

좌장 : 심민섭

- 13:00~13:15 **Turbidimetric determination of selenate in selenate-reducing bacterial cultures**
Jonghan Moon*, Min Sub Sim
- 13:15~13:30 **Experimental evidence of smectite alteration associated with microbial Fe-respiration at low-temperature**
Tae-Hee Koo*, Jee-Young Kim, Jin-Wook Kim
- 13:30~13:45 **Microbially Induced Ca-carbonate Precipitation (MICP) and Its Application for Sealing of Concrete Micro-cracks and Filling of Soil Micro-pores**
Yumi Kim*, Yul Roh
- 13:45~14:00 **Abiotic geochemical processes of manganese at the solid-water interface**
Giehyeon Lee
- 14:00~14:15 Coffee Break

좌장 : 김진욱

- 14:15~14:30 **Biogeochemical effects of zero-valent iron on mercury methylation and bioaccumulation in rice-paddy system**
Hakwon Yoon*, Sae Yun Kwon
- 14:30~14:45 **Biogeochemical fate and transport of arsenic in wetland microcosms**
In-Hyun Nam*, Young-Soo Han, So-Jeong Kim, Jungho Ryu, Chul-Min Chon
- 14:45~15:00 **The biogeochemical cycle of sulfur in a glacial meltwater stream in Jostedalbreen of Songefjord, Norway**
Young Ji Joo*, Min Sub Sim, Megan E. Elwood Madden, Gerilyn S. Soreghan
- 15:00~15:15 **Influences of distribution and speciation of antimony and toxic metals on microbial community compositions in contaminated soil environments**
Soo-Chan Park, Man Jae Kwon*
- 15:15~15:30 **Microbe-Metal Interactions and Their Application for Groundwater Remediation**
Yul Roh*, Yumi Kim, Hyunhee Seo

The biogeochemical cycle of sulfur in a glacial meltwater stream in Jostedalsbreen of Songefjord, Norway

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It is widely accepted that chemical weathering of silicate minerals consumes atmospheric CO₂, regulating the carbon cycle over geologic time scales; however, the role of sulfuric acid produced from weathering of sulfide minerals has only recently received attention as a potential source of CO₂. Some evidence suggests that physical erosion enhanced by glaciers imparts a greater impact on the chemical weathering of relatively labile minerals such as sulfides and carbonates compared to silicates, raising the hypothesis of a negative feedback between glacial weathering and pCO₂. Yet, our understanding of the biogeochemical sulfur cycle in glacial drainages remains incomplete. This study investigates the fate of sulfur in a proglacial stream system fed by the Jostedal Glacier of Norway, which overlies a granitic gneiss complex. The area has a low-temperature (MAT = 4.5°C) and high-humidity (MAP = 1769 mm) climate, and the melt season generally extends from May to September. Considering that sulfur isotope compositions of meltwater sulfate and other sulfur reservoirs may reflect the sulfur budget and biogeochemical processes in the drainage, we collected stream water, atmospheric wet deposition (rain and snow), basement rocks, sediments, and plant debris to analyze their sulfur isotope compositions. Riverine sulfate is enriched in heavy sulfur isotopes relative to the bedrock in the study area, regardless of the correction for atmospheric deposition; it is consistent with previous studies on the glacier meltwater streams in Svalbard and the Himalayas. Two hypotheses have been suggested for this enrichment: (1) sulfur isotope fractionation during pyrite oxidation under anaerobic conditions, and (2) dissimilatory sulfate reduction in freshwater wetland soils. Interestingly, in the Jostedal Glacier, the most ³⁴S-enriched sulfur reservoir is plant debris. Since plants assimilate sulfate from soil water without significant isotope effects, ³⁴S/³²S fractionation during the release of pyrite sulfur to solution (first

hypothesis) cannot solely explain the sulfur isotopic offset between plant debris and riverine sulfate. Instead, plant debris isotopically heavier than both atmospheric deposition and basement rock suggests the activity of sulfate reducers in the soil. Dissimilatory sulfate reduction is seemingly more likely here, because this drainage basin is heavily vegetated and hosts abundant organic matter to drive sulfate reduction especially during the melt season, when bioessential nutrients are released from fresh rock surfaces produced by glacier abrasion. Although comparative studies in glacial catchments with minimal vegetation are essential to test this hypothesis, it is noteworthy that some sulfate produced by pyrite oxidation can be reduced back to sulfide at the expense of organic carbon oxidizing back to CO₂. Perhaps the fraction of sulfate consumed by dissimilatory reduction in rivers might have changed over geologic time as well, in response to major events such as terrestrial afforestation.

Key words: glacial weathering, microbial sulfate reduction, pyrite weathering, sulfur isotope