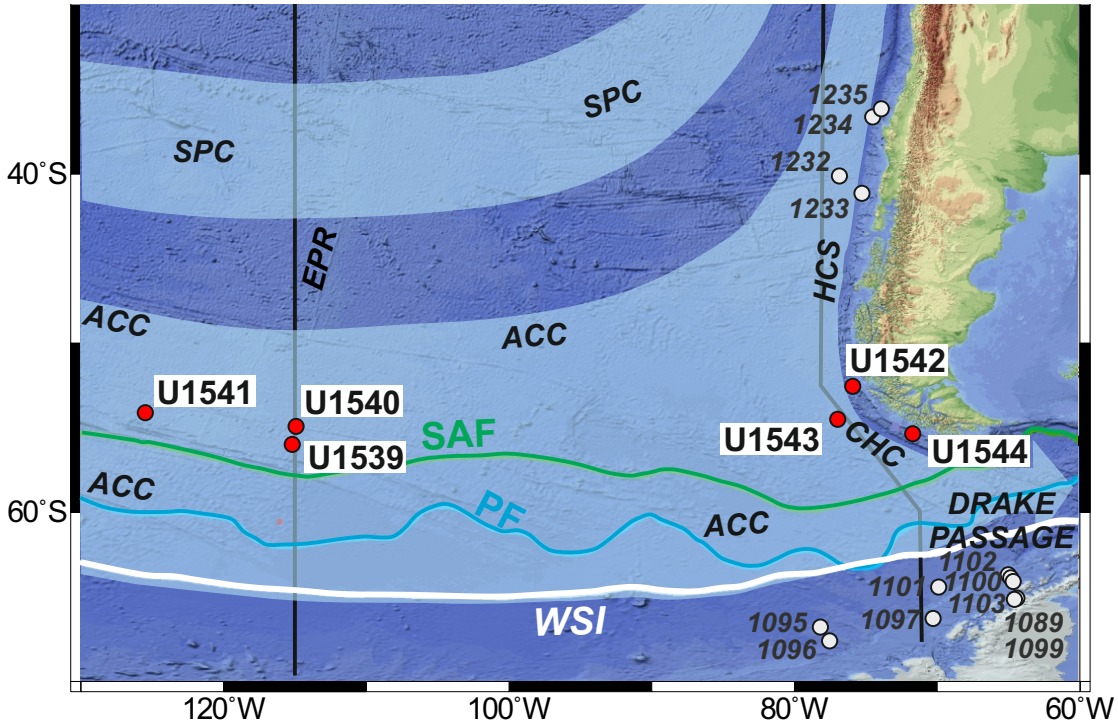
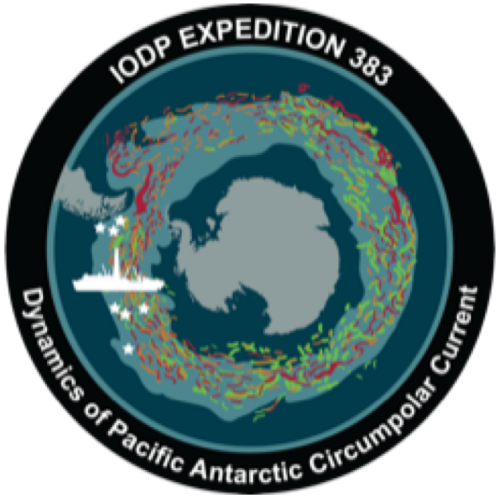
IODP Expedition 383: *Plio-Pleistocene Dynamics of the Pacific Antarctic Circumpolar Current (DYNAPACC)*





Punta Arenas –
Punta Arenas May-July 2019

Frank Lamy, Gisela Winckler, Carlos Zarikian-Alvarez
and the Expedition 383 Scientists

Expedition 383 Scientific Party

Frank Lamy
Co-Chief Scientist

Gisela Winckler
Co-Chief Scientist

Carlos Alvarez-Zarikian
Staff Scientist

Helge Arz
Sedimentologist

Chandranath Basak
Inorganic Geochemist

Anieke Brombacher
Paleontologist

Oliver Esper
Paleontologist

Jesse Farmer
Sedimentologist

Julia Gottschalk
Sedimentologist

Lisa Herbert
Inorganic Geochemist

Shinya Iwasaki
Sedimentologist

Vera Lawson
Physical Properties

Lester Lembke-Jene
Physical Properties

Li Lo
Sedimentologist

Alexandre de Souza
Paleontologist

Elisa Malinverno
Paleontologist

Igor Venancio de Oliveira
Paleontologist

Elisabeth Michel
Physical Properties

Jennifer Middleton
Stratigraphic Correlator

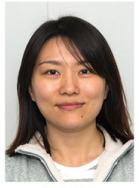
Simone Moretti
Organic Geochemist

Christopher Moy
Sedimentologist

Christina Ravelo
Stratigraphic Correlator

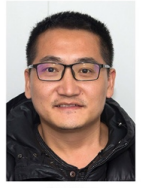
Christina Riesselman
Paleontologist

Mariem Saavedra-Pellitero
Paleontologist


Inah Seo
Sedimentologist

Rebecca Smith
Organic Geochemist

Joseph Stoner
Paleomagnetist


Sui Wan
Sedimentologist

Raj Singh
Sedimentologist

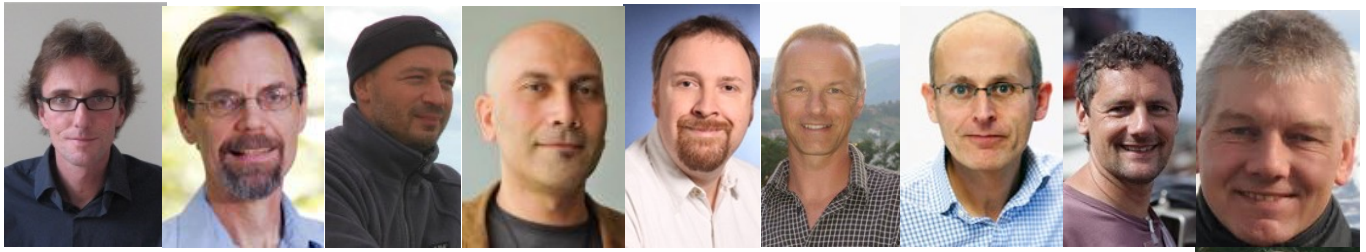
Xiangyu Zhao
Paleomagnetist

Nicole Foucher
Observer

Brian Cimagala
Videographer

Alejandro Wilkins
Videographer

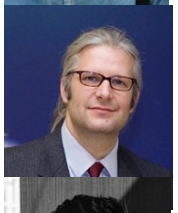
Sian Proctor
Outreach Officer



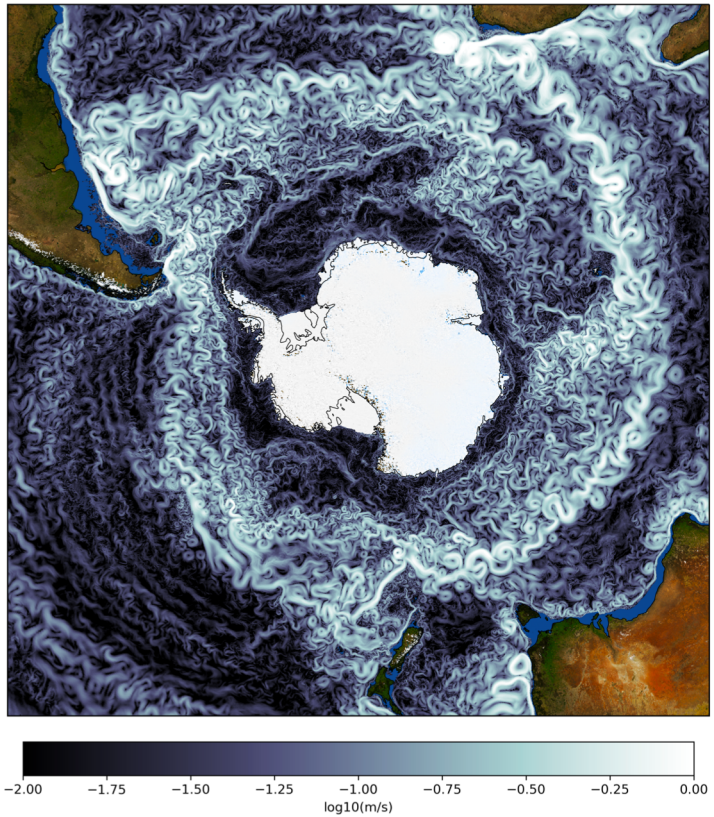
IODP Expedition 383
(proposal # 912 – October 2016)

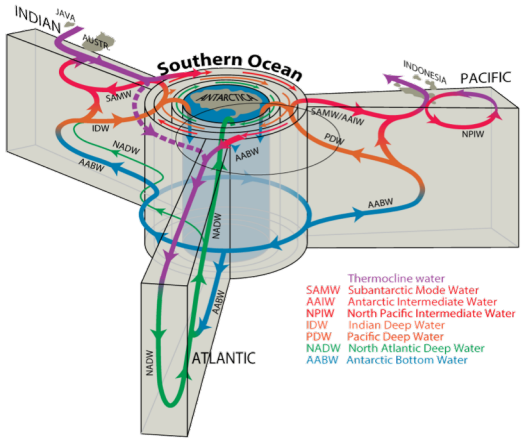
Frank Lamy*[1], Robert Anderson[2], *Helge W. Arz**[3], Giuseppe Cortese[4], *Oliver Esper**[1], Karsten Gohl[1], Ian Hall[5], C.D Hillenbrand[6], Christian Hübscher[7], *Carina Lange**[8], *Lester Lembke-Jene**[1], *Alfredo Martinez-Garcia**[9], Ulysses Ninnemann[10], Dirk Nürnberg[11], *Katharina Pahnke**[12], *Alina Polonia**[13], Joseph Stoner[14], Ralf Tiedemann[1], Gabi Uenzelmann-Neben[1], ***Gisela Winckler****[2]

**lead proponents*



Southern Ocean and Antarctic Circumpolar Current

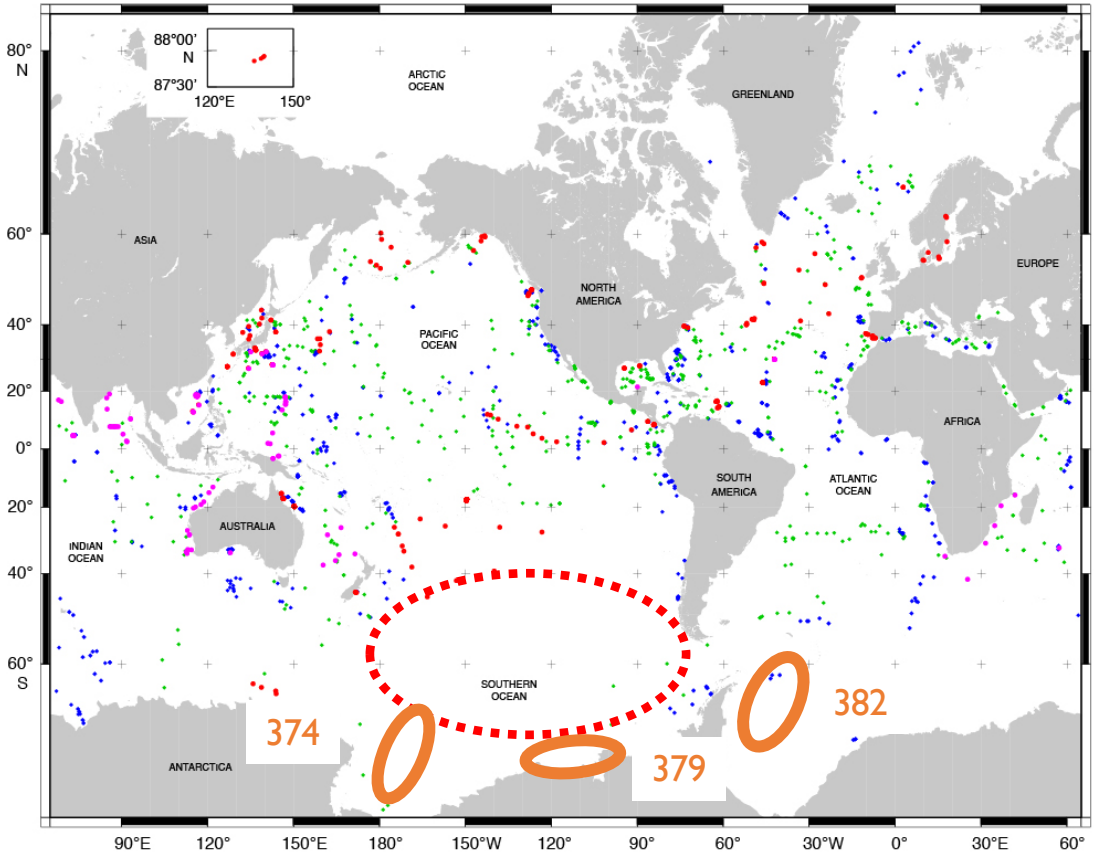




- ✓ Carbon Storage
- ✓ Overturning Circulation
- ✓ High-low Latitude Connectivity
- ✓ Stability of Antarctic ice sheets

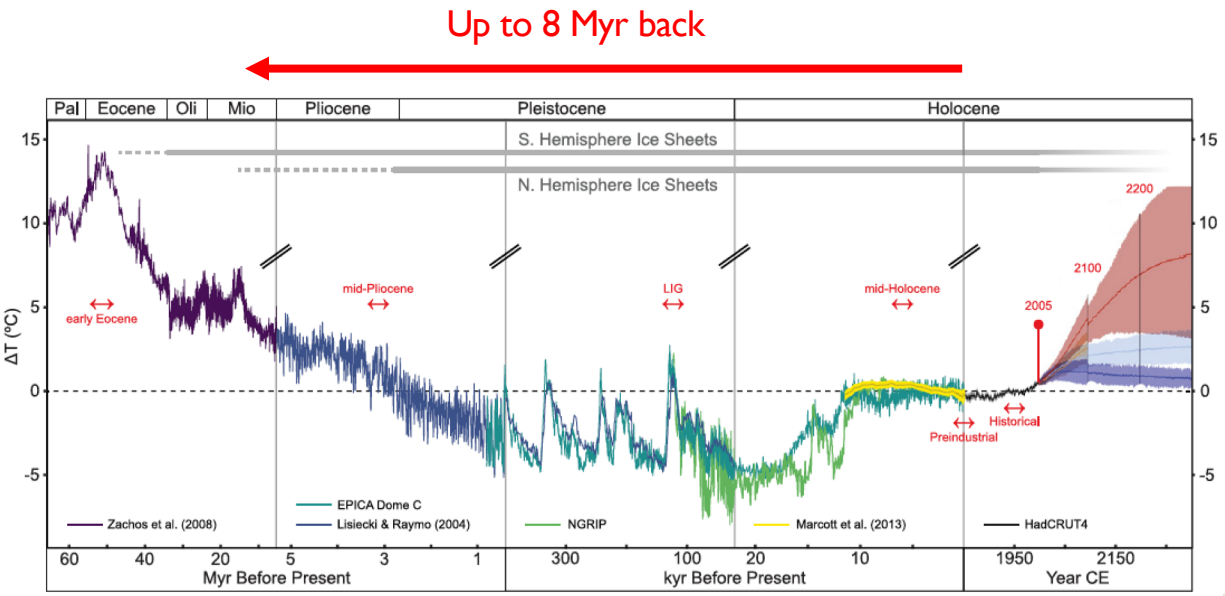
Courtesy of T. Jung, AWI

Context



DSDP Legs 1–96 (●), ODP Legs 100–210 (●), IODP Expeditions 301–348 (●), IODP Expeditions 349–371 (●)

Mio -Pleistocene Dynamics of the Southern Ocean



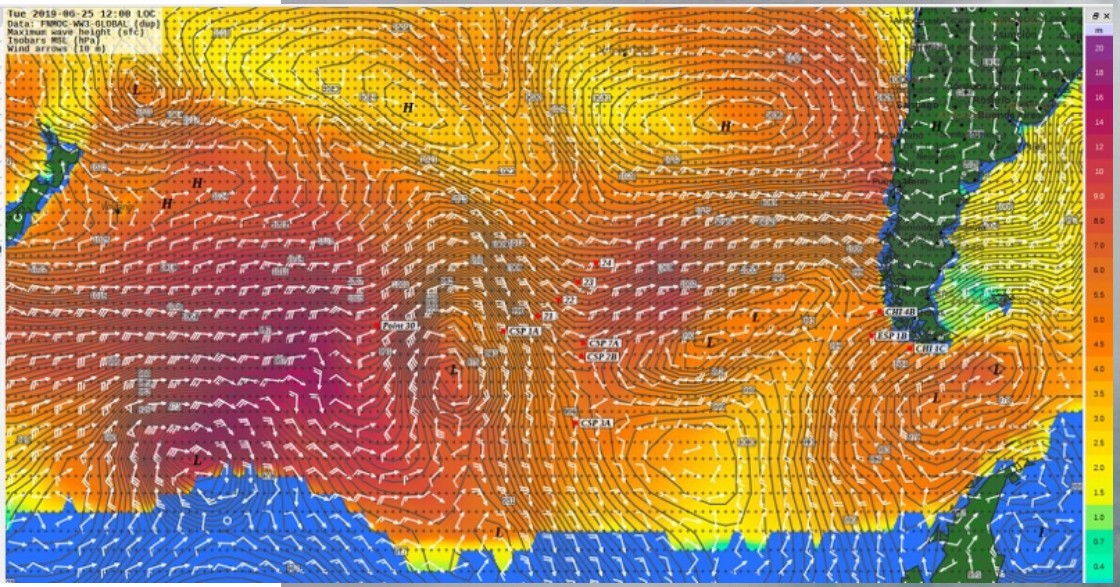
Burke et al., PNAS 2018

Investigate the Pliocene-Pleistocene atmosphere-ocean-cryosphere dynamics of the Antarctic Circumpolar Current (ACC),

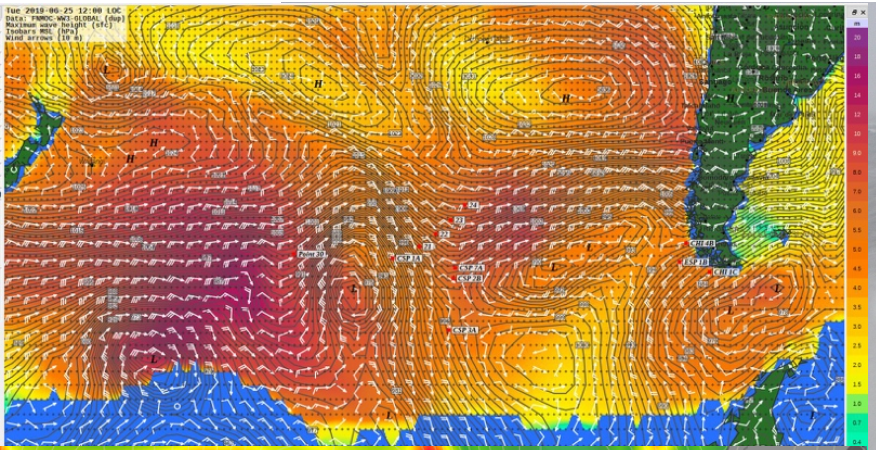
and their role in regional and global climate and atmospheric CO_2 based on sediment records with the highest possible stratigraphic resolution.

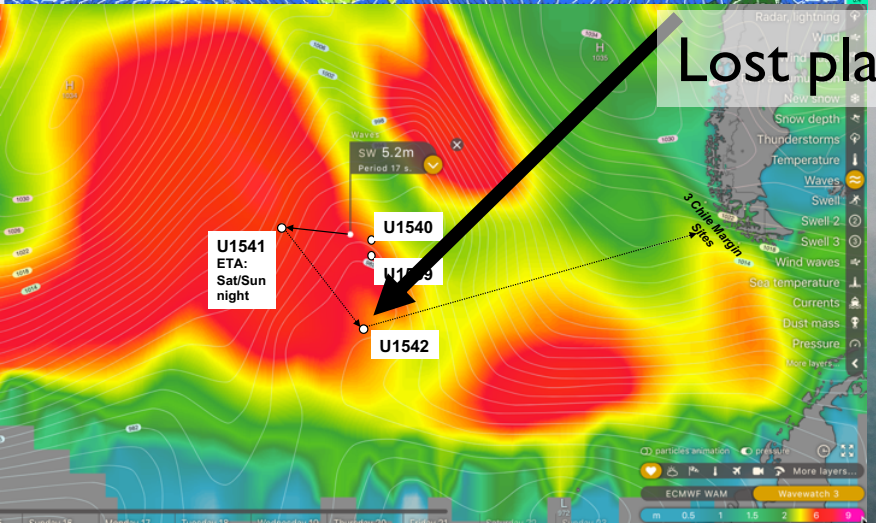
Major challenge: Weather & seas

Major challenge: Weather & seas

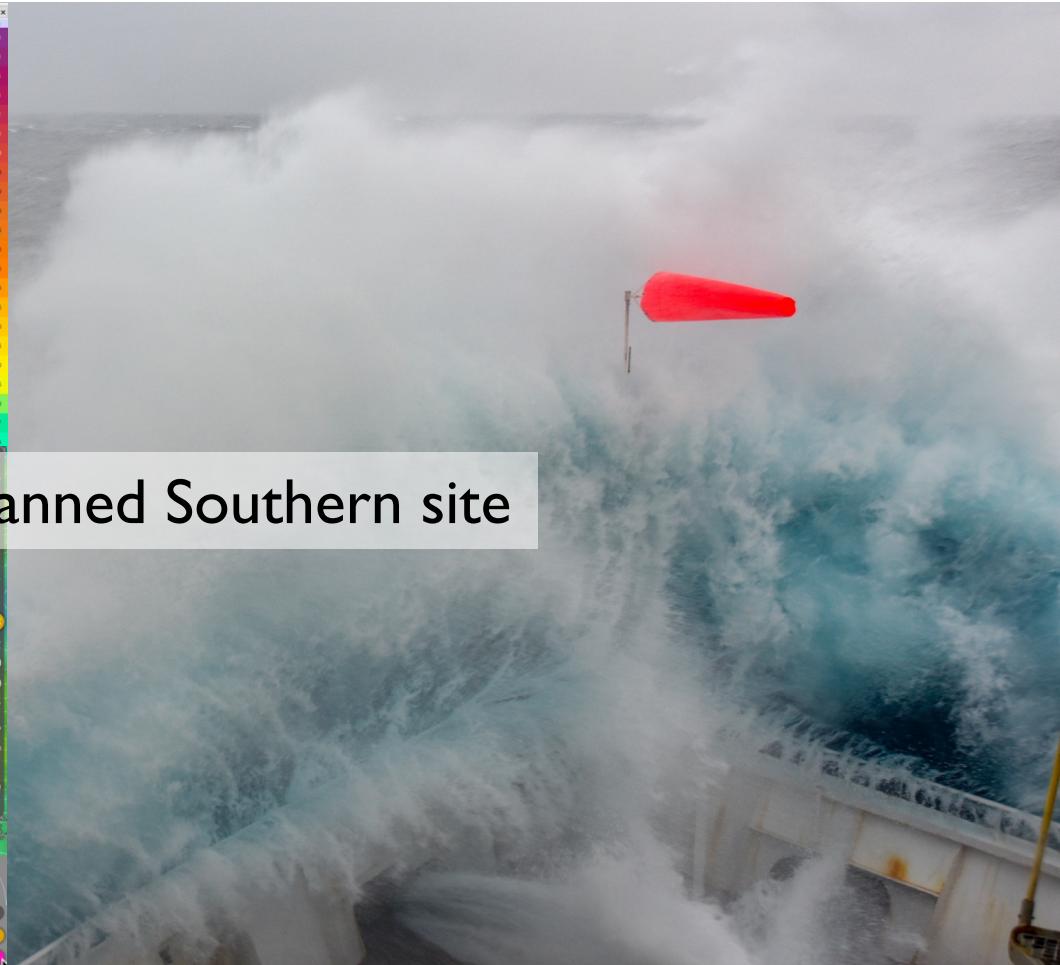


Major challenge: Weather & seas

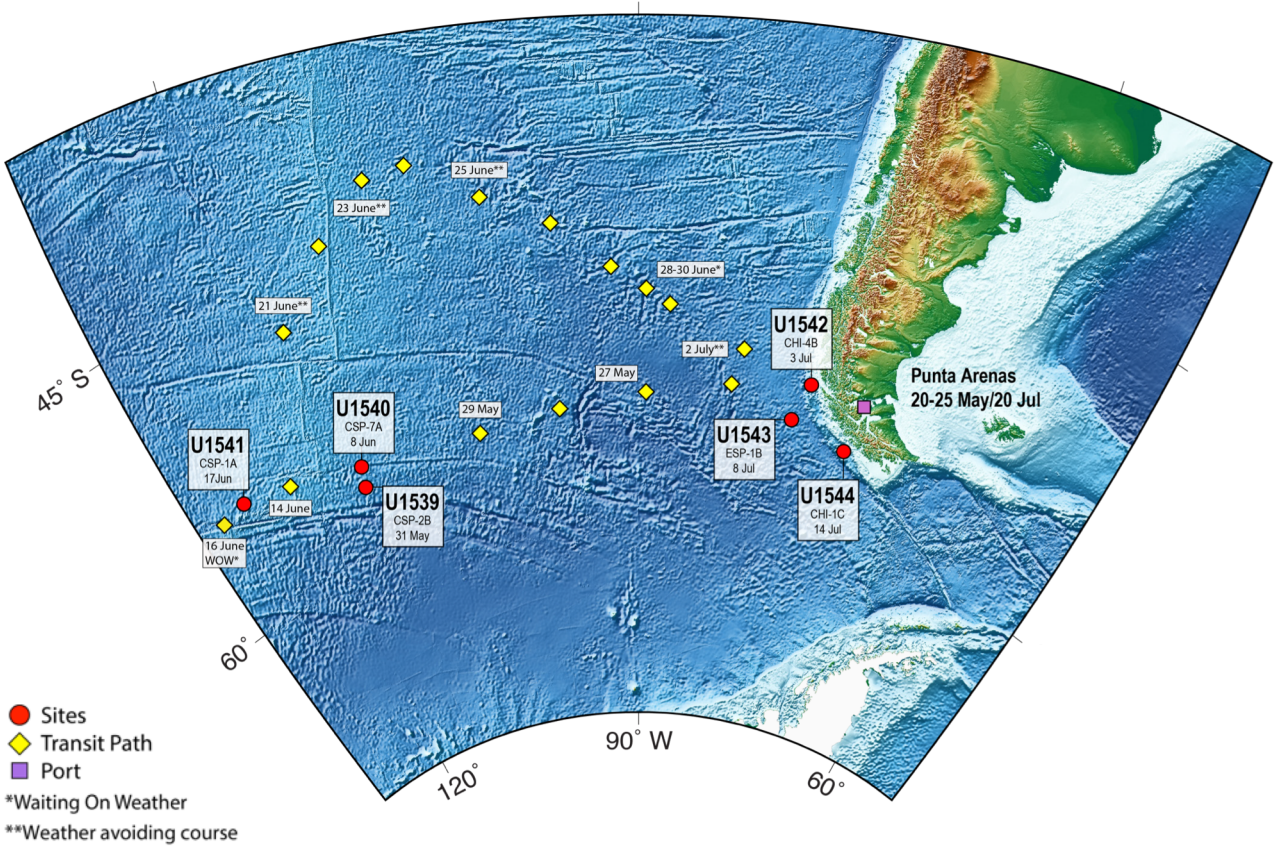




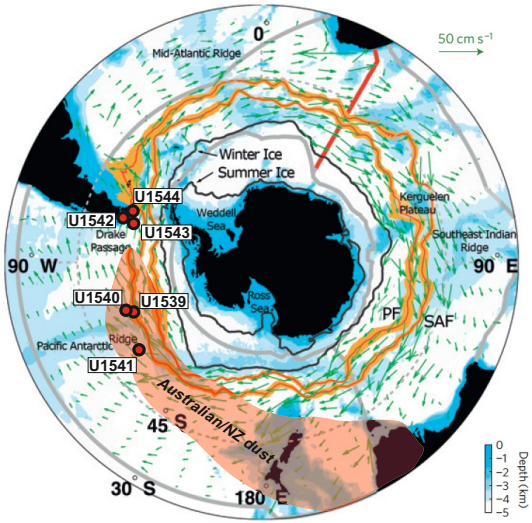
Lost planned Southern site



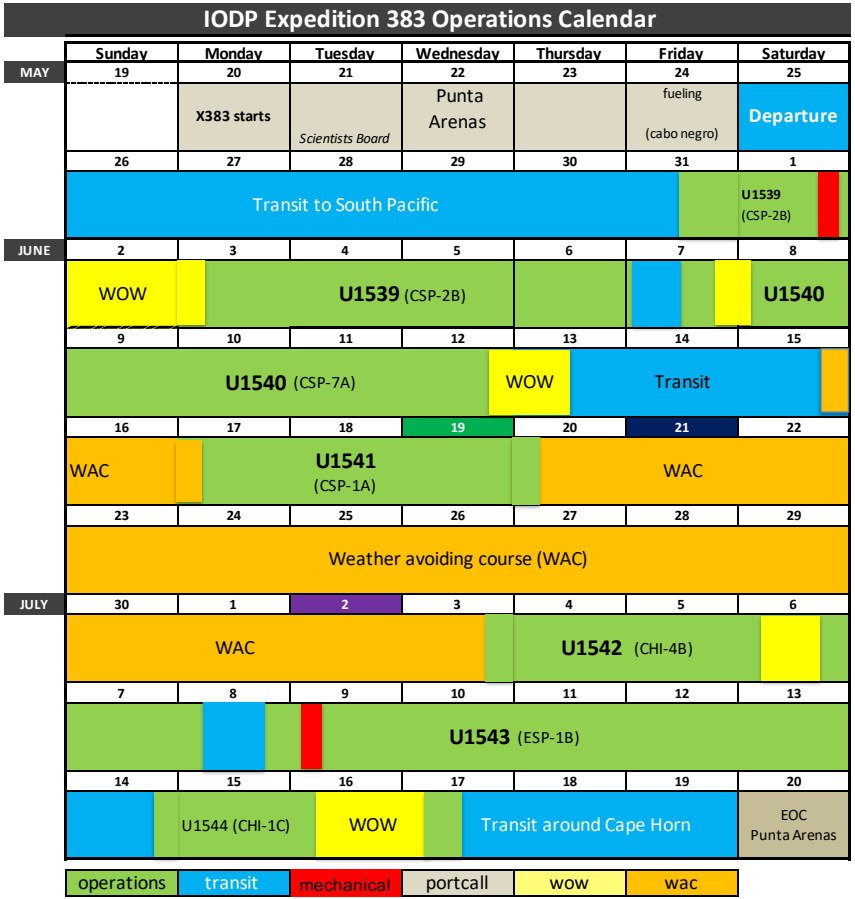
Expedition 383 Sites

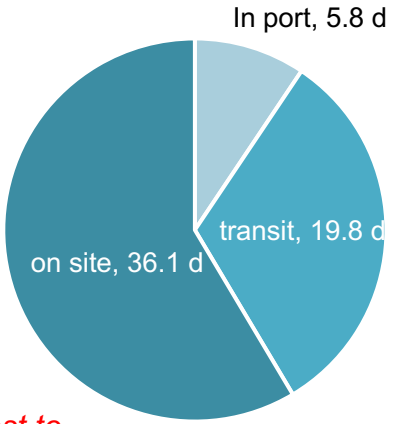


Sites are located at latitudes, water depths where sediments allow the application of a wide range of siliciclastic, carbonate, and opal-based proxies

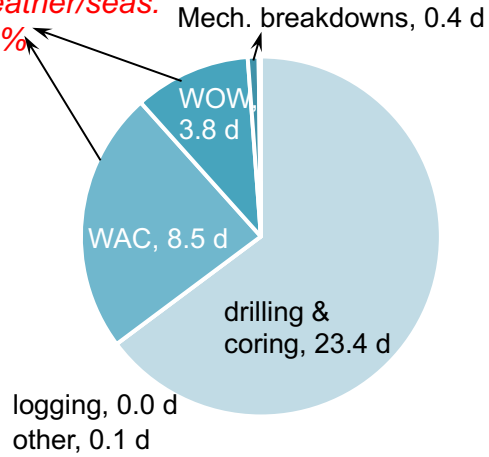


Lost 34% of our Coring time to weather/seas

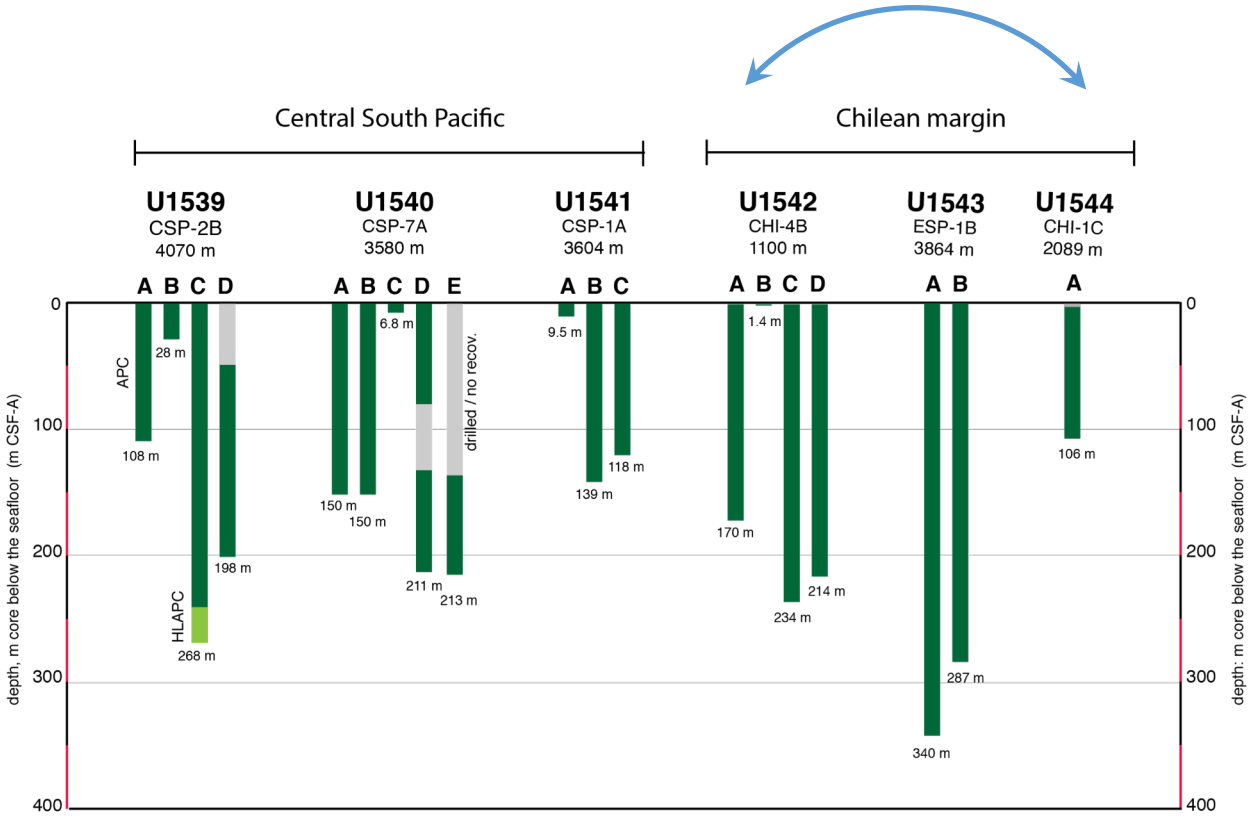




Time lost to weather/seas: 34%

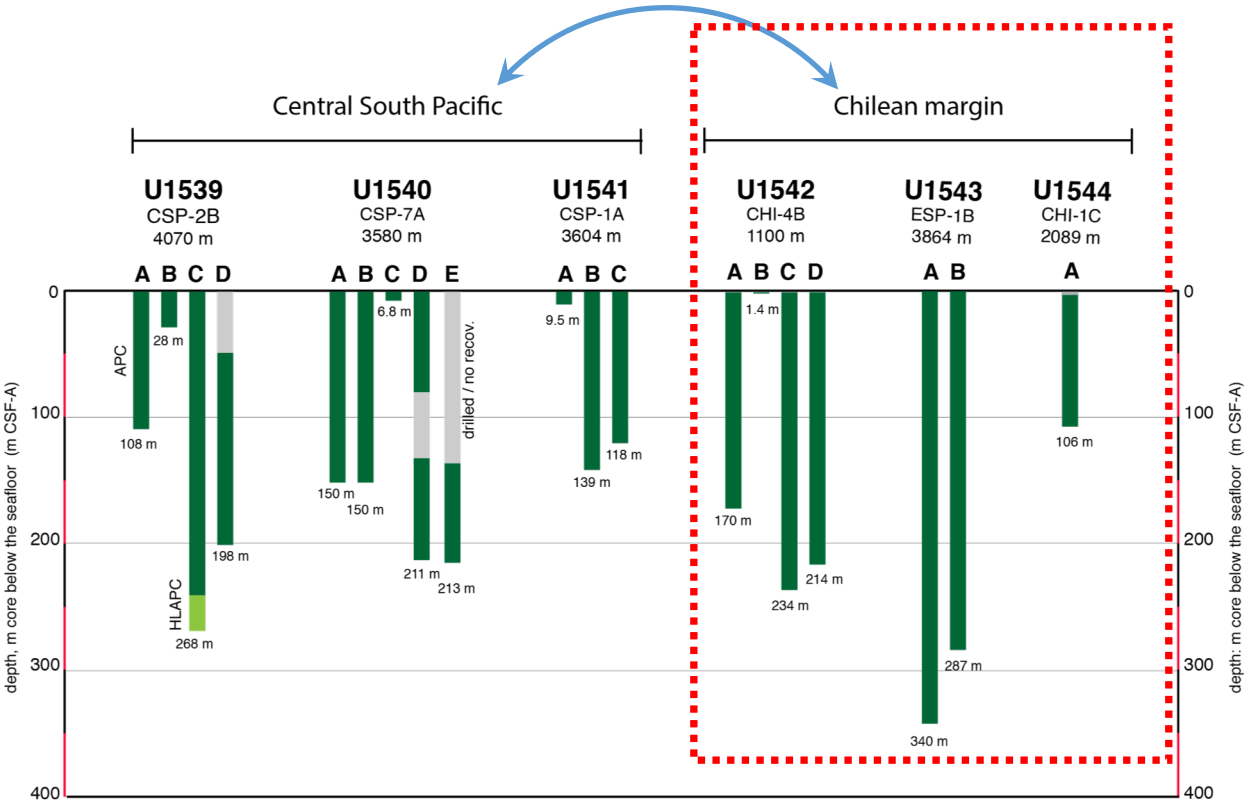


Core Recovery during Expedition 383

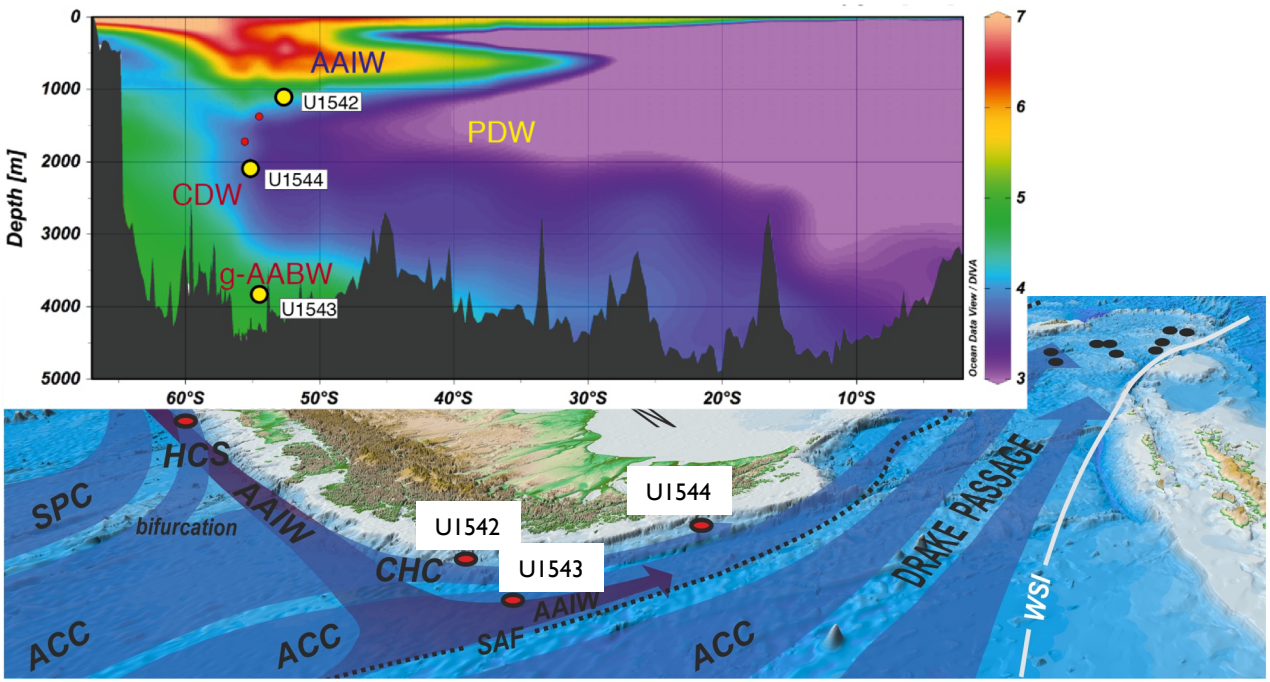


Complete recovery & continuous splice of all but 1 sites with APC coring

Core Recovery during Expedition 383

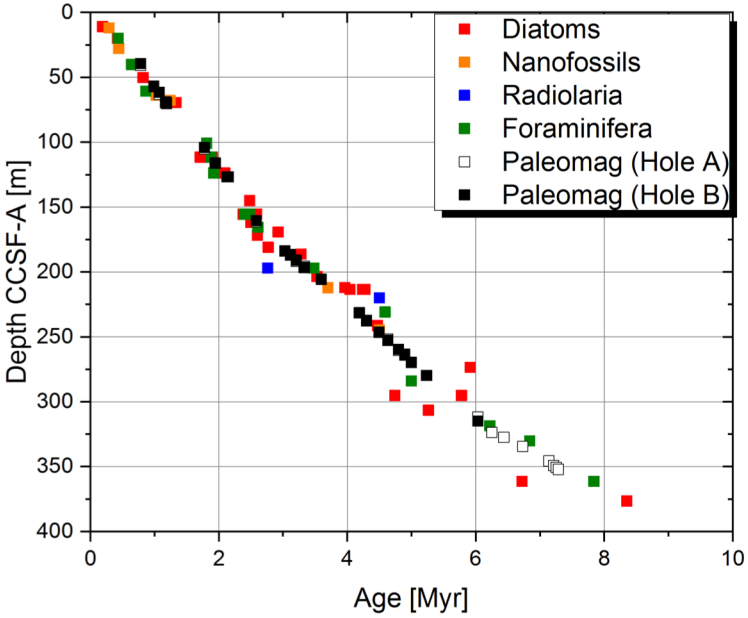


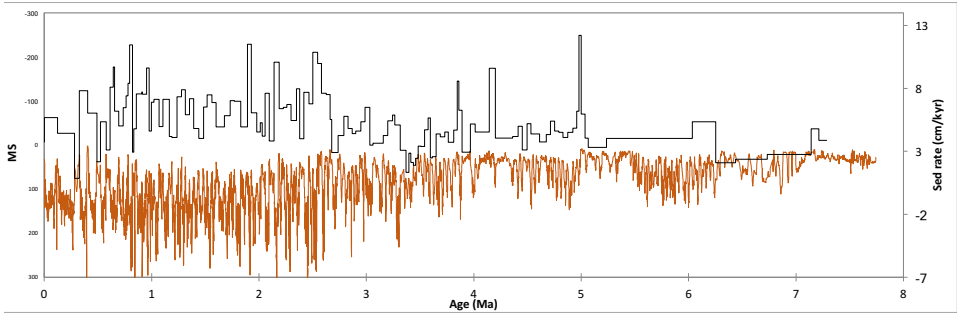
Chilean margin sites – U1542 - U1544



- ✓ Depth transect to reconstruct the strength and variability of the ACC entering the Drake Passage
- ✓ Record Pacific Deep Water (PDW) and Antarctic Bottom Water (AABW) → Ocean circulation
- ✓ High resolution record (U1542 ~30cm/kyr)
- ✓ Long-term Patagonian ice-sheet dynamics

Chilean margin sites: U1543





- ✓ Excellent stratigraphy

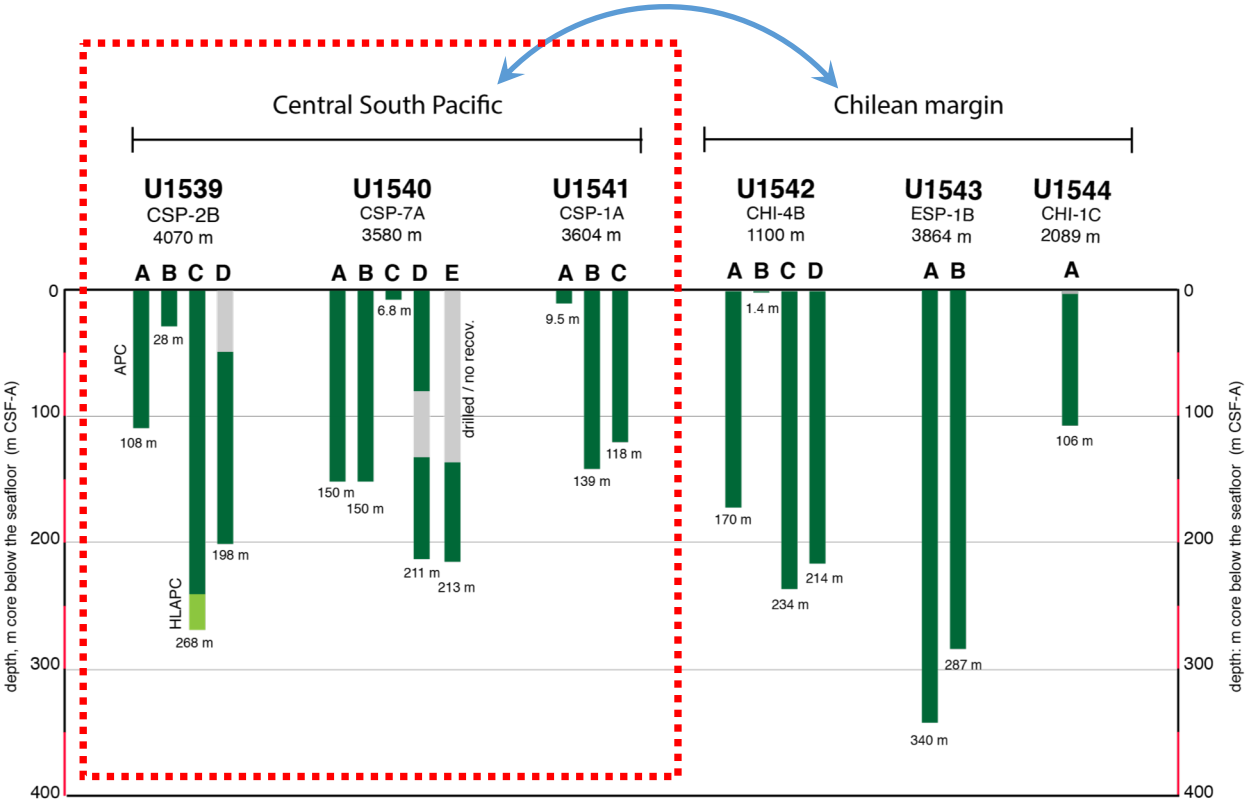
  → Biostratigraphy

  → Paleomag
  All 31 polarity boundaries from the B/M to the C3Br.2r observed

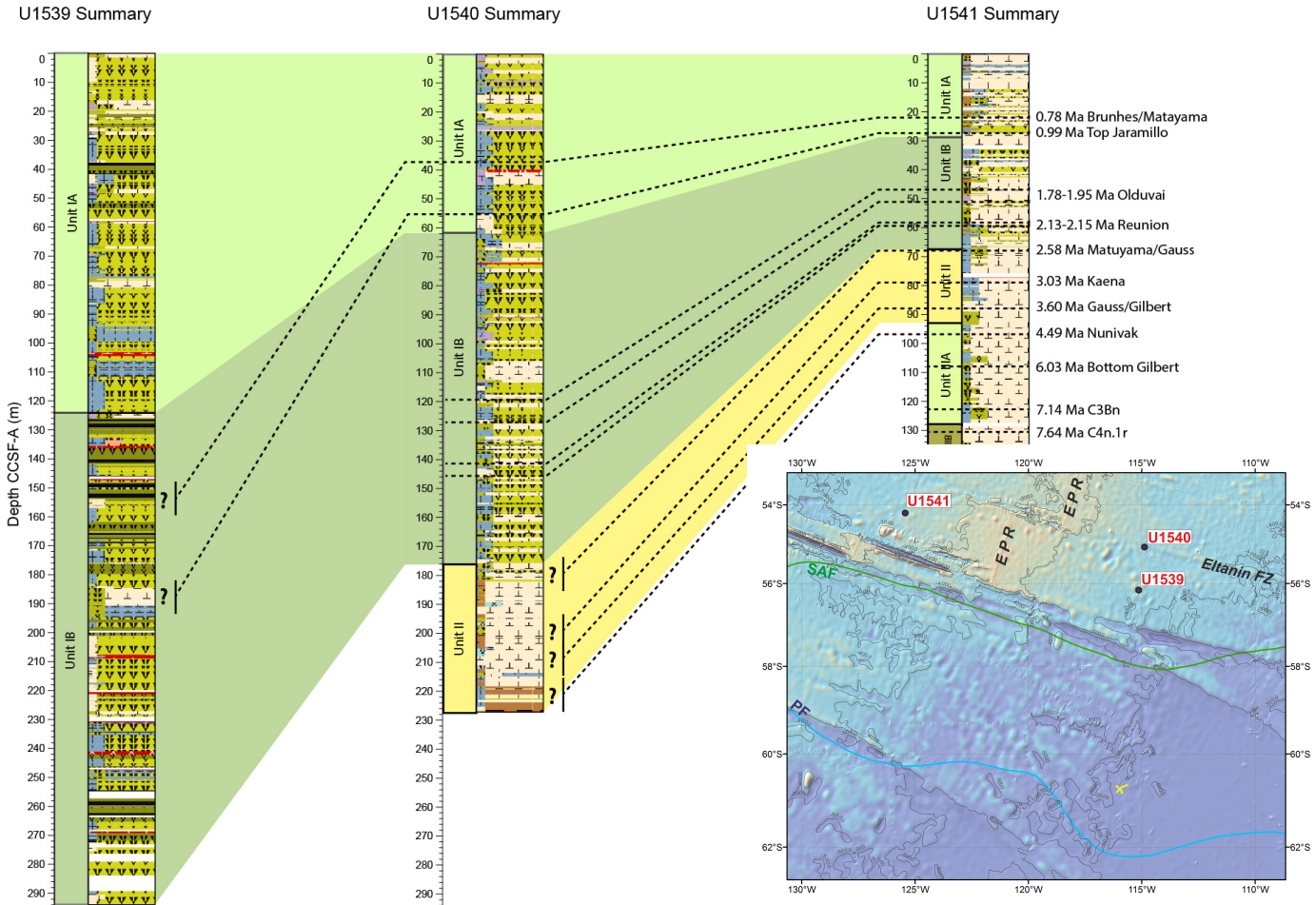
- ✓ Relatively constant Sed rate: 5cm/kyr

- ✓ → Eastern South Pacific Reference Record for the past ~ 8Myr

Core Recovery during Expedition 383



Central South Pacific sites



Expedition 383 Summary

- ✓ 2636 m recovered by APC coring
- ✓ Continuous records back to the upper Miocene
- ✓ High quality/high resolution records
- ✓ All but 1 sites have multiple copies
- ✓ Caveat: No Record from the Antarctic Zone (due to weather issues