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**Title:** *Relationship between sulphide oxidation and carbonation in carbonate dissolution in the glaciated basin, Werenskioldbreen (SW Svalbard)*

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This study aims to determine relationship between chemical denudation reactions such as sulphide oxidation and carbonation in the Werenskiold glacier (SW Svalbard). The fieldwork conducted in August and September 2011, consisted of water sampling from proglacial area (Hydrometric Station) and subglacial outflow from the glacier front (Kvisla River).

Simple linear regression between selected ions was used to examine the type of dominating reactions. Slope of  $\text{HCO}_3^-$  and  $\text{SO}_4^{2-}$  was higher in the Kvisla River (KR) than in the Hydrometric Station (HS) (0.93 and 0.52, respectively), and similarly, slope of  $\text{Ca}^{2+} + \text{Mg}^{2+}$  and  $\text{SO}_4^{2-}$  was higher in KR than in the HS (1.72 and 0.98 respectively).

Inversely, the slope of  $\text{Ca}^{2+} + \text{Mg}^{2+}$  and  $\text{HCO}_3^-$  was lower in KR than in the HS (1.09 and 1.64, respectively). Importantly, the slopes associations of  $\text{Ca}^{2+}$  and  $\text{HCO}_3^-$  as well as  $\text{Ca}^{2+}$  and  $\text{SO}_4^{2-}$  are lower than in  $\text{Ca}^{2+} + \text{Mg}^{2+}$ .

Interception of  $\text{Ca}^{2+} + \text{Mg}^{2+}$  and  $\text{HCO}_3^-$  vs  $\text{SO}_4^{2-}$  in the Kvisla River tends to be lower in compare with the Hydrometric Station. That suggests prominent enrichment of  $\text{Ca}^{2+}$ ,  $\text{Mg}^{2+}$  and  $\text{HCO}_3^-$ , at the 'zero- $\text{SO}_4^{2-}$ ' concentration in HS.

The slopes of  $\text{Ca}^{2+} + \text{Mg}^{2+}$  and  $\text{SO}_4^{2-}$  as well as  $\text{HCO}_3^-$  and  $\text{SO}_4^{2-}$ , are close to 2 and 1, respectively. The stoichiometric coefficients, interpreted as these slopes, suggest that the sulphide oxidation operates in the subglacial conditions.

Downstream in the proglacial area (HS), carbonation of the calcium carbonate, which is formed from area of extensive icing, is more plausible than the sulphide oxidation. This is shown by the pronouncedly higher concentration of  $\text{HCO}_3^-$  than  $\text{SO}_4^{2-}$ , low slopes between ions and  $\text{Ca}^{2+} + \text{Mg}^{2+}$  as well as high intercepts.