

ICAMG-8<sup>th</sup>

## Marine-terrestrial interaction of climate changes in the western Arctic region over the last 10,000 years

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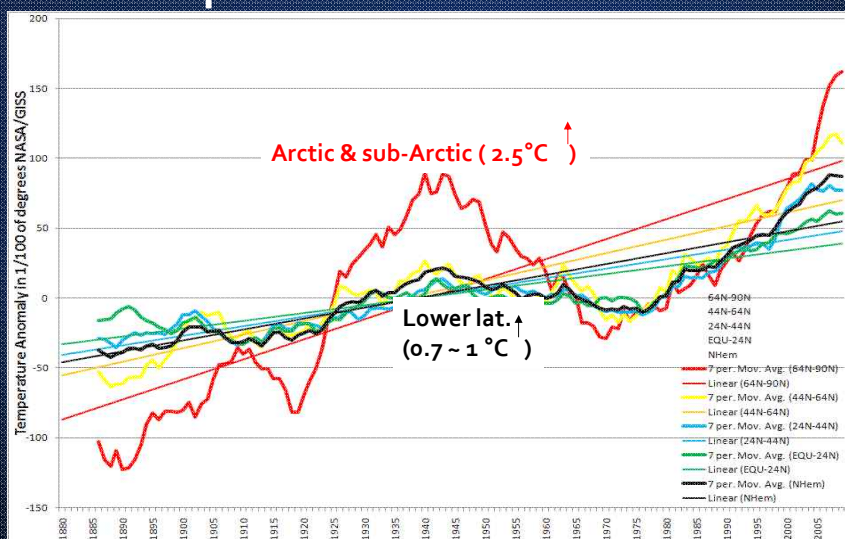
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### ■ Research background

#### Arctic amplification



## ■ Research background

### Arctic sea-ice change

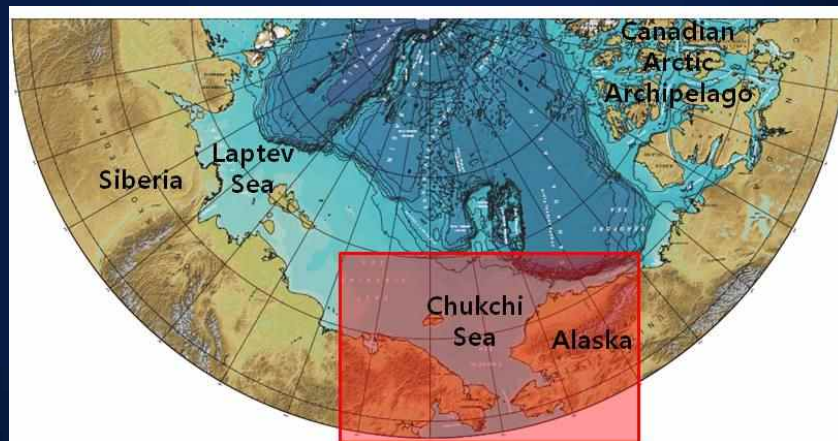
1980



2012



## ■ The Chukchi-Alaskan margin



- ~ 500 km wide (east-west)
- ~ 800 km long (north-south)
- a shallow shelf sea
- fed from the south by the Pacific water inflow through the Bering Strait

## The Chukchi-Alaska region

- Highly sensitive to climate variability and sea-level fluctuations
- Atmospheric connection via Aleutian low
- Oceanographic connection via Bering Strait
- Repeated subaerial exposure during low sea levels
- The most recent reopening of the Bering Strait and flooding of the Chukchi shelf : 11~12 ka during the last deglaciation (Elias et al., 1997; Keigwin et al., 2006)

## Research tools

### Palynomorphs in the Arctic sediments

*P. dalei*  
*I. minutum*  
*Brigantedinium*  
*V. calvum*  
*Q. constricta*

**Trees and Shrubs**  
**Herbs**

*Pinus* sp., *Alnus* sp., *Betula* sp., Asteraceae, Chenopodiaceae, Eriaceae, Pteridophyte sp., Lycopodium sp., Sphagnum

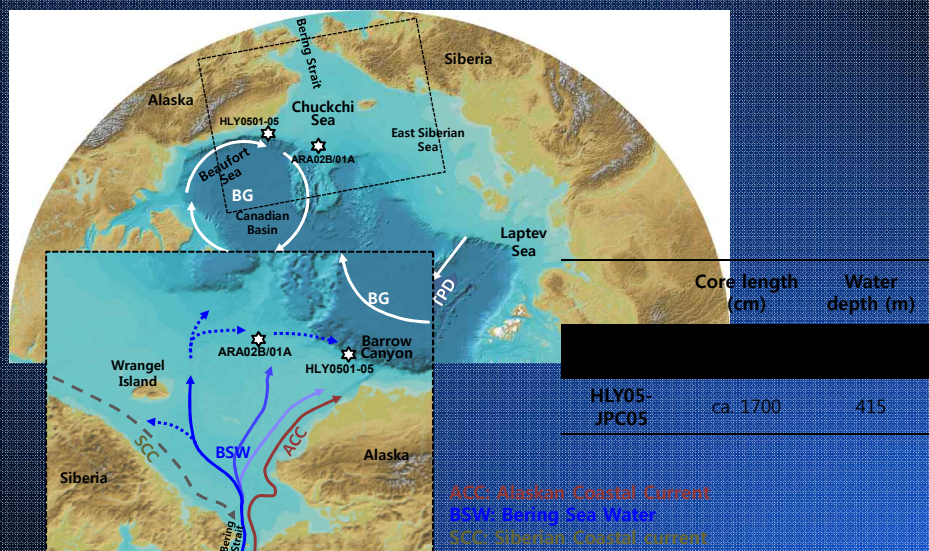
- highly resistant to decomposition
- relatively diverse
- relatively continuous
- good correlation with SST, SSS, SIC
- ultra-high resolution studies



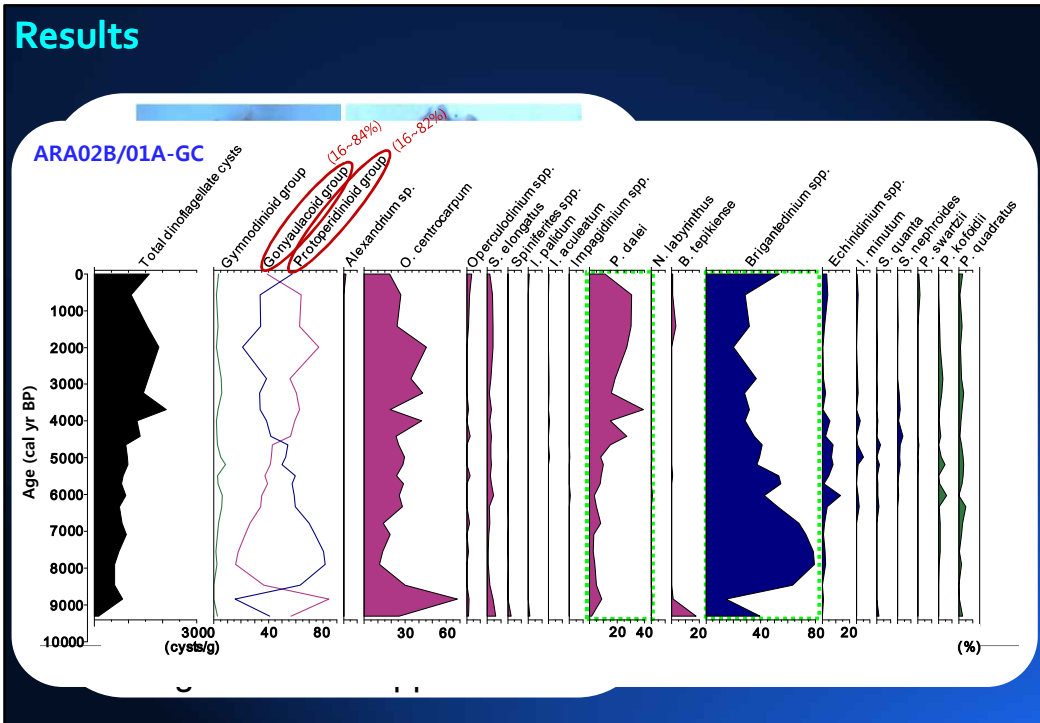
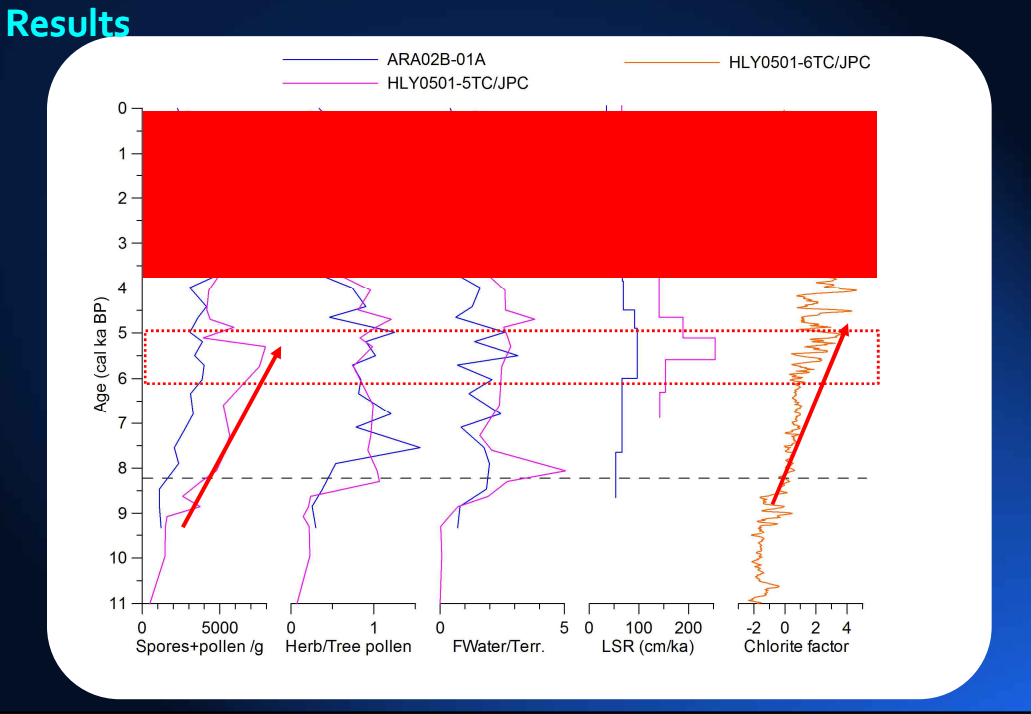
## Research objectives

- New terrestrial and aquatic palynomorph data from the Chukchi-Alaskan margin
- the effects of the Bering Strait opening & inputs of Pacific and riverine waters
- major vegetational changes in the adjacent Siberian and Alaskan regions
- Holocene changes in palynomorph associations
- possible source areas and transportation mechanisms

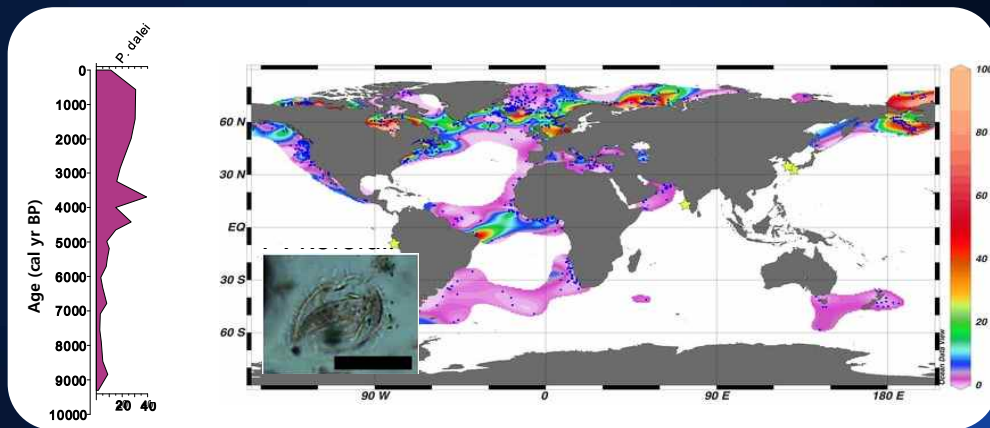
## Coring sites





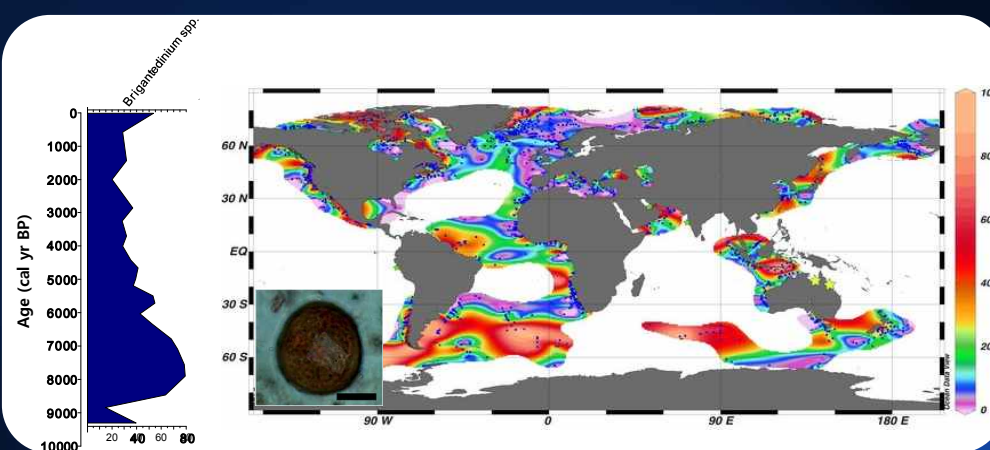


## Results

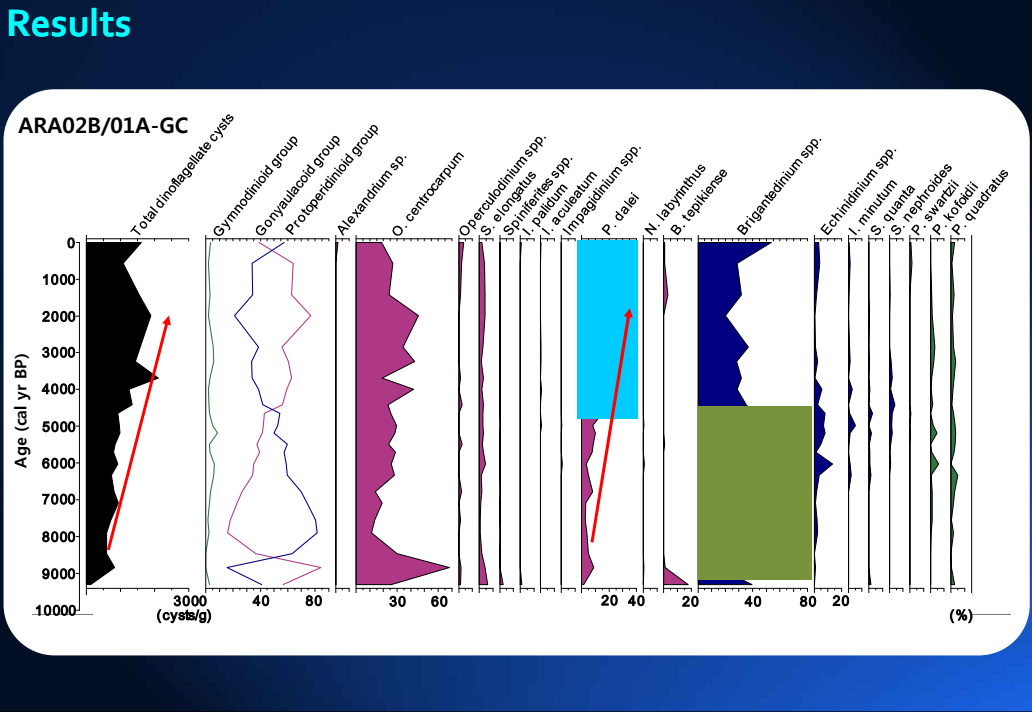


- observed in polar to equatorial regions & open ocean to coastal sites
- dominate (>50%) in the northern high latitude
  - form up to 96% of the association in the Chukchi Sea and the Bering Sea region
- abundant in sites where
  - water temperatures < 0°C
  - water salinities are reduced throughout the year as a result of meltwater or river input
  - in the Arctic, areas covered by sea ice for up to 9 to 12 months a year

## Results



- can dominate
  - from coastal to open ocean
  - from brackish to hypersaline
  - from tropics to sea-ice covered region
- increased cyst production occurs due to increased nutrient availability
- the production of diatoms and cyst production of *Brigantedinium* spp. clearly correlate



### Summary



**Thank you for your attention**