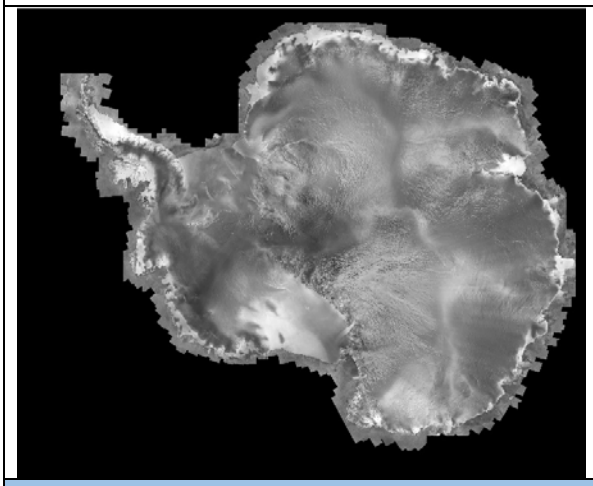
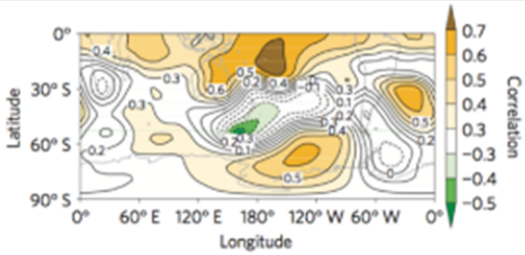
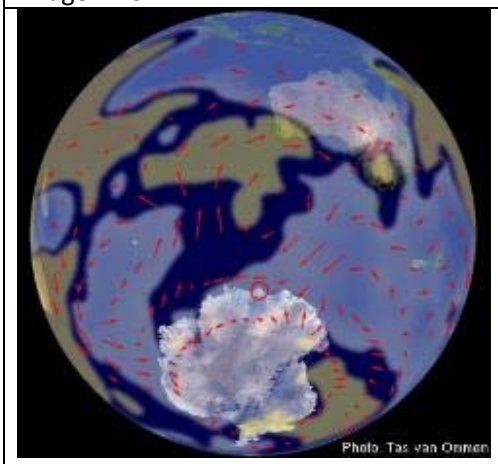
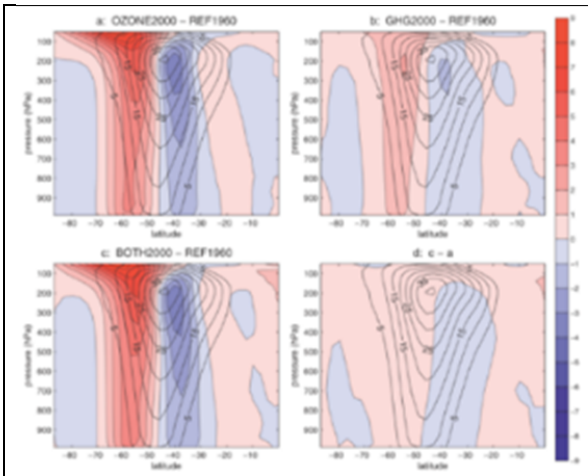
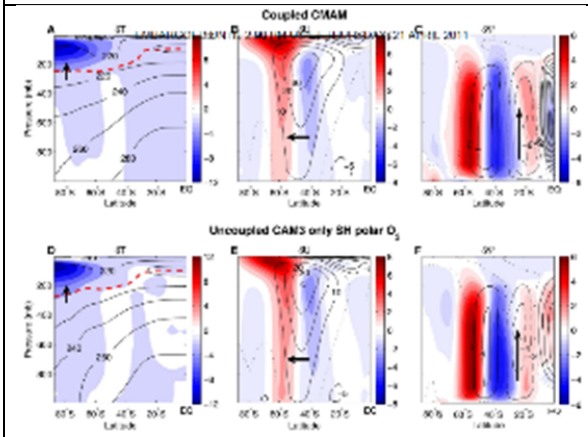
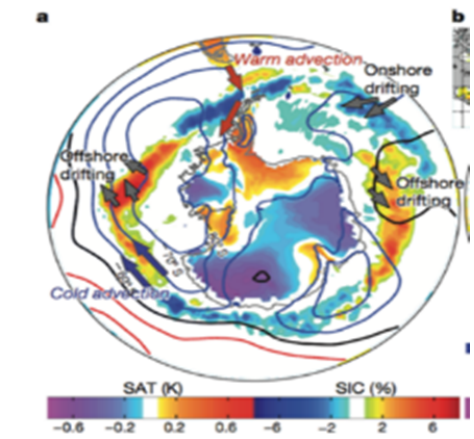
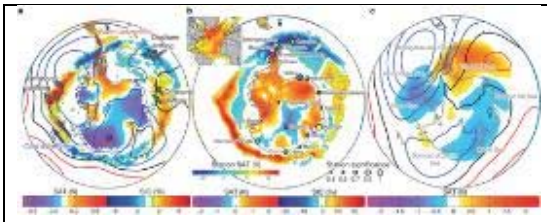
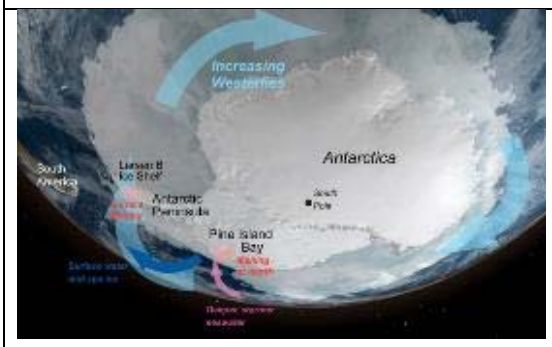
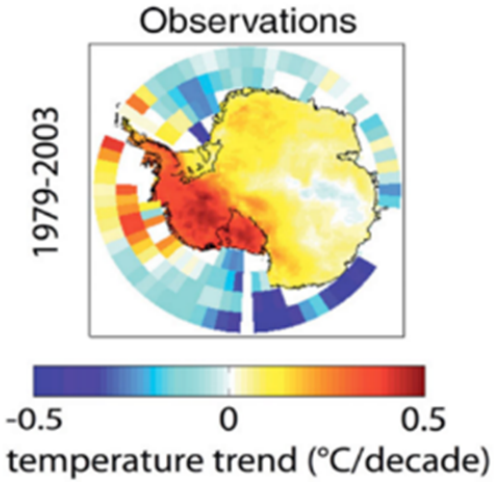
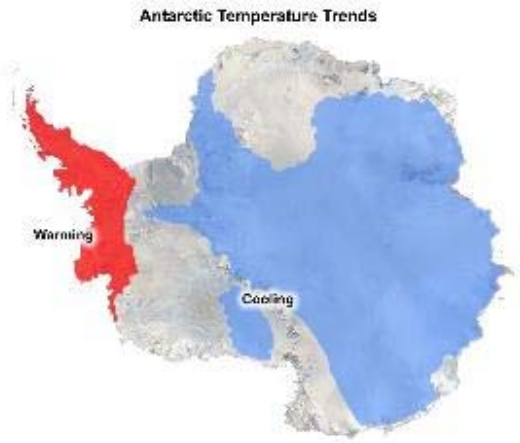
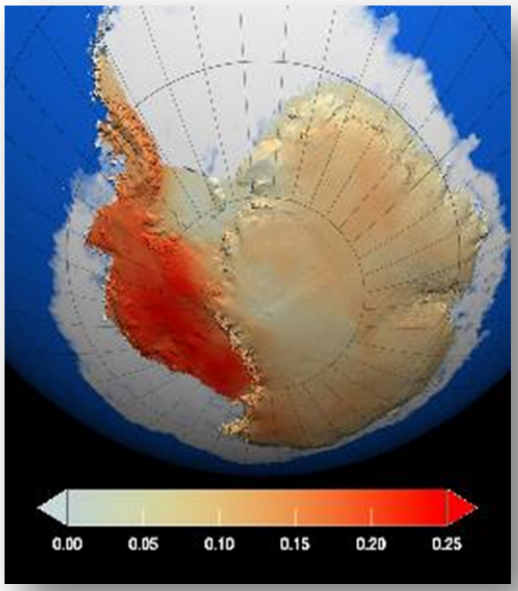
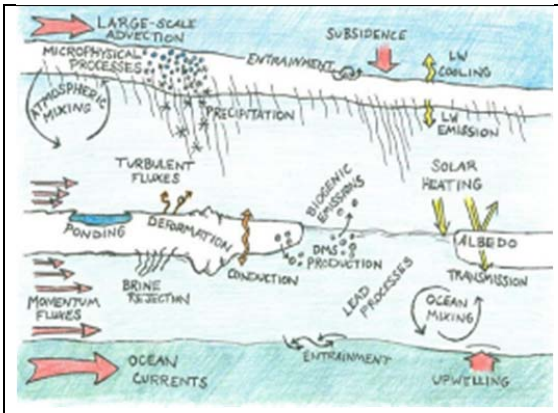
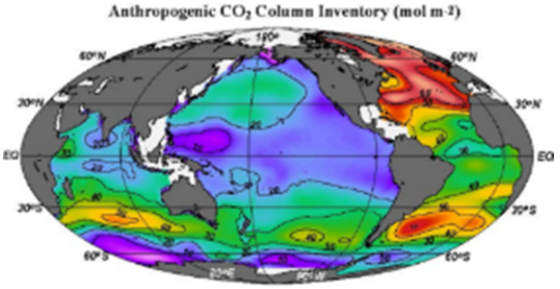
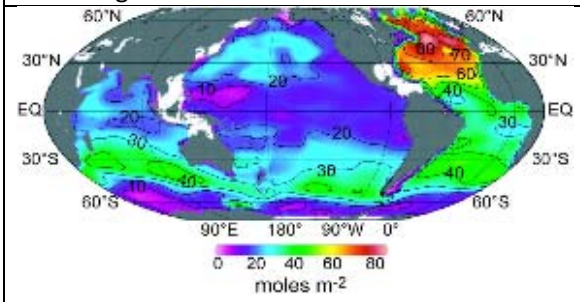
Image Glossary

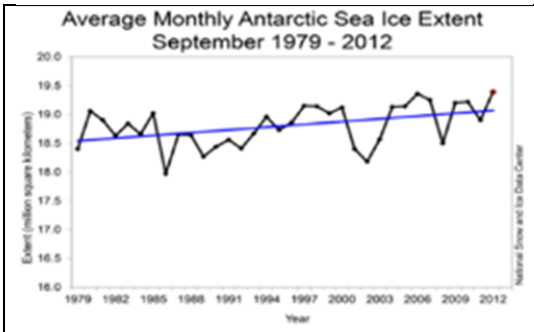
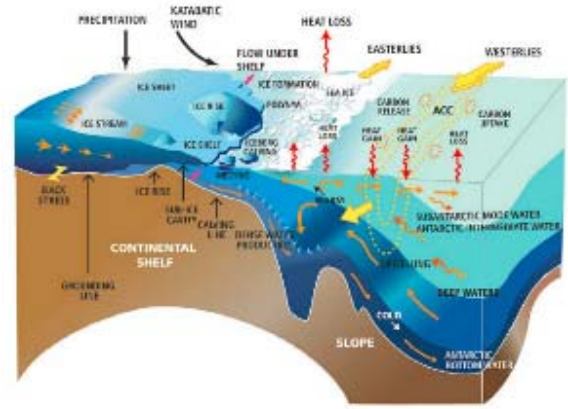
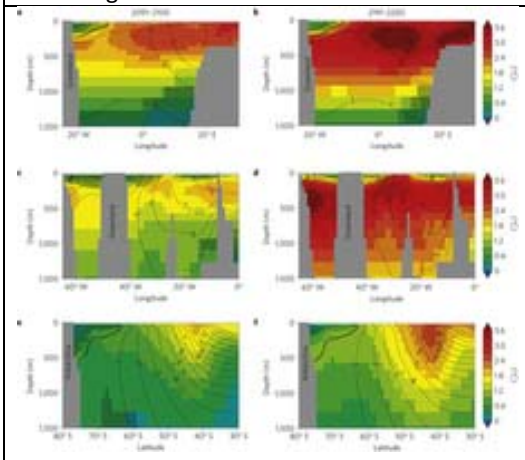
Image	Description	Source
	SAR Image from the Antarctic Mapping Mission of RADARSAT-1. The images were taken in 1997 and have a ground resolution of 125m.	Source: PGC. http://geoawesomeness.com/new-high-resolution-mosaic-arctic-antarctic/ http://www.agic.umn.edu/imagery/satellite
Antarctic Atmosphere and Global Connections		
 Image ARC 1	Unable to locate source	
 ARC Image 2	The map shows moist air being transported south to East Antarctica and Law Dome, accompanied by dry air flowing northward to Western Australia.	Photo by Tas van Omen (AAD). http://www.antarctica.gov.au/about-us/publications/australian-antarctic-magazine/2006-2010/issue-18-2010/glaciology/antarctic-ice-cores-shed-light-on-western-australian-drought

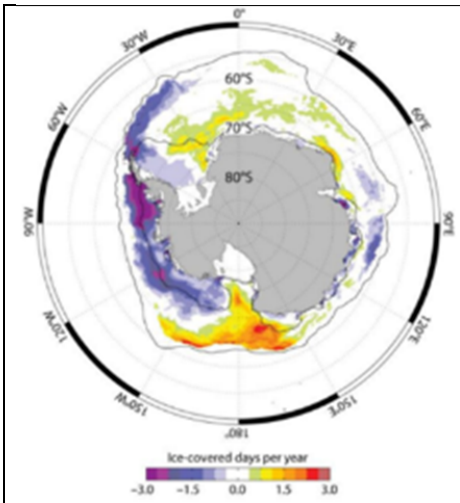
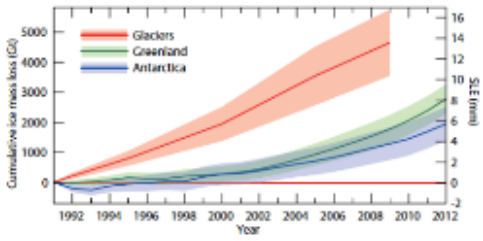
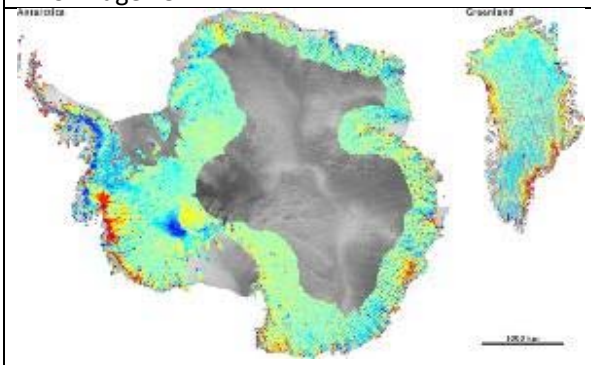
 ARC Image 3	See panel below – unable to locate original source	
 ARC Image 4	Mechanism linking the ozone hole to subtropical precipitation change.	Impact of Polar Ozone Depletion on Subtropical Precipitation S. M. Kang, L. M. Polvani, J. C. Fyfe, 3 M. Sigmond Science Express Report https://wattsupwiththat.files.wordpress.com/2011/04/kang-04-22-11.pdf
 ARC Image 5	See panel below	

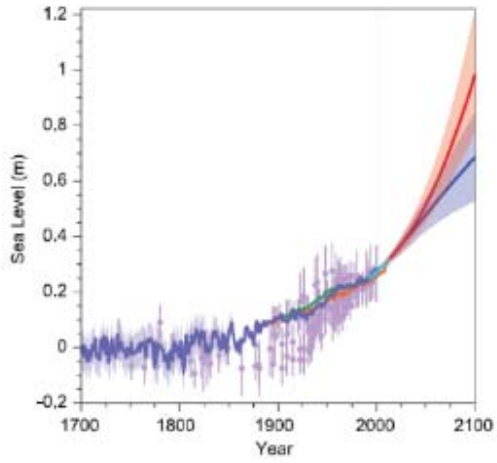
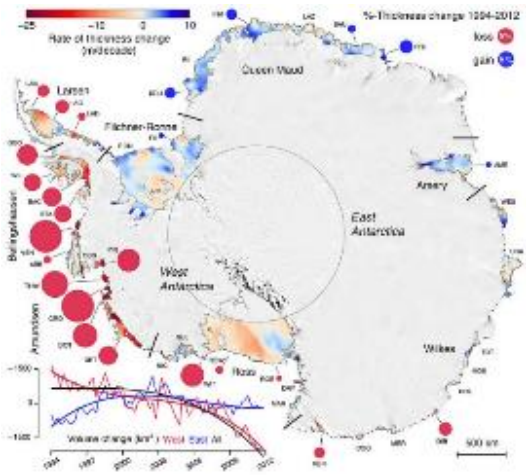
 ARC Image 6	The austral winter patterns of Antarctic SLP, SAT and SIC related to tropical Atlantic SST warming.	Impacts of the north and tropical Atlantic Ocean on the Antarctic Peninsula and sea ice Xichen Li, David M. Holland, Edwin P. Gerber & Changhyun Yoo Nature 505, 538–542 (23 January 2014) doi:10.1038/nature12945 http://www.nature.com/nature/journal/v505/n7484/full/nature12945.html?WT.ec_id=NATURE-20140123
 ARC Image 7	A graphic illustration of the atmospheric changes that are influencing the ocean circulation off the coast of West Antarctica, particularly the Pine Island Bay embayment. Winds are pushing surface waters away from the continent, drawing deeper, warmer water up onto the continental shelf and under the ice.	Photo credit NASA. http://antarcticsun.usap.gov/science/contentHandler.cfm?id=2559
 ARC Image 8	Source unknown	

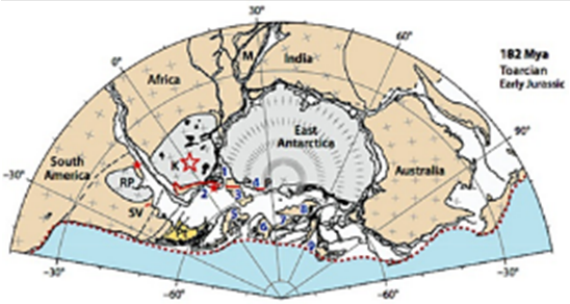
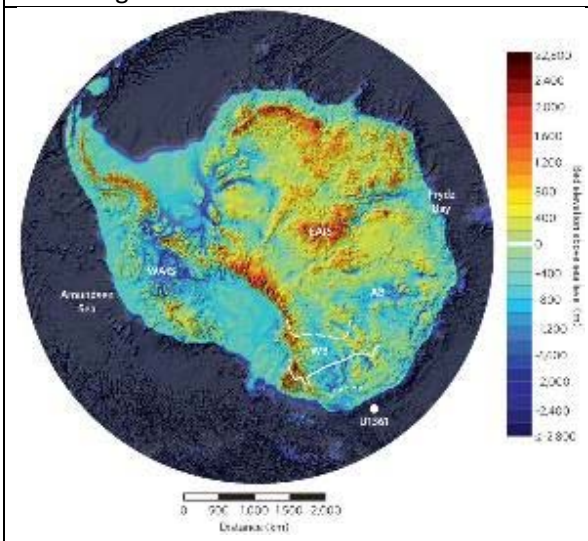
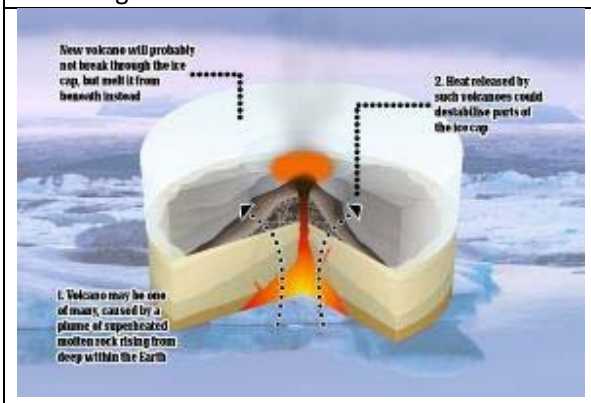
 ARC Image 9	This map of Antarctica shows the approximate boundaries of areas that have warmed or cooled over the past 35 years. The map is based on temperatures in a recently-constructed data set by NCAR scientist Andrew Monaghan and colleagues. The data combines observations from ground-based weather stations, which are few and far between, with analysis of ice cores used to reveal past temperatures.	Illustration by Steve Deyo, UCAR, 2008. https://www2.ucar.edu/atmosnews/news/941/climate-models-overheat-antarctica-new-study-finds#mediaterms
 ARC Image 10	Red represents areas where temperatures have increased the most during the last 50 years, particularly in West Antarctica, while dark blue represents areas with a lesser degree of warming. Temperature changes are measured in degrees Celsius.	Credit: NASA/GSFC Scientific Visualization Studio http://www.nasa.gov/topics/earth/features/warming_antarctica.html

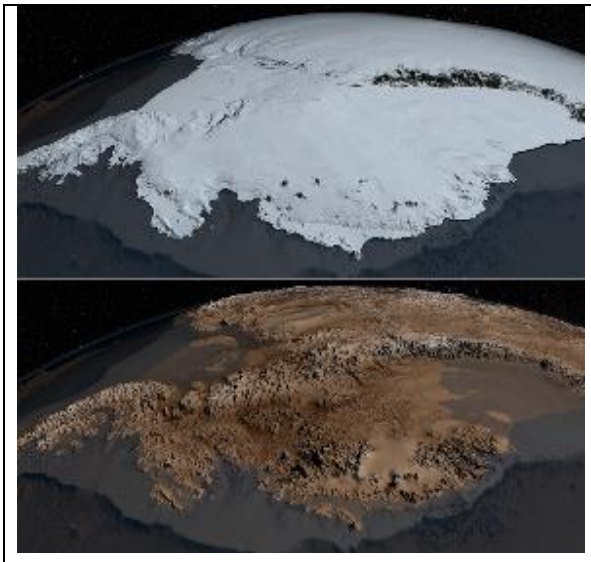
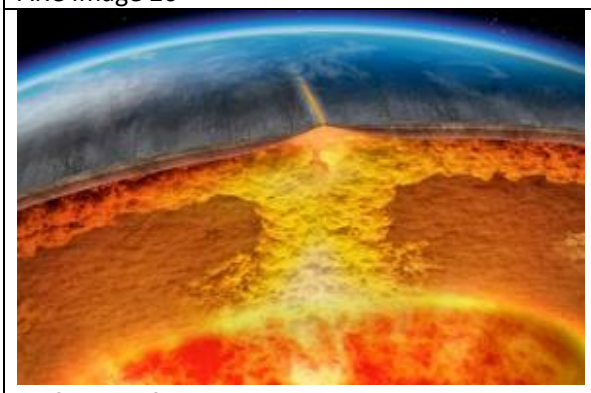
 ARC Image 11	Unknown source	
The Southern Ocean and Sea Ice in a Warming World		
 ARC Image 12	See version below	
 ARC Image 13	Global CO_2 Inventory	Sabine et al., 2004 http://www.pmel.noaa.gov/cfc/using-cfcs-estimate-anthropogenic-co2-uptake-ocean Sabine, C.L., R.A. Feely, N. Gruber, R.M. Key, K. Lee, J.L. Bullister, R. Wanninkhof, C.S Wong, D.W.R. Wallace, B. Tilbrook, F.J. Millero, T.-H. Peng, A. Kozyr, T. Ono, and A.F. Rios (2004): The oceanic sink for anthropogenic CO2. Science, 305(5682), doi: 10.1126/science.1097403 , 367–371.

 ARC Image 14	Antarctic sea ice extent growth for the month of September between 1979 and 2014.	US National Snow and Ice Data Center http://www.reportingclimatescience.com/news-stories/article/study-antarctic-sea-ice-growth-due-to-natural-variability.html
 ARC Image 15	Cartoon of Southern Ocean circulation and glaciological processes occurring on the coast of Antarctica.	Future Science Opportunities in Antarctica and the Southern Ocean (NAP,2011) http://www.nap.edu/read/13169/chapter/4
 ARC Image 16	Ensemble mean projections of ocean warming (shading) **a**,**b**, at 73° N; **c**,**d**, at 63° N; **e**,**f**, zonal mean in the Southern Ocean. Left and right panels show the warming during 2091–2100 and 2191–2200, respectively.	Different magnitudes of projected subsurface ocean warming around Greenland and Antarctica Jianjun Yin, Jonathan T. Overpeck, Stephen M. Griffies, Aixue Hu, Joellen L. Russell & Ronald J. Stouffer Nature Geoscience 4, 524–528 (2011) doi:10.1038/ngeo1189 Received 20 March 2011 Accepted 23 May 2011 Published online 03 July 2011 http://www.nature.com/ngeo/journal/v4/n8/full/ngeo1189.html

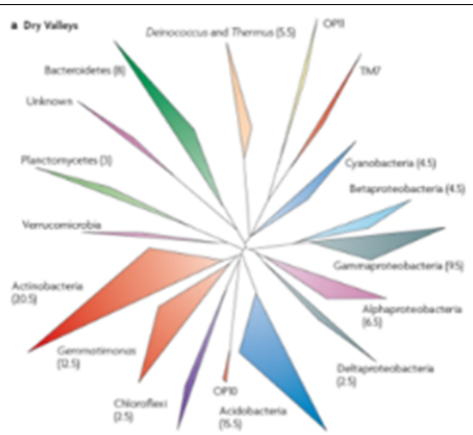
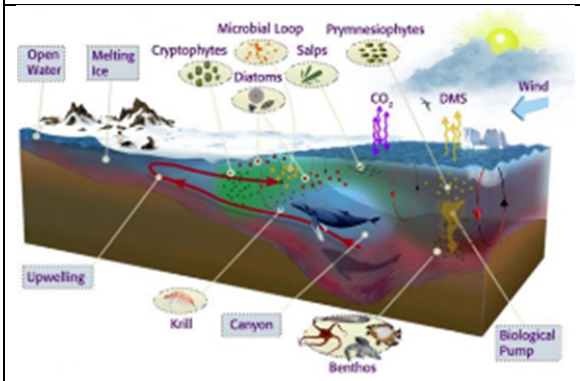
 ARC Image 17	Trends in sea ice duration, 1979-2010, showing large regional variations.	Figure from Maksym et al. 2012. Credit: Guy Williams http://phys.org/news/2014-09-antarctic-sea-ice-recordbut-scientists.html Maksym, T., S.E. Stammerjohn, S. Ackley, and R. Massom. 2012. Antarctic sea ice—A polar opposite? Oceanography 25(3):140–151, http://dx.doi.org/10.5670/oceanog.2012.88
Antarctic Ice Sheet and Sea Level		
 ARC Image 18	Contribution of global glaciers (red), Greendland (green) and Antarctica (blue) to sea level rise between 1992-2012. Positive correlation between cumulative ice mass loss and sea level equivalent, shaded areas indicate uncertainty.	https://www.ccin.ca/home/ccw/glaciers/current
 ARC Image 19	Antarctica today	NASA/Goddard Space Flight Center Scientific Visualization Studio https://svs.gsfc.nasa.gov/cgi-bin/details.cgi?aid=1045
	These images illustrate changes to the edges of the ice sheets between 2003 and 2007 as observed by ICESat. Places where glaciers thinned from lost ice over time are red, while areas where glaciers or the ice sheet gained ice are blue. Areas that were not a part of the analysis are gray. The data are in narrow bands,	Images by Hamish D. Pritchard, Robert J. Arthern, David G. Vaughan, and Laura A. Edwards, British Antarctic Survey and University of Bristol. Published in Nature. Caption by Holli Riebeek. http://earthobservatory.nasa.gov/IOTD/view.php?id=40569&src=ve

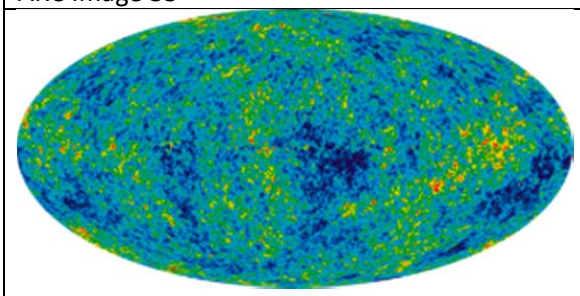
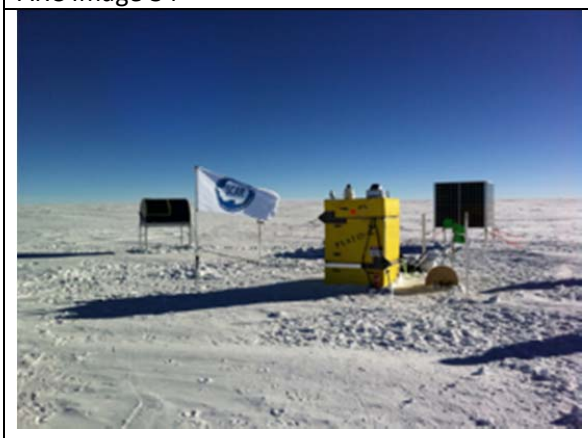
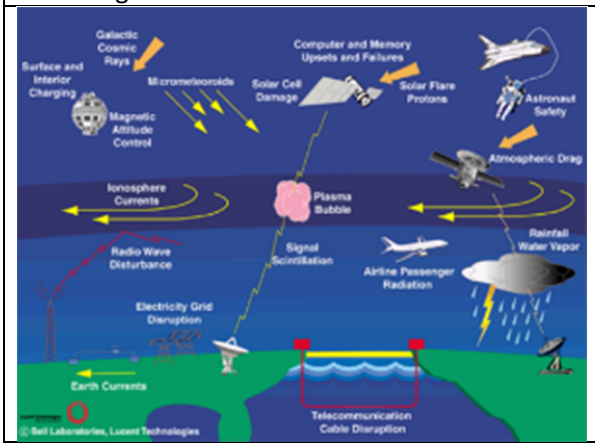
ARC Image 20	represented by the crossing lines that make up the image	
 ARC Image 21	Sea level rise according to the IPCC report of 2013. Shown is the past history of sea level since the year 1700 from proxy data (sediments, purple) and multiple records from tide gauge measurements. Light blue are the satellite data (from 1993). The two future scenarios mentioned in the text (RCP8.5 and RCP2.6) are shown in red and blue, with their "likely" uncertainty range according to the IPCC (meaning a 66 % probability to remain inside this range)..	Source: IPCC AR5 Fig. 13.27 http://www.ipcc.ch/
 ARC Image 22	Eighteen years of change in thickness and volume of Antarctic ice shelves. Rates of thickness change (m/decade) are color-coded from -25 (thinning) to +10 (thickening). Circles represent percentage of thickness lost (red) or gained (blue) in 18 years. The central circle demarcates the area not surveyed by the satellites (south of 81.5ºS).	Original data were interpolated for mapping purposes. Background is the Landsat Image Mosaic of Antarctica (LIMA). Credit: Scripps Institution of Oceanography, UC San Diego. http://phys.org/news/2015-03-antarctic-ice-shelves-rapidly-thinning.html

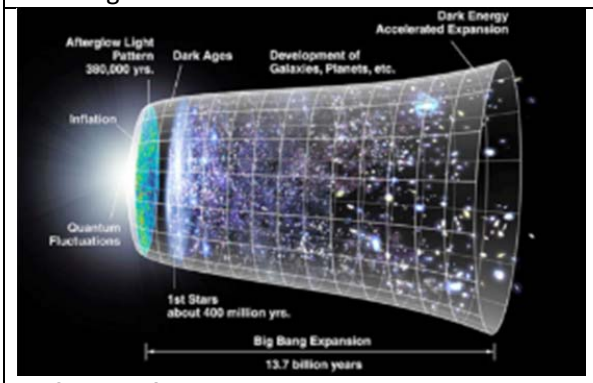
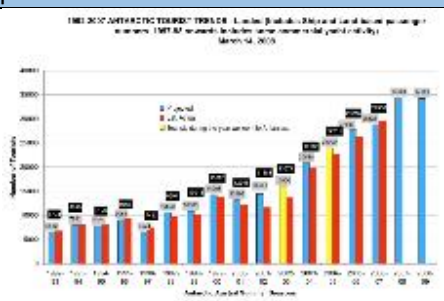
Dynamic Earth		
 ARC Image 23	Source unknown	
 ARC Image 24	Antarctic subglacial topography and bathymetry.	Palaeoclimate: East Antarctica's Achilles' heel Claus-Dieter Hillenbrand Nature Geoscience 6, 680–681 (2013) doi:10.1038/ngeo1897 http://www.nature.com/ngeo/journal/v6/n9/fig_tab/ngeo1897_F1.html
 ARC Image 25	A newly-discovered active volcano could erupt underneath Antarctica, melting the ice from below	http://www.dailymail.co.uk/news/article-2625583/Newly-discovered-active-volcano-erupt-underneath-ice-Antarctica-add-effects-global-warming-say-scientists.html

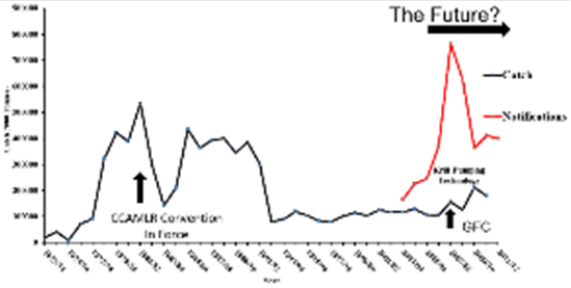
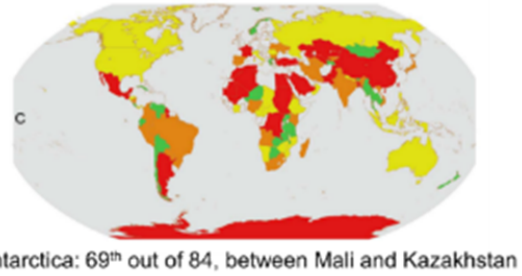
 ARC Image 26	This image depicts the differences between Antarctica's ice sheet, top, with its underlying topography. The map, produced by the British Antarctic Survey, illustrates the frozen continent with a level of clarity and resolution never before available, including a look at the mountain landscapes buried in ice and valleys that run deeper than previously known	(Image by NASA's Goddard Space Flight Center) http://www.cartography.org.uk/default.asp?contentID=1088
 ARC Image 27	West Antarctic ice sheet melting from geothermal heat	http://www.climatechangedispatch.com/west-antarctic-ice-sheet-melting-from-geothermal-heat-not-global-warming.html

Life on the Precipice		
 ARC Image 28	A Cape Petrel's wingspan can reach 91 cm (36 inches). Date Taken: January 1, 2010	National Science Foundation Photograph By: Peter Rejcek
 ARC Image 29	**Lichens on Heard Island**	Roger Kirkwood, Australian Antarctic Division http://www.antarctica.gov.au/about-antarctica/wildlife/plants/lichens
 ARC Iamge 30	Amphipods are ubiquitous inhabitants of Antarctic benthic communities, from shallow seas to abyssal depths	Photo: Keith Martin-Smith Australian Antarctic Division http://www.antarctica.gov.au/news/2011/world-oceans-day

 ARC Image 31	Phylogenetic diversity of bacterial 16S ribosomal RNA gene sequences from the McMurdo Dry Valleys, Antarctica, and comparison with bacterial diversity in clone libraries from the Antarctic Peninsula, a hot desert and temperate surface soils.	http://www.nature.com/nrmicro/journal/v8/n2/fig_tab/nrmicro2281_F1.html FROM THE FOLLOWING ARTICLE: On the rocks: the microbiology of Antarctic Dry Valley soils S. Craig Cary, Ian R. McDonald, John E. Barrett & Don A. Cowan Nature Reviews Microbiology 8, 129-138 (February 2010) doi:10.1038/nrmicro2281
 ARC Image 32	Cartoon view of the marine ecosystem of the west Antarctic Peninsula, as revealed through long-term observations by Palmer LTER. The system is characterized by large predators such as penguins, seals and whales, sustained by upwelling that supports high productivity and large krill populations.	https://www.lternet.edu/research/keyfindings/delicate-conditions

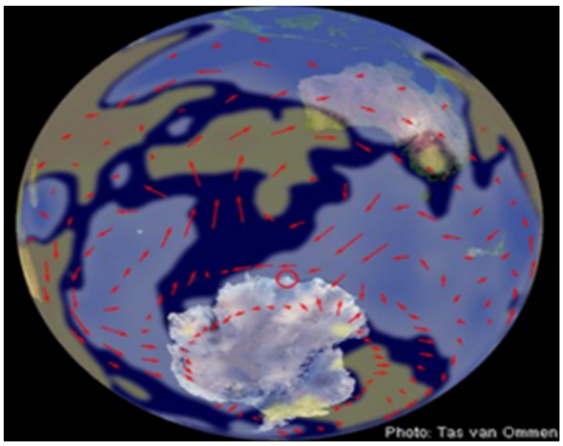
Eyes on the Sky		
 ARC Image 33		SCAR AAA
 ARC Image 34	A map of the cosmic microwave background radiation (CMB) made by the Wilkinson Microwave Anisotropy Probe (WMAP).	NASA
 ARC Image 35	PLATO Automated Observatory	John Storey (pers.comm.)
		http://www.thesuntoday.org/space-weather/impacts/

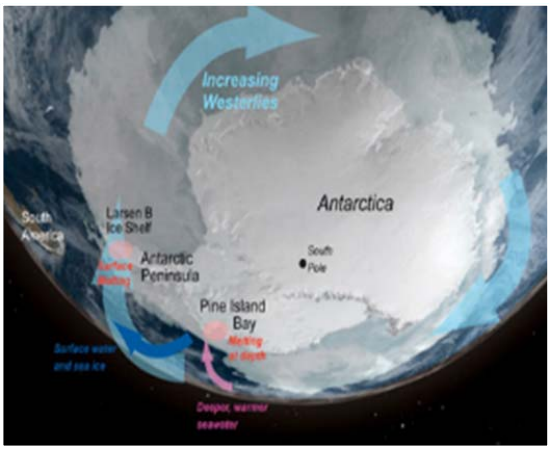
Arc Image 36		
 ARC Image 37	This is an artist's concept of the metric expansion of space, where space (including hypothetical non-observable portions of the universe) is represented at each time by the circular sections. Note on the left the dramatic expansion (not to scale) occurring in the inflationary epoch, and at the center the expansion acceleration. The scheme is decorated with WMAP images on the left and with the representation of stars at the appropriate level of development.	Credit: NASA http://phys.org/news/2015-02-big-quantum-equation-universe.html
Human presence		
 ARC Image 38	1992-2007 Antarctic Tourist Trends	IAATO

 ARC Image 39		COMNAP
 ARC Image 40	Source unknown	CCAMLR?
 ARC Image 41		Antarctica's Protected Areas Are Inadequate, Unrepresentative, and at Risk Justine D. Shaw , Aleks Terauds, Martin J. Riddle, Hugh P. Possingham, Steven L. Chown Published: June 17, 2014DOI: 10.1371/journal.pbio.1001888 http://journals.plos.org/plosbiology/article?id=10.1371/journal.pbio.1001888

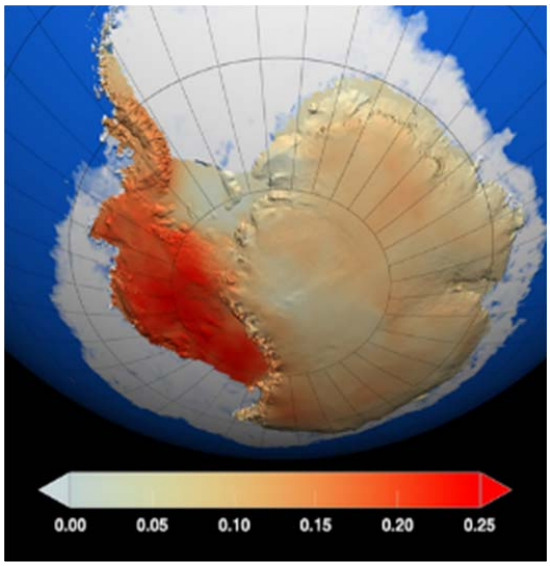
Antarctic Atmosphere and Global Connections

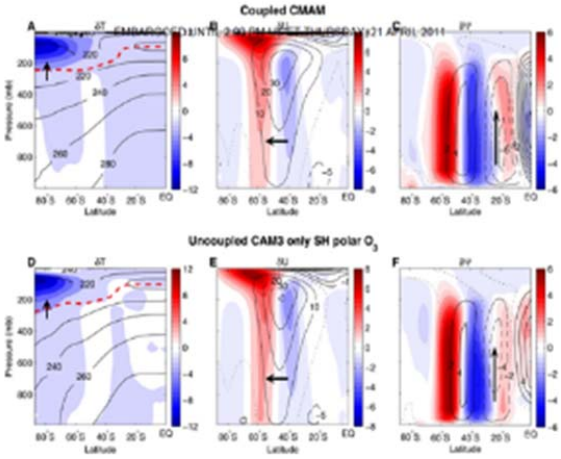
Global Teleconnections (2, 7)



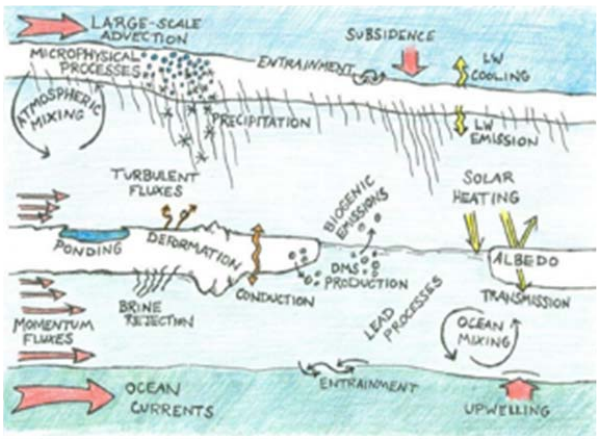


Regional Variations (10)





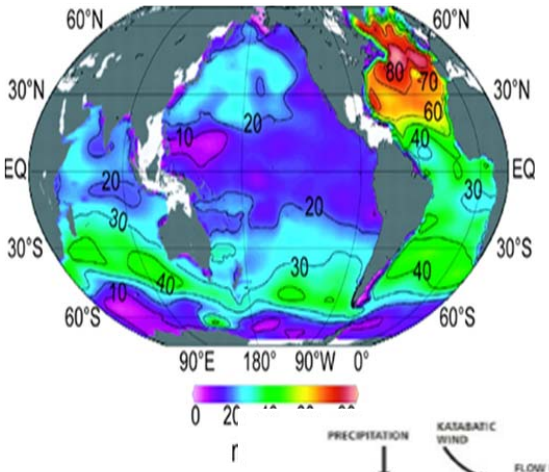
Greenhouse Gases and Ozone Hole Recovery (4)



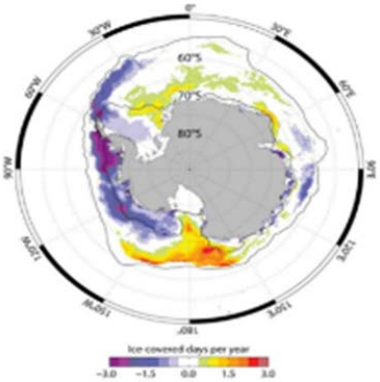
Processes and interfaces (11)

The Southern Ocean and Sea Ice in a Warming World

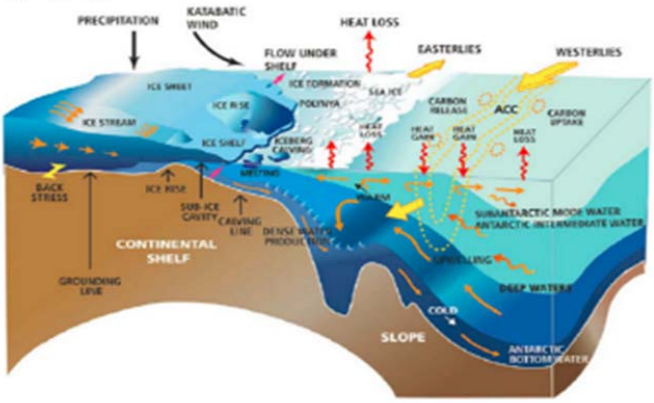
Defining the human role in ocean change (13)



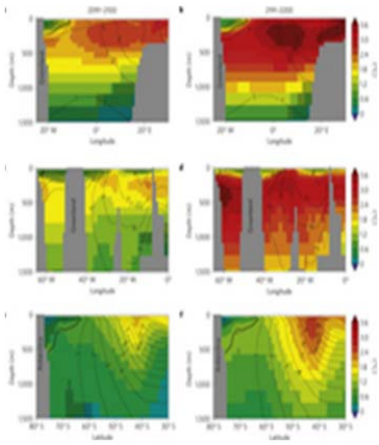
Improved climate and sea ice forecasts (17)



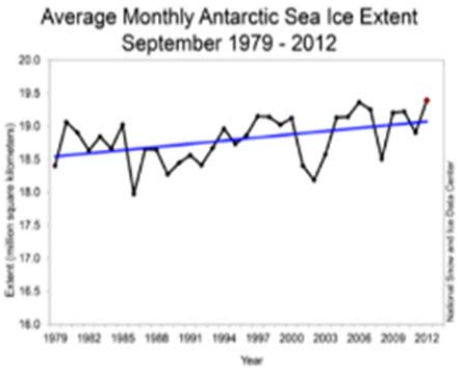
Heat, energy, and CO_2 cycles and budgets (15)



Carbon, oxygen, and nutrient cycles and budgets

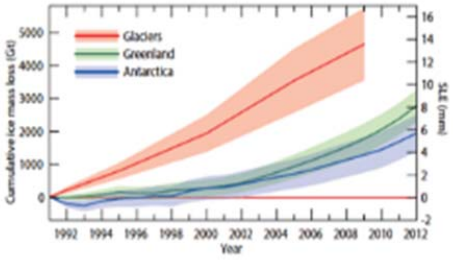


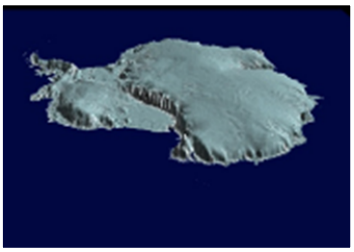
Ocean Warming (16)



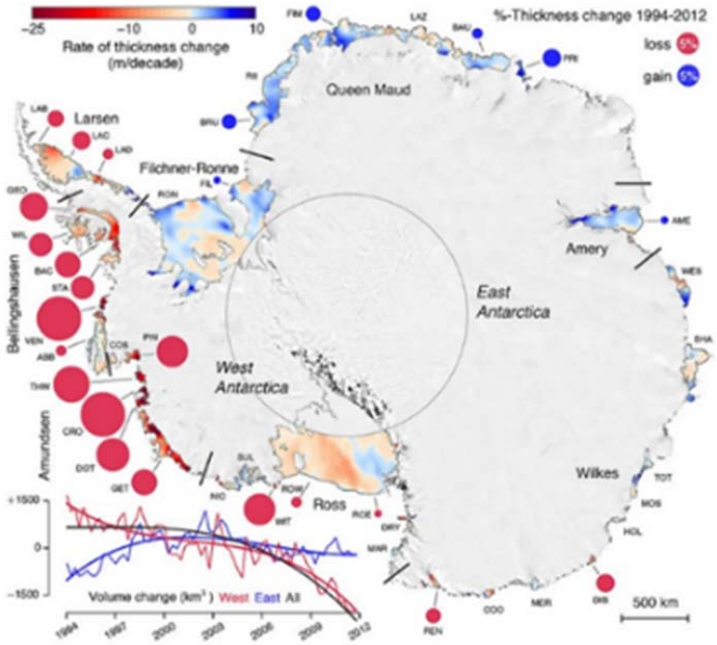
Sea ice variability (14)

Antarctic Ice Sheet and Sea Level

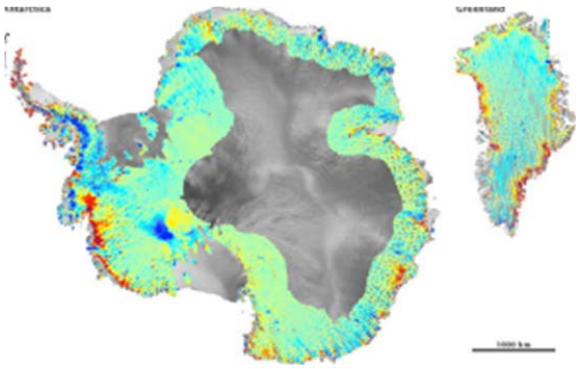


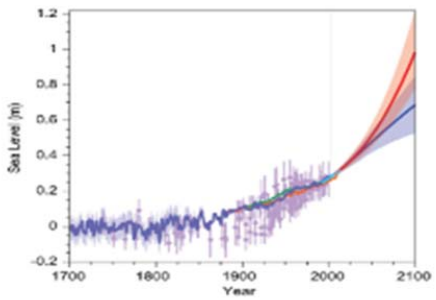


Improved climate and sea level forecasts (18, 19)



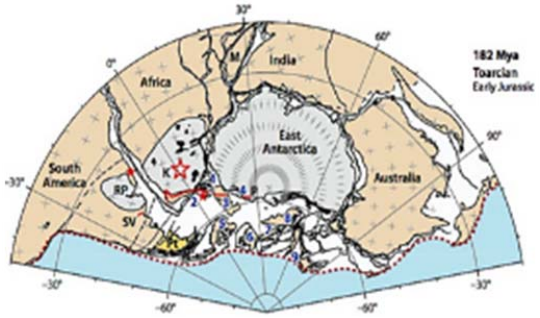
Ice sheet dynamics and mass balance (20,21, 22)



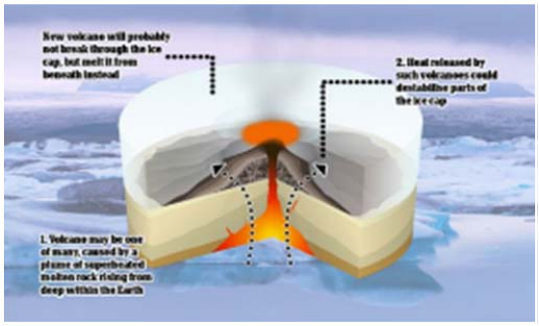


Dynamic Earth – Probing beneath Antarctic Ice

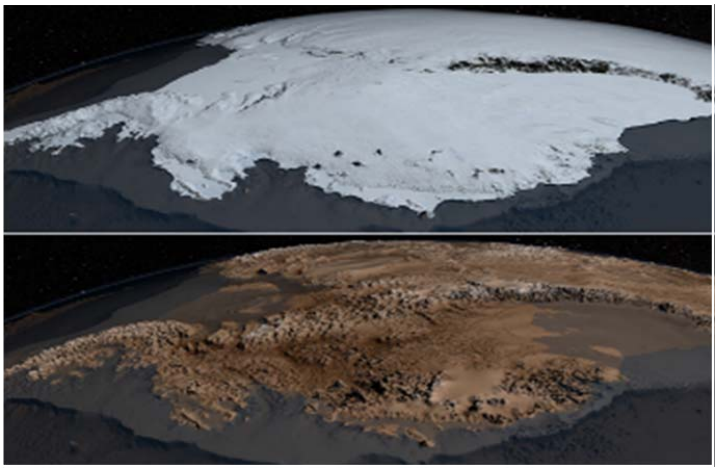
Super continent assembly (23)



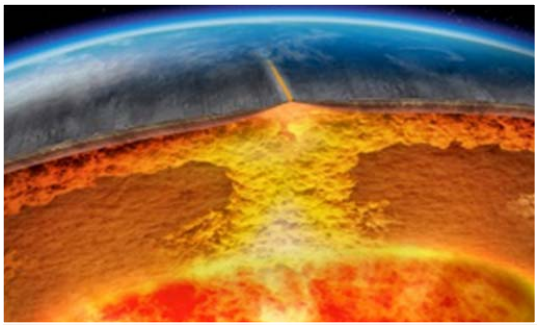
Deep Earth structure (24)



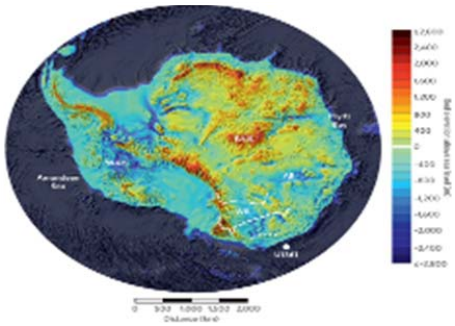
Cryospheric feedbacks (26)



Heat flux and volcanism (27)

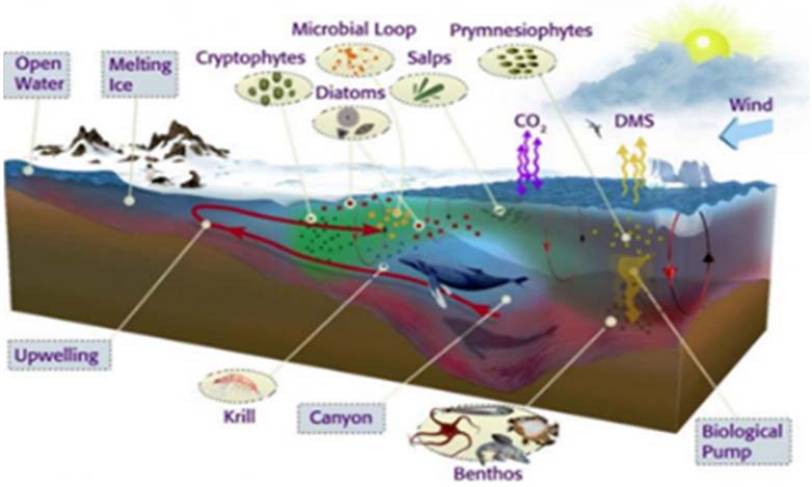


Sedimentary Records (25)



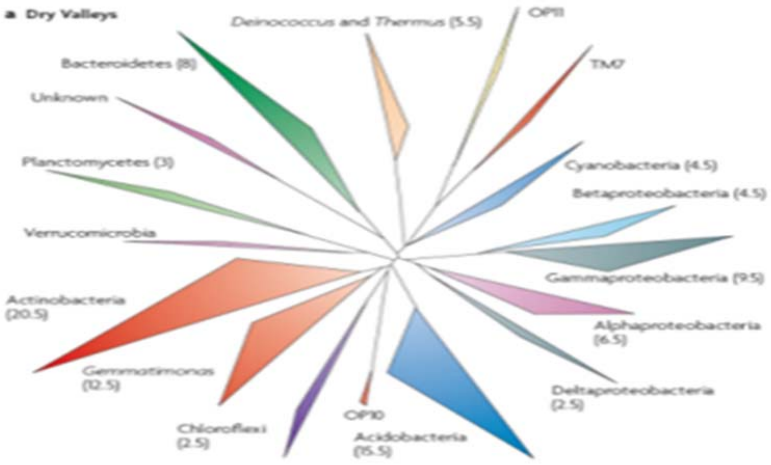
Antarctic life on the precipice

Adaptation (28, 29, 30) Biodiversity



Environmental drivers

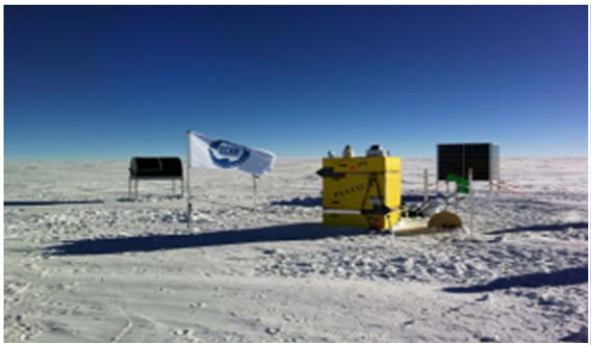
Ecosystem structure and function

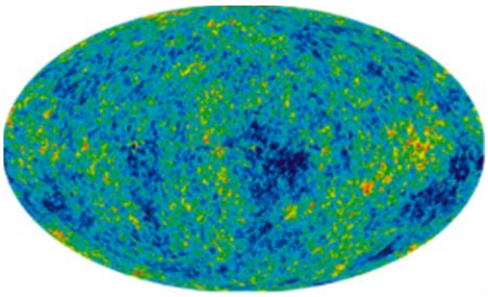


Conservation science

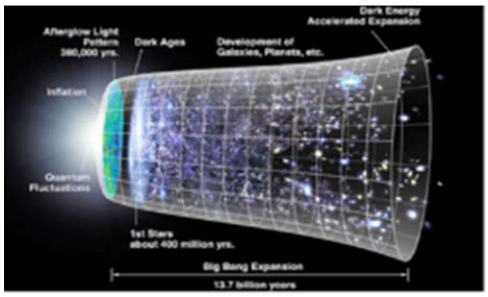
Near-Earth Space and Beyond –
Eyes on the Sky

Life beyond Earth (33, 35)

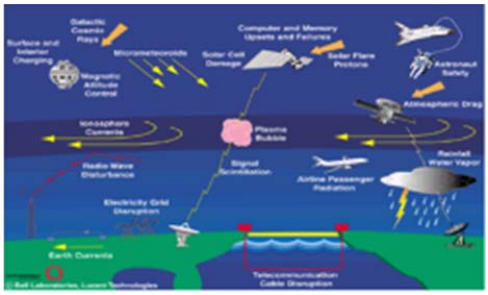




The nature of the dark Universe (34)



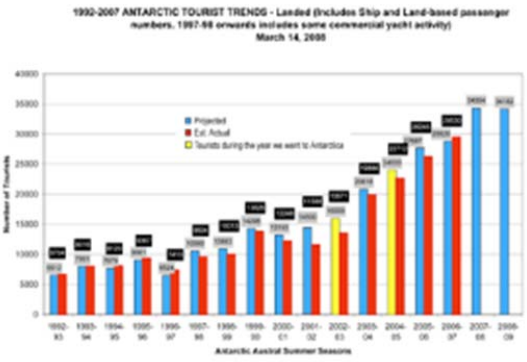
The origins of the Universe (36)



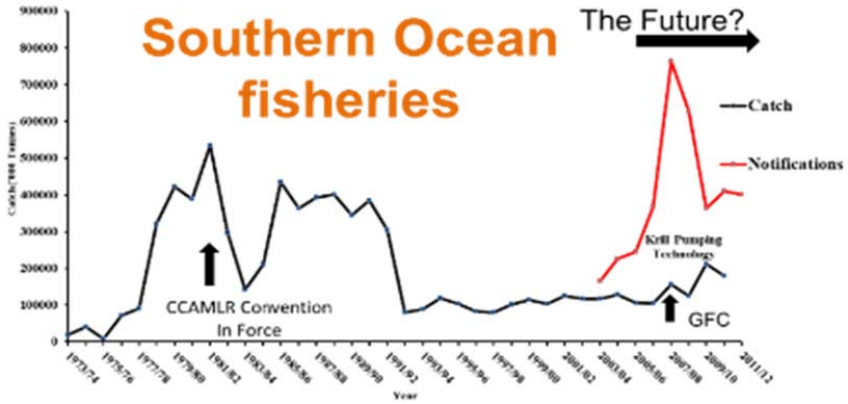
Space weather (37)

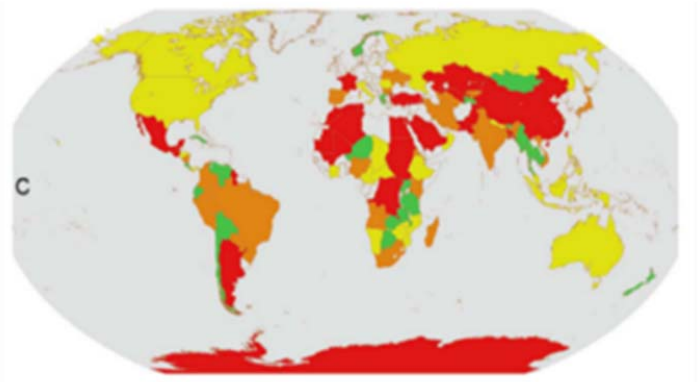
Human Presence in Antarctica

Tourism (38)



Scientific footprint (39)





Antarctica: 69th out of 84, between Mali and Kazakhstan

Conservation, protection, ecosystem services, and governance (41)