Solar-Induced Cyclic Variations of Holocene Climate and Ecosystems in a High-Latitude Region of the North Pacific


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North Atlantic’s Millennial-Scale Climate Pacemaker

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• **Biogenic silica**, carbon, and nitrogen
• Pollen
• $\delta^{18}$O of diatoms, and $\delta$D of palmitic acid
• $^{14}$C and $^{210}$Pb dating
• Did Holocene climatic and ecosystem changes in Alaska occur in a predictable fashion?

• Did these variations coincide with those in the North Atlantic and with solar cycles?
Biogenic silica

BSi (mg/g)

Calendar age in kyrs

[Graph showing fluctuations in Biogenic silica concentrations over time.]

[Images of microscopic samples of biogenic silica.]
Warmer/wetter
Colder/drier
HSG: Hematite-stained grains
• Cyclic climatic change at centennial time scales during the Holocene.

• Coherent with variations in solar irradiance and North Atlantic climate: Sun-climate-ocean linkages?

• Weak solar cycles induced pronounced changes in subpolar climate and ecosystems -- the role of ecosystem feedbacks?