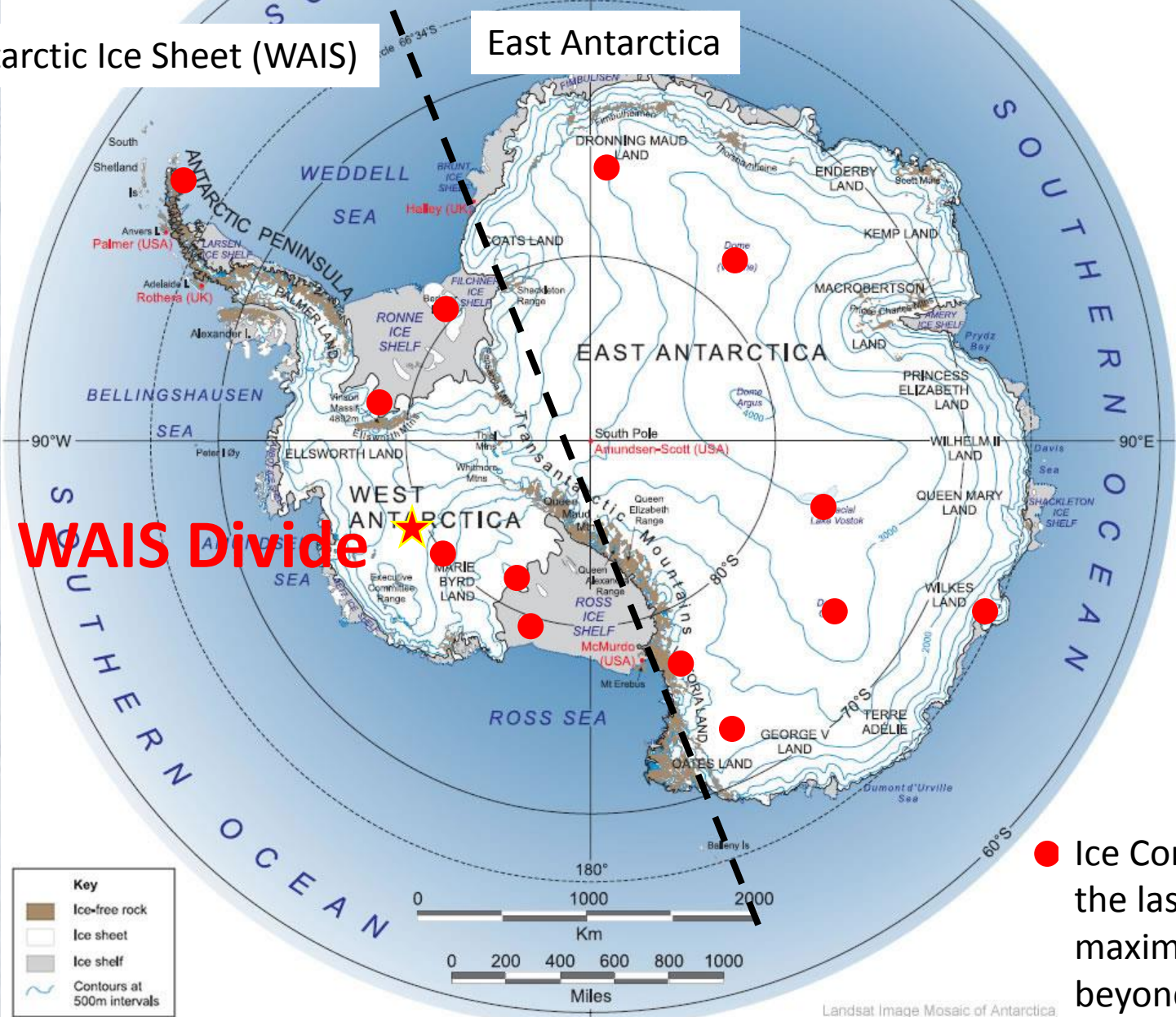


# West Antarctic Accumulation for the past 31 ka

T.J. Fudge, Michelle Koutnik  
Kurt Cuffey, Christo Buizert,  
Howard Conway, Ed Waddington, Tom Neumann  
Brooke Medley, Brad Markle, Eric Steig,  
WAIS Divide Dating Team

## West Antarctic Ice Sheet (WAIS)

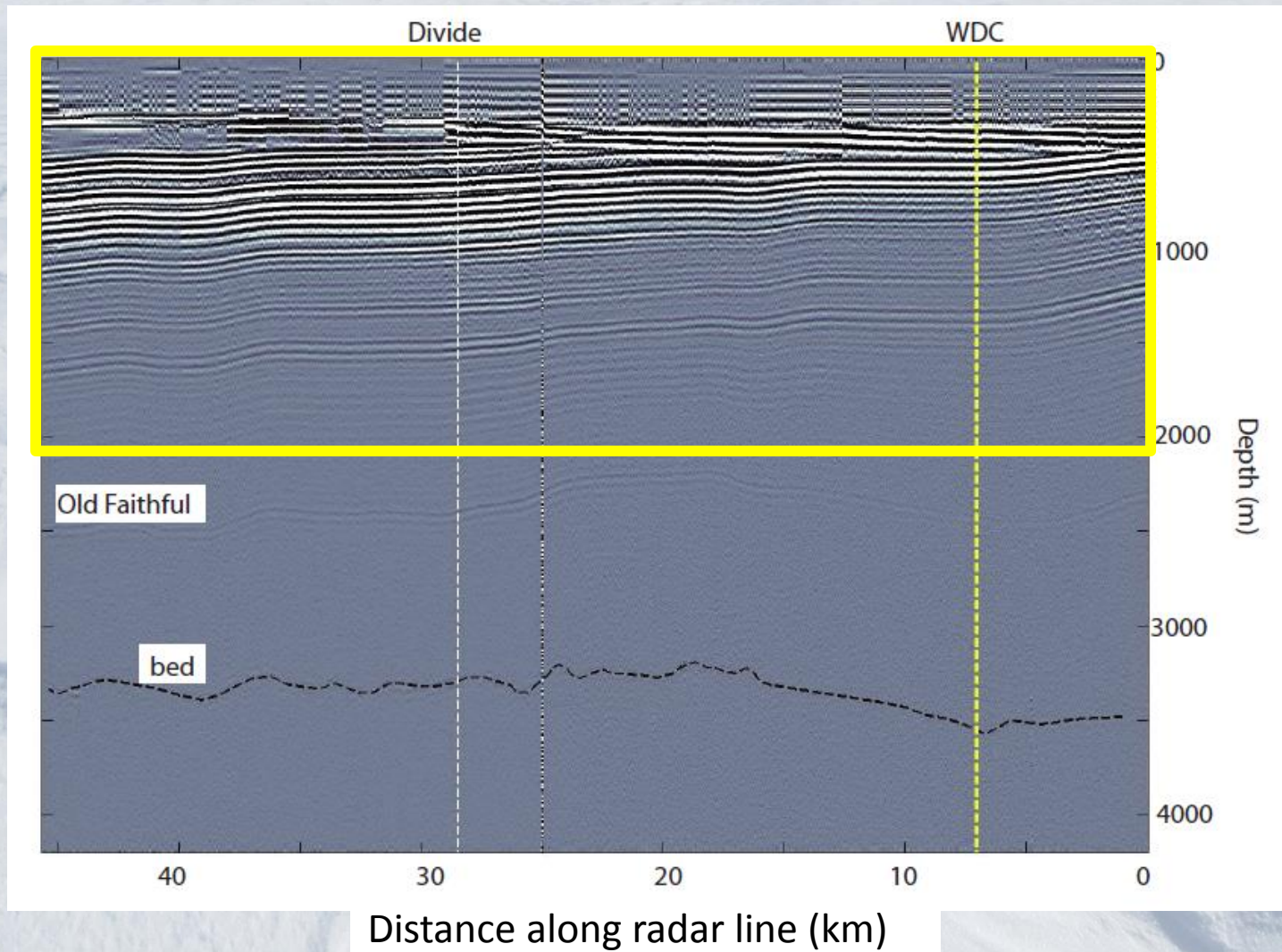
## East Antarctica



- Ice Cores reaching the last glacial maximum and beyond

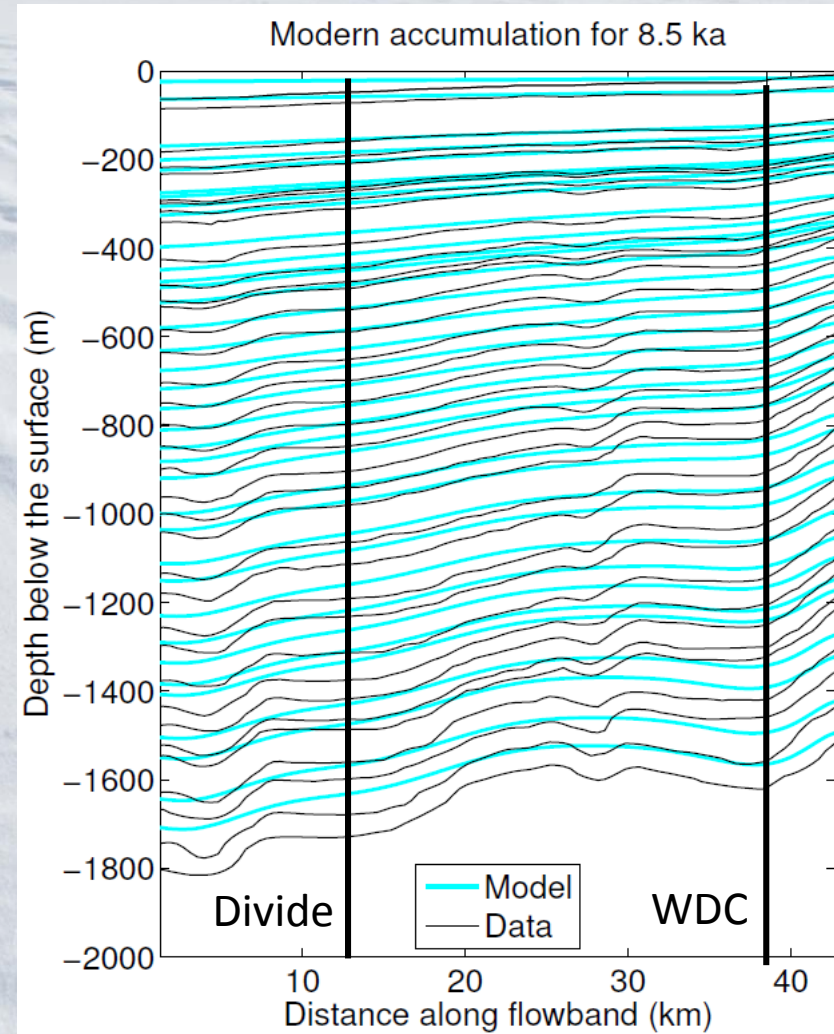
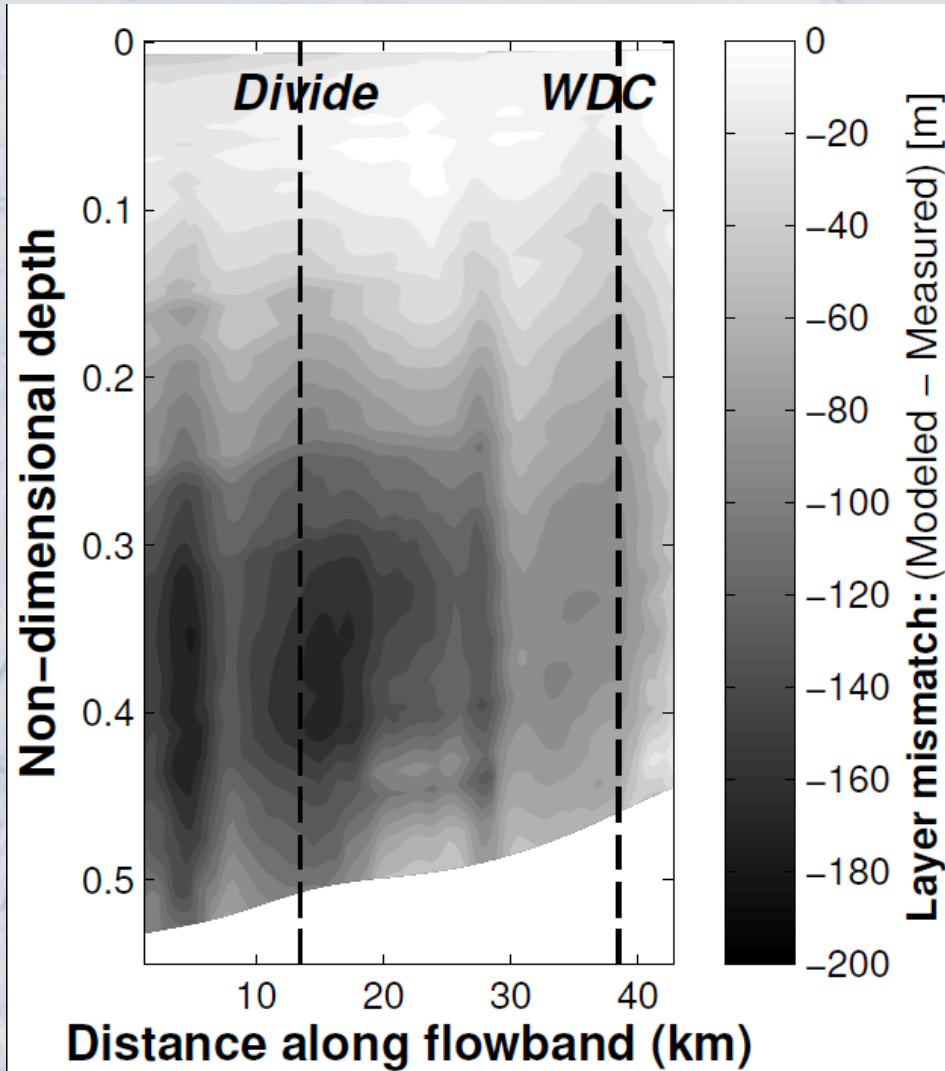


# Internal Stratigraphy



**How consistent is this with the internal stratigraphy?**

# Steady-state using modern conditions





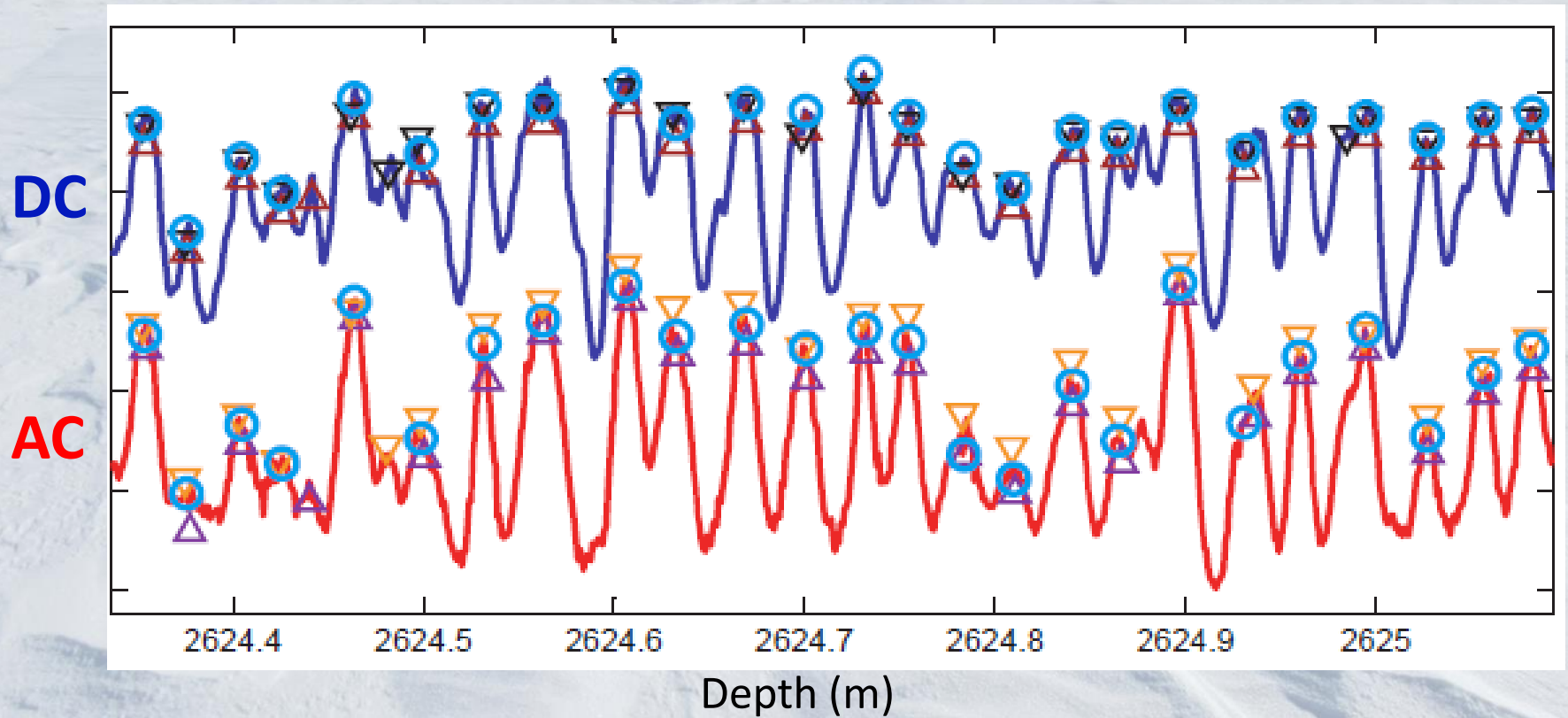
**Warning!!!**



Performing their  
California classic:  
“I love it when it  
rains”

**Entering paleoclimate wiggle land**

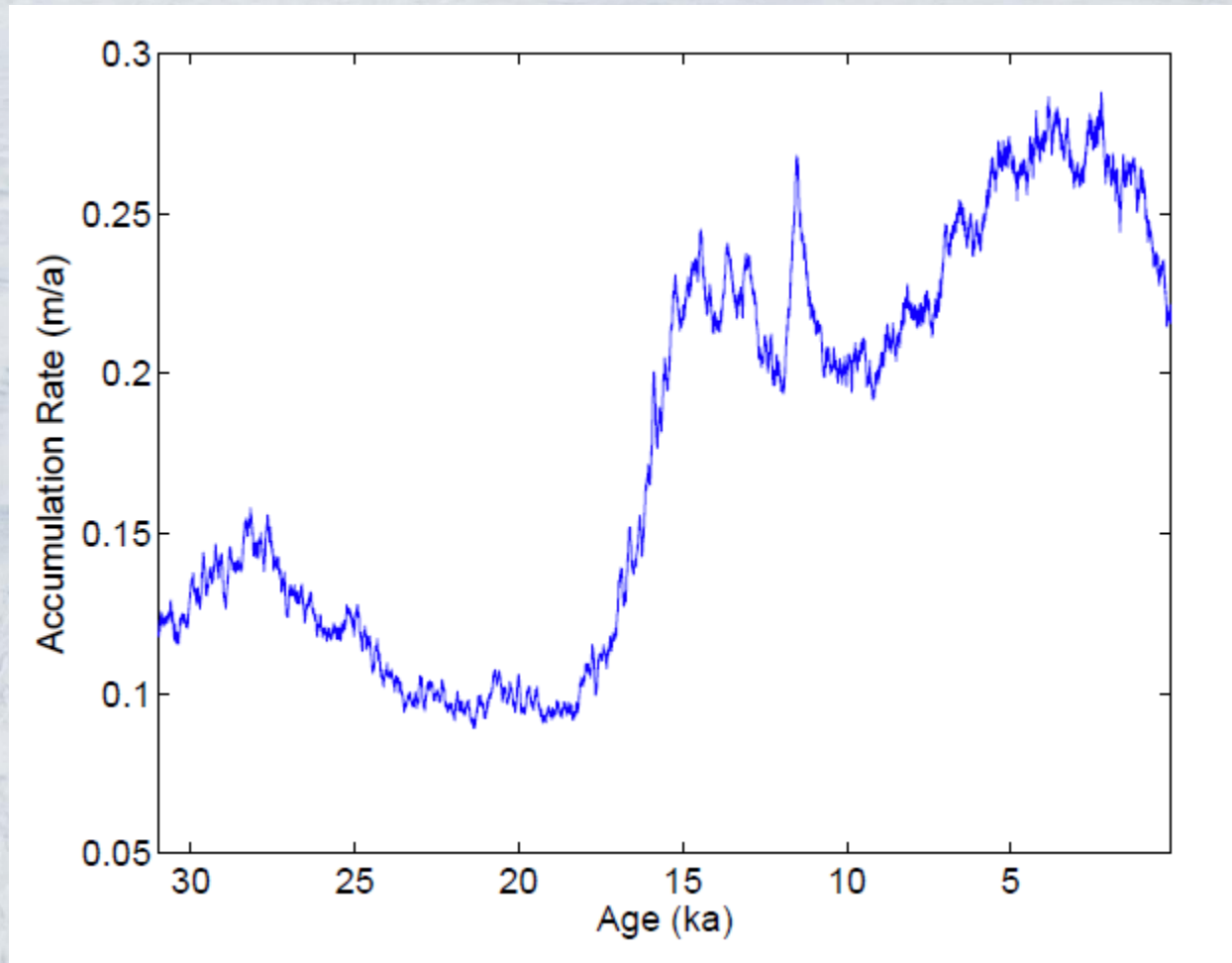
# Annual resolution for 31 ka



~26,000 years ago

Records high-frequency variations in accumulation rate

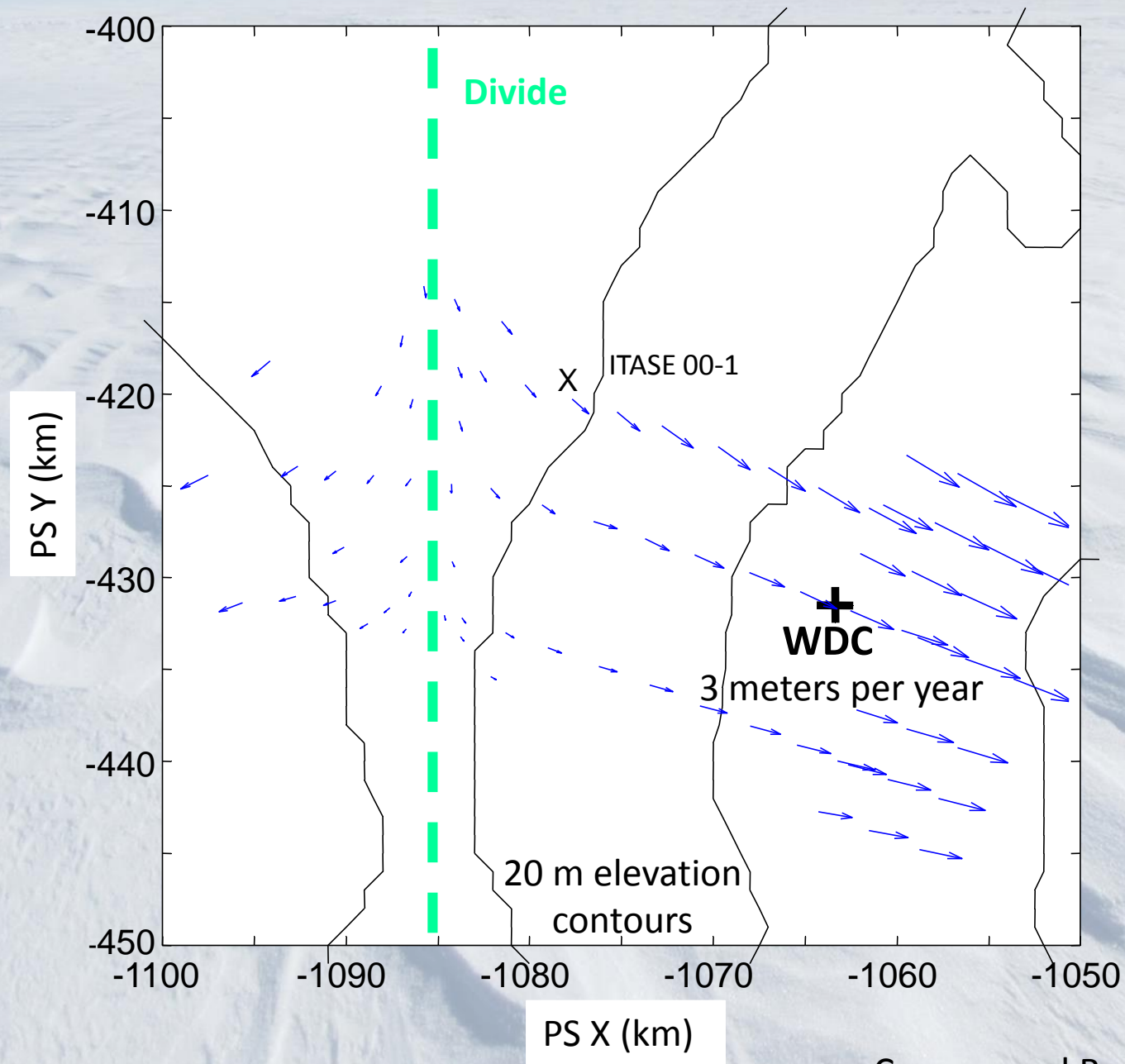
# “Ice Core” Accumulation Rate



“Ice core” accumulation rate inferred using 1-D ice flow model constrained by WD2014, borehole temperature profile, and firn thickness proxy  $\delta^{15}\text{N}$

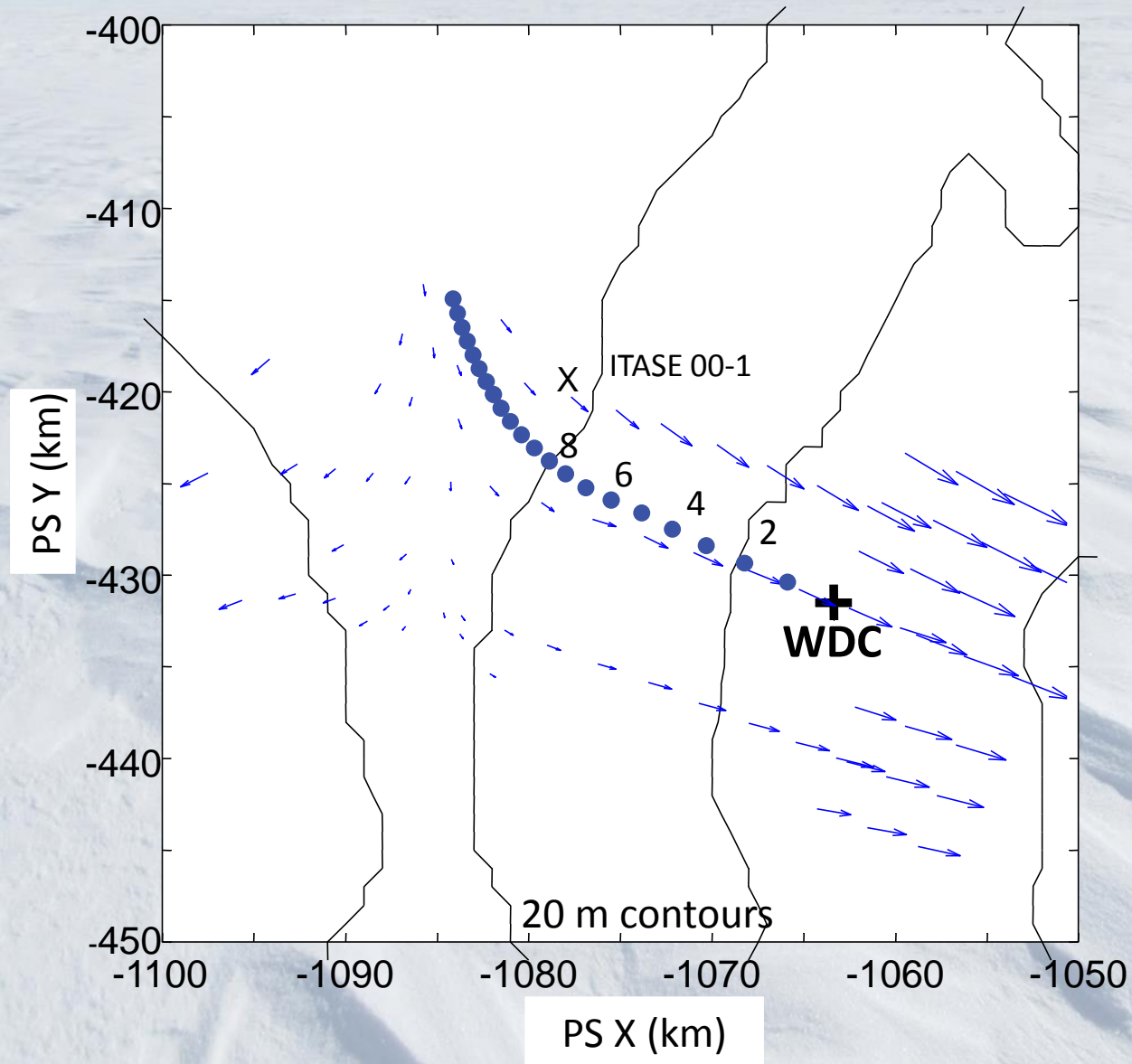


# Ice in the core originated upstream

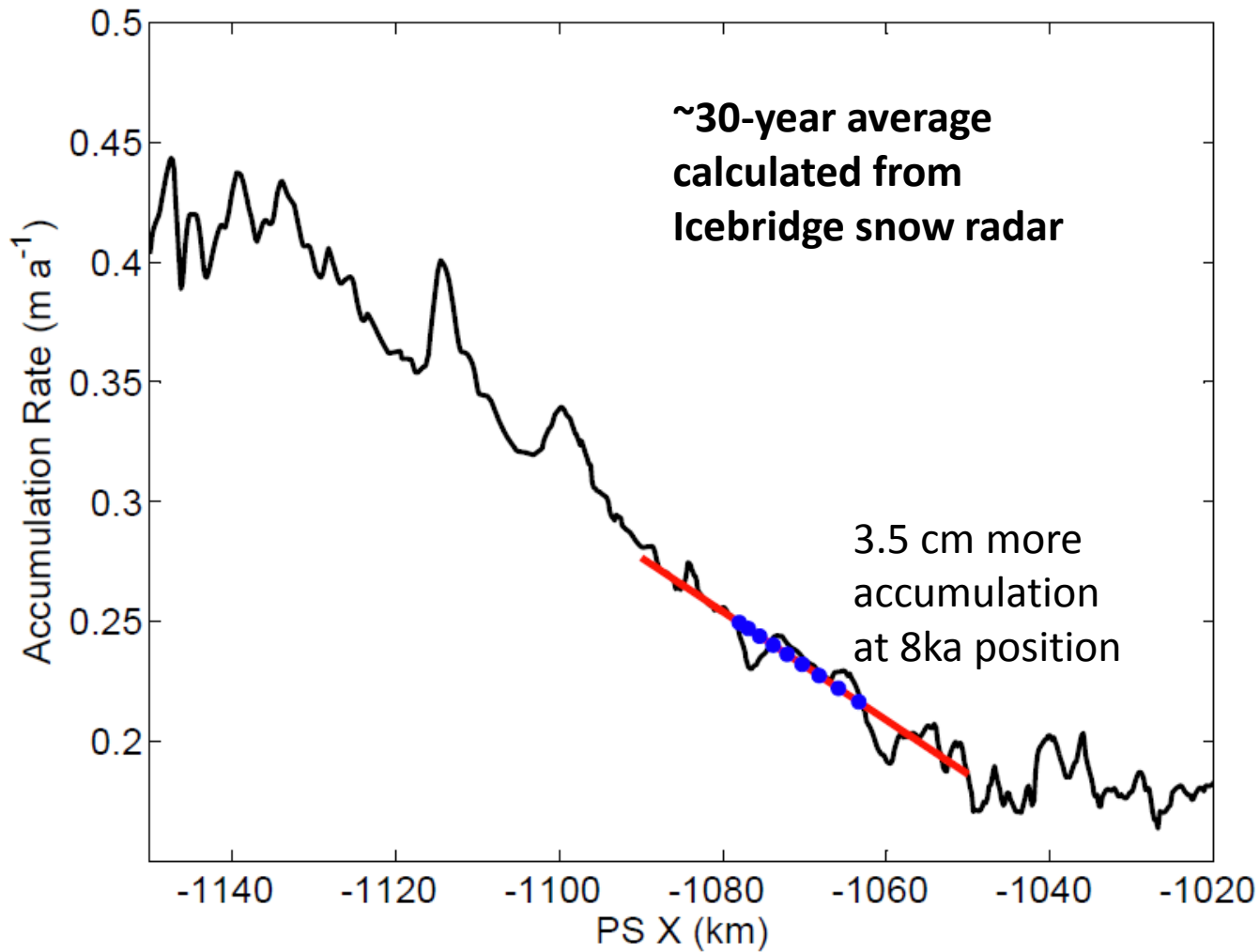




# Advection correction using modern conditions

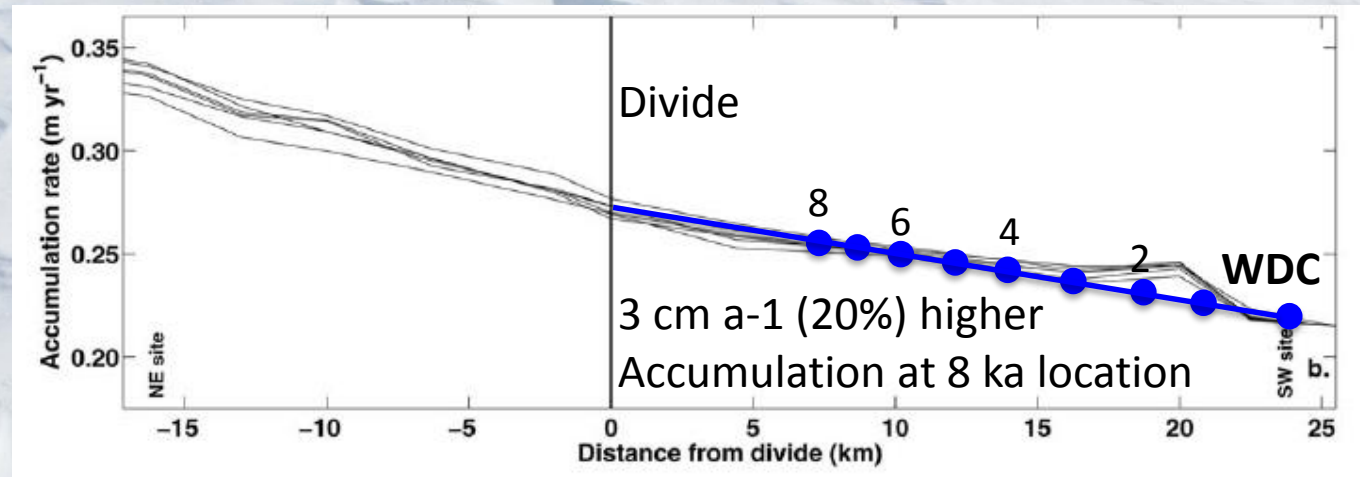


# Accumulation Gradient



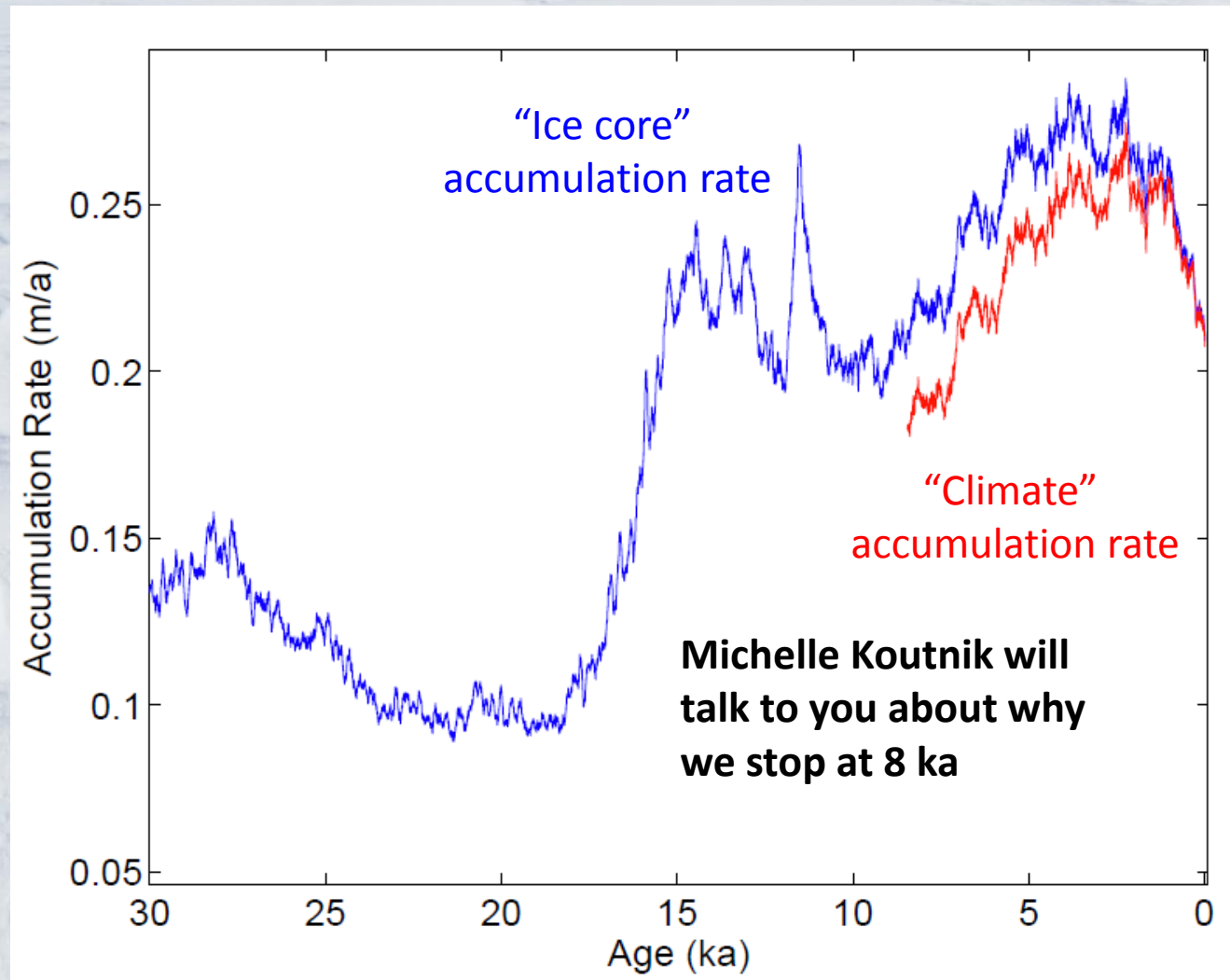


# Accumulation Gradient



Accumulation calculated from layers up to 370 years old

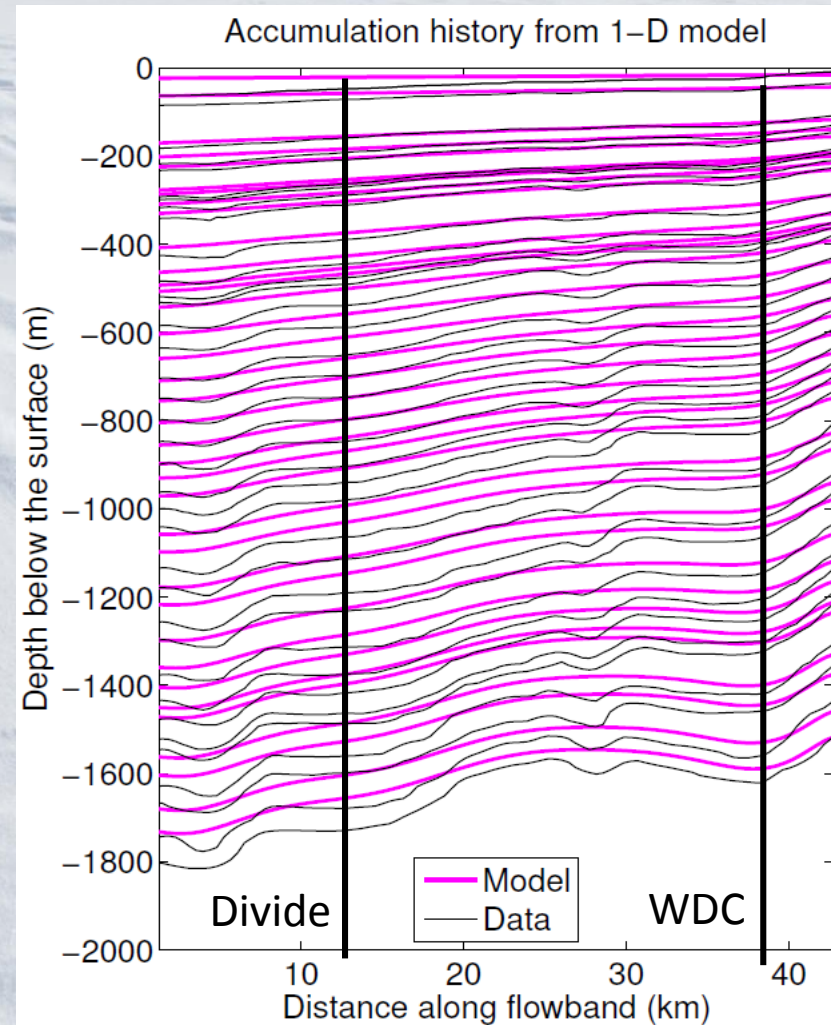
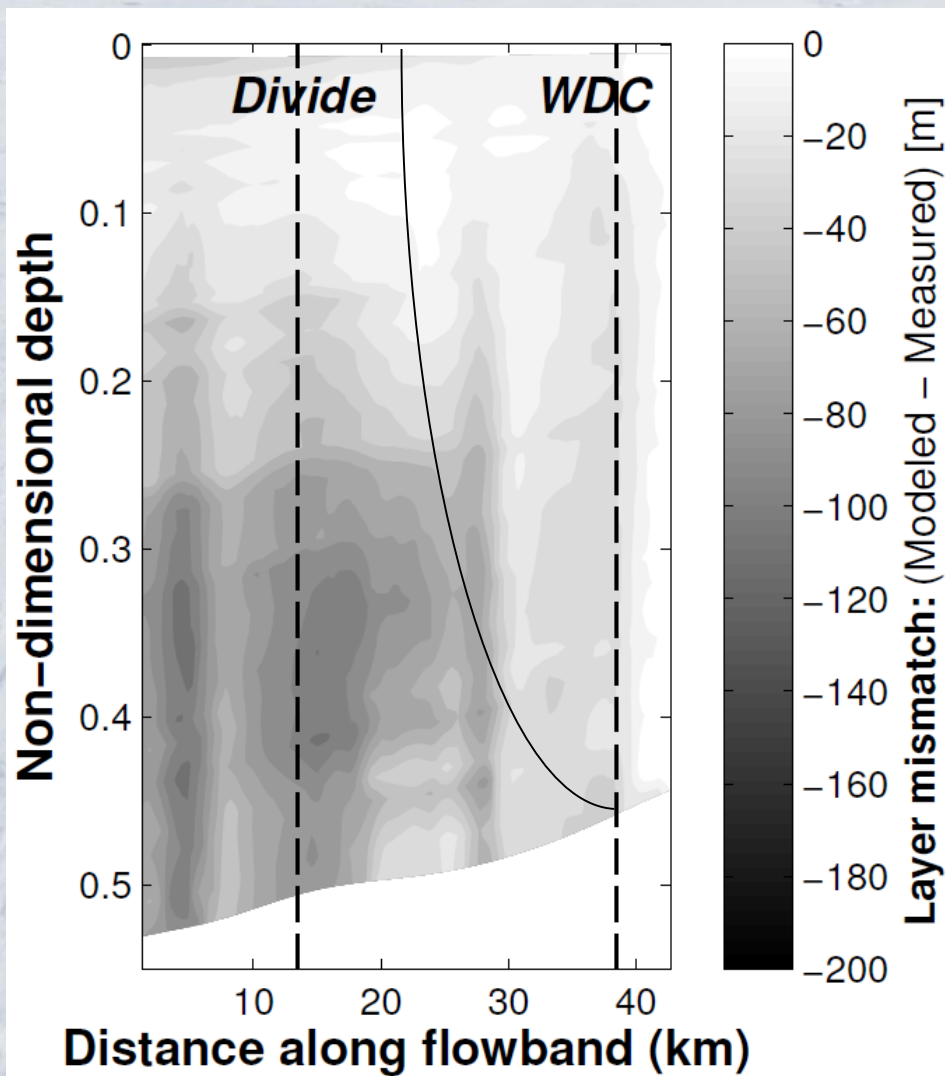
# “Climate” and “Ice Core” Accumulation Rates

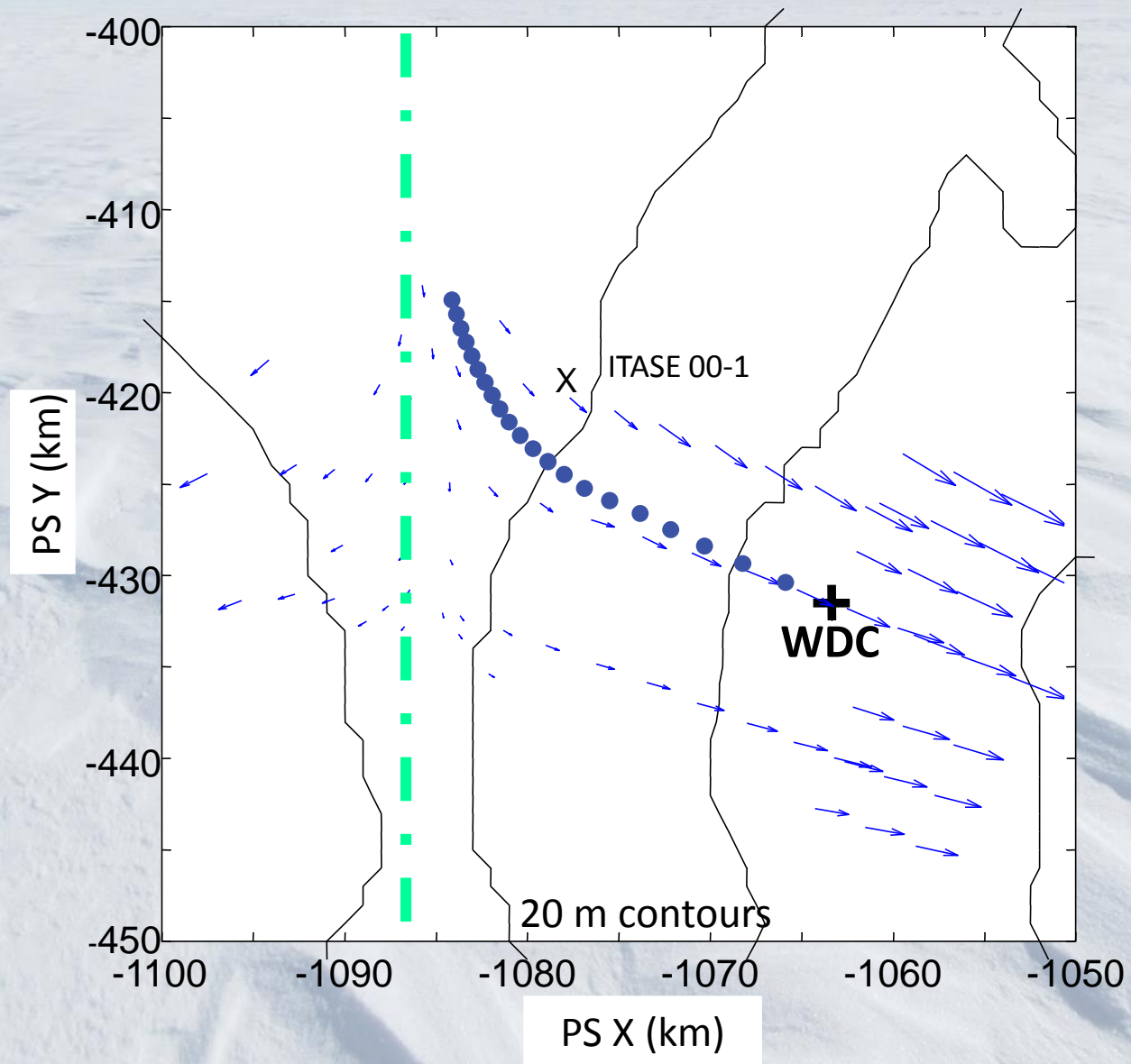


“Climate” Accumulation history is lower than “Ice core” accumulation history



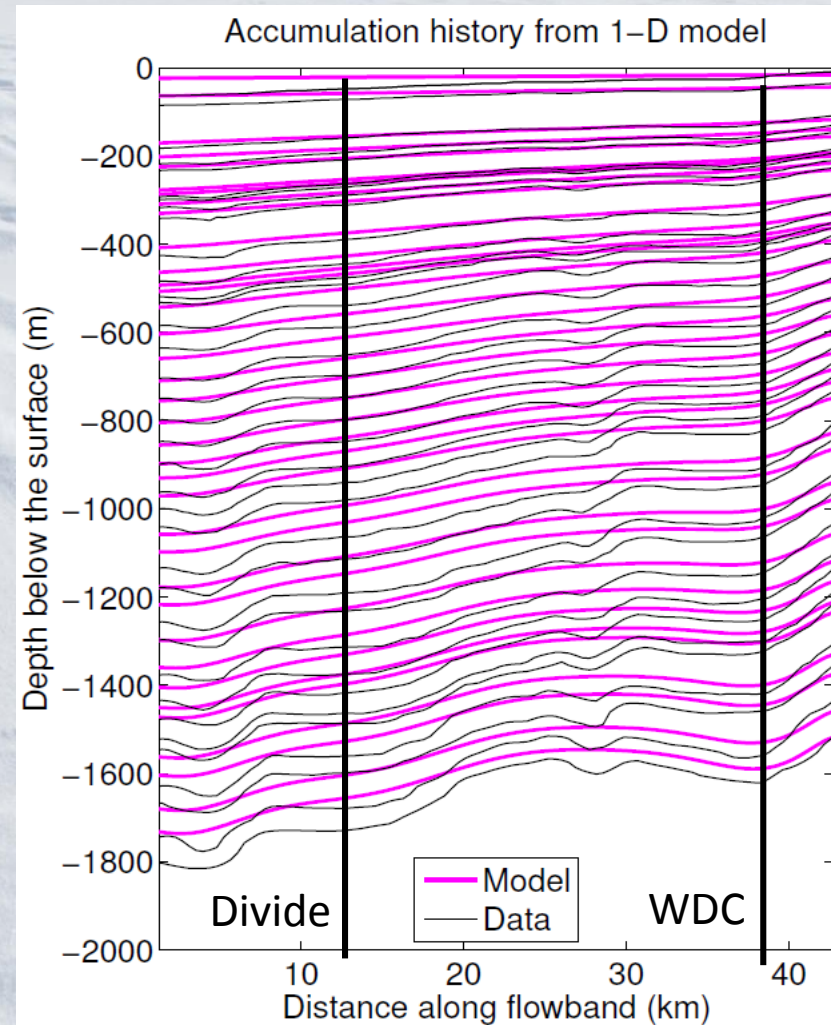
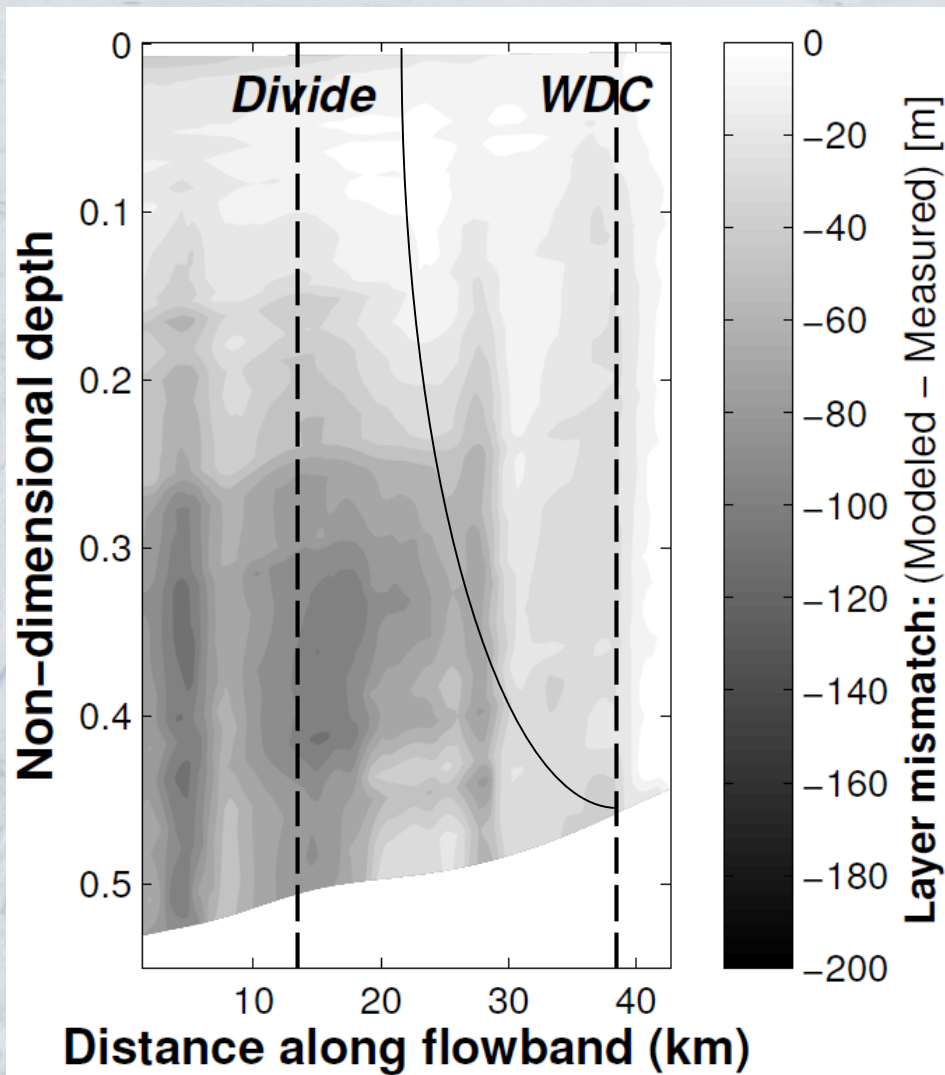
# “Climate” accumulation rate



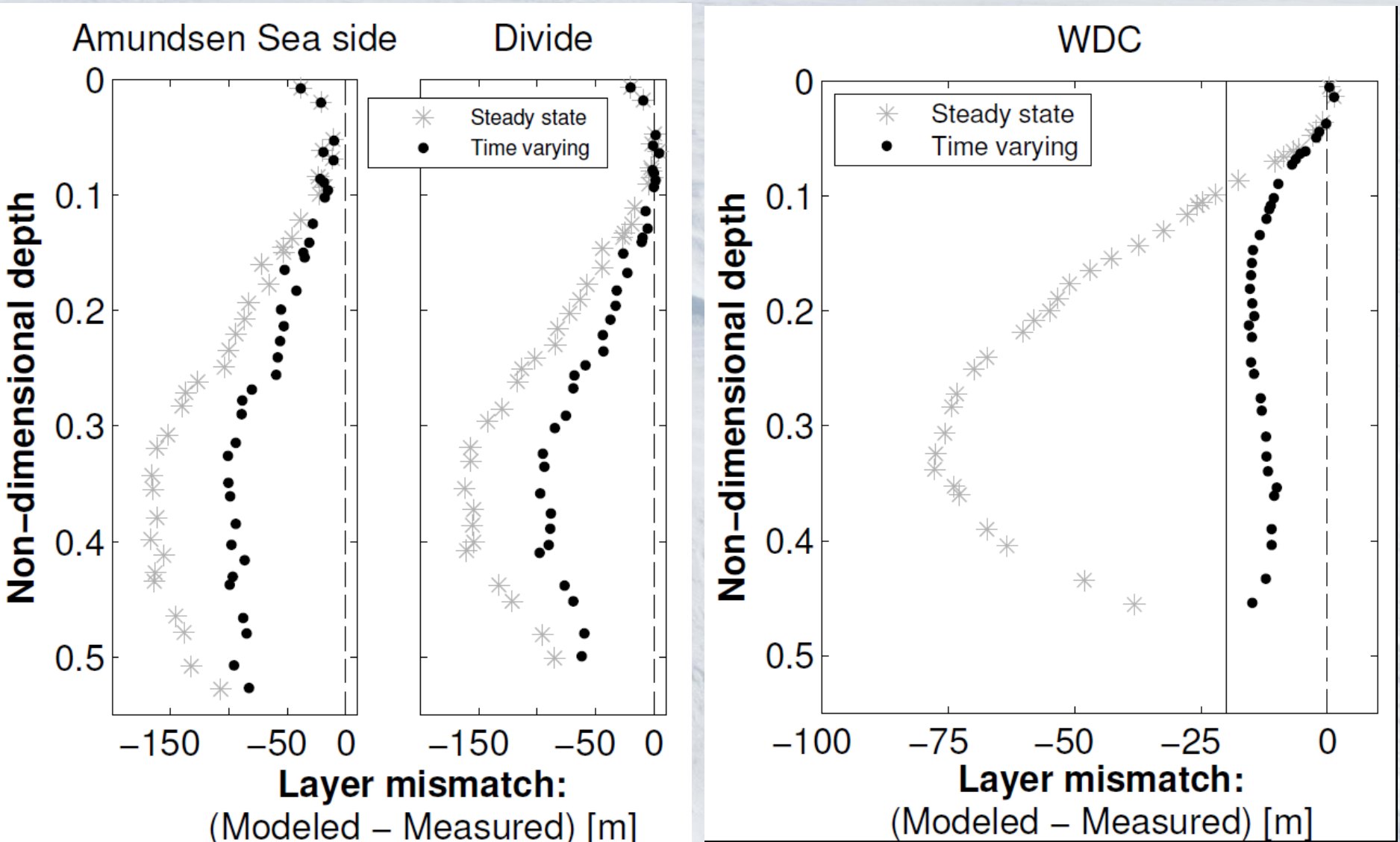




# “Climate” accumulation rate



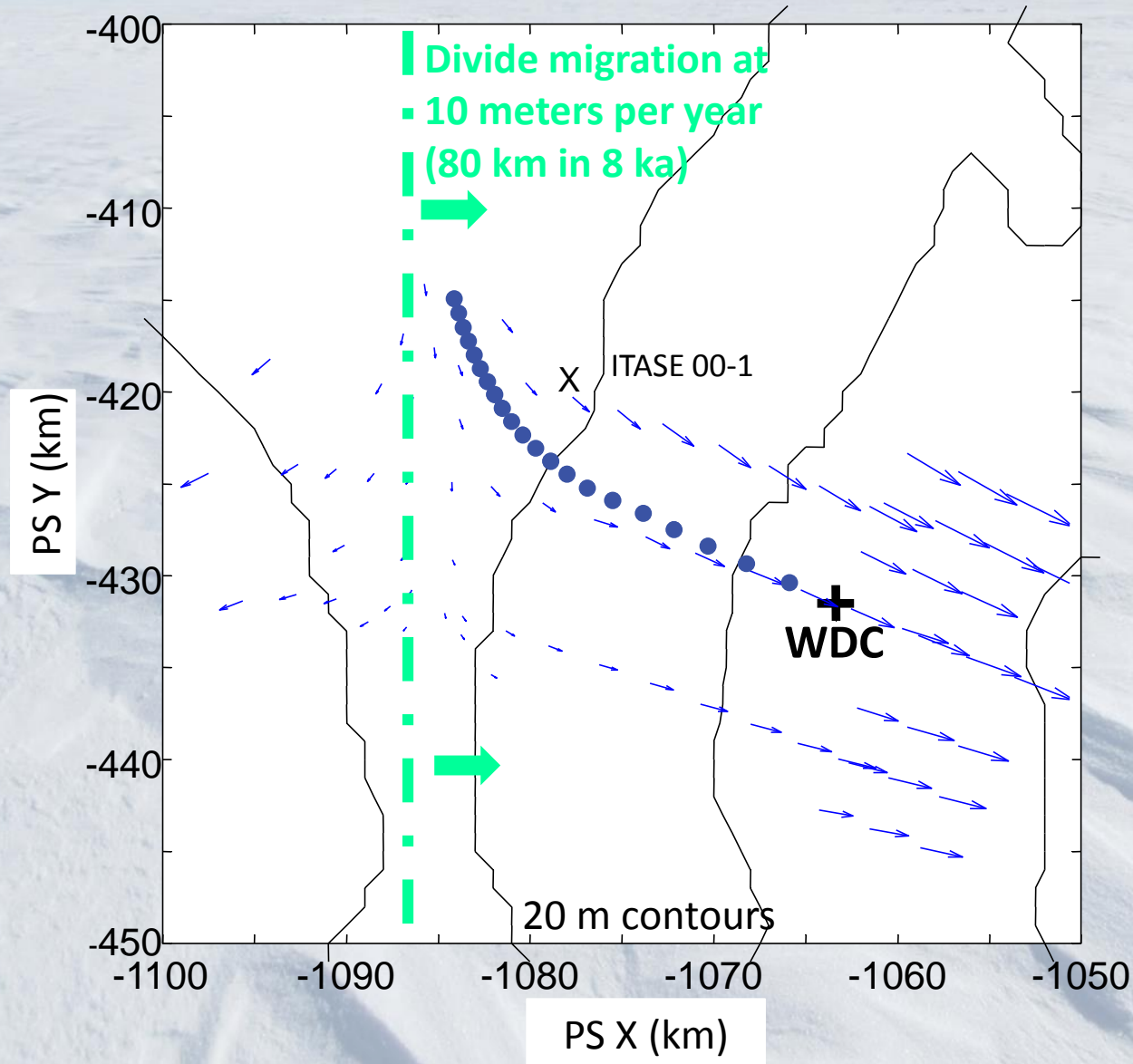
# Model Mismatch



**Match at core site is remarkably good**

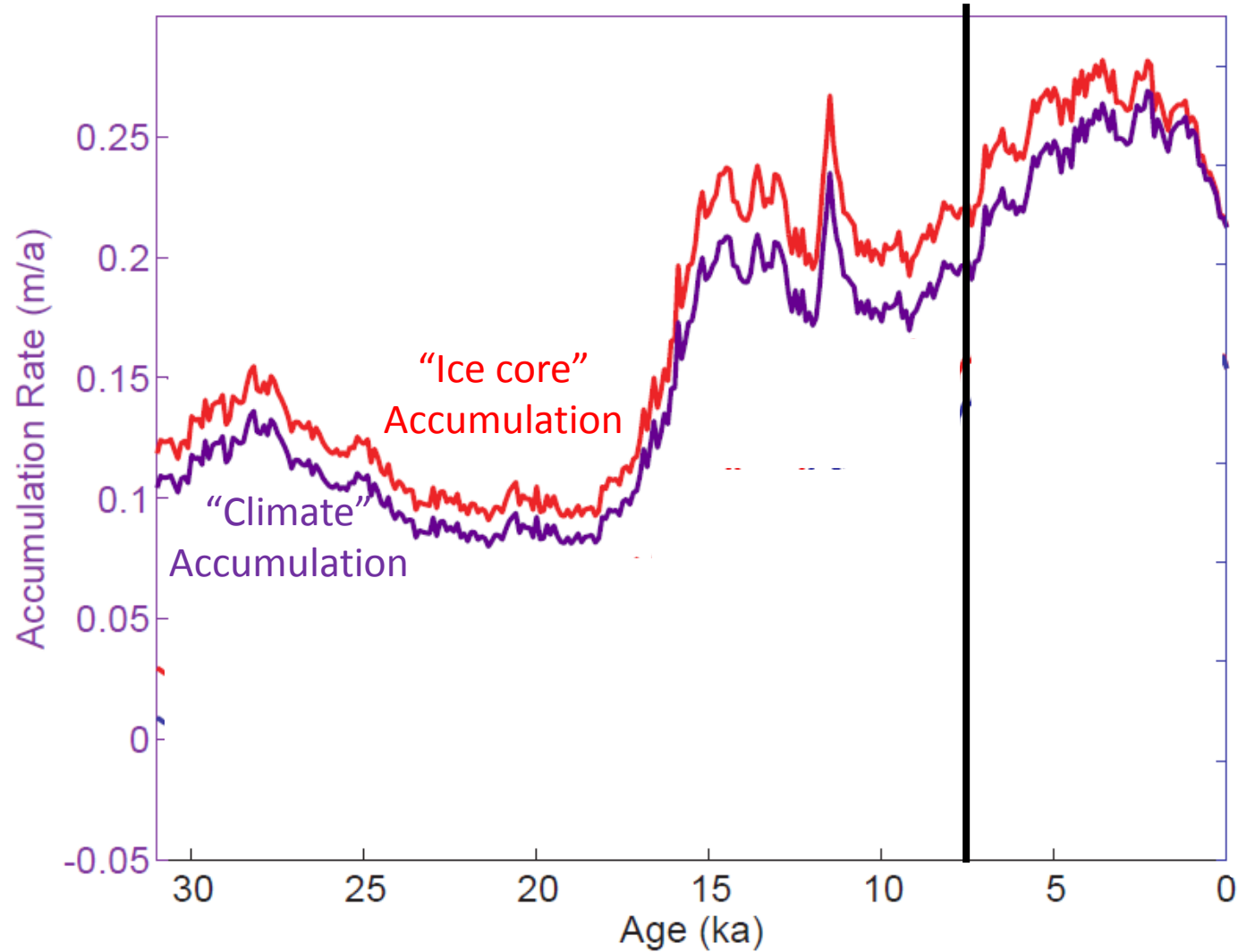


# Divide is migrating today

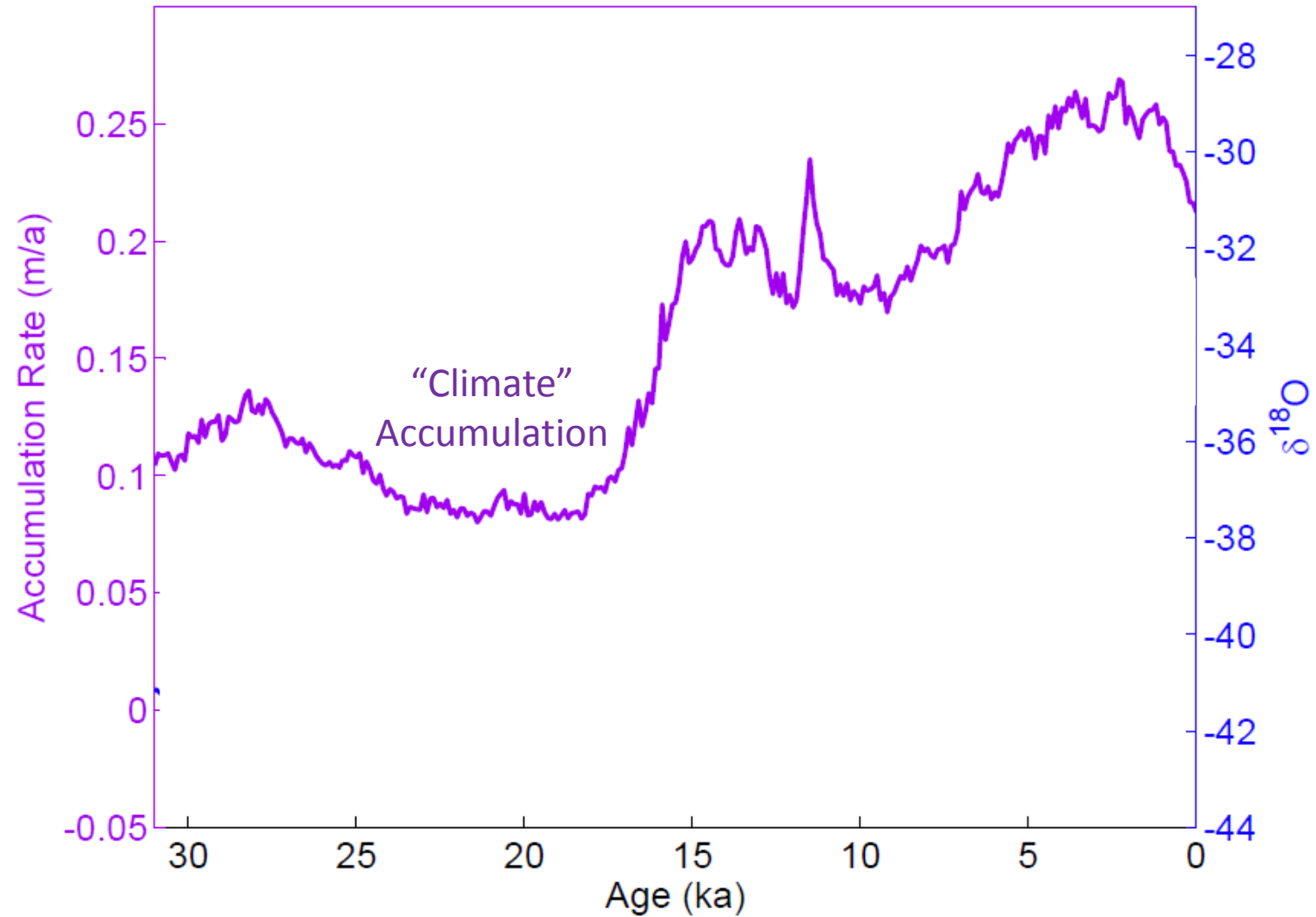


**Suggests current migration rates have not been sustained**

# “Climate” accumulation rate and stable water isotopes

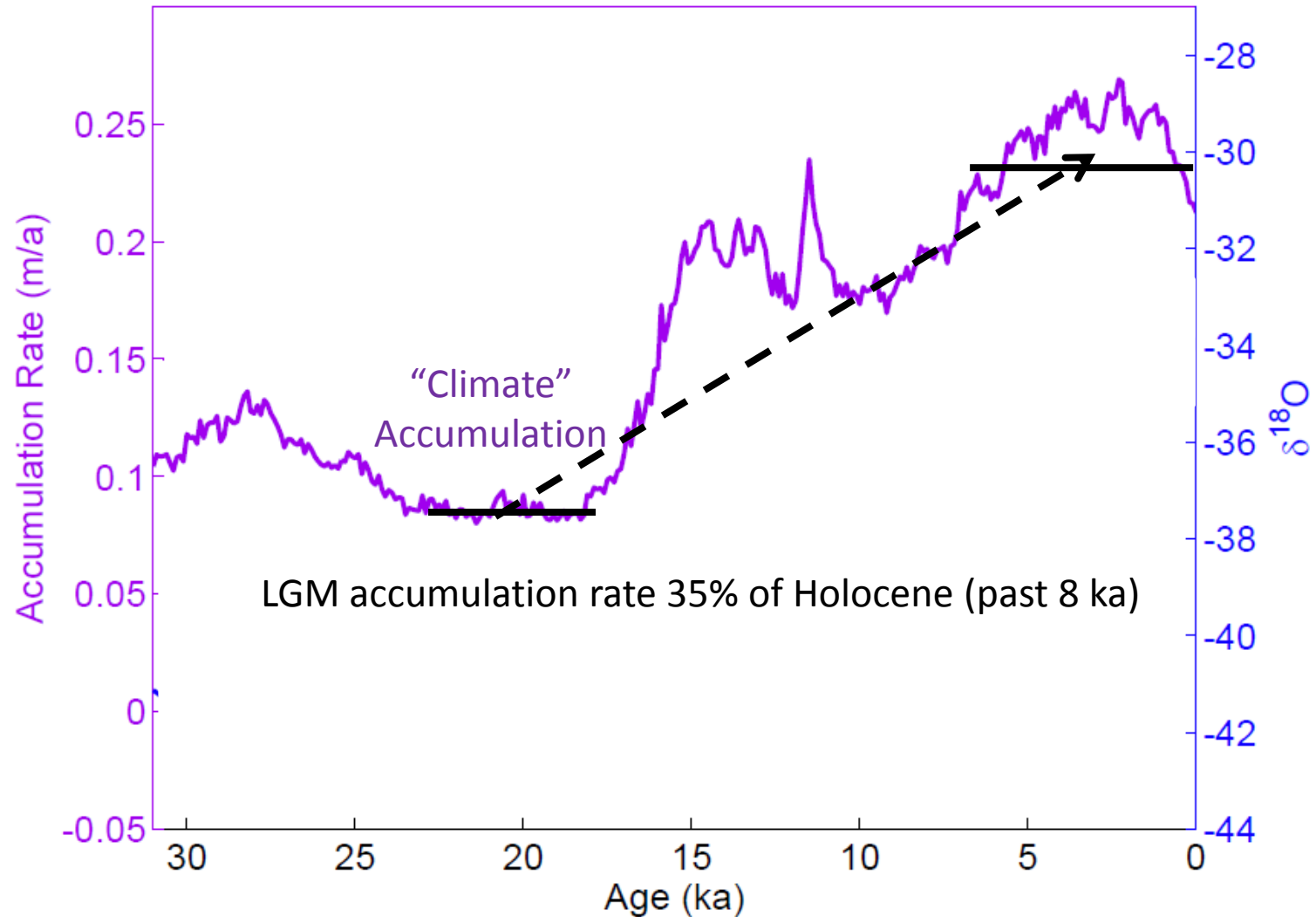


# Accumulation

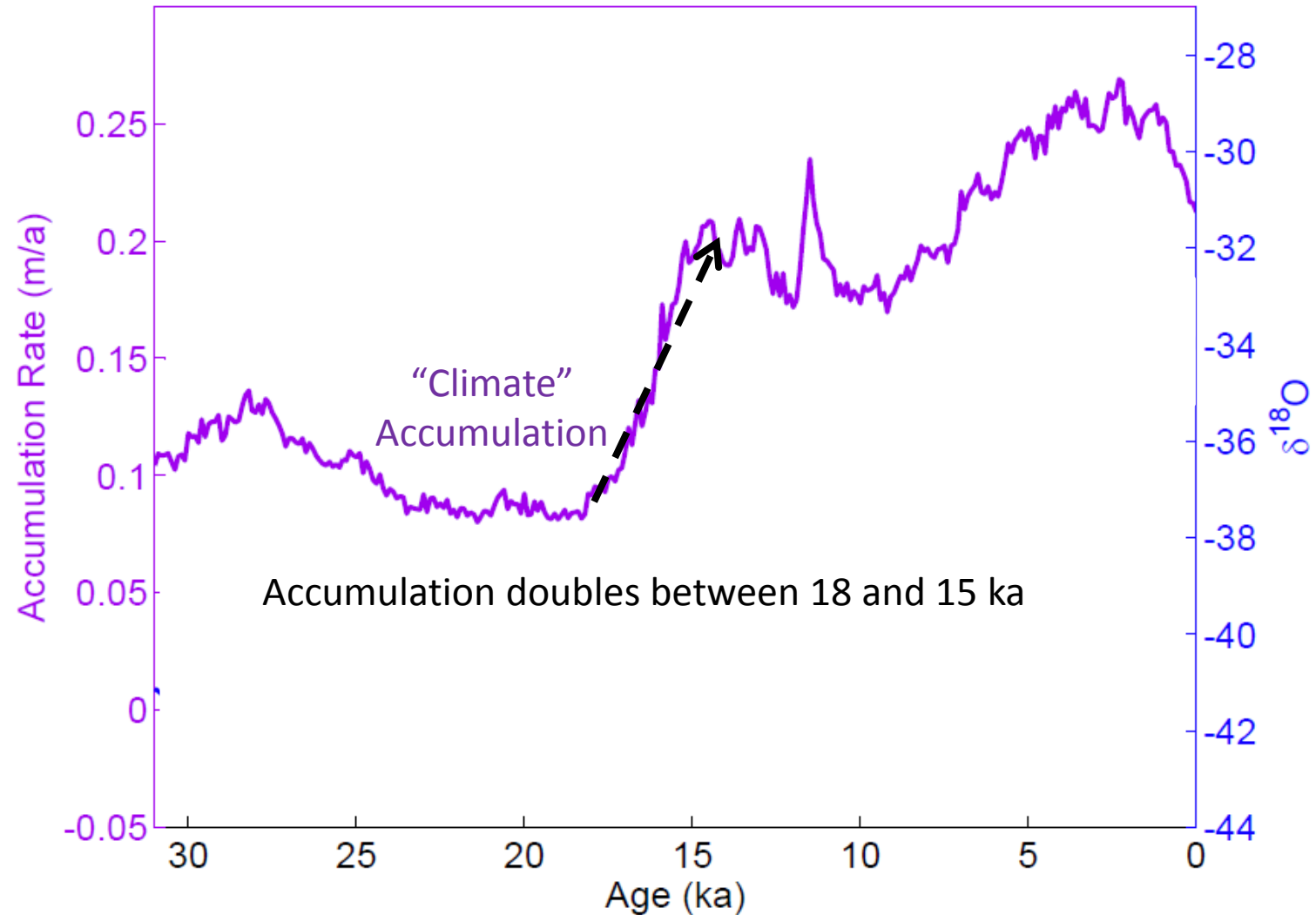




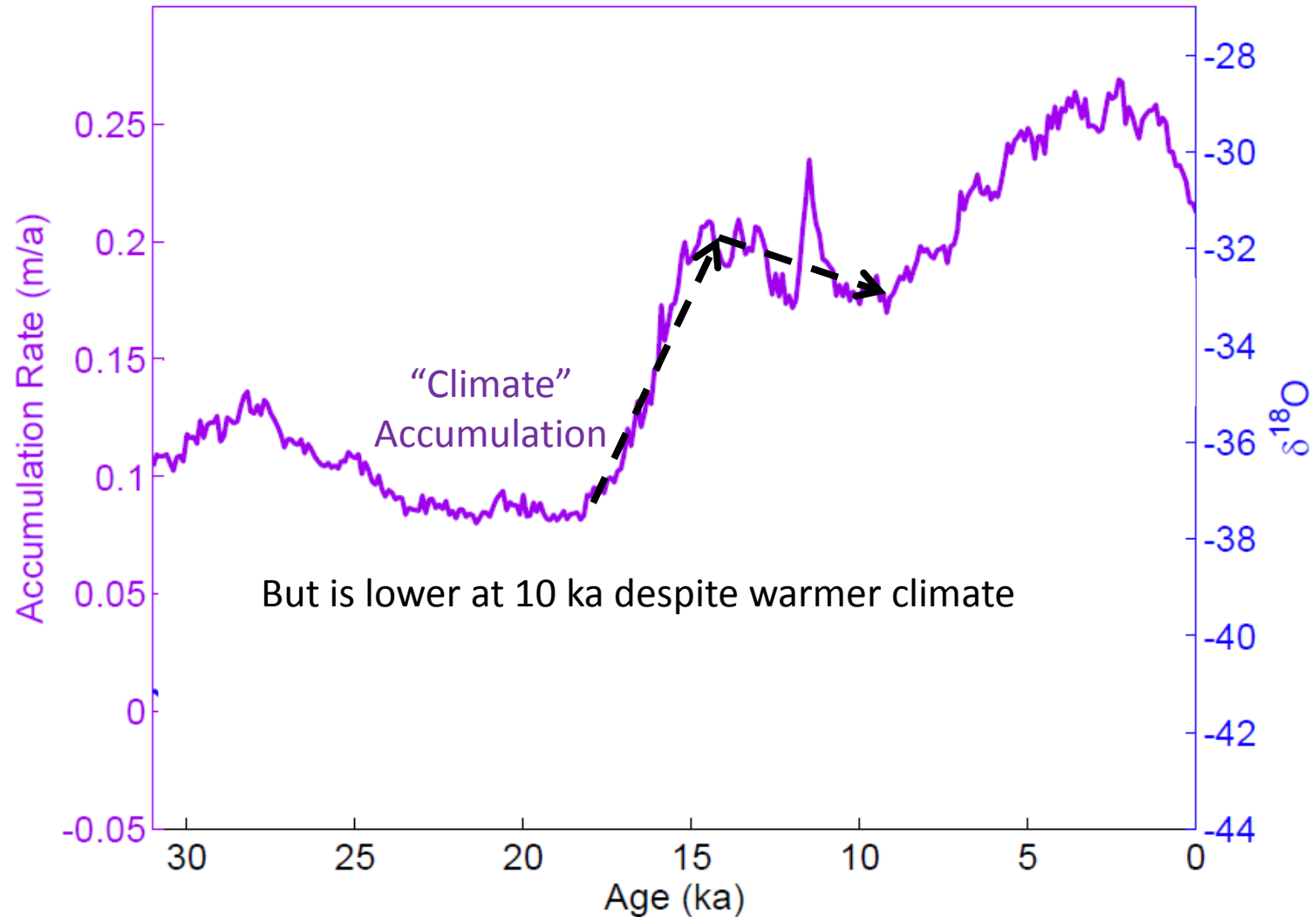
# Accumulation



# Accumulation

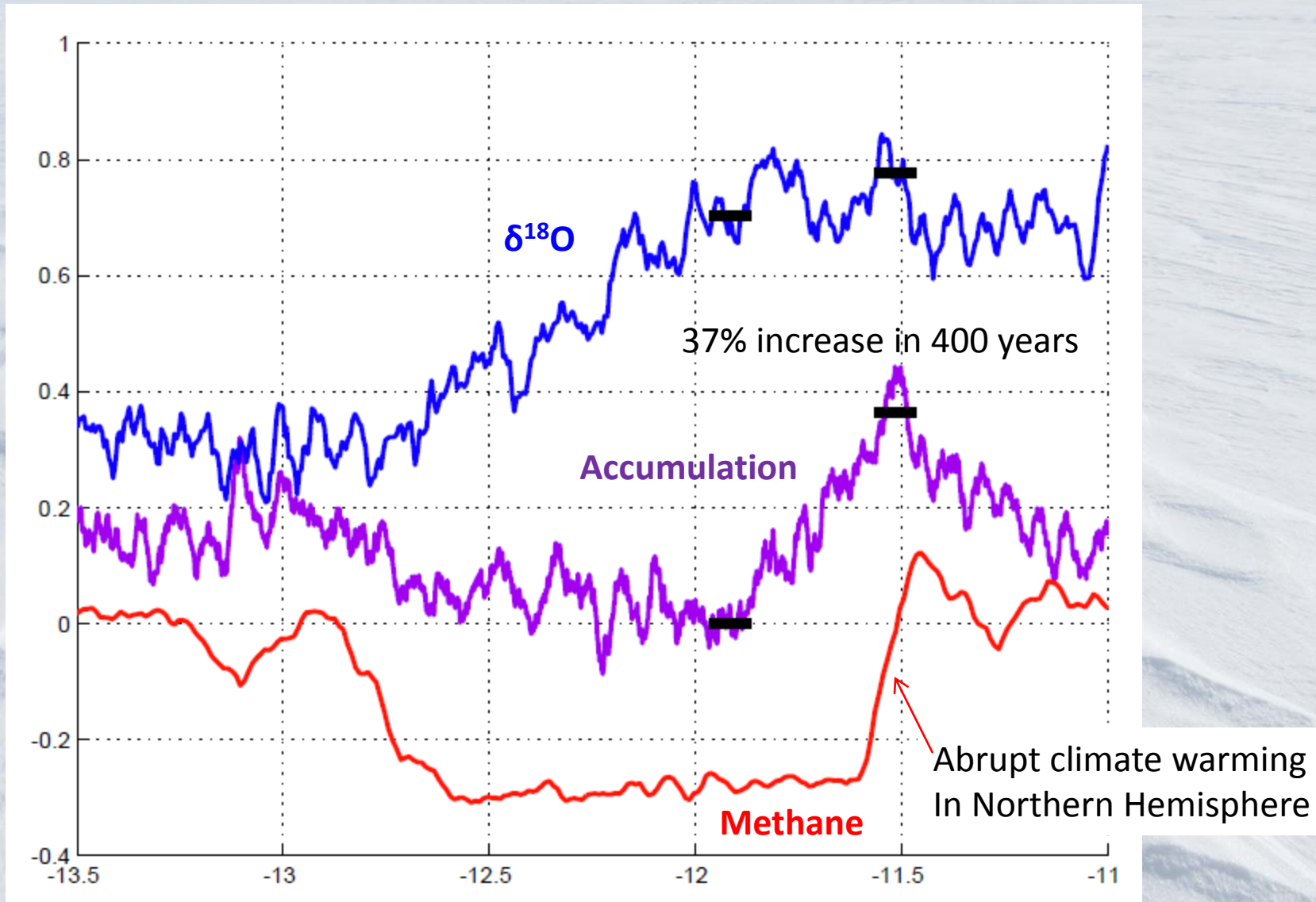


# Accumulation



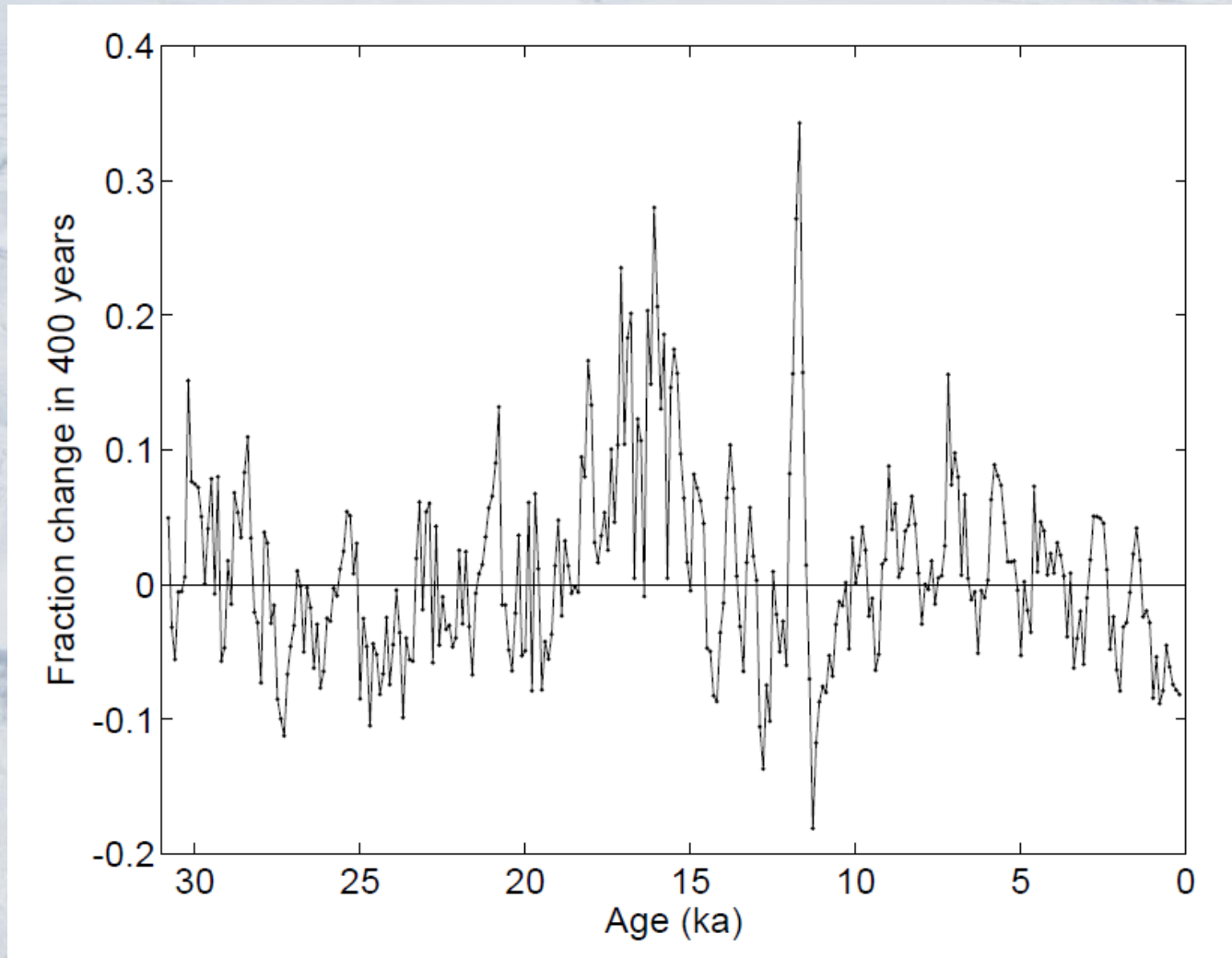


# Accumulation increase

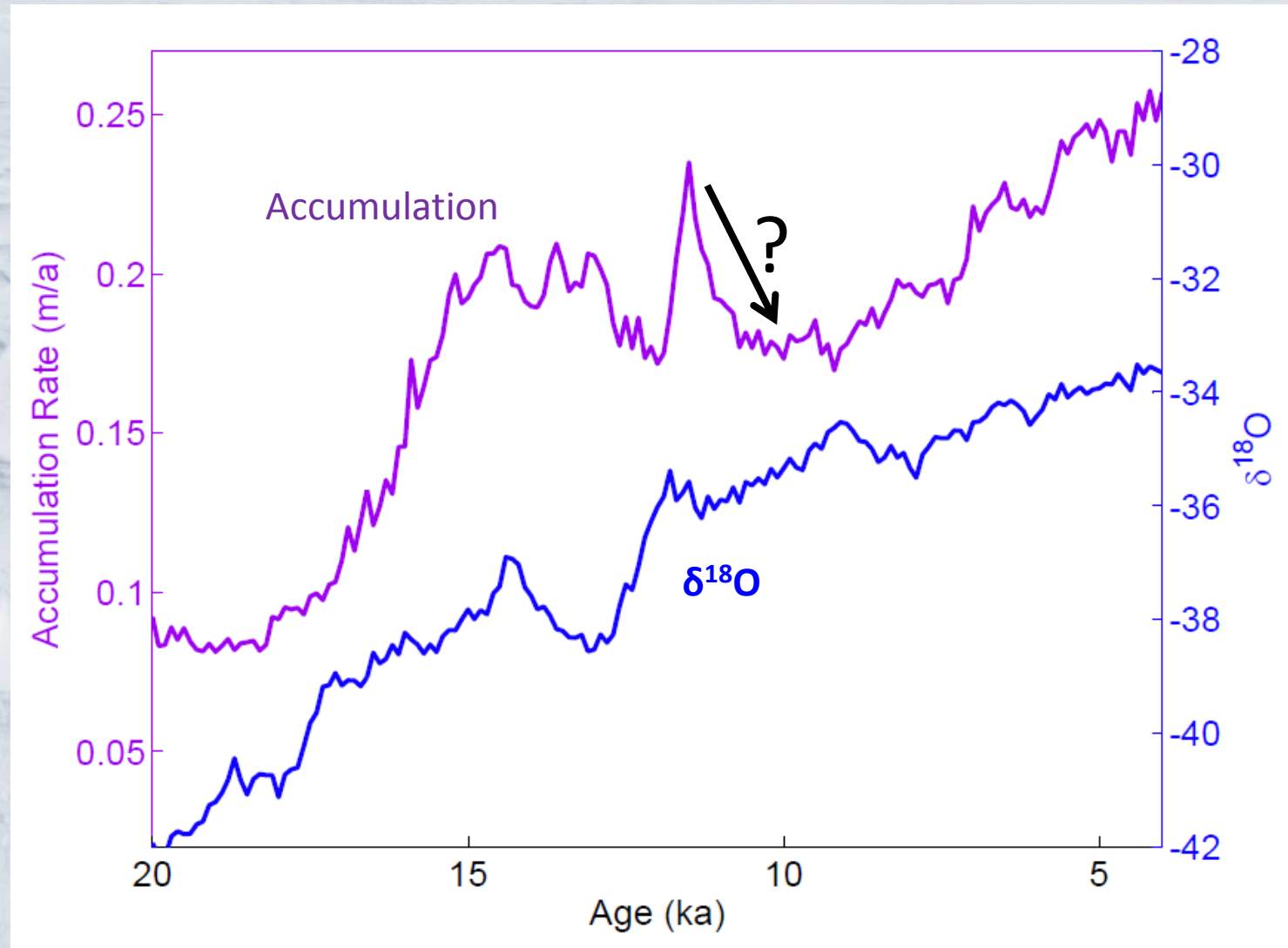


Climate not dynamics must cause increase

# How unique is 12 ka accumulation increase?



# What goes up must come down?



**Maybe the question is not why does the accumulation increase abrupt, but  
Why does accumulation decrease to below ACR values?**



# Conclusions

- Advection correction for past 8 ka is robust
- Current divide migration rate of 10 m per year has not been sustained
- Glacial-interglacial change in accumulation larger than expected. But advection effect unknown.
- Relatively abrupt accumulation change not easily explained by climate variations