Seasonal shifts in concentration, age, and lability of carbon exported from the Greenland ice sheet (GrIS)

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Active microbial communities at the base of glaciers and ice sheets provide a mechanism for (a) subglacial organic carbon metabolism on various timescales, and (b) the present-day export of labile carbon to downstream ecosystems. Prior studies point towards the importance of both these processes in modulating carbon cycling. Here we describe for the first time the bulk-level carbon composition of meltwater draining the GrIS. We investigate the dissolved (DOC) and particulate organic carbon (POC) concentration, age, and lability in the subglacial discharge throughout the summer. The early season discharge contains higher organic carbon concentrations, and exports younger DOC (~ 2 kyr ^{14}C age) compared to the peak season discharge, where the concentrations are lower and the age is older (~ 4 kyr ^{14}C age). Conversely, the age of the exported POC (~ 2.5 kyr ^{14}C age) does not change throughout the meltseason. We hypothesize that overwinter subglacial microbial processes shift the type of DOC exported, and use the dissolved ion loads in the discharge to explore this idea. These results illustrate (1) that chemically-distinct organic carbon pools are accessed by seasonally-evolving hydrology and (2) that the GrIS may deliver labile, old carbon to the North Atlantic Ocean.

Sr-Nd isotopic studies of Narcondam Volcanics, India: Constraints on Andaman-Indonesian arc magmatism

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Narcondam island, part of Andaman group of islands of India is a dormant volcano of Andaman-Indonesia island arc related to oblique subduction of Indian plate beneath the SE Asian plate.

Unlike the active Barren Island volcano of Andaman arc, which erupts basaltic to basaltic-andesite lavas, Narcondam samples, studied during the present study, range from basaltic-andesites to dacites with majority of them plotting in andesitic field of Total Alkali Silica (TAS) classification diagram.

Origin of andesitic lavas has been explained variably, ranging from models of hydrous melting of mantle-wedge to models of mixing of basaltic magma with rhyolitic magma at shallower depths [1].

Narcondam andesites show mineral textures, such as resorbed rims of plagioclase phenocrysts, Na rich layers sandwitched between Ca rich layers of plagioclase crystals and at least two generations of phenocrysts, indicating compositional changes in magma not related to fractional crystallization. Presence of rhyolitic glass inclusions, and olivine and quartz crystals together are reported from Narcondam samples in an earlier study [2]. It is therefore suggested that andesitic lavas are not primary melt but probably resulted from mixing of basaltic and rhyolitic magmas.

Sr and Nd isotope ratios are used to quantify the mixing and it appears that andesites of Narcondam and also other andesitic volcanoes of Sunda arc may have resulted from variable but small inputs of sediments (<5%) to the mixed magma which has 70 to 80% contribution from Barren Island type basaltic melt and 15-20% of rhyolitic melt similar to that erupted in Sunda arc elsewhere [3].

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