ANDRILL Coulman High Planning

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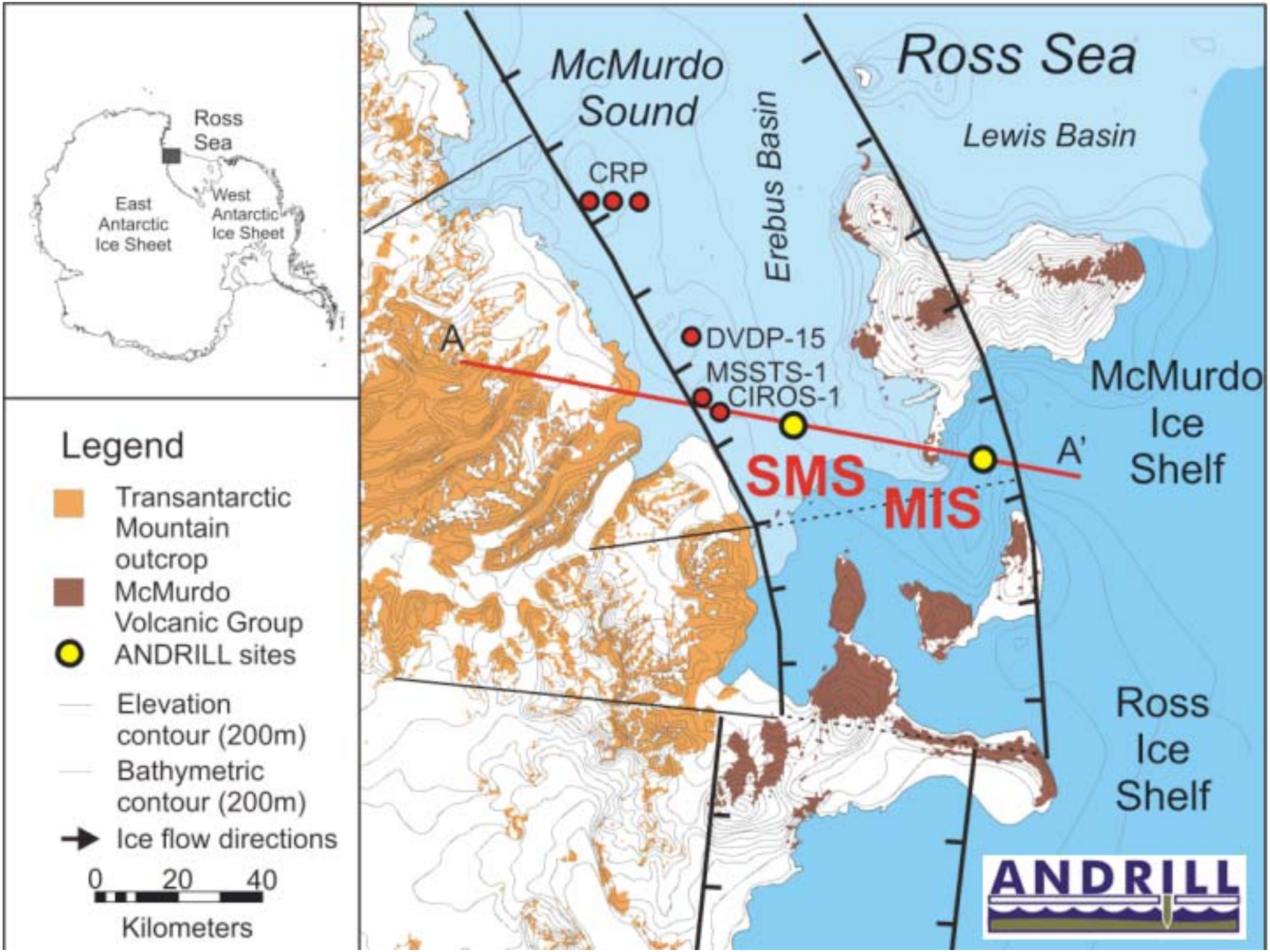
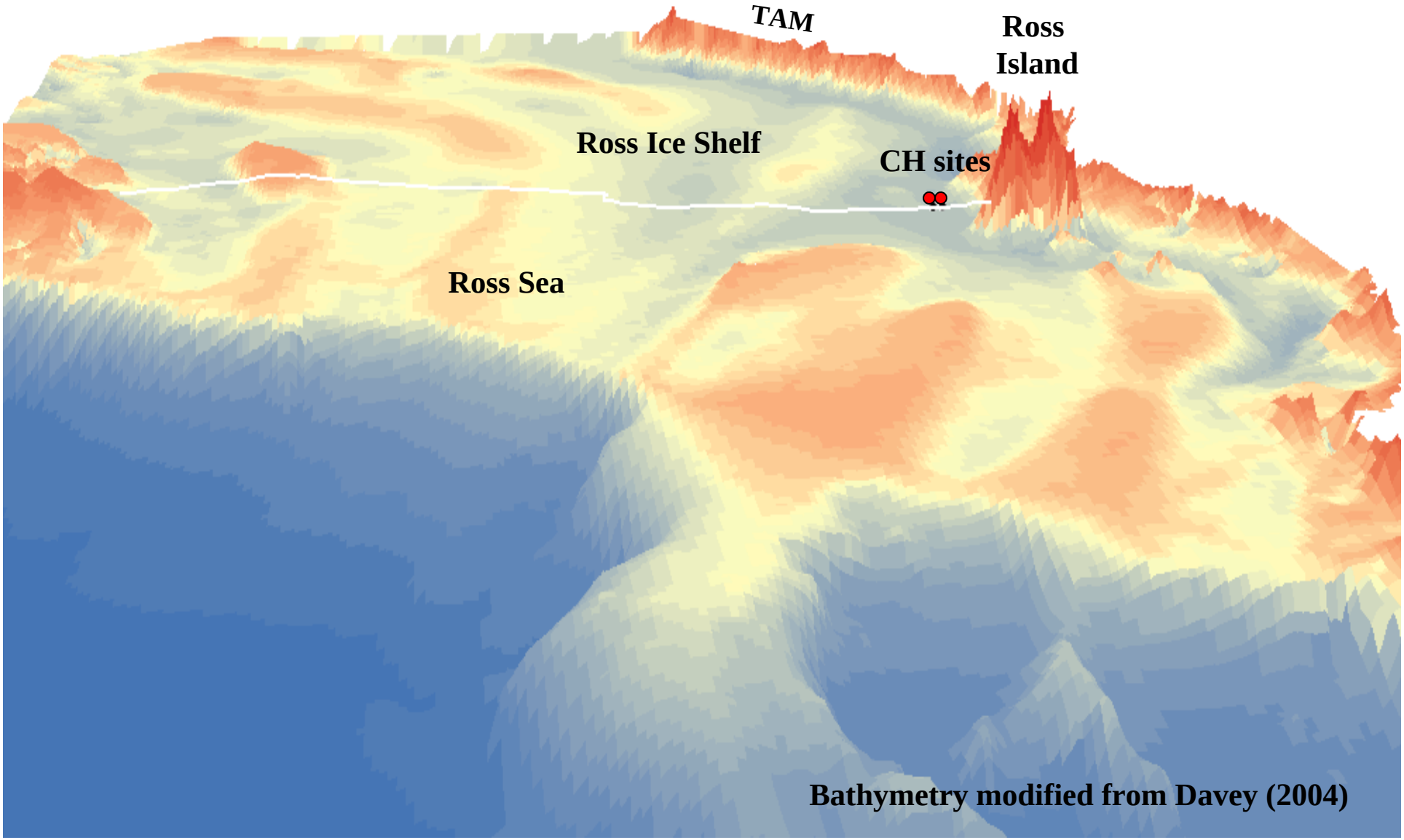
[(2)] CH Proponents, SDO-VUW, and others

2010 Polar Technology Conference, 25 March 2010, Boulder, CO.

ANDRILL

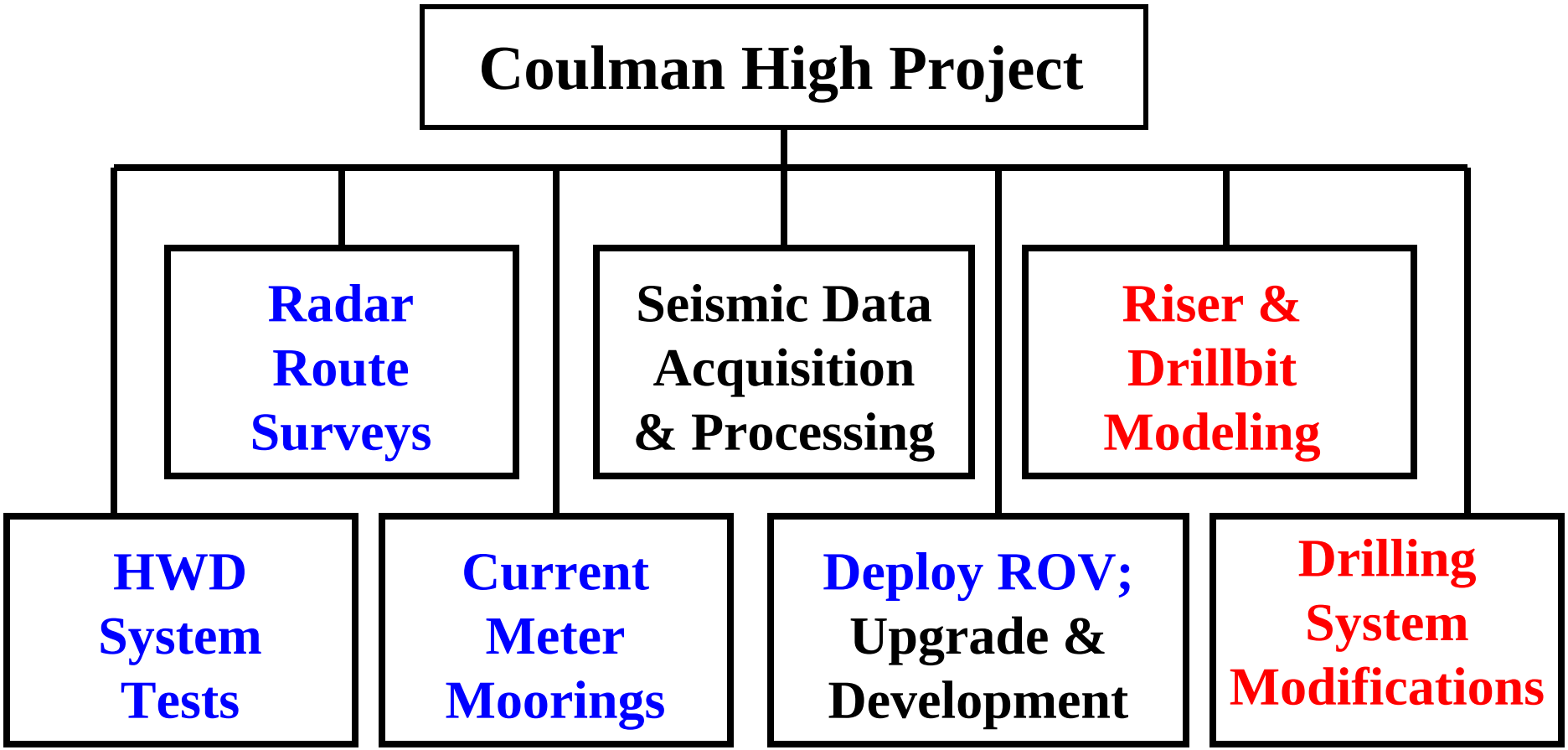

Ross Sea
East Antarctic Ice Sheet
West Antarctic Ice Sheet
McMurdo Sound
Ross Sea
Lewis Basin
Erebus Basin
CRP
DVDP-15
MSSTS-1
CIROS-1
A
A'
SMS
MIS
McMurdo Ice Shelf
Ross Ice Shelf
Legend
Transantarctic Mountain outcrop
McMurdo Volcanic Group
ANDRILL sites
Elevation contour (200m)
Bathymetric contour (200m)
Ice flow directions
0 20 40
Kilometers
ANDRILL

Location of Proposed ANDRILL Coulman High Drillsites (near the Ross Ice Shelf edge, northeast of McMurdo Station)



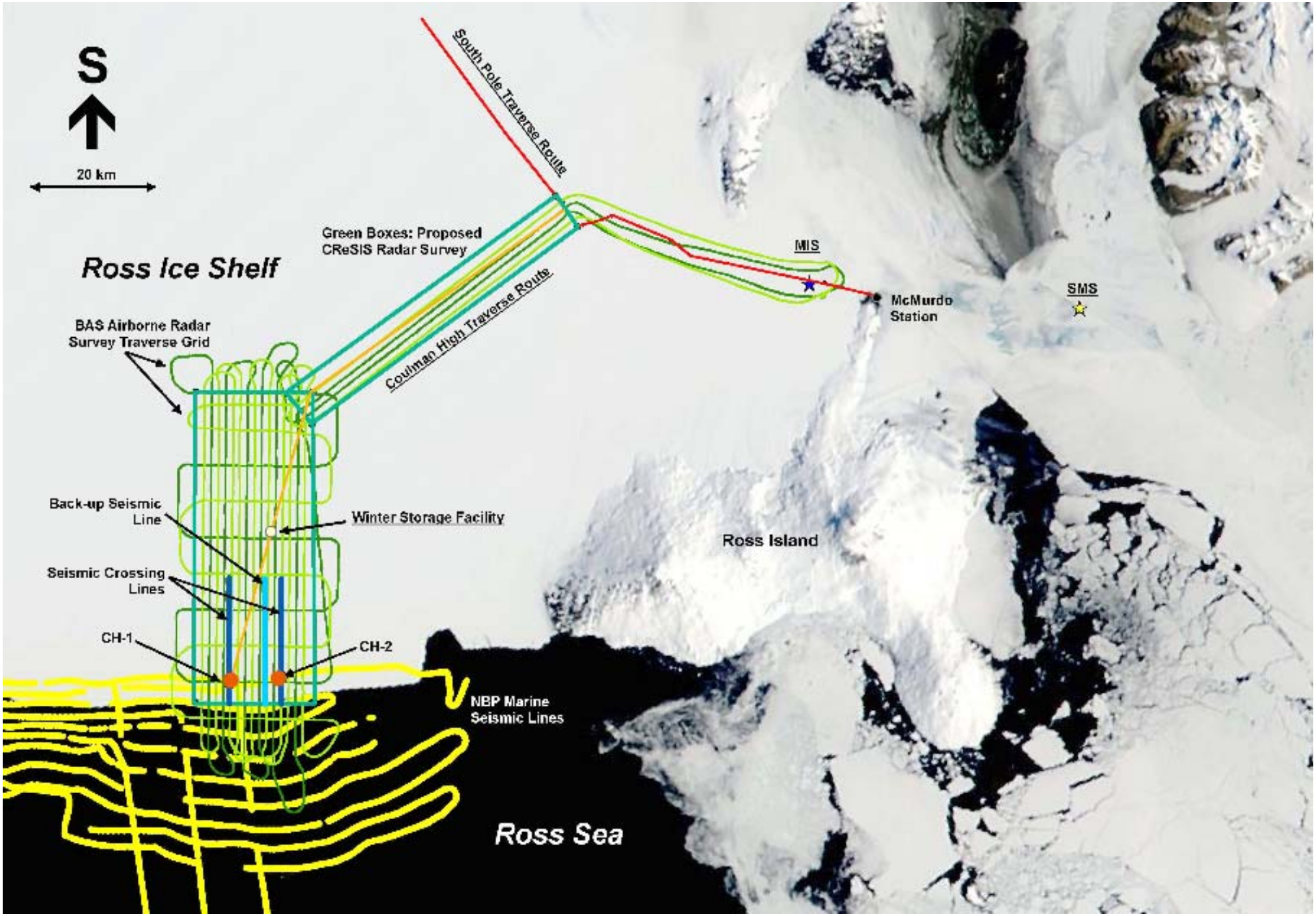
Iceberg C-19 Calves

Coulman High Project Planning Requirements

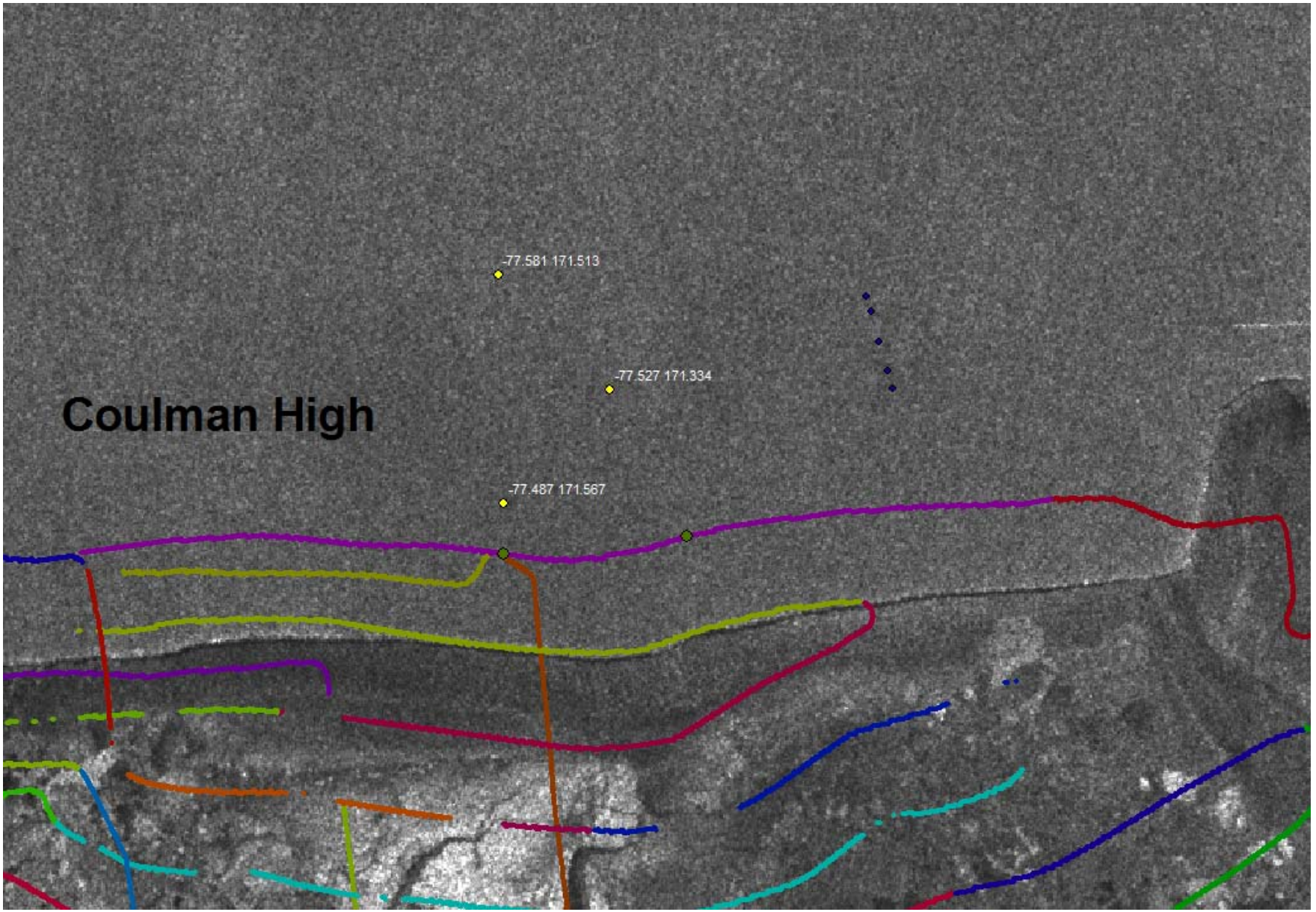


Note: Blue = Planned survey tasks; Black = Pending discussion or further funding; Red = Non-survey-related activities.

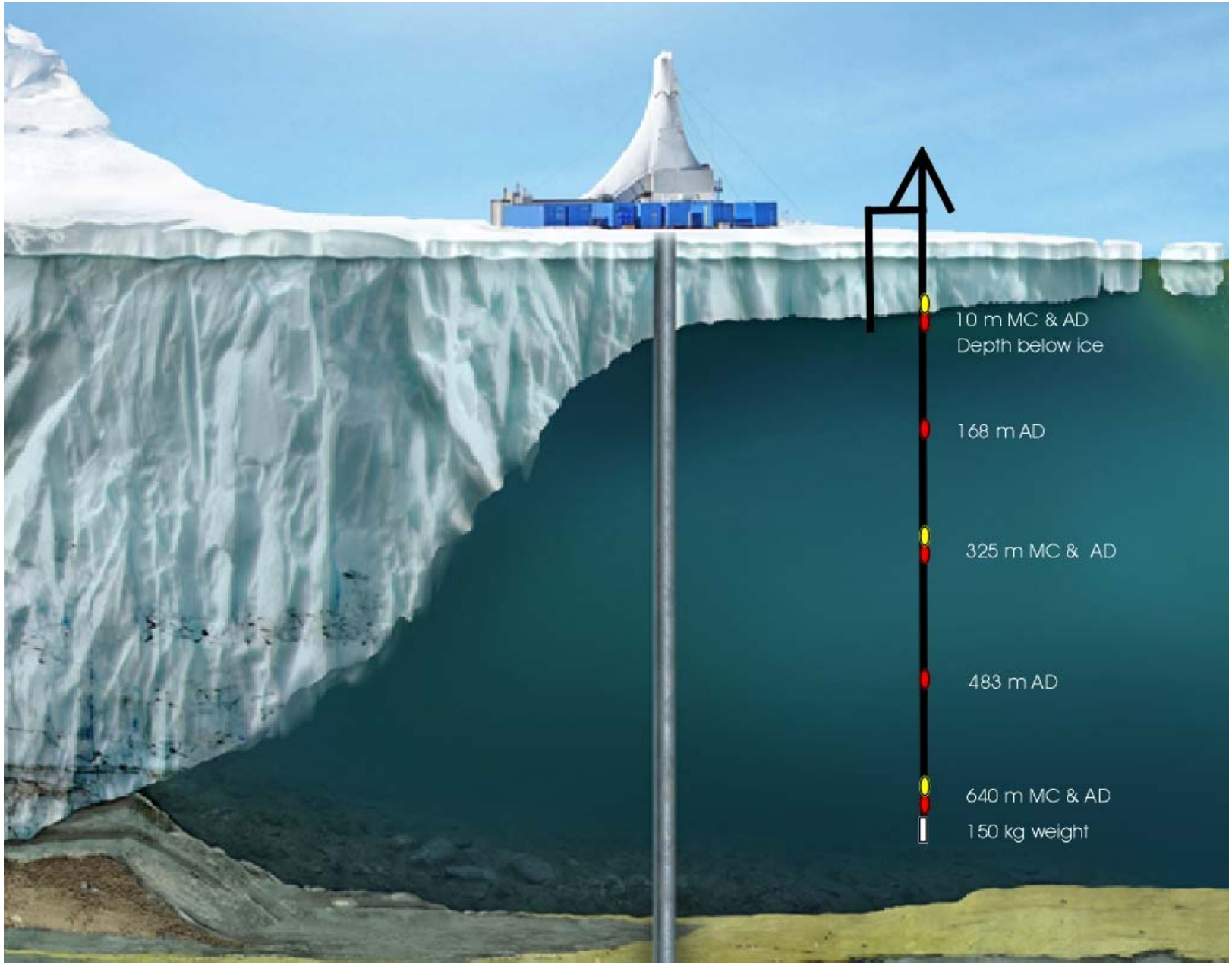
Airborne Radar Survey Lines Flown by British Antarctic Survey



CH Survey Site Locations for Moorings and Experiments



Proposed Oceanographic Mooring Design for CH Survey



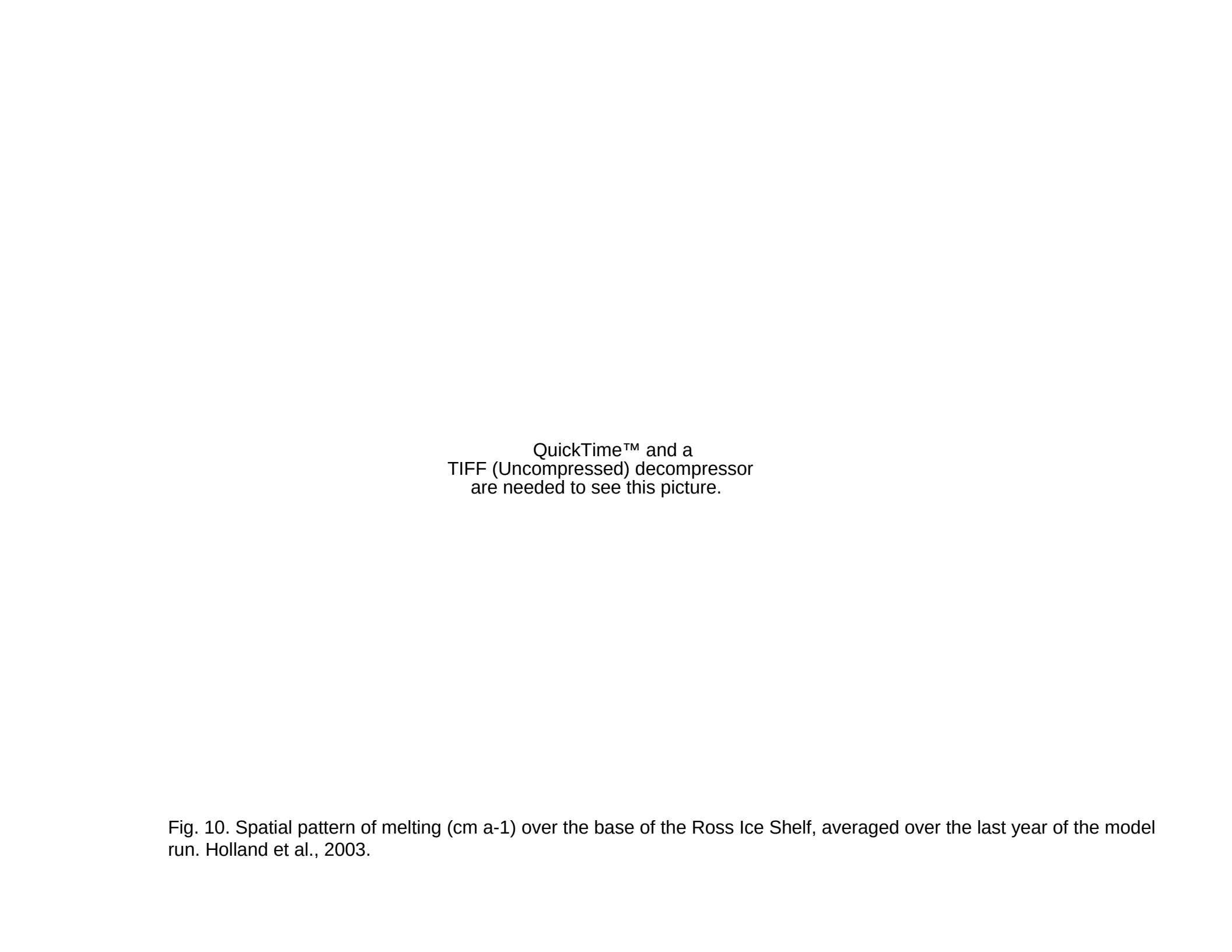


Fig. 10. Spatial pattern of melting (cm a-1) over the base of the Ross Ice Shelf, averaged over the last year of the model run. Holland et al., 2003.

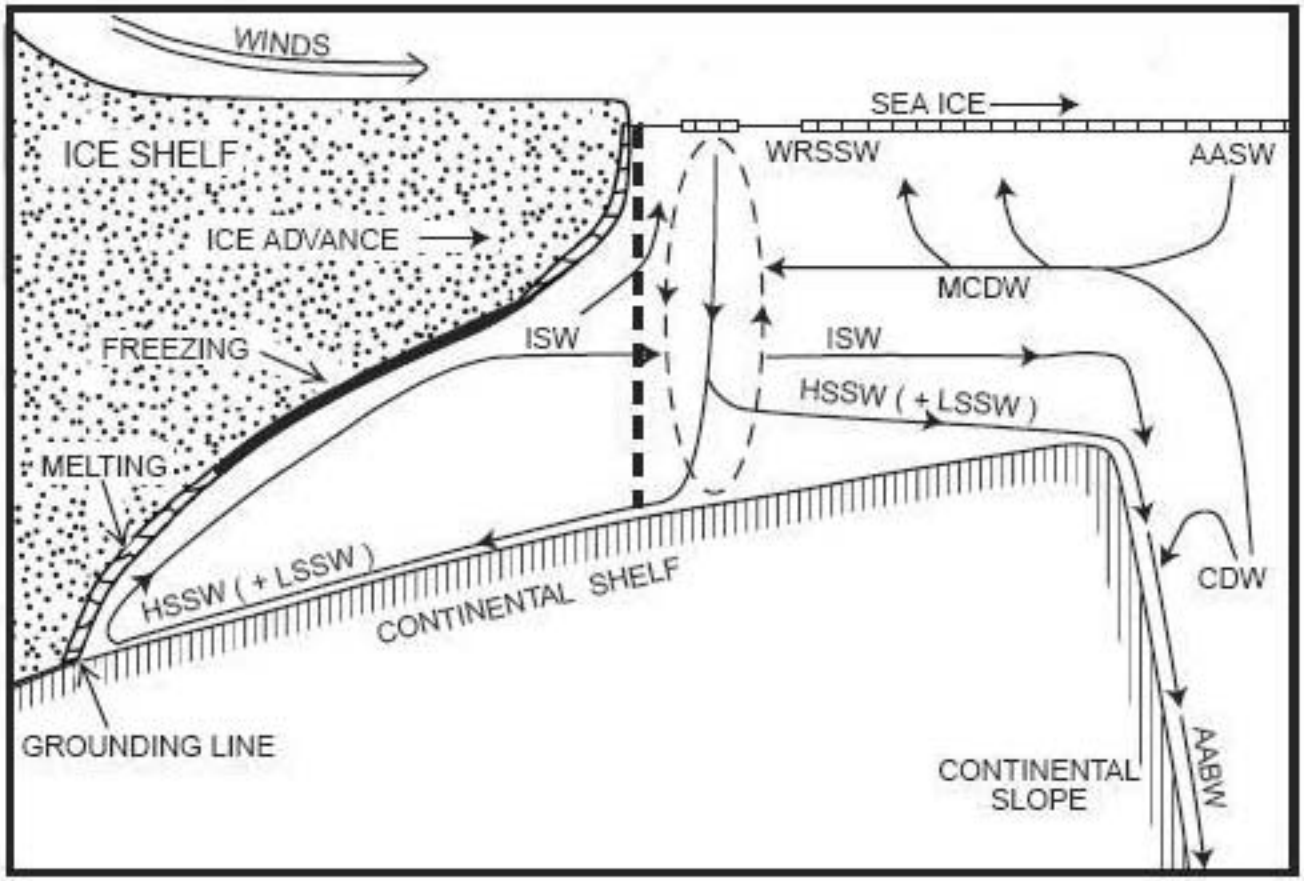
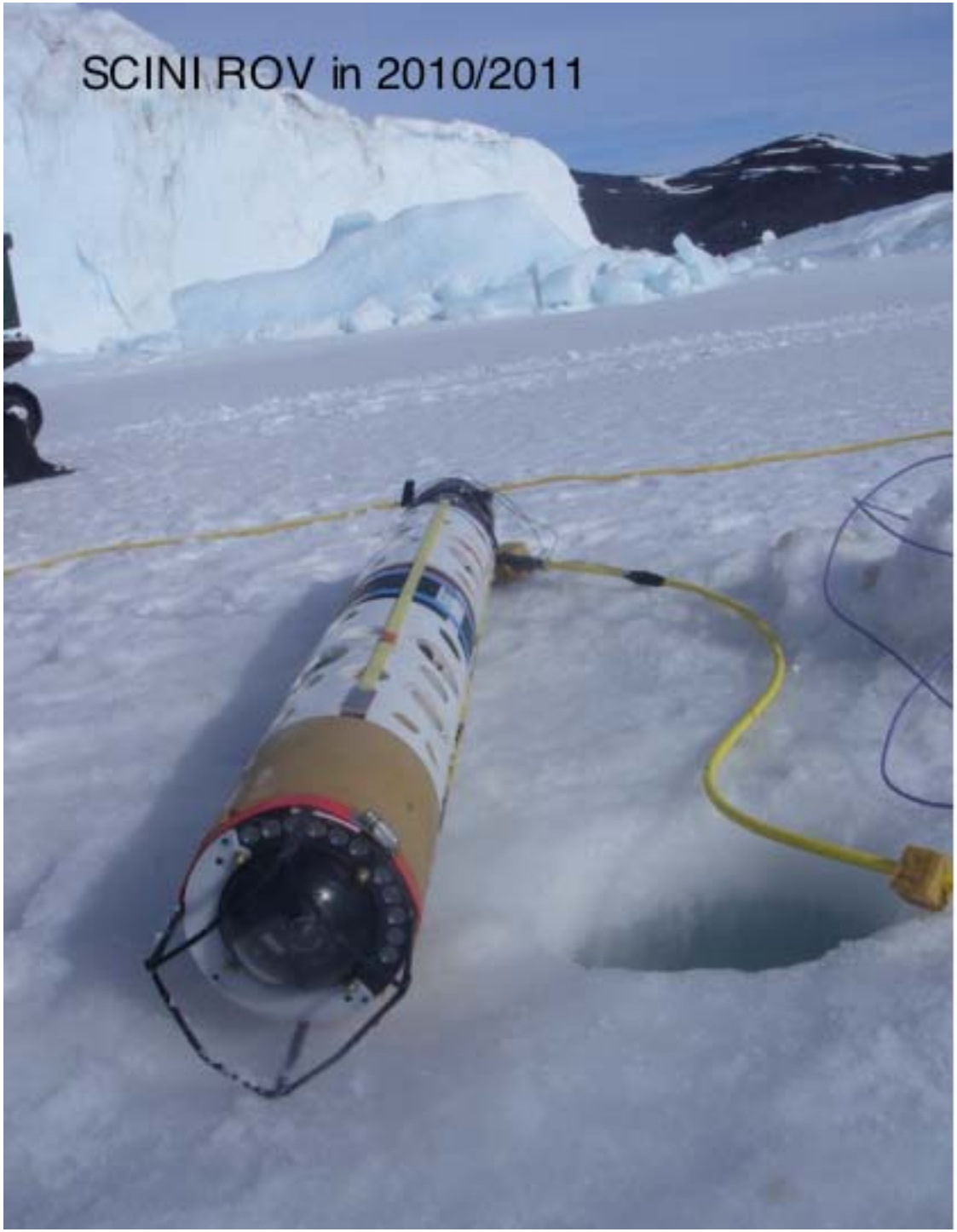
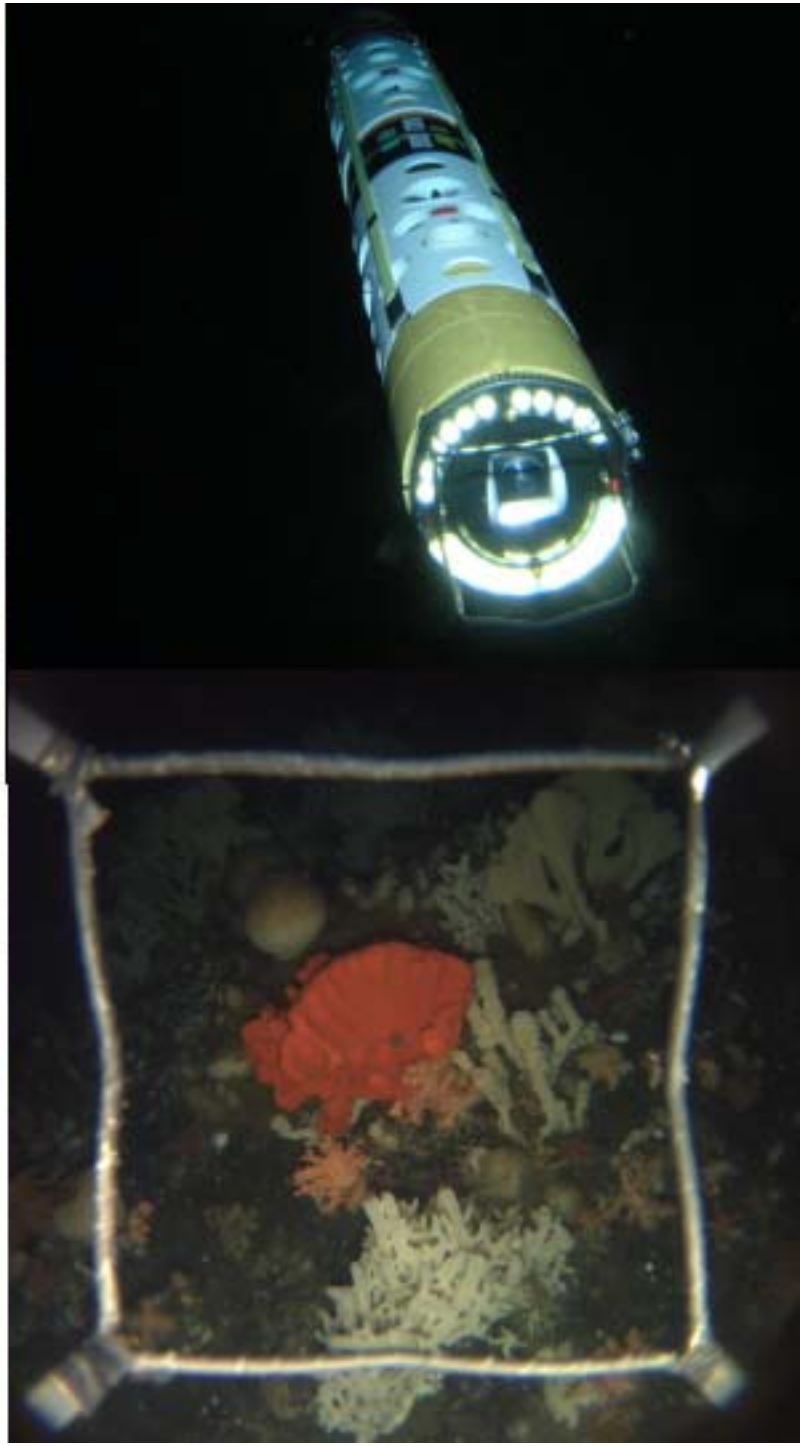


Figure 1.2: CDW intruding on shelf. Taken from Smethie and Jacobs (2005). Cartoon displaying circumpolar Deep Water intruding onto the shelf and mixing with Ice Shelf Water to form Bottom Water on the Ross Ice Front. AASW = Antarctic Surface Water, CDW = Circumpolar Deep Water, WRSSW = Western Ross Sea Surface Water, ISW = Ice Shelf Water, HSSW = High Salinity Shelf Water, LSSW = Low Salinity Shelf Water, AABW = Antarctic Bottom Water. Robinson (2009) MS Thesis, LSU.


SCINI ROV in 2010/2011



SCINI - 2009

- 15 cm diameter 20 cm hole
- 300 meter depth limit
- Copper data transmission
- PVC couplers
- Video Ray aft thruster
- 500W power limit tether
- 6 cm tunnel thrusters

Statistics:

- 44 dives 144 hours no failures
- 3 units in inventory
- Utilized on other grants

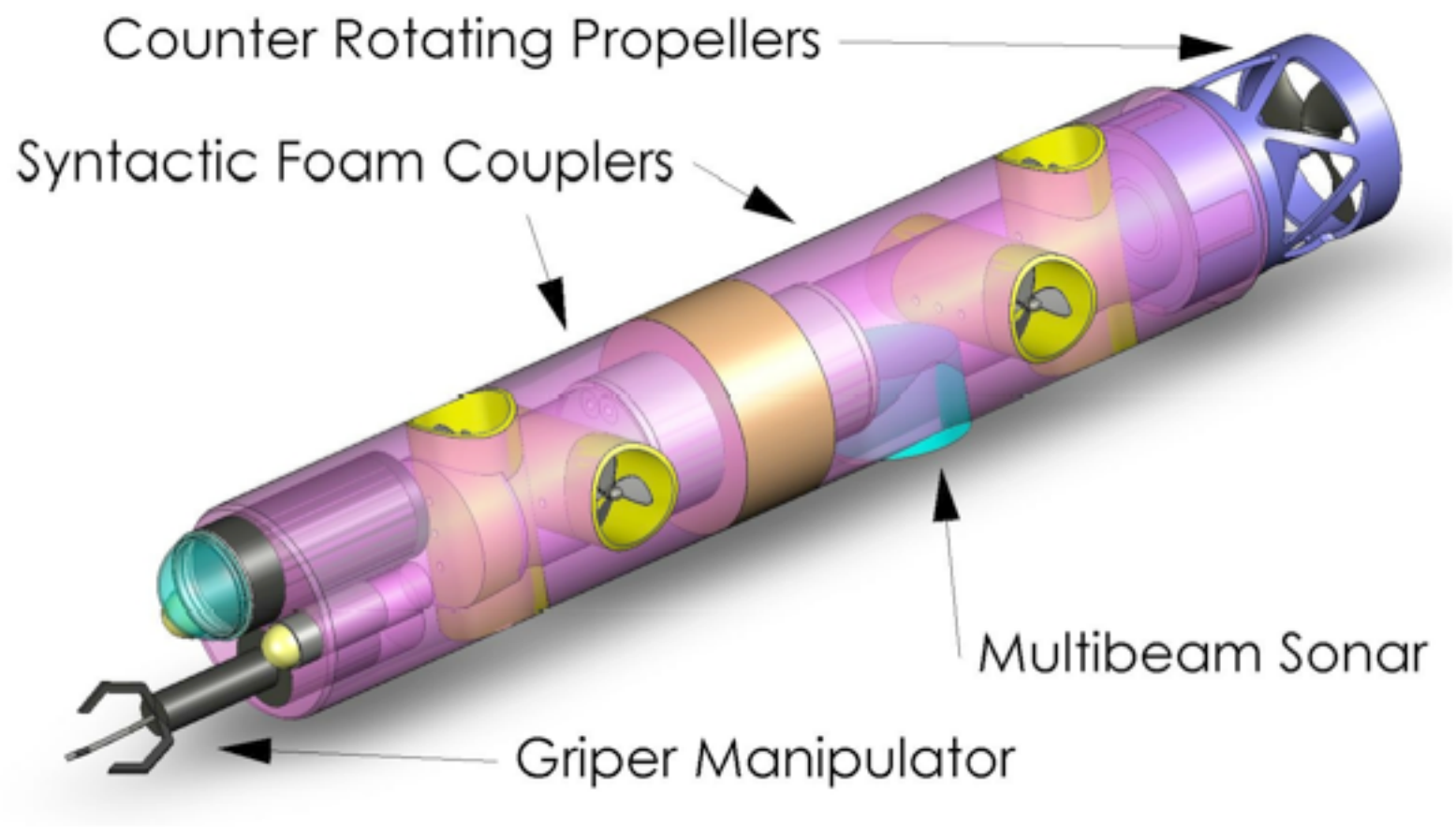
Deep - SCINI

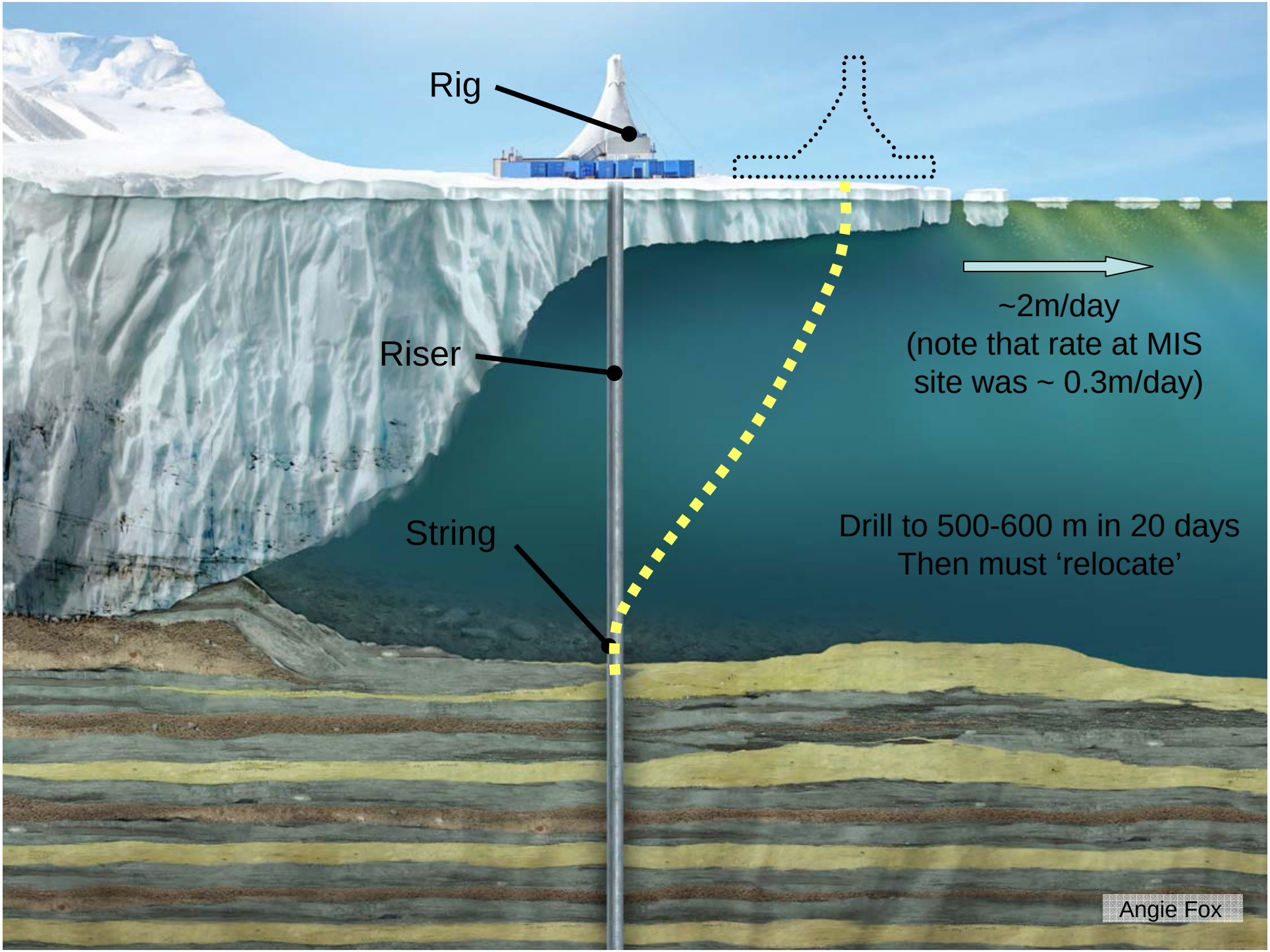
- 20 cm diameter 25 cm hole
- 1500 meter depth limit
- Fiber optic data transmission
- Syntactic foam couplers
- Gearless, counter rotating aft propellers
- 1500W power limit tether
- 9 cm tunnel thrusters

Proposed New Features:

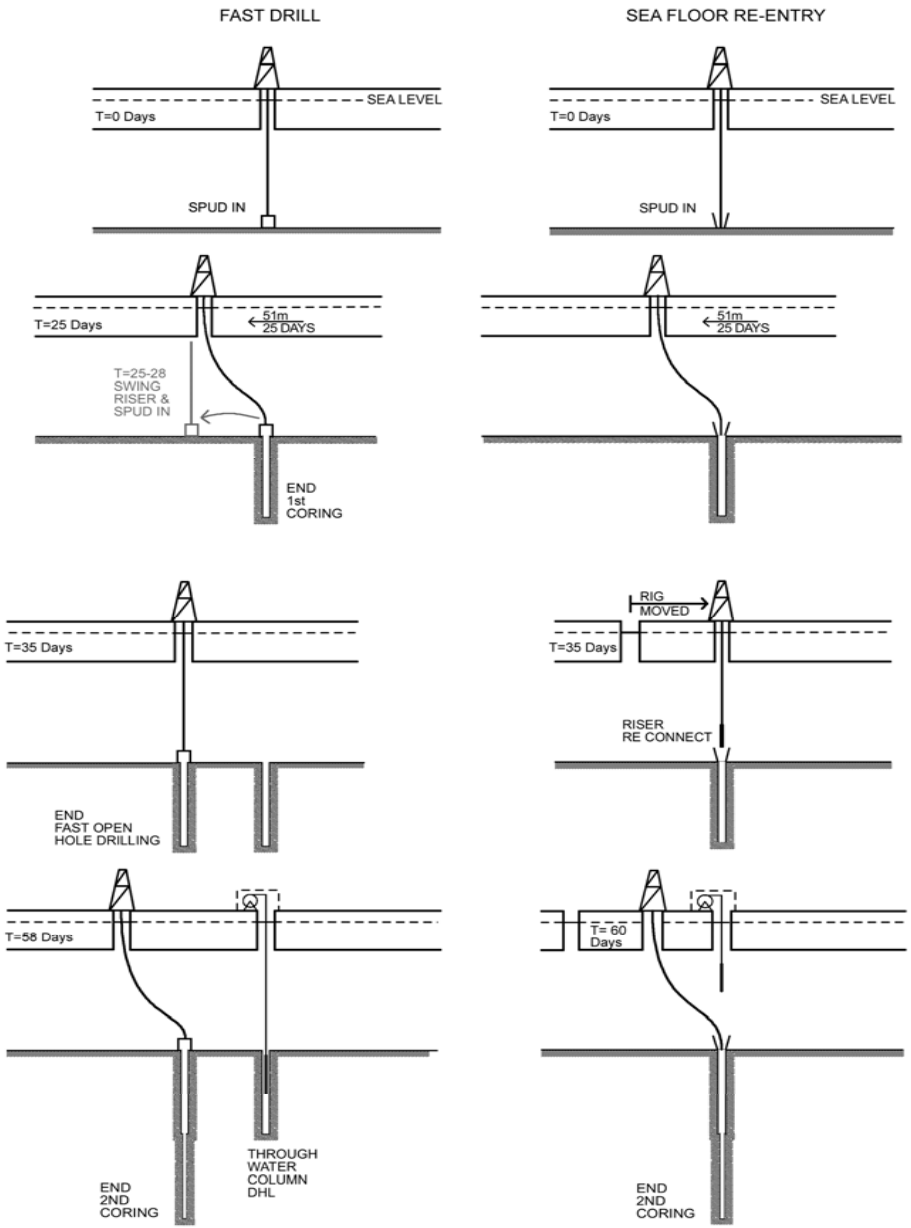
- Multibeam bathymetric sonar
- Griper manipulator
- Micro Cat CTD
- Dynamic positioning

Deep - SCINI

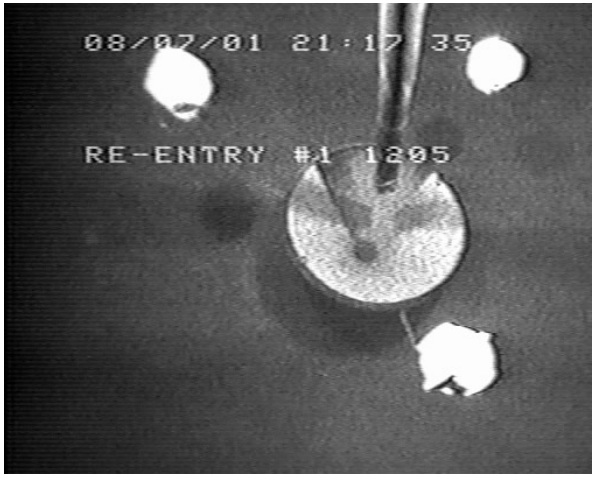

Counter Rotating Propellers
Syntactic Foam Couplers
Multibeam Sonar
Griper Manipulator


Rig
Riser
String
~2m/day
(note that rate at MIS
site was ~ 0.3m/day)
Drill to 500-600 m in 20 days
Then must 'relocate'
Angie Fox

Drilling Through a Fast Moving Ice Shelf



- The challenge:
  - Ice shelf moving faster
  - Thicker ice shelf
  - Shallower water
- Two possible drilling strategies:
  - Fast drilling
  - Re-entry

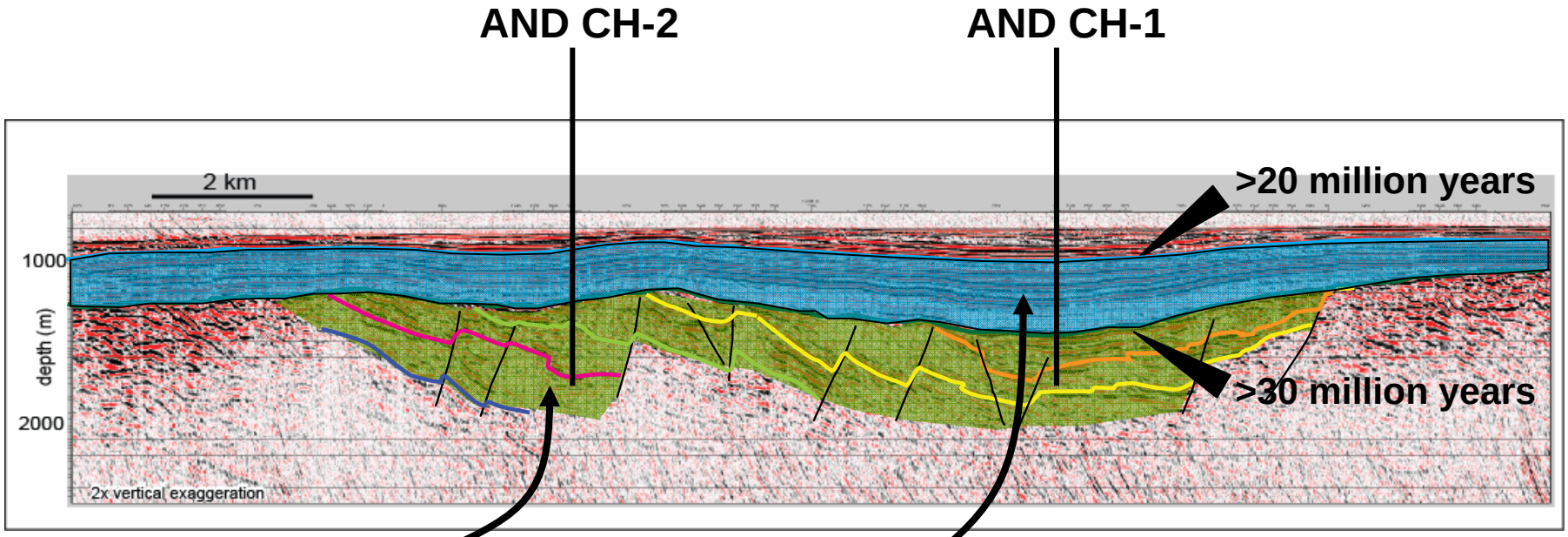


Drilling Targets 2012-2014

Key Science Drivers:

1. Uncover the evolution and behavior of the West Antarctic Ice Sheet in a high CO_2 world (> 600 ppmv)

2. Constrain West Antarctic geography through time to improve ice sheet models



GREENHOUSE WORLD

CO2 > 1000 ppmv

CO2 > 600 ppmv

QUESTIONS?