Understanding the liberation of nutrient from glacial rock flour in coastal waters

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2. **Short summary**: Glaciers and ice sheets are extremely effective agents of erosion and export large quantities of very fine sediment ("rock flour") into the oceans every year via glacially-fed rivers. Recent work has shown that this rock flour also contains significant quantities of organic carbon (Bhatia et al., 2013; Lawson et al., 2013) and key bioavailable nutrients such as silicon (Hawkings et al., 2015), phosphorous (Follmi et al., 2009; Hodson, 2007), nitrogen (Hodson et al., 2008; Wadham et al., In Review) and iron (Hawkings et al., 2014). The fate of most glacial meltwater is fjords and coastal marine waters, where sediment laden plumes emerge at glacier termini. A key question, however, is the degree to which glacially exported nutrients attached to rock flour particles may be a) solubilised, and hence liberated, in seawater and b) taken up by phytoplankton (either pre- or post-solubilisation). This project aims to fill both of these knowledge gaps via a suite of bespoke laboratory experiments and subsequent laboratory analysis, using glacial flour, seawater and phytoplankton cultures. It also aims to determine whether marine phytoplankton preferentially utilise forms of nutrient associated with glacial flour over nutrients associated with other particulate forms (e.g. aeolian dust). The project will be largely undertaken within the Low Temperature Experimental Facility, with the possibility of fieldwork to collect additional samples.

3. **Added Extras**

   a) **Travel** – this project includes a fully-funded trip to a glacier for sample collection. Possible destinations are: the European Alps and the Greenland Ice Sheet

   b) **Training** – the student will be fully trained in a range of state of the science laboratory analytical techniques, including: flow injection analysis (Geog. Sci.), Ion Chromatography and microbiological methods.

   c) **Co-funding** - the student will have the opportunity to undertake paid part time employment in the Low Temperature Experimental Facility as part of this position.
4. References


