Geophysical Research Abstracts
Vol. 17, EGU2015-9072, 2015
EGU General Assembly 2015

Continuous acidity measurements of the Roosevelt Island (coastal Antarctica) ice core

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A novel dye-based continuous flow analysis method for the determination of acidity has been developed and applied to the Roosevelt Island ice core. The Roosevelt Island ice core (79.36° S, 161.71° W) was drilled in 2011-13 at the top of the Roosevelt Island ice dome, a location surrounded by the Ross ice shelf. The site has high accumulation; 0.26 m of ice equivalent is deposited annually allowing sub-annual determination of conductivity, calcium and acidity.

The proximity to the ocean combined with the low altitude makes the RICE ice core loaded with sea salts, which dominate the conductivity signal. Similarly Ca^{2+}, which was measured by Continuous Flow Analysis, is primarily of oceanic origin. The proximity of the ocean also leads to high background levels of acidity (primarily sulphate) which mask volcanic peaks and thus complicate the identification of tropical volcanic eruptions. Using a combined approach of high resolution acidity, melt water conductivity and calcium measurements we have succeeded in identifying more than 450 volcanic eruptions in the top 500 metres of the RICE ice core. The combination of high-resolution acidity and calcium records allow for speculation into the inverse relationship between the two, which may be related to sea ice extent in the nearby Ross and Amundsen seas. Please fill in your abstract text.