Discussion on new data/constraints

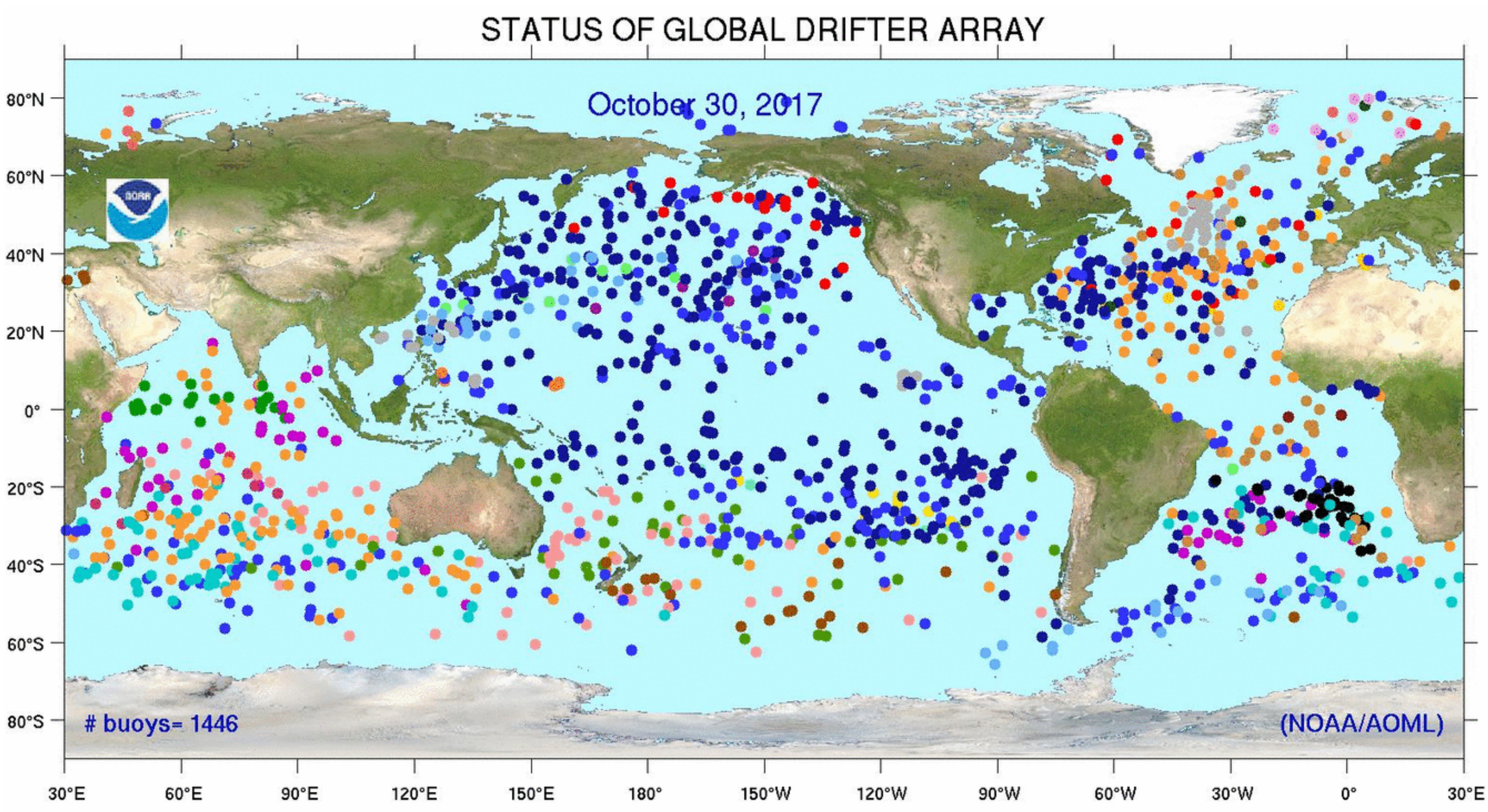
ECCO Meeting, California Institute of Technology, Pasadena

November 6-8, 2017

Data sets used in v4r3

Variable	Observations
Sea level	Various altimeters, including global mean sea level
Arctic moorings TS	Beaufort Gyre, Bering/Davis/Fram Straits
Temperature profiles	Argo, XBTs, CTDs, Southern Elephant seals as Oceanographic Samplers (SEaOS), Ice-Tethered Profilers
Salinity profiles	Argo, CTDs, SEaOS
Sea surface temperature	AVHRR
Sea surface salinity	Aquarius
Sea-ice concentration	SSM/I and SSMIS
Bottom pressure	GRACE including global mean ocean mass
TS climatology	World Ocean Atlas
MDT	Mean dynamic topography DTU13

Surface drifters

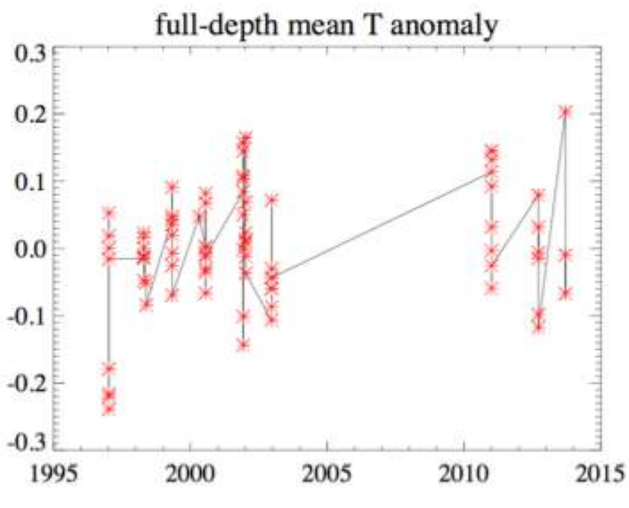


http://www.aoml.noaa.gov/phod/float_traj/index.php

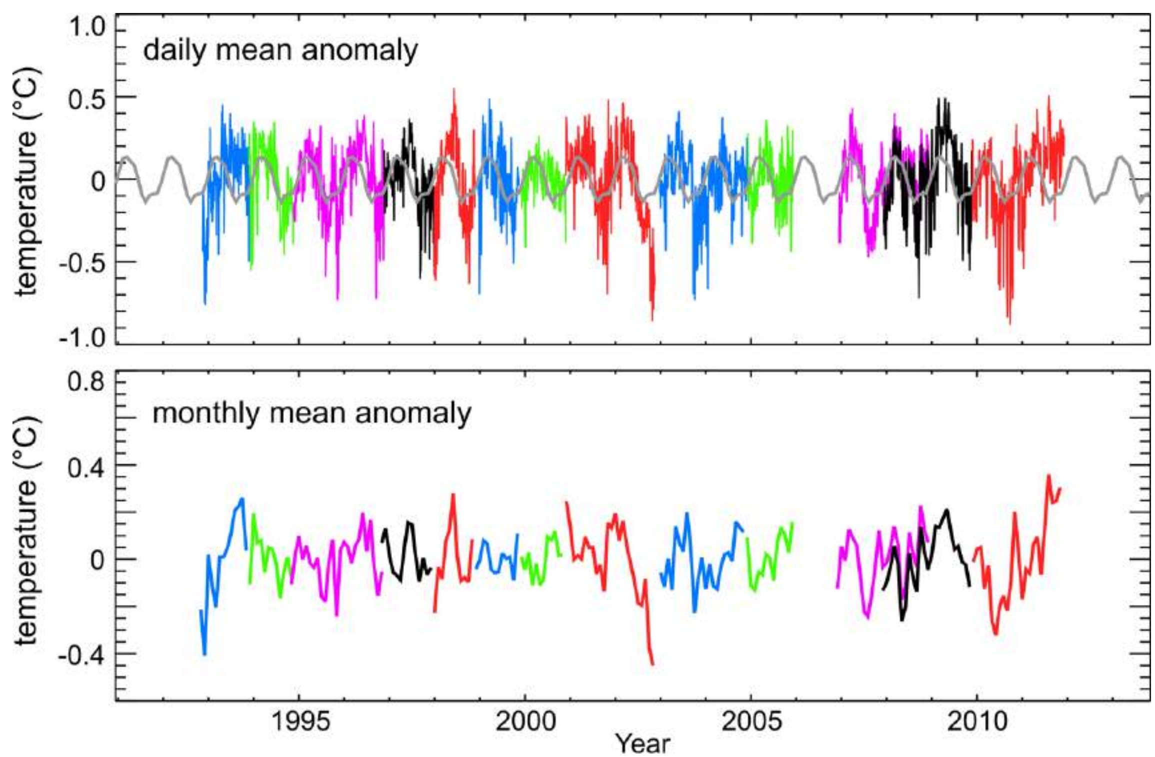
Are we using moorings enough?

Moorings could resolve interannual changes more accurately than sparsely distributed data (e.g., Argo, XBTs)

Repeat XBTs @ southern end of Drake Passage



1000m Temperature @ southern end of Drake Passage OBP mooring



Antarctic Moorings

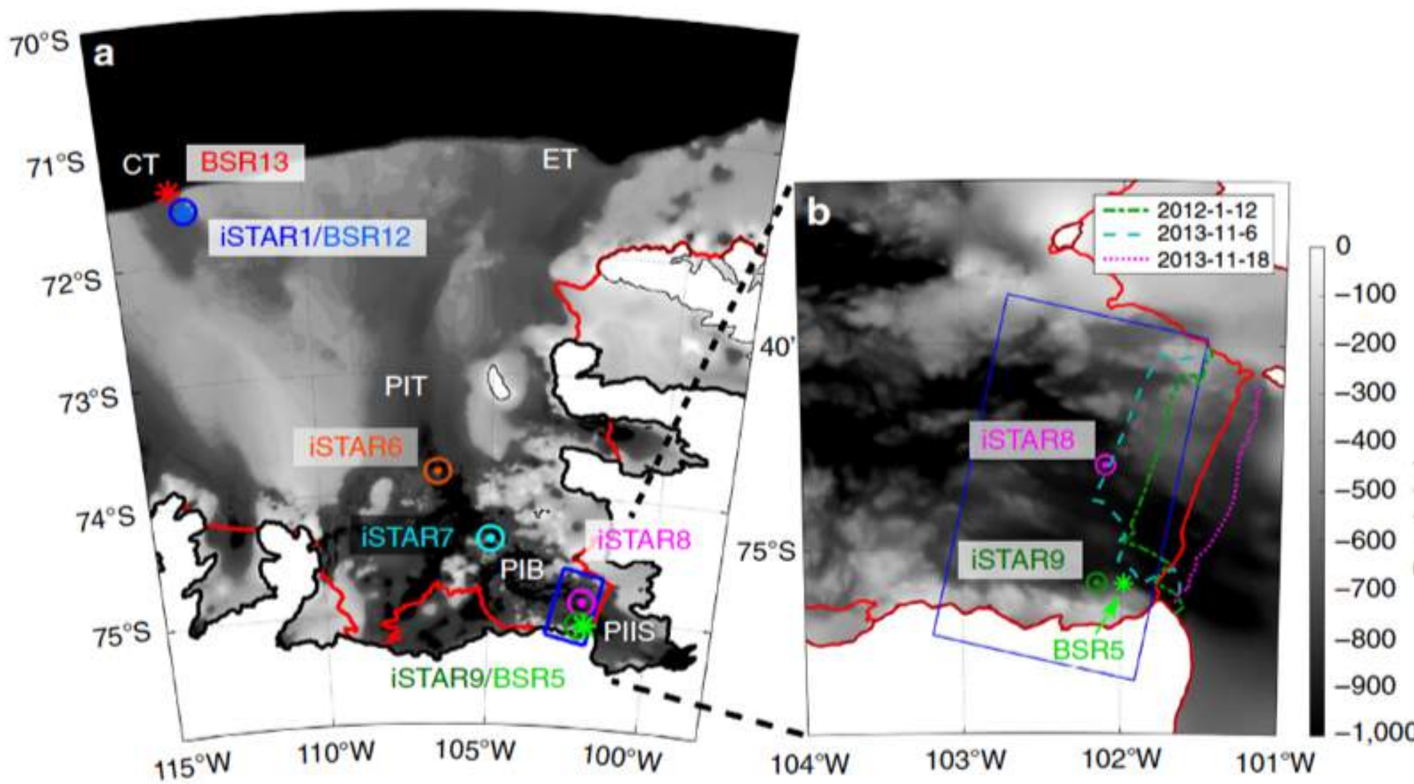
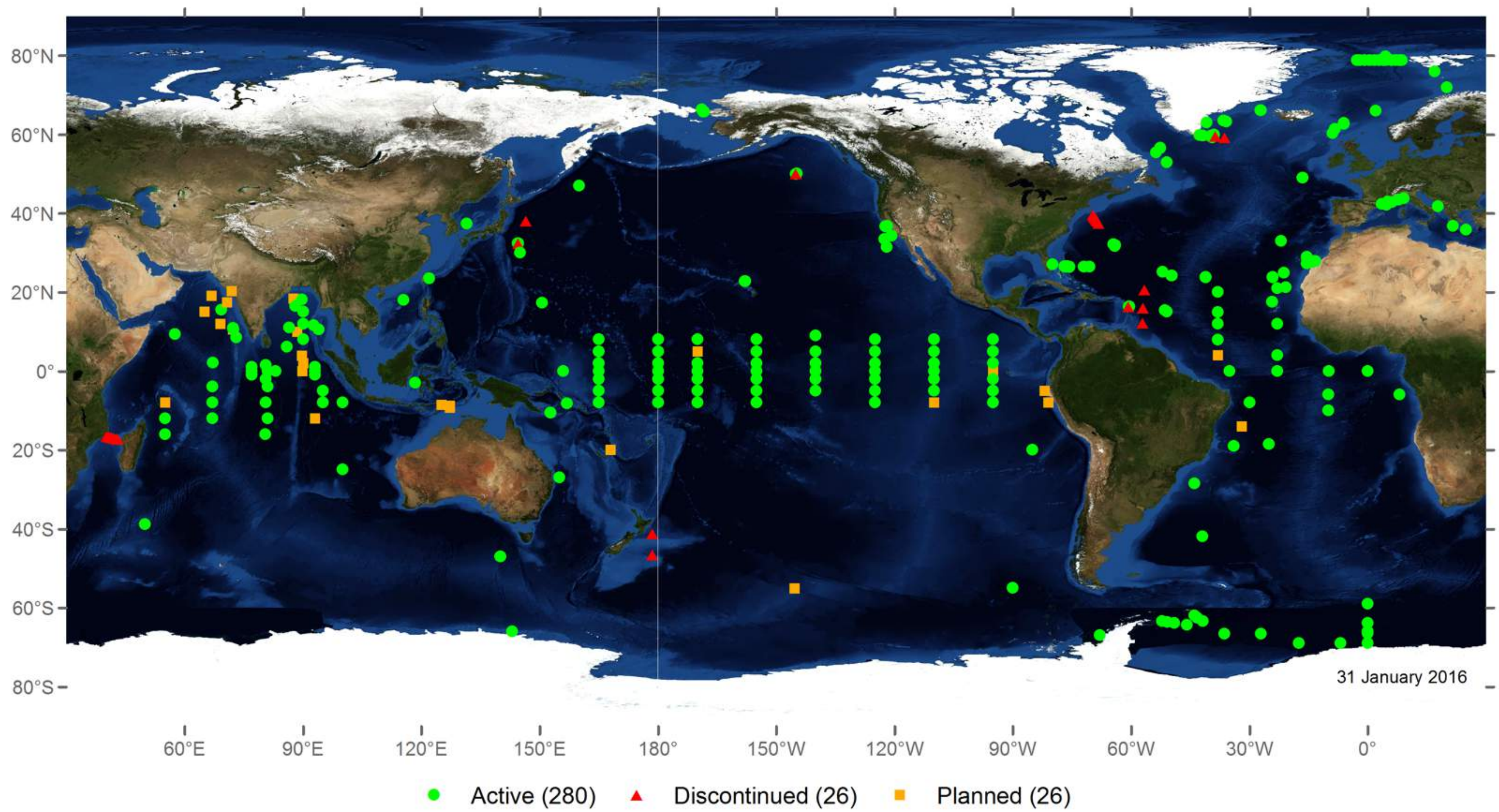


Figure 1 | Ocean observations in the Amundsen Sea. (**a**) Location of study area; IBCSO bathymetry[41] (shaded, see legend) and ice shelf edges from 2004 (red outlines); central (CT), eastern (ET) and Pine Island (PIT) troughs, Pine Island Bay (PIB), Pine Island Ice Shelf (PIIS); mooring locations (labelled; iSTAR moorings circles; BSR moorings stars) and the region over which the surface fluxes are averaged (blue box). (**b**) Enlargement of the Pine Island ice front showing the position of the ice front on 12 January 2012 (green dot-dash line), 6 November 2013 (before iceberg calved; cyan dashed line), 18 November 2013 (after iceberg calved; magenta dotted line).

Webber et al., 2017, *Nature Communications*, *8*, 14507, doi:10.1038/ncomms14507

http://www.marine-geo.org/tools/search/Files.php?tab=datacitation&data_set_uid=22014

In situ data

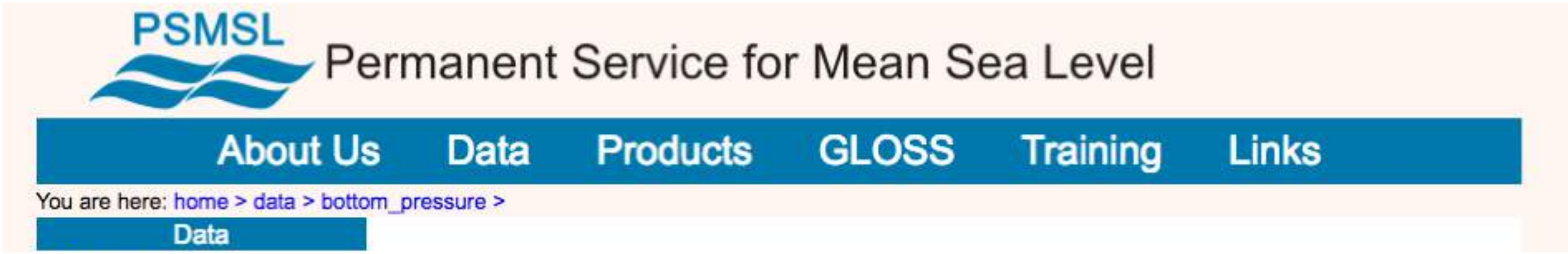


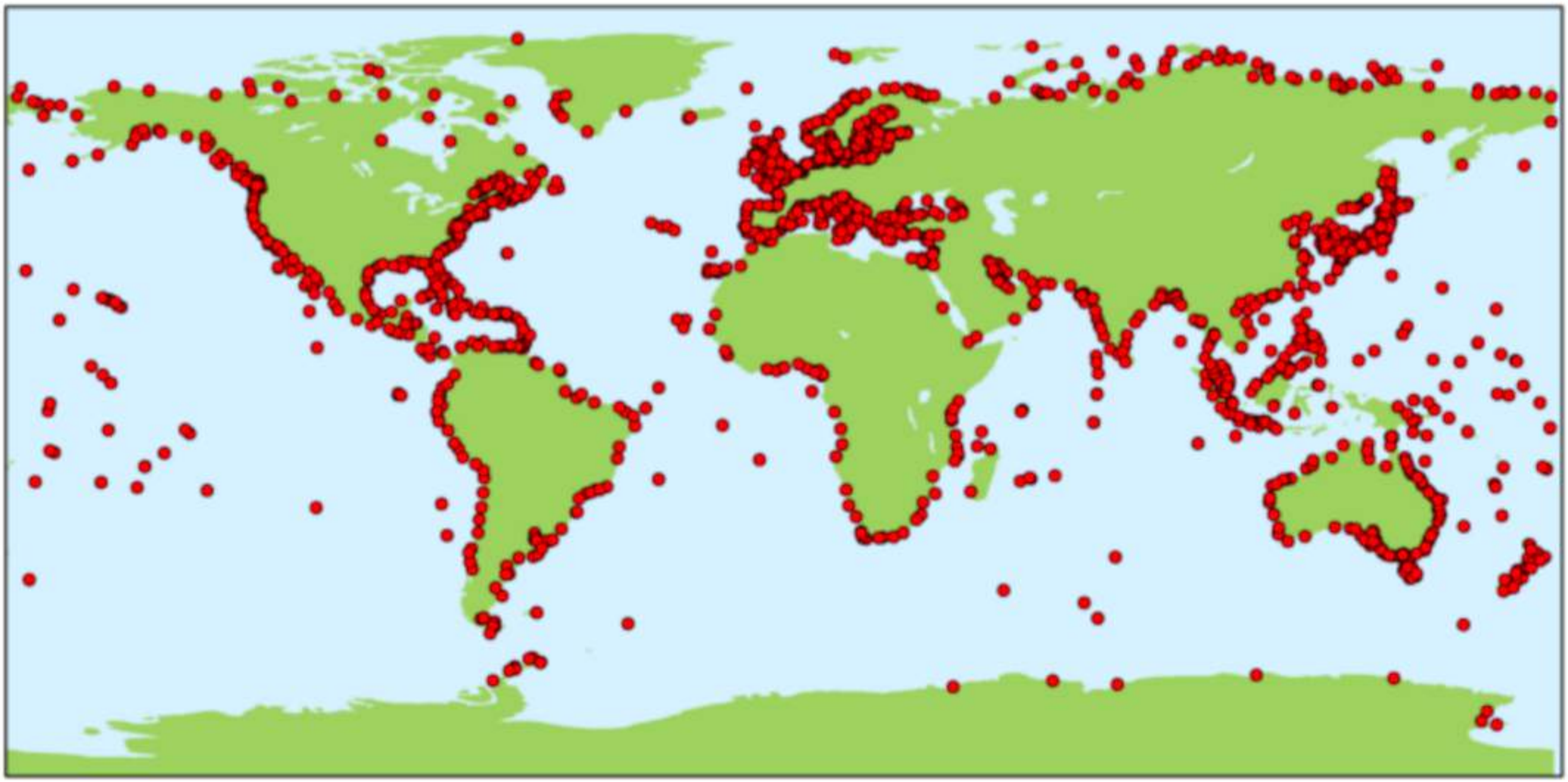
http://www.oceansites.org/index.html

In situ data

- MOC arrays
  - OSNAP
  - RAPID-MOCHA (including Florida Straits)
  - MOVE
  - SAMOC/SAMBA
- Tropical arrays
  - Atlantic-PIRATA
  - Indian-RAMA
  - Pacific-TAO

Sea level (tide gauges)





http://www.psmsl.org/products/data_coverage/

Long OBP time-series

PSMSL Permanent Service for Mean Sea Level

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You are here: home > data > bottom_pressure >

Data

- Obtaining
- Supplying
- High-Frequency
- Bottom Pressure Records
- Other Long Records
- GLOSS/ODINAFRICA Calibration Data

Other Links

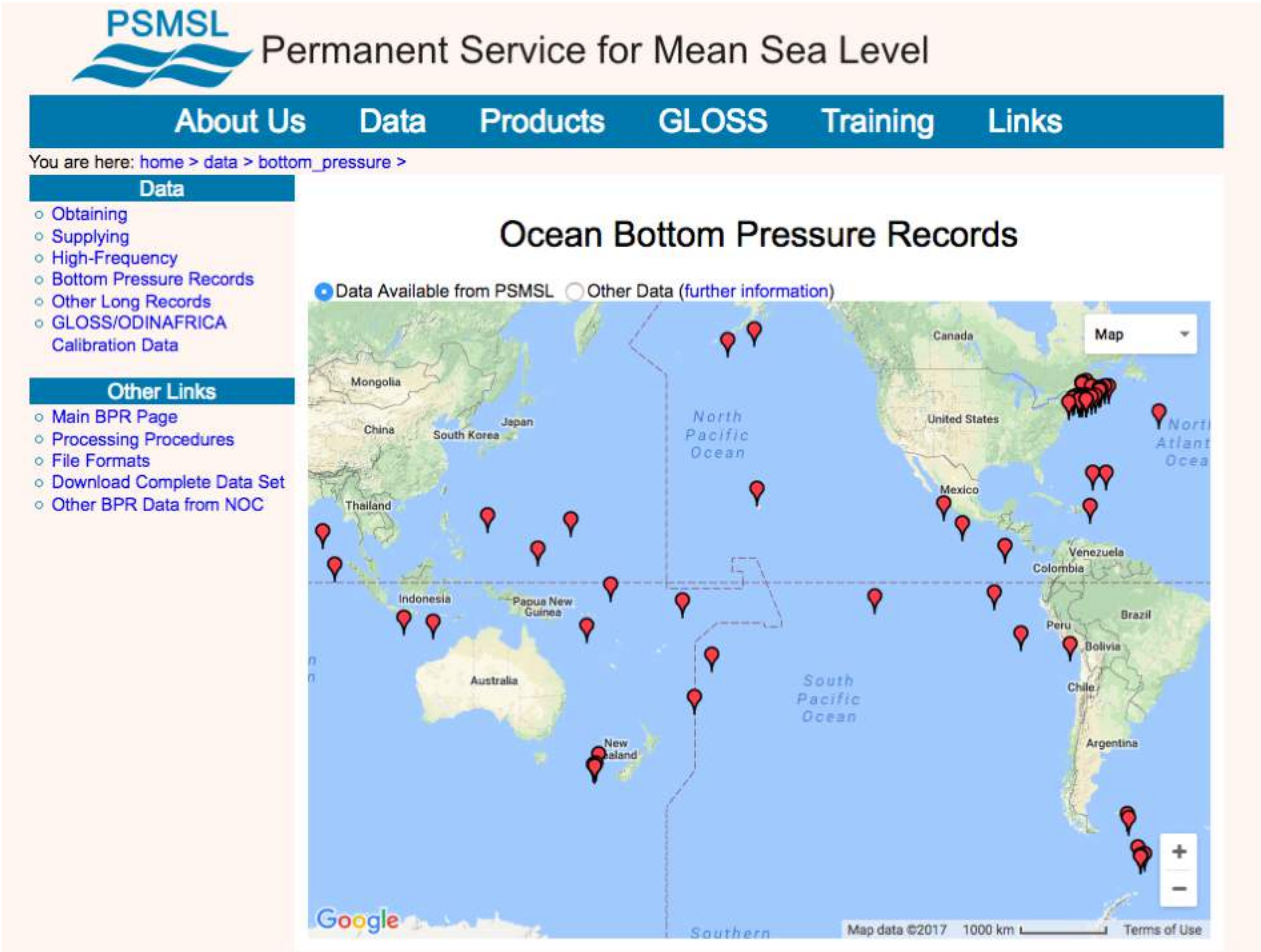
- Main BPR Page
- Ocean Regions
- Processing Procedures
- File Formats
- Download Complete Data Set
- Other BPR Data from NOC

Ocean Bottom Pressure Records

Location	Lat.	Lon.	Reg.	Start Date	End Date	Len.	Long.
Drake Passage South	-60.8570	-54.7147	4.2	1992-11-08	2011-12-06	7294	755
Drake Passage North	-54.9464	-58.3405	1.4	1992-11-09	2013-10-05	6513	748
NDBC 46403 - South East Shumagin Island - 186 NM SE of Shumagin Is, Alaska	52.6330	-156.9888	2.1	1998-07-03	2014-09-29	4748	690
NDBC 46402 - South Dutch Harbor - 220 NM SSE of Dutch Harbor, Alaska	50.8881	-164.3138	2.1	1999-10-03	2014-09-27	4647	895
NDBC 51406 - Central South Pacific - 1040 NM NNE of Pitcairn Island	-8.4870	-125.0194	2.3	2001-09-02	2013-02-19	4131	1038
NDBC 51407 - Hawaii - 34 NM West of Kailua-Kona	19.5777	-156.5393	2.3	2005-06-28	2014-06-07	3173	770
NDBC 32401 - 260 NM WSW of Arica, Chile	-20.4730	-73.4290	2.3	2005-03-23	2014-11-27	3022	1166
NDBC 52403 - North Manus - 345 NM N of Manus Island,New Guinea	4.0470	145.6132	2.3	2006-12-19	2014-08-13	2488	601
NDBC 52402 - South East Saipan - 540 NM ESE of Saipan	11.7491	154.2571	2.3	2006-12-15	2013-12-31	2429	942
NDBC 42407 - South Puerto Rico - 230 NM South of San Juan	15.2823	-68.2192	1.3	2006-04-11	2014-05-28	2398	758
NDBC 41420 - North Santo Domingo - 328 NM NNE of Santo Domingo	23.4181	-67.4634	1.3	2006-04-07	2014-05-16	2393	729
NDBC 32411 - West Panama - 710 NM WSW of Panama City, Panama	4.9568	-90.7302	2.3	2007-03-27	2014-03-24	2367	764
NDBC 51425 - North West Apia - 370 NM NW of Apia, Samoa	-9.5100	-176.2410	2.3	2008-02-28	2014-08-01	2190	862
NDBC 41421 - North St Thomas - 300 NM N of St Thomas, Virgin Is	23.4090	-63.9060	1.3	2006-04-11	2014-05-18	2161	722
NDBC 43413 - South Acapulco - 360NM South of Acapulco, Mexico	10.8576	-101.8721	2.3	2007-03-24	2014-03-20	2133	771
NDBC 55015 - Tasman Sea 1 - 1110 km ESE of Hobart	-46.8290	160.2560	2.4	2008-04-02	2014-03-21	2121	1062
NDBC 23401 - 600 NM West-Northwest of Phuket, Thailand	8.9050	88.5370	3.1	2006-12-04	2013-08-21	1995	1011
NDBC 52405 - South Philippine Sea - 725 NM West of Agana, Guam	12.9682	132.2062	2.3	2006-12-04	2013-12-31	1995	947
NDBC 44401 - 620 NM S of St Johns, 790 NM NE of Bermuda	37.5577	-49.9957	1.2	2007-09-01	2012-12-17	1853	996
NDBC 32412 - South West Lima - 645 NM SW of Lima, Peru	-17.9786	-86.3580	2.3	2007-11-02	2012-11-14	1836	706
NDBC 55012 - Coral Sea 1 - 1285 km ENE of Townsville	-15.7980	158.3990	2.3	2008-03-27	2014-08-22	1804	804
NDBC 43412 - South West Manzanillo - 240 NM SW of Manzanillo, Mexico	16.0563	-106.9973	2.3	2008-03-01	2014-03-17	1712	738
NDBC 56001 - Indian Ocean 1 - 1025km NW of Dampier	-13.9910	110.0970	3.1	2009-10-08	2014-06-24	1684	773

http://www.psmsl.org/data/bottom_pressure/table.php

Long OBP time-series



http://www.psmsl.org/data/bottom_pressure/map.php

Data sets: High-latitude/ice

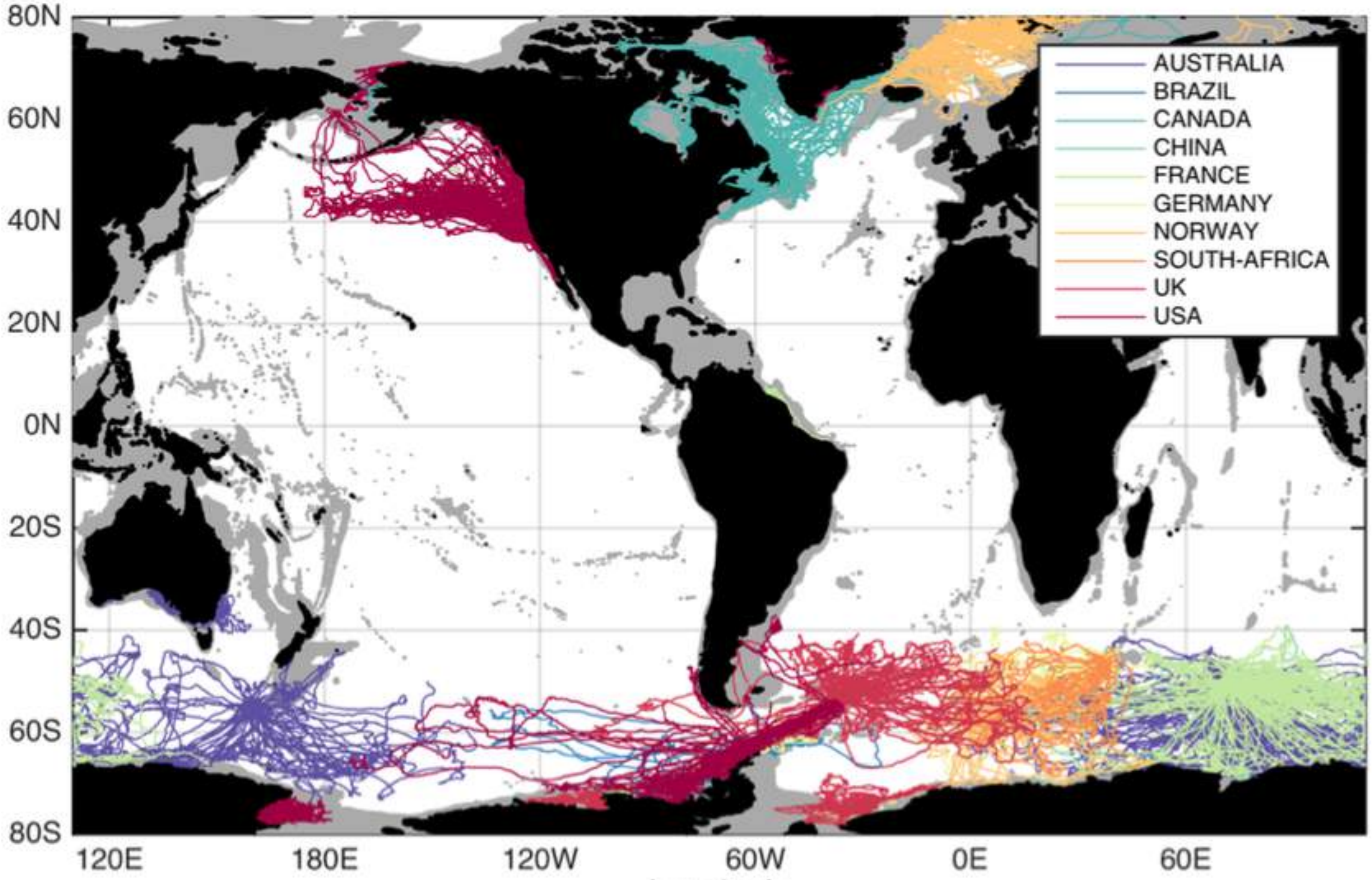
- Ice thickness
  - ICESat (and in future ICESat-2)
  - CryoSat-1 and 2
  - SMOS
  - IceBridge?
- Ice velocity
  - Microwave
  - RGPS (Radarsat Geophysical Processing System)…already being used by An for ASTE?
  - ICESat…used in ASTE?
- …

Data sets: Forcing

For use as constraints or as actual forcing fields:

- **Satellite winds: multiple instruments or merged fields like the Cross-Calibrated Multi-Platform (CCMP) Ocean Surface Wind Vector Analyses**
- **Precipitation: Tropical Rainfall Measurement Mission (TRMM,1997-2015), Global Precipitation Measurement (GPM, 2014-…)**
- **River runoff: global monthly data set almost up to date (through ~2014)…** Dai, A., 2016: Historical and future changes in streamflow and continental runoff: A review. Chapter 2 of *Terrestrial Water Cycle and Climate Change: Natural and Human-Induced Impacts, Geophysical Monograph 221, edited by Qiuhong Tang and Taikan Oki, AGU, John Wiley & Sons, 17-37.*

“New” insitu data



http://www.meop.net/

“New” satellite data

- Sea surface salinity
    - SMOS
    - SMAP
- Sea surface temperature
    - Microwave