

## Ice Drilling Program Office Draft ICWG Matrix for SAB-LRSP



TENTATIVE draft: Future IDD & DISC sites	2014	2015	2016	2017	2018	3 2019	2020	2021	2022	2023	2024
3-5-2014	1234	1234	123	4123	4123	41234	1234	1234	1234	1234	1234
40k - South Pole Intermediate drill coring		1	1								
Northwest Greenland & Coastal Domes ( Intermediate drill	Qaanaa	q)		11	11		11	11			
South Dome - Greenland									11	11	
North Taylor & Allan Hills area Site selection for North Taylor ground ba North Taylor - intermed drill Borehole logging North Taylor	ased	x	x	11	x x						
Allan Hills - Site selection ground based Allan Hills -Intermediate drill Allan Hills borehole logging		x	x		11	x x					
Antarctic coastal domes Amundsen Sea Coastal Dome with IDD Site selection Siple Coast dome Siple Coast domes				x x							
WAIS-D Deeper DISC drill coring - may be unlikely		?	?								
Herc Dome RAID Drilling at Herc Dome (optional) Herc Dome ground based site selection DISC drill coring main core DISC drill replicate coring Herc Dome borehole logging		x	x	x x	RR	D D D D D	D D D D	D D D D	D D D D	D	
IPICS oldest ice Drilling for oldest ice, estimate											D



## Future Sites for Intermediate Depth Cores (1500m)



- North Taylor Dome
- Allen Hills Intermediate core
- Qaannaak
- Amundsen Sea Coastal Domes

## North Taylor Dome



## Why an intermediate core at Taylor Dome?

- Core was drilled 554 meters to bedrock in 1994.
- 100 ka history of western Ross Embayment.
- -25°C at bed, preserves gas and chemistry well.

#### The bad news

- 25 ka 15 ka very compressed in original core.
- Possibly even wind scouring and unconformity.
- Interpretation of AIM1, ACR was problematic.
- Dust correlation with Taylor Glacier implies huge (and unbelievable?) ∆age (Scripps Lab)

## Why go back to Taylor Dome?

### The good news

- Another site within 10 km offers greatly enhanced temporal resolution through this interval.
- "Virtual Core" site identified by Morse et al. (1998).

Morse et al., 1998. Ice age storm trajectories inferred from radar stratigraphy at Taylor Dome, Antarctica. *GRL* 25(17) 3383-3386



### <- North Taylor Gl





Band C: 32ka – 9ka

#### Stage 5e was a warm period

- lower accumulation on north
- Stage 5e started life very thin
- Slower thinning rate
- Stage 5e still higher off the bed
- Still relatively thin at hill tops





Where Stage 5e looks thicker in hollows, there may have been difficulties in tracking layers from the core site Exploration and Development of the Climate Archive of the Allan Hills Blue Ice Area, Antarctica

Andrei V. Kurbatov, Paul A. Mayewski, Nicole E. Spaulding



February 26<sup>th</sup> 2014



DEPARTMENT OF EARTH SCIENCES



#### Blue ice areas offer a complementary alternative to traditional deep ice coring



#### Redirected Ice Flow

• Mountains, nunataks and/or irregular bedrock topography

Easily accessible, high-resolution records of ancient climate

- Large sample volume
- Lower expense



#### Does the ice contain a continuous environmental signal?

159°15'0"E



76°40'0"S









# Camp 21<sup>st</sup> Century Ice Core:



## NW Greenland Is Melting



## **Previous Cores from Camp Century**

 1960-1966: Original core drilled to till (1387 m ice depth) by CRREL (with Dartmouth undergrads)

 Analyzed for isotopes throughout, microparticles at discrete levels, chemistry at few discrete layers

1977: updated with shallow core

 Isotopes and accumulation

 1996: GITS core (120 m) collected w/PARCA back to 1745 AD

Isotopes and major ions

## Camp Century Depth-Age Scale

# Holocene starts at ~1100 m



# Amundsen See Constal Dom Higheresolution Report ice co

#### Peter Neff (VUW), T.J. Fudge (UW), Brooke Medley (NASA)



# Amundsen Sea Coastal Domes Take Aways

 Most active glaciology and climate outside Peninsula

- Observed regional and global linkages between ice, ocean, and atmosphere
- Unsampled!
- Many ice coring targets for 2k records, potential for full-Holocene records

Operation IceBridge snow radar data

## Amundsen Coastal Domes

Ice thickness

Age at 90% thickness

- Carney Is: 800 to 1000 m 3300 to 6700 yBP
- Siple Is: yBP
- 600 to 700 m

2100 to 5000



## **Amundsen Coastal Dome Ice Core**

## **Deliverables:**

- > 2k high-resolution climate record (annual to seasonal)
- Borehole temperatures to constrain recent warming
- Isotope, aerosol records as sea-ice, circulation proxies
- Ice dynamic constraints on Holocene retreat of WAIS

#### · Context for recent change



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