

Data

1993-1995

resolution

AWI traverse in Northern

Greenland (NGT) between

100-150 m long firn cores

after back diffusion

 $\delta^{18}O$ measured in 2-3 cm depth

annual dated by layer counting

B16 B18 B19 B21 B22 B26 B29 B30

Accumulation rates (mm w. e. a-1)

144 106 102 108 159 161 152 177 Hight (m WGS 84)

3040 2508 2234 2185 2242 2598 2874 2947

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Spatial variability of δ^{18} O during the past 1000 years in Northern Greenland

Motivation

To reconstruct climate changes it is neccessary to have regionally representative data set. Stable water isotope records from the NGT cores are used to better understand the spatial variability of the climate in Northern Greenland. *Questions:*

· How representative is a single record?

Fig. 2 Time series of δ^{18} O in the NGT cores

· What ist the correlation between the sites in Northern Greenland?



Time series

- NGT cores do not show the same δ^{18} Ovariability
- isotope records from low accumulation sites are more smoothed by diffusion (B19)
- core sites have different sources of moisture
- influence of volcanic and global climate events is evident
- for some time slots cores are highly correlated, for others not



Conclusion

- the quality of correlation is independent on distance between the core sites
- the isotope records reflect high spatial variability in the Northern Greenland's climate
- it is difficult to find a representative record for climate in Greenland

Outlook

· to analyze spatio-temporal variability

Principal components $\int_{0}^{0} \int_{0}^{0} \int_{$

- · PCA-analysis shows that there is no dominant signal for the cores
- each core has other main influencing factor
- climatic meaning of the principal components is unclear



Spatial correlations



Fig. 5

Lower pannel: The scatter matrix of the 5 years box average of the annual δ^{18} O values. The red lines in the scatter plots show the linear regression line.

Upper pannel: Significant pearson correlation coefficients as used in fig. 1. 5 years box averaged data usded, because correlation increases increases with averaging. Black numbers are significant on 95% level, blue numbers on 90%.

- relatively low correlation coefficients
- negative correlation with B19
- differences in accumulation rates are not the reason for differences in load of trace elements (Mieding 2005)





References. B. Madrey (2009) Roomstruction of mitienial aerosol-chemical ice core records from the northeast Greenland: Quantification of temporal changes in atmospheric circulation, emission and deposition, PhD-theses