A Study of Ice-rafted Debris as a Paleoclimatic Proxy for the North Atlantic for the Last One Million Years.

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Introduction

Interactions between the ocean, atmosphere, and glaciers play a major role in the earth’s climate system. Previous studies have identified the North Atlantic as a region that is particularly sensitive to these climate interactions.

“Global Salt Conveyor”

In the North Atlantic,
• Warm surface water releases heat to the atmosphere
• Cooled surface water sinks
• Rates of inflow (cooling and sinking) have varied between glacial and interglacial episodes

Background and Objectives

Milankovitch Theory

Three separate cyclic movements combine to produce variations in solar insolation received at the earth’s surface.
1. Precession of Earth’s axis of rotation
2. Changes in tilt of axis (Obliquity)
3. Changes in the shape of Earth’s orbit about the sun (Eccentricity)

The changes in solar insolation are viewed as the “pacemaker” of the Pleistocene Ice Ages.

Materials and Methods

In this study:
• ~ 380 samples will be examined
• estimated spacing of 3,000 – 4,000 years

To obtain data, each sample:
• is dried and weighed
• wet – sieved at 150 μm and 2mm
• dried and reweighed

Results

Supply Rates of Ice-rafted Debris (IRD)

Influx of ice-rafted debris will vary with climate conditions. For example,
• Last interglacial (Fig. 4a)
• Last glacial maximum (Fig. 4b)

- Note the significant increase in IRD supply during glacial maximum.

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