughfall collectors
- Zero tension lysimeters
- Ceramic suction cups in 50 cm soil depth
- Weir
- Filtration apparatus for f POM

From late June to August 2013 - 2014:
- Runoff: During 4 precipitation events each of low and high intensity at intervals of 2 hours for 48 h by automatic sampler
- Bulk precipitation:
  → 2 sites × 8 precipitation events
- Throughfall, Forest floor percolate:
  → 2 sites × 8 precipitation events

Analysis

In the field
- High temporal resolution measurement of DOC and TOC with immersible UV/Vis Spectrolyser

In the laboratory
- DOC + TN by thermo-catalytic oxidation
- NH_4^+ by colorimetrical flow injection analysis
- NO_3^- by ion chromatography
- POC and PON after filtration with C/N analyzer
- DOM quality
  - UV/Vis absorbance
  - Fluorescence spectroscopy
  - Molecular weight by size exclusion chromatography



EXPECTED RESULTS

1. During high precipitation, DOM and POM concentration from coniferous forested watershed will be higher than those of broadleaf dominated watersheds in throughfall, forest floor percolate and runoff samples.
2. Fluorescence intensity of percolates from coniferous site will be larger than those from broadleaf sites.
3. The export form of N in runoff will be in the order: PON > NO_3-N > DON.
4. Both C and N (DOC vs. DON; POC vs. PON) concentration will show a positive correlation with discharge and precipitation intensity during monsoon events.
5. DOM concentrations in soil solutions at 50 cm depth will increase during the monsoon.
6. The DOM pool of the forest floor is exhausted by high precipitation events, but will recover at time scales of days.

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