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Changing State of the Climate System Supplementary Material

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2.SM.1 Data Table

Table 2.SM.1 | Input Data Table. Input datasets and code used to create chapter figures.

Figure/Table Number	Dataset/Code Name	Type	File Name/ Specificities	License Type	Dataset/Code Citation	Dataset/Code URL	Related Publication/ Software Used	Notes
Cross-Chapter Box 2.1, Figure 1	Hansen – Cenozoic (60–0.02 Ma) GMST reconstruction from benthic marine isotope stack.	Input dataset		CC0 for metadata; CC-BY for data		www.columbia.edu/~mhs119/Sensitivity+SL+CO2/Table.txt (accessed 27/1/2022)	Hansen et al. (2013); isotope dataset from Zachos et al. (2008)	Added 0.36°C to adjust GMST estimated for 1961–1900 to 1850–1900. Converted to GMST based on equations in (Hansen et al., 2013).
	Westerhold – Cenozoic (60–0.02 Ma) GMST reconstruction from spliced benthic marine isotope records; binned and interpolated (CENOGRID).	Input dataset	https://doi.pangaea.de/10.1594/PANGAEA.917717?format=html#mcol6_ds13915407 2000-year-binned dataset	CC0 for metadata; CC-BY for data	Converted to GMST based on equations in Hansen et al. (2013)	DOI:10.1594/PANGAEA.917717 (accessed 27/1/2022)	Westerhold et al. (2020)	Added 0.36°C to adjust GMST estimated for 1961–1900 to 1850–1900.
	Snyder – Pleistocene (1–0.02 Ma) GMST reconstruction from sea surface temperature stack.	Input dataset	www.nature.com/articles/nature19798 (supplementary data)			https://static-content.springer.com/esm/art%3A10.1038%2Fnature19798/MediaObjects/41586_2016_BFnature19798_MOESM258_ESM.xlsx (accessed 27/1/2022)	Snyder (2016)	
	Shakun – 20–12 ka global mean surface temperature reconstruction.	Input dataset	www.nature.com/articles/nature10915#Sec14 (supplementary data, temperature stacks tab)				Shakun et al. (2012)	Added 0.24°C to splice temperature at 12 ka to Holocene temperature reconstruction.
	Kaufman – Holocene global mean surface temperature reconstruction (Temp12k multi-method).	Input dataset	www.ncei.noaa.gov/pub/data/paleo/reconstructions/kaufman2020/temp12k_allmethods_percentiles.csv			www.ncdc.noaa.gov/paleo/study/29712 (accessed 27/1/2022)	Kaufman et al. (2020a, b)	Median ensemble reconstruction.
	1850–2020 global mean surface temperature (AR6-assessed mean).	Same as Figure 2.11c						
Figure 2.2a	Total solar irradiance (TSI) reconstruction. PMIP4 SATRIRE-M solar forcing data.	Input dataset	SSI_14C_cycle_yearly_cmip_v20160613_fc.nc			https://pmip4.lsce.ipsl.fr/doku.php/data:solar_satire (accessed 27/1/2022)	Jungclaus et al. (2017)	The right axis is the ERF derived on the basis of TSI as in Section 7.3.4.4.
Figure 2.2a, b	Total solar irradiance (TSI) reconstruction. CMIP6 solar forcing data.	Input dataset	solarforcing-ref-mon_input4MIPs_solar_CMIP_SOLARIS-HEPPA-3-2_gn_18500101-22991231.nc			https://solarisheppa.geomar.de/cmip6 (accessed 27/1/2022)	Matthes et al. (2017)	

Figure/Table Number	Dataset/Code Name	Type	File Name/ Specificities	License Type	Dataset/Code Citation	Dataset/Code URL	Related Publication/ Software Used	Notes
Figure 2.2b	Total solar irradiance (TSI) time series. CMIP5 solar forcing data.	Input dataset	TSI_WLS_ mon_1882_2008.txt			http://solarisheppa.geomar.de/cmip5 (accessed 27/1/2022)	Lean (2000); Wang et al. (2005)	TSI by definition includes the UV range, 200–400 nm, contributing particularly strongly to the TSI changes.
	Total solar irradiance (TSI) time series.	Input dataset	TSI_Composite.txt			https://spot.colorado.edu/~koppg/TSI/ (accessed 27/1/2022)	Dudok de Wit et al. (2017)	
Figure 2.2c	Reconstructed volcanic stratospheric sulphur injections and aerosol optical depth, 500 BCE to 1900 CE, version 3. World Data Center for Climate (WDCC) at DKRZ.	Input dataset	eVolv2k_v3_ds_1.nc	CC BY-NC-SA 2.0 DE	Toohey and Sigl (2019)	https://cera-www.dkrz.de/WDCC/ui/cerasearch/entry?acronym=eVolv2k_v3 (accessed 27/1/2022)	Toohey and Sigl (2017)	
Figure 2.2c, d	Stratospheric aerosol optical depth (SAOD).	Input dataset	CMIP_1850_2014_ extinction_550nm_ strat_only_v3.nc			ftp://iacftp.ethz.ch/pub_read/luo/CMIP6_SAD_radForcing_v4.0.0/ (accessed 22/4/2022)	Luo (2018)	See unit bars for a visual guide as to scale mismatch. TSI values refer to changes in solar radiation and do not account for the spherical Earth.
Figure 2.2d	Stratospheric aerosol optical depth (SAOD).	Input dataset	tau.map_2012.12.txt			https://data.giss.nasa.gov/modelforce/strataer/ (accessed 27/1/2022)	Sato et al. (1993); Luo (2018)	
Table 2.1	Atmospheric CO_2 during 1995–2014.	Input dataset					NOAA, references in Annex 5	The uncertainty of CO_2 in 1995 and 2014 is assumed to be the same as that of 2019. To estimate the centennial rate of change, the CO_2 data are extrapolated using the mean rate of change during 1995–2014.
	Atmospheric CO_2 during 1850–1900.	Input dataset					Siegenthaler et al. (2005); MacFarling Meure et al. (2006); Ahn et al. (2012a); Bauska et al. (2015); Meinshausen et al. (2017); Annex 5	
	Atmospheric CO_2 during 1850–1900 (CMIP6).	Input dataset					Meinshausen et al. (2017)	

Figure/Table Number	Dataset/Code Name	Type	File Name/ Specificities	License Type	Dataset/Code Citation	Dataset/Code URL	Related Publication/ Software Used	Notes
Table 2.1 *(continued)*	Atmospheric CO_2 during the last millennium (1000–1750).	Input dataset	Fig2.4_data_Feb_2021			www.ncdc.noaa.gov/paleo/study/18316 (accessed 27/1/2022) https://data.csiro.au/collections/collection/CIcsiro:37077v1 (accessed 27/1/2022) www.ncdc.noaa.gov/paleo-search/study/2488 (accessed 27/1/2022)	Siegenthaler et al. (2005); Ahn et al. (2012a); Rubino et al. (2019)	The rate of CO_2 concentration change (ppm/century) was estimated from the 100-year running mean average for each ice-core record.
	Atmospheric CO_2 during the mid-Holocene.	Input dataset	Ice-core CO2.xls			www.ncdc.noaa.gov/paleo/study/17975 (accessed 27/1/2022)	Monnin et al. (2004)	CO_2 is averaged during the given time period.
	Atmospheric CO_2 during the Last Deglacial Transition.	Input dataset	Ice-core CO2.xls			www.ncdc.noaa.gov/paleo-search/study/18636 (accessed 27/1/2022) www.ncdc.noaa.gov/paleo-search/study/17975 (accessed 27/1/2022)	Marcott et al. (2014); Bereiter et al. (2015)	The rate of CO_2 concentration change (ppm/century) was estimated from the 100-year running mean average for each ice-core record.
	Atmospheric CO_2 during the Last Glacial Maximum.	Input dataset	Ice-core CO2.xls		Schmitt et al. (2012b); Ahn and Brook (2014)	www.ncdc.noaa.gov/paleo-search/study/18636 (accessed 27/1/2022) www.ncdc.noaa.gov/paleo-search/study/17975 (accessed 27/1/2022) www.ncdc.noaa.gov/paleo/study/6178 (accessed 27/1/2022)	Ahn and Brook (2008, 2014); Schmitt et al. (2012a); Marcott et al. (2014); Bereiter et al. (2015)	CO_2 is averaged during the given time period.
	Atmospheric CO_2 during the Last Inter-glacial.	Input dataset	Ice-core CO2.xls		Schneider et al. (2013a); Köhler et al. (2017)	www.ncdc.noaa.gov/paleo-search/study/17975 (accessed 27/1/2022)	Petit et al. (1999); Lourantou et al. (2010); Schneider et al. (2013b)	CO_2 is averaged during the given time period.
	Atmospheric CO_2 during the Mid-Pliocene Warm Period (KM5c).	Input dataset				www.pangaea.de/ (accessed 27/1/2022) https://paleo-co2.org/ (accessed 27/1/2022)		
	Atmospheric CO_2 during the Early Eocene Climatic Optimum.	Input dataset				www.pangaea.de/ (accessed 27/1/2022) https://paleo-co2.org/ (accessed 27/1/2022)		
	Atmospheric CO_2 during the Paleocene-Eocene Thermal Maximum.	Input dataset				www.pangaea.de/ (accessed 27/1/2022) https://paleo-co2.org/ (accessed 27/1/2022)		To calculate the average rate of CO_2 change across the PETM a Monte Carlo approach was used to fully propagate the uncertainty in age and CO_2 estimates. A normal distribution for the uncertainty on the CO_2 estimates across the PETM from Anagnostou et al. (2020) was assumed, whereas for the onset duration a uniform probability was assumed from 3–20 kyr.

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Figure 2.3a	Atmospheric CO_2 from 0 to 22.6 Ma estimated from $\delta^{11}B$ planktic foraminifera (the Planktic-HO-SI-LE option of Sosdian et al., 2018).	Input dataset	Sosdian.txt	CC BY 4.0 (Sosdian et al., 2018); CC BY-NC-ND (Chalk et al., 2017); free access (Bartoli et al., 2011)	Bartoli et al. (2011); Martínez-Botí et al. (2015)		Sosdian et al. (2018) plus recalculations of: Hönisch et al. (2009); Bartoli et al. (2011); Martínez-Botí et al. (2015); Chalk et al. (2017)	See note below regarding the quality of the Plio-Pleistocene data in this dataset.
	Atmospheric CO_2 from 33 to 56.3 Ma estimated from $\delta^{11}B$ planktic foraminifera.	Input dataset	Anagnostou.txt	CC BY 4.0 (Anagnostou et al., 2020)	Pearson et al., 2009; Anagnostou et al., 2016, 2020; Gutjahr et al., 2017		Anagnostou et al. (2020) plus recalculations of: (Pearson et al., 2009; Anagnostou et al., 2016; Gutjahr et al., 2017; Harper et al., 2020; Henehan et al., 2020) Penman et al. (2014)	
	Atmospheric CO_2 from 0 to 450 Ma estimated from $\delta^{13}C$ of phytane.	Input dataset	wit.txt	CC BY-NC 4.0		https://advances.sciencemag.org/content/suppl/2018/11/26/4.11.eaat4556.DC1 (accessed 27/1/2022)	Witkowski et al. (2018)	
	Atmospheric CO_2 estimated from alkenone $\delta^{13}C$.	Input dataset	Akenonecompilation.txt				Pagani et al. (2005, 2011); Zhang et al. (2013); Stoll et al. (2019)	For <22.9 Ma the CO_2 concentration is calculated using the model of Stoll et al. (2019); for >22.9 Ma a diffusive model is used as outlined in Pagani et al. (2005). Following Rae et al. (2021), the $\delta^{13}C$ alkenone-based CO_2 estimates of Stoll et al. (2019) are used for <23 Ma in preference to those of Super et al. (2018) and Pagani et al. (2010) due to the more accurate model applied by Stoll et al. (2019) to account for non-diffusive CO_2 uptake by alkenone-producing coccolithophorids at low CO_2.
	Atmospheric CO_2 over the last 450 million years estimated using $\delta^{13}C$ in palaeosol $CaCO_3$ and plant stomata.	Input dataset	PhanCO2F.txt	CC BY 4.0	Foster et al. (2017)		Foster et al. (2017)	
	Smoothed fit through all the above data.	Input dataset	PhanCO2sm.exp.txt					Smoothed fit through all the above data using the methods described in Foster et al. (2017).

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Figure 2.3b	Atmospheric CO_2 estimated from alkenone $\delta^{13}C$.	Input dataset	Akenone compilation.txt				Pagani et al. (2005, 2011); Zhang et al. (2013); Stoll et al. (2019)	For <22.9 Ma the CO_2 concentration is calculated using the model of Stoll et al. (2019); for >22.9 Ma a diffusive model is used as outlined in Pagani et al. (2005). Following Rae et al. (2021), the $\delta^{13}C$ alkenone-based CO_2 estimates of Stoll et al. (2019) are used for <23 Ma in preference to those of Super et al. (2018) and Pagani et al. (2010) due to the more accurate model applied by Stoll et al. (2019) to account for non-diffusive CO_2 uptake by alkenone-producing coccolithophorids at low CO_2.
	Atmospheric CO_2 0 to 22.6 Ma estimated from $\delta^{11}B$ planktic foraminifera (the Planktic-HO-SI-LE option of Sosdian et al., 2018).	Input dataset	Sosdian.txt	CC BY 4.0 (Sosdian et al., 2018); CC BY-NC-ND (Chalk et al., 2017); free access (Bartoli et al., 2011)	Bartoli et al. (2011); Martínez-Botí et al. (2015)		Sosdian et al. (2018) plus recalculations of: Hönisch et al. (2009); Bartoli et al. (2011); Martínez-Botí et al. (2015); Chalk et al. (2017)	
	Atmospheric CO_2 from 33 to 56.3 Ma estimated from $\delta^{11}B$ planktic foraminifera.	Input dataset	Anagnostou.txt	CC BY 4.0 (Anagnostou et al., 2020; Henehan et al., 2020)	Pearson et al. (2009); Anagnostou et al. (2016, 2020); Gutjahr et al. (2017); Henehan et al. (2020)		Anagnostou et al. (2020) plus recalculations of: Pearson et al. (2009); Anagnostou et al. (2016); Gutjahr et al. (2017); Harper et al. (2020); Henehan et al. (2020)	
	Atmospheric CO_2 from 0 to 450 Ma estimated from $\delta^{13}C$ of phytane.	Input dataset	wit.txt	CC BY-NC 4.0		https://advances.sciencemag.org/content/suppl/2018/11/26/4.11.eaat4556.DC1 (accessed 27/1/2022)	Witkowski et al. (2018)	

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Figure 2.3c	Atmospheric CO_2 estimated from alkenone $\delta^{13}C$.	Input dataset	Akenone compilation.txt				Pagani et al. (2005, 2011); Zhang et al. (2013); Stoll et al. (2019)	For <22.9 Ma the CO_2 concentration is calculated using the model of Stoll et al. (2019); for >22.9 Ma a diffusive model is used as outlined in Pagani et al. (2005). Following Rae et al. (2021), the $\delta^{13}C$ alkenone-based CO_2 estimates of Stoll et al. (2019) are used for <23 Ma in preference to those of Super et al. (2018) and Pagani et al. (2010) due to the more accurate model applied by Stoll et al. (2019) to account for non-diffusive CO_2 uptake by alkenone-producing coccolithophorids at low CO_2.
	Antarctic ice-core CO_2 from various sources.	Input dataset	Ice_core.txt	CC BY 4.0 (Siegenthaler et al., 2005)	Bereiter et al. (2015)		Petit et al. (1999); Siegenthaler et al. (2005); Bereiter et al. (2015)	
	Atmospheric CO_2 from 0 to 3500 ka estimated from $\delta^{11}B$ planktic foraminifera.	Input dataset	Plio_Pleisto_Final.txt	Open access (de la Vega et al. 2020)	Bartoli et al., (2011); Martínez-Botí et al. (2015); Dyez et al. (2018)		de la Vega et al. (2020) plus recalculation of Martínez-Botí et al. (2015) Bartoli et al. (2011) data recalculated by Sosdian et al. (2018) Other datasets as published Hönisch et al. (2009); Chalk et al. (2017); Dyez et al. (2018); Raitzsch et al. (2018)	These data are preferred for this interval over the recalculations in Sosdian.txt because the Plio-Pleistocene data reported in Sosdian et al. (2018) are not representative due to the large uncertainties propagated in the long-term Neogene reconstruction (i.e., seawater composition; see Sosdian et al., 2018 for more details).
	Figure 2.3 code.	Code	CO2_IPCC_colours_ clear.R			https://github.com/gavinfosterd11B/IPCC-AR5-Figure-2.3 (accessed 27/1/2022)		
Figure 2.4a Atmospheric CO_2 concentration during the last 800,000 years	EPICA Dome C – 800-kyr CO_2 data; Antarctic ice-cores revised 800-kyr CO_2 data.	Input dataset	Fig2.4_data_Nov_2020		Lüthi et al. (2008); Bereiter et al. (2015)	www.ncdc.noaa.gov/paleo-search/study/6091 (accessed 27/1/2022) www.ncdc.noaa.gov/paleo-search/study/17975 (accessed 27/1/2022)	Petit et al. (1999)	

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Figure 2.4a Atmospheric CO_2 concentration during the glacial termination	WAIS Divide Ice-Core 9–23-kyr bp CO_2 data; Antarctic ice-cores revised 800-kyr CO_2 data.	Input dataset	Fig2.4_data_Nov_2020		Marcott et al. (2014); Bereiter et al. (2015)	www.ncdc.noaa.gov/paleo-search/study/18636 (accessed 27/1/2022) www.ncdc.noaa.gov/paleo-search/study/17975 (accessed 27/1/2022)		
Figure 2.4a Atmospheric CH_4 concentration during the last 800,000 years	EPICA Dome C – 800-kyr methane data.	Input dataset	Fig2.4_data_Nov_2020		Loulergue et al. (2008)	www.ncdc.noaa.gov/paleo-search/study/6093 (accessed 27/1/2022)		
Figure 2.4a Atmospheric N_2O concentration during the last 800,000 years	EPICA Dronning Maud Land, EPICA Dome C – 140-kyr N_2O data, 800-kyr N_2O data.	Input dataset	Fig2.4_data_Nov_2020		Schilt et al. (2010); Köhler et al. (2017)	www.ncdc.noaa.gov/paleo-search/study/8615 (accessed 27/1/2022) https://doi.pangaea.de/10.1594/PANGAEA.871273 (accessed 27/1/2022)		
Figure 2.4b Atmospheric CO_2 concentration during the last 2000 years	WAIS Divide ice-core 1200-year atmospheric CO_2 and CO_2 stable isotope data; Law Dome ice-core 2000-year CO_2, CH_4, N_2O and d13C-CO_2; EPICA Dronning Maud Land, EPICA South Pole – CO_2 data for the last millennium; West Antarctic Ice Sheet (WAIS) ice-core WDC – 05a 1000-year CO_2 data.	Input dataset	Fig2.4_data_Nov_2020	https://confluence.csiro.au/display/daphelp/CSIRO+Data+Licence	Siegenthaler et al. (2005); Ahn et al. (2012b); Bauska et al. (2015); Rubino et al. (2019)	www.ncdc.noaa.gov/paleo/study/18316 (accessed 27/1/2022) https://data.csiro.au/collections/collection/CIcsiro:37077v1 (accessed 27/1/2022) www.ncdc.noaa.gov/paleo-search/study/2488 (accessed 27/1/2022) www.ncdc.noaa.gov/paleo/study/12949 (accessed 27/1/2022)	MacFarling Meure et al. (2006)	
Figure 2.4b Atmospheric CH_4 concentration during the last 2000 years	Law Dome ice-core 2000-year CO_2, CH_4, N_2O and d13C-CO_2.	Input dataset	Fig2.4_data_Nov_2020	https://confluence.csiro.au/display/daphelp/CSIRO+Data+Licence	Rubino et al. (2019)	https://data.csiro.au/collections/collection/CIcsiro:37077v1 (accessed 27/1/2022)	Mitchell et al. (2013)	

Figure/Table Number	Dataset/Code Name	Type	File Name/ Specificities	License Type	Dataset/Code Citation	Dataset/Code URL	Related Publication/ Software Used	Notes
Figure 2.4b Atmospheric N_2O concentration during the last 2000 years	NEEM and Styx polar ice-cores 2000-year N_2O data. Law Dome ice-core 2000-year CO_2, CH_4, N_2O and d13C-CO_2. EPICA Dome C – nitrous oxide, CO_2 and CH_4 data.	Input dataset	Fig2.4_data_Nov_2020	https://confluence.csiro.au/display/daphelp/CSIRO+Data+Licence	Flückiger et al. (1999); Rubino et al. (2019); Ryu et al. (2020)	www.ncdc.noaa.gov/paleo-search/study/30752 https://data.csiro.au/collections/collection/CIcsiro:37077v1 (accessed 27/1/2022) www.ncdc.noaa.gov/paleo/study/2457 (accessed 27/1/2022)	Machida et al. (1995); Sowers (2001)	
Table 2.2	Global annual mean mixing ratios of WMGHGs: CO_2/CH_4 (NOAA).	Input dataset	See Annex III		https://gml.noaa.gov/ccgg/trends/global.html		Updated from Conway et al. (1994); Dlugokencky et al. (1994); Masarie and Tans (1995)	Derived from measurements in the remote, unpolluted troposphere.
	Global annual mean mixing ratios of WMGHGs: N_2O/SF_6 (NOAA).	Input dataset	See Annex III				Updated from Hall et al. (2011)	Derived from measurements in the remote, unpolluted troposphere.
	Global annual mean mixing ratios of WMGHGs: other (NOAA).	Input dataset	See Annex III				Updated from Montzka et al. (2015)	Derived from measurements in the remote, unpolluted troposphere.
	Global annual mean mixing ratios of WMGHGs: all (AGAGE).	Input dataset	See Annex III				Updated from Rigby et al. (2014); Prinn et al. (2018)	Derived from measurements in the remote, unpolluted troposphere.
	Global annual mean mixing ratios of WMGHGs: CO_2 (SIO).	Input dataset	See Annex III				Updated from Keeling et al. (2005)	Derived from measurements at Mauna Loa, Hawaii and the South Pole.
	Global annual mean mixing ratios of WMGHGs (UCI).	Input dataset	See Annex III				Updated from Simpson et al. (2012)	
	Global annual mean mixing ratios of WMGHGs (CSIRO).	Input dataset	See Annex III				Updated from Langenfelds et al. (2002); Kirschke et al. (2013)	
	Global annual mean mixing ratios of WMGHGs (WMO-GAW).	Input dataset	See Annex III	Free and open access		https://gaw.kishou.go.jp/publications/global_mean_mole_fractions#content1 (accessed 27/1/2022)	Updated from WMO (2019)	WMO global means include data from NOAA, AGAGE, CSIRO and SIO, and may include observations subject to regional and local influence.

Figure/Table Number	Dataset/Code Name	Type	File Name/ Specificities	License Type	Dataset/Code Citation	Dataset/Code URL	Related Publication/ Software Used	Notes
Table 2.2 *(continued)*	Global annual mean mixing ratios of WMGHGs (CMIP6).	Input dataset	See Annex III				Updated from Meinshausen et al. (2017)	May include observations subject to regional and local influence.
	CFC-114, CFC-113.	Input dataset	See Annex III				Engel et al. (2018)	CFC-114 is a combination of CFC-114 and an unquantified amount of the minor isomer CFC-114a. CFC-113 includes the minor isomer CFC-113a. For ERF, the 2019 CFC-114 value was adjusted by factor 0.98 to be consistent with values used in WMO (2018).
	Lifetime (except SF_6, CH_4 and N_2O).	Input dataset			Witkowski et al. (2018)	https://advances.sciencemag.org/content/4/11/eaat4556/tab-figures-data (accessed 27/1/2022)	Appendix A in WMO (2018)	
	SF_6 lifetime.						Kovács et al. (2017); Ray et al. (2017)	
	CH_4 lifetime.		See Chapter 6					Total atmospheric lifetime of 9.1 ± 0.9 years (1 standard deviation) and the perturbation residence time of 11.8 ± 1.8 years, respectively (see 6.3.1).
	N_2O lifetime.		See Chapter 5				Prather et al. (2015)	N_2O atmospheric lifetime is 116 ± 9 years (1 standard deviation) and perturbation residence time 109 ± 10 years (see Section 5.2.3; Prather et al., 2015).
Figure 2.5a	CO_2 from Scripps Institution of Oceanography (SIO) based on measurements from Mauna Loa, Hawaii and the South Pole.	Input dataset	See Annex III				Keeling et al. (2005)	At monthly time resolution based on measurements from Mauna Loa, Hawaii and the South Pole (deseasonalized).
	CO_2 from Commonwealth Scientific and Industrial Research Organization, Aspendale, Australia (CSIRO).	Input dataset	See Annex III				Langenfelds et al. (2002); Kirschke et al. (2013)	At monthly time resolution.
	CO_2 from National Oceanic and Atmospheric Administration, Global Monitoring Laboratory (NOAA/GML).	Input dataset	See Annex III			https://gml.noaa.gov/ccgg/trends/global.html (accessed 27/1/2022)		At quasi-weekly time resolution.

Figure/Table Number	Dataset/Code Name	Type	File Name/ Specificities	License Type	Dataset/Code Citation	Dataset/Code URL	Related Publication/ Software Used	Notes
Figure 2.5b	CH_4 from National Oceanic and Atmospheric Administration (NOAA).	Input dataset	See Annex III				Conway et al. (1994); Dlugokencky et al. (1994); Masarie and Tans (1995)	
	CH_4 from Advanced Global Atmospheric Gases Experiment (AGAGE).	Input dataset	See Annex III				Rigby et al. (2014); Prinn et al. (2018)	
	CH_4 from Commonwealth Scientific and Industrial Research Organization, Aspendale, Australia (CSIRO).	Input dataset	See Annex III				Langenfelds et al. (2002); Kirschke et al. (2013)	
	CH_4 from University of California, Irvine (UCI).	Input dataset	See Annex III				Simpson et al. (2012)	
Figure 2.5c	N_2O from National Oceanic and Atmospheric Administration (NOAA).	Input dataset	See Annex III				Conway et al. (1994); Dlugokencky et al. (1994); Masarie and Tans (1995)	Insufficient and noisy data prevent the calculation of accurate growth rates for N_2O prior to 1995.
	N_2O from Advanced Global Atmospheric Gases Experiment (AGAGE).	Input dataset	See Annex III				Rigby et al. (2014); Prinn et al. (2018)	
	N_2O from Commonwealth Scientific and Industrial Research Organization, Aspendale, Australia (CSIRO).	Input dataset	See Annex III				Langenfelds et al. (2002); Kirschke et al. (2013)	
Figure 2.6	Climate Model Intercomparison Project Phase 6 (CMIP6).	Input dataset	See Annex III				Meinshausen et al. (2017)	
	National Oceanic and Atmospheric Administration (NOAA).	Input dataset	See Annex III				Montzka et al. (2009)	
	Advanced Global Atmospheric Gases Experiment (AGAGE).	Input dataset	See Annex III				Rigby et al. (2014); Prinn et al. (2018)	

Figure/Table Number	Dataset/Code Name	Type	File Name/ Specificities	License Type	Dataset/Code Citation	Dataset/Code URL	Related Publication/ Software Used	Notes
Figure 2.7	Multi-Sensor Reanalysis (MSR-2) of total ozone.	Input dataset				www.temis.nl/protocols/O3global.php (accessed 27/1/2022)	Braesicke et al. (2018); Chipperfield et al. (2018); Weber et al. (2018a, 2020); Blunden and Arndt (2020)	The values are given in Dobson units (see Glossary).
	GOME-type total ozone (GTO) data record GOME/SCIA/OMI.	Input dataset		https://climate.esa.int/en/terms-and-conditions/		www.esa-ozone-cci.org/?q=node/163 (accessed 27/1/2022)	Weber et al. 2018; Weber et al. 2020	
	GOME-SCIAMACHY-GOME-2A (GSG) total ozone time series.	Input dataset		www.uni-bremen.de/en/data-privacy/disclaimer		www.iup.uni-bremen.de/gome/wfdoas (accessed 27/1/2022)	Weber et al. (2018b, 2020)	
	Solar Backscatter Ultraviolet Radiometer (SBUV). NOAA cohesive data record (COH), v8.6.	Input dataset				ftp://ftp.cpc.ncep.noaa.gov/SBUV_CDR (accessed 27/1/2022)	Solar Backscatter Ultraviolet Radiometer (SBUV) NOAA Cohesive data record (COH) v8.6	
	Solar Backscatter Ultraviolet Radiometer (SBUV) NASA Merged Ozone Data Set (MOD), v8.6 (release 6).	Input dataset				http://acdb-ext.gsfc.nasa.gov/Data_services/merged (accessed 27/1/2022)	Solar Backscatter Ultraviolet Radiometer (SBUV) NASA Merged Ozone Data Set (MOD) v8.6 (release 6): updated from: Frith et al. (2014)	
	World Ozone and Ultraviolet Radiation Data Centre (WOUDC).	Input dataset				http://woudc.org/archive/Projects-Campaigns/ZonalMeans (accessed 27/1/2022)	WOUDC data: updated from: Fioletov et al. (2002)	
Figure 2.8a	Surface stations.	Input dataset		CC BY 4.0 (Cooper et al., 2020)	Cooper et al. (2020)	https://join.fz-juelich.de/ https://gml.noaa.gov/aftp/data/ozwv/SurfaceOzone/Historical/ (accessed 27/1/2022)	Wang et al. (2019); Cooper et al. (2020)	High-elevation surface sites are >1500 m above sea level.
	IAGOS.	Input dataset				DOI:10.25326/20 (accessed 27/1/2022)	Cohen et al. (2018); Gaudel et al. (2020)	Above Europe, north-eastern USA, south-eastern USA, western North America, north-east China, South East Asia, southern India, Persian Gulf, Malaysia/Indonesia, Gulf of Guinea and northern South America.

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Figure 2.8b	IAGOS.	Input dataset				DOI:10.25326/20 (accessed 27/1/2022)	Cohen et al. (2018); Gaudel et al. (2020)	Mid-troposphere (700–300 hPa; about 3–9 km and seven regions of the upper troposphere (about 10–12 km).
	Sondes.	Input dataset				ftp://aftp.cmdl.noaa.gov/data/ozwv/Ozonesonde (accessed 27/1/2022)	Chang et al. (2020)	Analysed using a similar method as the aircraft observations above Hilo, Hawaii, which are representative of the central North Pacific region.
Figure 2.8c	TOST composite ozonesonde product.	Input dataset				http://woudc.org/archive/products/ozone/vertical-ozone-profile/ozonesonde/1.0/tost/ (accessed 27/1/2022) https://woudc.org/archive/products/ozone/vertical-ozone- (accessed 27/1/2022) https://woudc.org/archive/products/ozone/vertical-ozone-profile/ozonesonde/1.0/tost/tropospheric_column/TROPOSPHERIC_OZONE_DATA/ANNUAL/SEA_LEVEL// (accessed 27/1/2022)	Gaudel et al. (2018)	
	SAT1 (TOMS, OMI/MLS).	Input dataset				https://acd-ext.gsfc.nasa.gov/Data_services/cloud_slice/new_data.html (accessed 27/1/2022) https://climate.esa.int/en/projects/ozone/ www.iup.uni-bremen.de/UVSAT/datasets/tropospheric-ozone-ccd (accessed 27/1/2022)	Ziemke et al. (2019)	
	SAT2 (GOME, SCIAMACHY, OMI, GOME-2A, GOME-2B).	Input dataset					Heue et al. (2016)	
	SAT3 (GOME, SCIAMACHY, GOME-II).	Input dataset					Leventidou et al. (2018)	
	OMI/MLS tropospheric column ozone.	Input dataset				https://acd-ext.gsfc.nasa.gov/Data_services/cloud_slice/new_data.html (accessed 27/1/2022)	Ziemke et al. (2019)	The conversion of DU to tropospheric weighted average ozone mixing ratios is based on data from the URL link.
		Code	plot_tropospheric_ozone_trends_for_IPCC_AR6_Chapter_2.m					

Figure/Table Number	Dataset/Code Name	Type	File Name/ Specificities	License Type	Dataset/Code Citation	Dataset/Code URL	Related Publication/ Software Used	Notes
Figure 2.9a, b	Non-sea-salt sulphate ice-core data.	Input dataset					Wendl et al. (2015)	Arctic (Svalbard,78.82°N 17.43°E).
		Input dataset					Olivier et al. (2006)	Russia (Belukha, 49.81°N 86.58°E).
		Input dataset					Engardt et al. (2017)	Europe (Colle Gnifetti, 45.93°N 7.88°E).
		Input dataset					Kellerhals et al. (2010)	South America (Illimani, 16.62°S 67.77°W) ex-sulphate, corrected for mineral-dust input.
		Input dataset					Sigl et al. (2014)	Antarctica (stacked sulphate record from Antarctica including the four ice cores DIV2010, 77.95°S 95.96°W; B40, 70.0°S 0.06°E; Talos Dome, 72.48°S 159.46°E, and DFS10, 77.40°S 39.62°W).
								Sulphate concentrations were not corrected for sea-salt input, which is negligible at the ice-core locations. The exception is Antarctica, for which non-sea-salt sulphate is shown, calculated from total sulphur concentrations using sodium concentrations as a sea-salt tracer and assuming a sulphur-to-sodium ratio in bulk sea water of 0.084. Non-sea-salt sulphate was calculated from the non-sea-salt sulphur concentration using $[nssSO_4^{2-}]$ = [nssS]x3 for conversion.
	Refractory black carbon (rBC) ice-core data.	Input dataset					Arienzo et al. (2017)	BC from the B40 core.
		Input dataset					McConnell et al. (2007); Sigl et al. (2013, 2015, 2018); Keegan et al. (2014); Mernild et al. (2015)	Stacked rBC record from Greenland including the four ice cores NEEM-2011-S1, 77.45°N 51.06°W; D4, 71.4°N 44.0°W; TUNU2013, 78.0°N 33.88°W; and Summit2010, 72.6°N 38.5°W).
		Input dataset					Lim et al. (2017)	Eastern Europe (Elbrus, 43.35°N 42.43°E). The record for Eastern Europe goes back to 1820 only.

Figure/Table Number	Dataset/Code Name	Type	File Name/ Specificities	License Type	Dataset/Code Citation	Dataset/Code URL	Related Publication/ Software Used	Notes
Figure 2.9c	First link: MODIS Aerosol Parameters Integrated Climate Data Center (ICDC). Second link: MODerate Resolution Imaging Spectroradiometer MODIS AOD.	Input dataset	MOD08_D3 (Terra), MYD08_D3 (Aqua)	Second link: https://modaps.modaps.eosdis.nasa.gov/services/faq/LAADS_Data-Use_Citation_Policies.pdf	Platnick et al. (2015)	https://icdc.cen.uni-hamburg.de/en/modis-aerosol-properties.html (accessed 27/1/2022) https://ladsweb.modaps.eosdis.nasa.gov/search/order/ (accessed 27/1/2022)	Santer et al. (2008); Levy et al. (2010)	MODIS and MISR data from the Terra satellite are analysed starting in 2000 and are enhanced by MODIS on Aqua starting in 2002. Areas without crosses show a trend that is significant at the 0.9 level (two-sided t-test with correction). Superimposed are the trends in annual-mean AOD from the AERONET surface sunphotometer network for 2000–2019.
	Multi-Angle Imaging Spectroradiometer MISR AOD.	Input dataset	MIL3MAEN			https://opendap.larc.nasa.gov/opendap/MISR/MIL3YAEN.004 (accessed 27/1/2022)	Garay et al. (2017)	
	AErosol RObotic NETwork AERONET AOD.	Input dataset	Level 2.0, V3, monthly			https://aeronet.gsfc.nasa.gov/data_push/AOT_Level2_Monthly.tar.gz (accessed 27/1/2022)	Holben et al. (1998); Santer et al. (2008); Giles et al. (2019)	
	AERONET AODf.	Input dataset	Level 2.0, V3, monthly			https://aeronet.gsfc.nasa.gov/data_push/AOT_Level2_Monthly.tar.gz (accessed 27/1/2022)	Holben et al. (1998); Giles et al. (2019)	
Figure 2.9d	MODerate Resolution Imaging Spectroradiometer MODIS AODf.	Input dataset	MOD08_D3 (Terra), MYD08_D3 (Aqua)	Licence link for LAADS DAAC: https://modaps.modaps.eosdis.nasa.gov/services/faq/LAADS_Data-Use_Citation_Policies.pdf	Platnick et al. (2015)	https://icdc.cen.uni-hamburg.de/en/modis-aerosol-properties.html (accessed 27/1/2022) https://ladsweb.modaps.eosdis.nasa.gov/search/order/ (accessed 27/1/2022)	Levy et al. (2010)	
	Multi-Angle Imaging Spectroradiometer MISR AODf.	Input dataset	MIL3MAEN			https://opendap.larc.nasa.gov/opendap/MISR/MIL3YAEN.004 (accessed 27/1/2022)	Garay et al. (2017)	

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Figure 2.10	Effective radiative forcing (ERF).	Input dataset	Forcing time series			See Annex III	Section 7.3	ERF of changes to the atmospheric composition are shown for the gases carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), ozone (O_3) and halogenated gases. Aerosol changes include the sum of the ERF due to aerosol – radiation and aerosol–cloud interactions. Other anthropogenic forcings include stratospheric ozone, stratospheric water vapour, land-use/land-cover changes, black carbon deposition on snow, and contrails. Volcanic ERF is defined such that there is zero mean forcing in the past 2.5 kyr. The sum of the best estimates for all forcings is shown as the total forcing. Further uncertainty ranges are provided in Figures 7.10 and 7.11.
Figure 2.11a	Holocene global mean surface temperature reconstruction (Temp12k multi-method).	Input dataset	www.ncei.noaa.gov/pub/data/paleo/reconstructions/kaufman2020/temp12k_allmethods_percentiles.csv			www.ncdc.noaa.gov/paleo/study/29712 (accessed 27/1/2022)	Kaufman et al. (2020a, b)	Multi-method reconstruction, 5–95 percentile.
	Last millennium global mean surface temperature reconstruction (PAGES2k multi-method). PAGES2k Common Era Surface Temperature Reconstructions.	Input dataset	www.ncei.noaa.gov/pub/data/paleo/pages2k/neukom2019temp/recons/Full_ensemble_median_and_95pct_range.txt			www.ncdc.noaa.gov/paleo/study/26872 (accessed 27/1/2022)	PAGES 2k Consortium (2017, 2019)	Median ensemble reconstruction, adjusted to mean of 1850–1900 from the reconstruction (+0.38°C).
	1900–2020 global mean surface temperature (multi-dataset mean).	Same as in panel c of this figure						

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Figure 2.11b, c	HadCRUT, version 5.0.	Input dataset		www.metoffice.gov.uk/about-us/legal/tandc#Use-of-Crown-Copyright		www.metoffice.gov.uk/hadobs/hadcrut5 (accessed 27/1/2022)	Morice et al. (2021)	Trends have been calculated where data are present in both the first and last decade and for at least 70% of all years within the period using OLS. Significance is assessed with AR(1) correction as described in Santer et al. (2008) and denoted by stippling.
	NOAAGlobalTemp. version 5 – Arctic variant (not yet officially named).	Input dataset				ftp://ftp.ncdc.noaa.gov/pub/data/cmb/ersst/v5/2020.grl.dat/interim/ (expected to be superseded) (accessed 27/1/2022)	Vose et al. (2021)	
	Berkeley Earth.	Input dataset				http://berkeleyearth.org/archive/data/ (accessed 27/1/2022)	Rohde and Hausfather (2020)	
	FREVA-CLINT/ climateronstructionAI: updated reconstruction, version 1.0.1.	Input dataset		Open access	Kadow et al. (2020)	DOI:10.5281/zenodo.3873044 (accessed 27/1/2022)		
	China-MST.	Input dataset					Sun et al. (2021)	
Cross-Chapter Box 2.3, Table 1	HadCRUT, version 5.0.	Input dataset		www.metoffice.gov.uk/about-us/legal/tandc#Use-of-Crown-Copyright		www.metoffice.gov.uk/hadobs/hadcrut5/ (accessed 27/1/2022)	Morice et al. (2021)	
	NOAAGlobalTemp-Interim.	Input dataset				www.ncei.noaa.gov/pub/data/cmb/ersst/v5/2020.grl.dat/ (accessed 27/1/2022) DOI:10.1029/2020GL090873	Vose et al. (2021)	
	Berkeley Earth.	Input dataset				http://berkeleyearth.org/archive/data/ (accessed 27/1/2022)	Rohde and Hausfather (2020)	

Figure/Table Number	Dataset/Code Name	Type	File Name/ Specificities	License Type	Dataset/Code Citation	Dataset/Code URL	Related Publication/ Software Used	Notes
Cross-Chapter Box 2.3, Table 1 *(continued)*	Global temperature reconstructions, version 2.	Input dataset			Cowtan and Way (2014)	https://pure.york.ac.uk/portal/en/datasets/global-temperature-reconstructions-version-2-cowtan-and-way(20ee85c3-f53c-4ab6-8e50-270b0ddd3686).html (accessed 27/1/2022)		
	FREVA-CLINT/ climateronstructionAI: updated reconstruction, version 1.0.1.	Input dataset		Open access	Kadow et al. (2020)	DOI:10.5281/zenodo.3873044 (accessed 27/1/2022)		
Cross-Chapter Box 2.3, Figure 1	HadCRUT, version 5.0.	Input dataset		www.metoffice.gov.uk/about-us/legal/tandc#Use-of-Crown-Copyright		www.metoffice.gov.uk/hadobs/hadcrut5/ (accessed 27/1/2022)	Morice et al. (2021)	
	NOAAGlobalTemp-interim.	Input dataset				www.ncei.noaa.gov/pub/data/cmb/ersst/v5/2020.grl.dat/ (accessed 27/1/2022)	Vose et al. (2021)	
	Berkeley Earth.	Input dataset				http://berkeleyearth.org/archive/data/ (accessed 27/1/2022)	Rohde and Hausfather (2020)	
	Global temperature reconstructions, version 2.	Input dataset			Cowtan and Way (2014)	https://pure.york.ac.uk/portal/en/datasets/global-temperature-reconstructions-version-2-cowtan-and-way(20ee85c3-f53c-4ab6-8e50-270b0ddd3686).html (accessed 27/1/2022)		
	FREVA-CLINT/ climateronstructionAI: updated reconstruction, version 1.0.1.	Input dataset		Open access	Kadow et al. (2020)	DOI:10.5281/zenodo.3873044 (accessed 27/1/2022)		

Figure/Table Number	Dataset/Code Name	Type	File Name/ Specificities	License Type	Dataset/Code Citation	Dataset/Code URL	Related Publication/ Software Used	Notes
Table 2.3	HadCRUT, version 5.0.	Input dataset		www.metoffice.gov.uk/about-us/legal/tandc#Use-of-Crown-Copyright		www.metoffice.gov.uk/hadobs/hadcrut5 (accessed 27/1/2022)	Morice et al. (2021)	
	NOAAGlobalTemp-interim.	Input dataset				ftp://ftp.ncdc.noaa.gov/pub/data/cmb/ersst/v5/2020.grl.dat/interim/ (expected to be superseded) (accessed 27/1/2022)	Vose et al. (2021)	
	Berkeley Earth.	Input dataset				http://berkeleyearth.org/archive/data/ (accessed 27/1/2022)	Rohde and Hausfather (2020)	
	FREVA-CLINT/ climateronstructionAI: updated reconstruction, version 1.0.1.	Input dataset		Open access	Kadow et al. (2020)	DOI:10.5281/zenodo.3873044 (accessed 27/1/2022)		
	China-MST.	Input dataset					Sun et al. (Sun et al., 2021)	
	GISTEMP, version 4.	Input dataset				https://data.giss.nasa.gov/gistemp/ (accessed 27/1/2022)	Lenssen et al. (2019)	
	Global temperature reconstructions, version 2.	Input dataset		CC BY 4.0	Cowtan and Way (2014)	DOI:10.15124/20ee85c3-f53c-4ab6-8e50-270b0ddd3686 (accessed 27/1/2022)	Cowtan and Way (2014)	
	GraphEM-infilled temperature data.	Input dataset		https://creativecommons.org/licenses/by/4.0/legalcode	Vaccaro et al. (2021)	https://zenodo.org/record/4469607 (accessed 27/1/2022)		
Table 2.4	HadCRUT, version 5.0.	Input dataset		www.metoffice.gov.uk/about-us/legal/tandc#Use-of-Crown-Copyright		www.metoffice.gov.uk/hadobs/hadcrut5 (accessed 27/1/2022)	Morice et al. (2021)	
	NOAAGlobalTemp-interim.	Input dataset				ftp://ftp.ncdc.noaa.gov/pub/data/cmb/ersst/v5/2020.grl.dat/interim/ (expected to be superseded) (accessed 27/1/2022)	Vose et al. (2021)	
	GISTEMP, version 4.	Input dataset				https://data.giss.nasa.gov/gistemp/ (accessed 27/1/2022)	Lenssen et al. (2019)	
	Berkeley Earth.	Input dataset				http://berkeleyearth.org/archive/data/ (accessed 27/1/2022)	Rohde and Hausfather (2020)	
	China-MST.	Input dataset					Sun et al. (2021)	
	FREVA-CLINT/ climateronstructionAI: updated reconstruction, version 1.0.1.	Input dataset		Open access	Kadow et al. (2020)	DOI:10.5281/zenodo.3873044 (accessed 27/1/2022)		

Figure/Table Number	Dataset/Code Name	Type	File Name/ Specificities	License Type	Dataset/Code Citation	Dataset/Code URL	Related Publication/ Software Used	Notes
Table 2.4 *(continued)*	Global temperature reconstructions, version 2.	Input dataset		CC BY 4.0	Cowtan and Way (2014)	DOI:10.15124/20ee85c3-f53c-4ab6-8e50-270b0ddd3686 (accessed 27/1/2022)	Cowtan and Way (2014)	
	GraphEM-infilled temperature data.	Input dataset		https://creativecommons.org/licenses/by/4.0/legalcode	Vaccaro et al. (2021)	https://zenodo.org/record/4469607 (accessed 27/1/2022)		
	ERA5, version 5.1.	Input dataset		https://cds.climate.copernicus.eu/api/v2/terms/static/licence-to-use-copernicus-products.pdf		www.ecmwf.int/en/forecasts/datasets/reanalysis-datasets/era5 (accessed 27/1/2022)	Hersbach et al. (2020)	
Table 2.5	RAOBCORE, version 1.7.	Input dataset				ftp://srvx1.img.univie.ac.at/pub/ (accessed 27/1/2022)	Haimberger et al. (2012)	The running variance is plotted against the end of the 30-year period concerned. All values are expressed as a ratio with the 1900–1970 variance (for Niño 3.4, the 1900–1970 variance is estimated by scaling the observed 1950–2018 variance with the ratio of the SOI variances from 1900–1970 and 1950–2018).
	RICH, version 1.7.	Input dataset				ftp://srvx1.img.univie.ac.at/pub/ (accessed 27/1/2022)	Haimberger et al. (2012)	
	SUNY.	Input dataset				ftp://aspen.atmos.albany.edu/data/UA-HRD/ (accessed 27/1/2022)	Zhou et al. (2021)	
	UAH, version 6.0.	Input dataset				www.nsstc.uah.edu/climate/ (accessed 27/1/2022)	Spencer et al. (2017)	
	RSS, version 4.0.	Input dataset				www.remss.com/measurements/upper-air-temperature/ (accessed 27/1/2022)	Mears and Wentz (2017)	
	ERA5, version 5.1.	Input dataset		https://cds.climate.copernicus.eu/api/v2/terms/static/licence-to-use-copernicus-products.pdf		www.ecmwf.int/en/forecasts/datasets/reanalysis-datasets/era5 (accessed 27/1/2022)	Hersbach et al. (2020)	
	STAR, version 3.0.	Input dataset				ftp://ftp.star.nesdis.noaa.gov/pub/smcd/emb/mscat/data/SSU/SSU_v3.0/ (accessed 27/1/2022)	Zou and Qian (2016)	
Figure 2.12	ERA5, version 5.1.	Input dataset		https://cds.climate.copernicus.eu/api/v2/terms/static/licence-to-use-copernicus-products.pdf		www.ecmwf.int/en/forecasts/datasets/reanalysis-datasets/era5 (accessed 27/1/2022)	Hersbach et al. (2020)	
	RAOBCORE, version 1.7.	Input dataset				ftp://srvx1.img.univie.ac.at/pub/ (accessed 27/1/2022)	Haimberger et al. (2012)	
	RICH, version 1.7.	Input dataset				ftp://srvx1.img.univie.ac.at/pub/ (accessed 27/1/2022)	Haimberger et al. (2012)	

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Figure 2.12 *(continued)*	Radio Occultation Meteorology Satellite Application Facility (ROM SAF) CDR (and ICDR), version 1.0.	Input dataset		www.romsaf.org/licence.php		www.romsaf.org/product_archive.php (accessed 27/1/2022)	Gleisner et al. (2020)	
	University Corporation for Atmospheric Research/National Oceanic and Atmospheric Administration (UCAR/NOAA).	Input dataset				https://cdaac-www.cosmic.ucar.edu/ (accessed 27/1/2022)	Steiner et al. (2020)	
	Wegener Center (WEGC), Ops version 5.6.	Input dataset		CC-BY 4.0		DOI:10.25364/WEGC/OPS5.6:2020.1 (accessed 27/1/2022)	Angerer et al. (2017)	
	Atmospheric InfraRed Sounder (AIRS), version 6.0.	Input dataset				https://cmr.earthdata.nasa.gov/search/concepts/C1238517301-GES_DISC.html (accessed 27/1/2022)	Susskind et al. (2014)	
Figure 2.13a	Met Office Hadley Centre HadISDH.blend gridded global surface specific humidity, version 1.0.0.2019f.	Input dataset	https://www.metoffice.gov.uk/hadobs/hadisdh/	www.nationalarchives.gov.uk/doc/open-government-licence/version/3/		https://www.metoffice.gov.uk/hadobs/hadisdh/downloadblend1112020.html (accessed 27/1/2022)	Santer et al. (2008); Willett et al. (2013, 2014, 2020)	Blend (land and marine) in situ monitoring product.
Figure 2.13b	Met Office Hadley Centre HadISDH.blend gridded global surface specific humidity, version 1.0.0.2019f.	Input dataset	HadISDH.blendq.1.0.0.2019f_FLATgridIDPHABClocalSHIPboth5by5_anoms8110_JAN2020_cf.nc	www.nationalarchives.gov.uk/doc/open-government-licence/version/3/		https://www.metoffice.gov.uk/hadobs/hadisdh/downloadblend1112020.html (accessed 27/1/2022)	Willett et al. (2013, 2014, 2020)	
	ERA5 specific humidity.	Input dataset	qERA5.nc	www.romsaf.org/product_archive.php		https://cds.climate.copernicus.eu/cdsapp#!/dataset/reanalysis-era5-pressure-levels-monthly-means?tab=form (accessed 27/1/2022)	Hersbach et al. (2019, 2020)	
	The Japanese 55-Year Reanalysis (JRA55) specific humidity.	Input dataset	jraq19732019.nc	CC BY 4.0	JMA (2013)	https://rda.ucar.edu/datasets/ds628.1/ (accessed 27/1/2022)	Kobayashi et al. (2015)	

Figure/Table Number	Dataset/Code Name	Type	File Name/ Specificities	License Type	Dataset/Code Citation	Dataset/Code URL	Related Publication/ Software Used	Notes
Figure 2.13b *(continued)*	20th-Century Reanalysis version 3 (20CRv3), specific humidity.	Input dataset	shum.2m.mon.mean.nc			ftp://ftp2.psl.noaa.gov/Datasets/20thC_ReanV3/Monthlies/2mSI-MO/shum.2m.mon.mean.nc (accessed 27/1/2022) https://psl.noaa.gov/data/gridded/data.20thC_ReanV3.monolevel.html (accessed 27/1/2022)	Slivinski et al. (2019)	
Figure 2.13c	Met Office Hadley Centre HadISDH.blend gridded global surface relative humidity, version 1.0.0.2019f.	Input dataset	HadISDH.blendRH.1.0.0.2019f_FLATgridIDPHABClocalSHIPboth5by5_anoms8110_JAN2020_cf.nc	www.metoffice.gov.uk/about-us/legal/tandc#Use-of-Crown-Copyright		https://www.metoffice.gov.uk/hadobs/hadisdh/downloadblend1112020.html (accessed 27/1/2022)	Willett et al. (2013, 2014, 2020)	Blend (land and marine) in situ monitoring product.
Figure 2.13d	Met Office Hadley Centre HadISDH.blend gridded global surface relative humidity, version 1.0.0.2019f.	Input dataset	HadISDH.blendRH.1.0.0.2019f_FLATgridIDPHABClocalSHIPboth5by5_anoms8110_JAN2020_cf.nc	www.metoffice.gov.uk/about-us/legal/tandc#Use-of-Crown-Copyright		https://www.metoffice.gov.uk/hadobs/hadisdh/downloadblend1112020.html (accessed 27/1/2022)	Willett et al. (2013, 2014, 2020)	
	ERA5 relative humidity.	Input dataset	RHERA5.nc	https://cds.climate.copernicus.eu/api/v2/terms/static/licence-to-use-copernicus-products.pdf		https://cds.climate.copernicus.eu/cdsapp#!/dataset/reanalysis-era5-pressure-levels-monthly-means?tab=form (accessed 27/1/2022)	Hersbach et al. (2019; 2020)	
	The Japanese 55-Year Reanalysis (JRA55) relative humidity.	Input dataset	jrarh19732019.nc	CC BY 4.0	JMA (2013)	https://rda.ucar.edu/datasets/ds628.1/ (accessed 27/1/2022)	Kobayashi et al. (2015)	
	20th-Century Reanalysis version 3(20CRv3) relative humidity.	Input dataset	rhum.2m.mon.mean.nc			ftp://ftp2.psl.noaa.gov/Datasets/20thC_ReanV3/Monthlies/2mSI-MO/rhum.2m.mon.mean.nc (accessed 27/1/2022) https://psl.noaa.gov/data/gridded/data.20thC_ReanV3.monolevel.html (accessed 27/1/2022)	Slivinski et al. (2019)	

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Figure 2.14	ERA5.	Input dataset	tcwvera5.nc	https://cds.climate.copernicus.eu/api/v2/terms/static/licence-to-use-copernicus-products.pdf		https://cds.climate.copernicus.eu/cdsapp#!/dataset/reanalysis-era5-single-levels-monthly-means?tab=overview (accessed 27/1/2022)	Hersbach et al. (2019, 2020)	Reanalyses covering the 1979–2019 period.
	The Japanese 55-Year Reanalysis (JRA55).	Input dataset	jrapwat19792019.nc	CC BY 4.0	JMA (2013)	https://rda.ucar.edu/datasets/ds628.1/ (accessed 27/1/2022)	Kobayashi et al. (2015)	
	20th-Century Reanalysis, version 3 (20CRv3).	Input dataset	pr_wtr.eatm.mon.mean.nc			ftp://ftp2.psl.noaa.gov/Datasets/20thC_ReanV3/Monthlies/miscSI-MO/pr_wtr.eatm.mon.mean.nc (accessed 27/1/2022) https://psl.noaa.gov/data/gridded/data.20thC_ReanV3.monolevel.html (accessed 27/1/2022)	Slivinski et al. (2019)	
	The Hamburg Ocean Atmosphere Parameters and Fluxes from Satellite (HOAPS), version 4.	Input dataset	HOAPS4.nc		Andersson et al. (2017)	https://wui.cmsaf.eu/safira/action/viewDoiDetails?acronym=HOAPS_V002 (accessed 27/1/2022)	Andersson et al. (2017) (Product User Manual SSM/I and SSMIS)	Observations covering the 1979–2019 period.
	Remote Sensing Systems (REMSS), version 7.	Input dataset	tpw_v07r01_198801_202012.nc4.nc			ftp://ftp.remss.com/vapor/monthly_1deg/ (accessed 27/1/2022) www.remss.com/measurements/atmospheric-water-vapor/tpw-1-deg-product/ (accessed 27/1/2022)	Wentz and Meissner (2007)	
	NASA Water Vapour Project MEaSURsS (NVAP-M).	Input dataset	TCWV_MERGED_NVAPM_TOTAL_V01_long_commongrid_198801_200812_v1.0.nc			https://public.satproj.klima.dwd.de/data/GVAP_data_archive/v1.0/TCWV/long/ (accessed 27/1/2022) (accessed 6/11/2020)	Vonder Haar et al. (2012)	
Figure 2.15a, d	Climatic Research Unit (CRU) time series (TS) data, version 4.04.	Input dataset	https://crudata.uea.ac.uk/cru/data/hrg/cru_ts_4.04/cruts.2004151855.v4.04/pre/cru_ts4.04.1901.2019.pre.dat.nc.gz			https://crudata.uea.ac.uk/cru/data/hrg/cru_ts_4.04/cruts.2004151855.v4.04/pre/ (accessed 27/1/2022)	Harris et al. (2020)	Data products have been masked to regions with an observational constraint.
Figure 2.15b, e	Global Precipitation Climatology Centre (GPCC), version 2020.	Input dataset	gpcc_v2020_f.nc	www.dwd.de/EN/service/imprint/imprint_node.html		https://opendata.dwd.de/climate_environment/GPCC/html/fulldata-monthly_v2020_doi_download.html (accessed 27/1/2022)	Becker et al. (2013)	

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Figure 2.15c	Climatic Research Unit (CRU) time series (TS) data, version 4.04.	Input dataset	https://crudata.uea.ac.uk/cru/data/hrg/cru_ts_4.04/cruts.2004151855.v4.04/pre/cru_ts4.04.1901.2019.pre.dat.nc.gz			https://crudata.uea.ac.uk/cru/data/hrg/cru_ts_4.04/cruts.2004151855.v4.04/pre/ (accessed 27/1/2022)	Harris et al. (2020)	
	Global Historical Climatology Network Monthly (GHCN), version 4.	Input dataset	GHCNv4-pave_BASE1961-1990.dat			www.ncei.noaa.gov/data/global-historical-climatology-network-monthly/v4beta/ (accessed 27/1/2022)	Updated from Vose et al. (1992)	
	Global Precipitation Climatology Project (GPCP), version 2.3, combined precipitation dataset.	Input dataset	ftp://ftp.cdc.noaa.gov/Datasets/gpcp/precip.mon.mean.nc			https://psl.noaa.gov/data/gridded/data.gpcp.html (accessed 27/1/2022)	Adler et al. (2018)	Land only.
	Global Precipitation Climatology Centre (GPCC), version 2020.	Input dataset	gpcc_v2020_f.nc			https://opendata.dwd.de/climate_environment/GPCC/html/fulldata-monthly_v2020_doi_download.html (accessed 27/1/2022)	Becker et al. (2013)	
Figure 2.15f	Global Precipitation Climatology Project (GPCP), version 2.3.	Input dataset	ftp://ftp.cdc.noaa.gov/Datasets/gpcp/precip.mon.mean.nc			https://psl.noaa.gov/data/gridded/data.gpcp.html (accessed 27/1/2022)	Adler et al. (2018)	
Table 2.6	Global Precipitation Climatology Centre (GPCC), version 2020.	Input dataset	gpcc_v2020_f.nc			https://opendata.dwd.de/climate_environment/GPCC/html/fulldata-monthly_v2020_doi_download.html (accessed 27/1/2022)	Becker et al. (2013)	
	Climatic Research Unit (CRU) time series (TS) data, version 4.04.	Input dataset	https://crudata.uea.ac.uk/cru/data/hrg/cru_ts_4.04/cruts.2004151855.v4.04/pre/cru_ts4.04.1901.2019.pre.dat.nc.gz			https://crudata.uea.ac.uk/cru/data/hrg/cru_ts_4.04/cruts.2004151855.v4.04/pre/ (accessed 27/1/2022)	Harris et al. (2020)	
	Global Historical Climatology Network (GHCN) monthly, version 4.	Input dataset	GHCNv4-pave_BASE1961-1990.dat			www.ncei.noaa.gov/data/global-historical-climatology-network-monthly/v4beta/ (accessed 27/1/2022)	Vose et al. (1992)	
	Global Precipitation Climatology Project (GPCP), version 2.3.	Input dataset	ftp://ftp.cdc.noaa.gov/Datasets/gpcp/precip.mon.mean.nc			https://psl.noaa.gov/data/gridded/data.gpcp.html (accessed 27/1/2022)	Adler et al. (2018)	

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Figure 2.16a	ERA5 total precipitation and evaporation.	Input dataset	era5_tp_2.nc era5_evap_2.nc	https://cds.climate.copernicus.eu/api/v2/terms/static/licence-to-use-copernicus-products.pdf		https://cds.climate.copernicus.eu/cdsapp#!/dataset/reanalysis-era5-single-levels-monthly-means?tab=form (accessed 27/1/2022)	Santer et al. (2008); Hersbach et al. (2019, 2020)	Blue shading shows regions that have moistened at the surface [δ(P–E) >0] and red shading shows regions that have dried [δ (P–E) <0]. The X indicates regions where the trends are non-significant at the p = 0.1 level.
Figure 2.16b, c, d	ERA5 total precipitation and evaporation.	Input dataset	era5_tp_2.nc era5_evap_2.nc	https://cds.climate.copernicus.eu/api/v2/terms/static/licence-to-use-copernicus-products.pdf		https://cds.climate.copernicus.eu/cdsapp#!/dataset/reanalysis-era5-single-levels-monthly-means?tab=form (accessed 27/1/2022)	Hersbach et al. (2020)	
	Japanese 55-Year Reanalysis (JRA-55) precipitation minus evaporation.	Input dataset	fcst_phy2m125	JMA (2013)	DOI:10.5065/D60G3H5B	http://search.diasjp.net/en/dataset/JRA55 (accessed 27/1/2022)	Kobayashi et al. (2015)	
	20th-Century Reanalysis, version 3 (20CRv3), precipitation minus evaporation.	Input dataset	lhtfl.mon.mean.nc, prate.mon.mean.nc			ftp://ftp.cdc.noaa.gov/Datasets/20thC_ReanV3/Monthlies/sfcFlxSI/lhtfl.mon.mean.nc (accessed 27/1/2022) ftp://ftp.cdc.noaa.gov/Datasets/20thC_ReanV3/Monthlies/sfcSI/prate.mon.mean.nc (accessed 27/1/2022) https://psl.noaa.gov/data/gridded/data.20thC_ReanV3.monolevel.html (accessed 27/1/2022)	Slivinski et al. (2019)	
	Climate Forecast System Reanalysis (CFSR) precipitation minus evaporation.	Input dataset	flxf06.gdas.grb2			www.ncei.noaa.gov/data/climate-forecast-system/access/reanalysis/monthly-means/ (accessed 27/1/2022)	Saha et al. (2010)	
	ERA20C precipitation minus evaporation.	Input dataset	ERA20C_MMfcst_1978-2010.nc			www.ecmwf.int/en/forecasts/datasets/reanalysis-datasets/era-20c (accessed 27/1/2022)	Poli et al. (2016)	
	ERA20CM precipitation minus evaporation.	Input dataset	ERA20CM_FLX.nc			www.ecmwf.int/en/forecasts/datasets/reanalysis-datasets/era-20cm-model-integrations (accessed 27/1/2022)	Hersbach et al. (2015)	
	Modern-Era Retrospective analysis for Research and Applications (MERRA) precipitation minus evaporation, version 5.2.0.	Input dataset	tavgM_2d_flx_Nx		GMAO (2008)	https://disc.sci.gsfc.nasa.gov/datasets?keywords=%22MERRA%22%20tavgM_2d_flx_Nx&page=1 (accessed 27/1/2022)	Rienecker et al. (2011)	

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Figure 2.16b, c, d *(continued)*	Modern-Era Retrospective analysis for Research and Applications, version 2 (MERRA-2), precipitation minus evaporation, version 5.12.4.	Input dataset	tavgM_2d_flx_Nx DOI:10.5067/0JRLVL8YV2Y4		GMAO (2015)	https://disc.sci.gsfc.nasa.gov/datasets?keywords=%22MERRA%22%20tavgM_2d_flx_Nx&page=1 (accessed 27/1/2022)	Gelaro et al. (2017)	
Figure 2.17	ERA5.	Input dataset	Monthly averaged reanalysis, V-component of wind, all pressure levels.	https://cds.climate.copernicus.eu/api/v2/terms/static/licence-to-use-copernicus-products.pdf		https://cds.climate.copernicus.eu/cdsapp#!/dataset/reanalysis-era5-pressure-levels-monthly-means?tab=form (accessed 27/1/2022)	Hersbach et al. (2019; 2020)	The edge of the Hadley cell is taken as the average latitude of the zero cross of mean meridional mass streamfunction averaged between 800 and 400 hPa (Studholme and Gulev, 2018). Hadley cell intensity is taken as the vertically averaged maximum value of the meridional stream function between 900 and 200 hPa in each overturning cell.
	ERA-Interim.	Input dataset	Monthly means of daily means, V-component of wind, all pressure levels.			https://apps.ecmwf.int/datasets/data/interim-full-moda/levtype=pl/ (accessed 27/1/2022)	Dee et al. (2011)	
	Japanese 55-Year Reanalysis (JRA-55).	Input dataset	JRA-55/Hist/Monthly//anl_p125/anl_p125_vgrd.{YEAR}{MONTH}.nc		JMA (2013)	http://search.diasjp.net/en/dataset/JRA55 (accessed 27/1/2022)	Kobayashi et al. (2015)	
	Modern-Era Retrospective analysis for Research and Applications, version 2 (MERRA-2).	Input dataset	M2IMNPASM.5.12.4:MERRA2_100.instM_3d_asm_Np.{YEAR}{MONTH}.nc4		GMAO (2015)	https://disc.gsfc.nasa.gov/datasets/M2IMNPASM_5.12.4/summary?keywords=merra2 (accessed 27/1/2022)	Gelaro et al. (2017)	
Figure 2.18	ERA5 zonal wind.	Input dataset	https://cds.climate.copernicus.eu/cdsapp#!/dataset/reanalysis-era5-pressure-levels-monthly-means?tab=form	https://cds.climate.copernicus.eu/api/v2/terms/static/licence-to-use-copernicus-products.pdf		https://cds.climate.copernicus.eu/cdsapp#!/dataset/reanalysis-era5-pressure-levels-monthly-means?tab=form (accessed 27/1/2022)	Santer et al. (2008); Hersbach et al. (2019; 2020)	
Figure 2.19a	HadISD station wind speed, v2.0.2.2017f.	Input dataset	www.metoffice.gov.uk/hadobs/hadisd/v202_2017f/station_download.html More than 8000 stations	www.metoffice.gov.uk/about-us/legal/tandc#Use-of-Crown-Copyright		www.metoffice.gov.uk/hadobs/hadisd/ (accessed 27/1/2022)	Dunn et al. (2016)	To improve readability of plots, all datasets (including land-station data) are interpolated into a uniform 4 × 4 longitude-latitude grid. Trends for HadISD were computed only if at least 36 years had values and each year has at least three seasons of observations available.
Figure 2.19b	ERA5 surface wind.	Input dataset	https://cds.climate.copernicus.eu/cdsapp#!/dataset/reanalysis-era5-pressure-levels-monthly-means?tab=form	https://cds.climate.copernicus.eu/api/v2/terms/static/licence-to-use-copernicus-products.pdf		https://cds.climate.copernicus.eu/cdsapp#!/dataset/reanalysis-era5-single-levels-monthly-means?tab=form (accessed 27/1/2022)	Hersbach et al. (2019, 2020)	
Figure 2.19c	Cross-Calibrated Multi-Platform (CCMP) gridded surface vector winds, version 2.	Input dataset	http://data.remss.com/ccmp/v02.0		Wentz et al. (2015)	www.remss.com/measurements/ccmp/ (accessed 27/1/2022)	Atlas et al. (2011)	

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Figure 2.19d	Objectively Analysed Air-Sea Heat Fluxes (OAFlux) dataset surface wind, release 3.	Input dataset	ftp://ftp.whoi.edu/pub/science/oaflux/wind_v1			ftp://ftp.whoi.edu/pub/science/oaflux/data_v3 https://oaflux.whoi.edu/data-access/ (accessed 22/4/2022)	Yu et al. (2008)	To improve readability of plots, all datasets (including land-station data) are interpolated into a uniform 4 × 4 longitude-latitude grid. Trends for HadISD were computed only if at least 36 years had values and each year has at least three seasons of observations available.
Figure 2.20	Ocean and Sea Ice Satellite Application Facility (OSISAF). NOAA/NSIDC Climate Data Record of Passive Microwave Sea Ice Concentration, version 3: NASA Team (NOAA CDR) v3.0); NASA Bootstrap (NOAA CDR) v3.0. Gridded Monthly Sea Ice Extent and Concentration, 1850 Onward, version 2 – Walsh NSIDC G10010 (Arctic only). UHH Sea Ice Area Product.	Input dataset	SIA_nh_September_ 1850-2020.csv SIA_nh_March_ 1850-2020.csv SIA_sh_September_ 1979-2020.csv SIA_sh_February_ 1979-2020.csv	Doerr et al. (2021): https://creativecommons.org/licenses/by/4.0/legalcode	Walsh et al. (2019): DOI:10.7265/jj4s-tq79 Doerr et al. (2021)	OSISAF: OSI-450 and OSI-430-b under https://osi-saf.eumetsat.int/products/osi-450 (accessed 22/4/2022) https://osi-saf.eumetsat.int/products/osi-430-b-complementing-osi-450 (accessed 22/4/2022) https://osi-saf.eumetsat.int/products/sea-ice-products (accessed 22/4/2022) NASA Team and Bootstrap: https://nsidc.org/data/g02202	OSISAF: Lavergne et al. (2019) NASA Bootstrap: Comiso (2017) NASA Team: Cavalieri et al. (1996) Walsh: Walsh et al. (2017, 2019) Doerr: Doerr et al. (2021)	Sea ice area values have been calculated from sea ice concentration fields provided by OSISAF/CCI, NASA Team, and NASA. Bootstrap from NOAA CDR 3.0.
Figure 2.21	Arctic sea ice thickness from submarine transects.	Input dataset			Rothrock et al. (2008)			The orbit inclination of both satellite altimeters allows mapping of Arctic sea ice to 88°N.
	Ice, Clouds and Land Elevation Satellite (ICESat).	Input dataset			Kwok et al. (2009)	DOI:10.1029/2007JC004252		
	CryoSat-2 European Space Agency (ESA).	Input dataset				https://science-pds.cryosat.esa.int/ DOI:10.1029/2009JC005312	Kwok and Cunningham (2015)	
	Electromagnetic (EM).	Input dataset					Haas et al. (2008, 2010, 2011)	

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Figure 2.21 *(continued)*	Operation IceBridge.	Input dataset			Studinger (2013, 2014); Paden et al. (2014)	ATM L1B elevation and echo strength: DOI:10.5067/19SIM5TXKPGT (accessed 27/1/2022) Narrow swath ATM L1B elevation and echo strength: DOI:10.5067/CXEQS8KVIXEI (accessed 27/1/2022) Snow radar L1B geolocated radar echo strength profiles: DOI:10.5067/FAZTWP500V70 (accessed 27/1/2022)	Kwok and Kacimi (2018)	The orbit inclination of both satellite altimeters allows mapping of Arctic sea ice to 88°N.
Figure 2.22	Northern Hemisphere blended snow cover extent and snow mass time series.	Input dataset (for snow cover extent only)	1922-1991: SCE_NH_index_april.nc 1967-2018: SCE_timeseries.nc	Open access	Mudryk et al. (2020)	http://data.ec.gc.ca/data/climate/scientificknowledge/climate-research-publication-based-data/northern-hemisphere-blended-snow-extent-and-snow-mass-time-series/ (accessed 27/1/2022)	Brown (2000, 2002), Haas et al. (2008, 2010, 2011); Mudryk et al. (2020)	Data are from a multi-observation dataset, based on the method of Mudryk et al. (2020) for the satellite era (1967–2018) with the earlier part of the record based on in situ data (Brown, 2000, 2002), recalibrated to the multi-observational dataset as described in Mudryk et al. (2020).
Figure 2.23a	A global compilation of glacier advances and retreats for the past two millennia grouped by 17 regions (excluding Antarctica).	Input dataset	Data stored locally but link will be made available once archived		Solomina et al. (2016)	DOI:10.1016/j.quascirev.2016.04.008 (accessed 27/1/2022)	Solomina et al. (2016)	The time series is based on 275 studied glaciers in both hemispheres from an extensive compilation. The increasing number of glaciers with recorded advances between the 12th and 19th centuries represents both widespread glacier expansion and better preservation of evidence left during more recent advances, especially where those advances were large and therefore obliterated evidence of earlier advances.
Figure 2.23b	Global and regional glacier-mass changes from 1961 to 2016.	Input dataset	Zemp_etal_results_global.xlsx	https://creativecommons.org/licenses/by/4.0/legalcode	Zemp et al. (2019, 2020)	DOI:10.1038/s41586-019-1071-0 (accessed 27/1/2022) DOI:10.5194/tc-14-1043-2020 (accessed 27/1/2022)	Zemp et al. (2020), Table 1	From 450 glacial and 19,130 geodetic glacier datasets.
	GRACE satellite mission.	Input dataset	annual_MB_Gtyr.mat			https://gracefo.jpl.nasa.gov/data/grace-fo-data/ (accessed 27/1/2022)	Wouters et al. (2019)	
	Global glacier ice mass change.	Input dataset	SROCC_table_A2.xlsx			www.ipcc.ch/srocc/ (accessed 27/1/2022)	IPCC (2019)	
	Hugonnet et al. (2021).	Input dataset	table_hugonnet_regions_10yr_ar6period.xlsx		Hugonnet et al. (2021)	DOI:10.1038/s41586-021-03436-z		

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Figure 2.24	Ice Sheet Mass Balance Inter-comparison Exercise (IMBIE) 2019, Greenland Dataset.	Input dataset	imbie_dataset_ greenland_dynamics-2020_02_28.xlsx			http://imbie.org/data-downloads/ (accessed 27/1/2022)	Greenland: IMBIE Consortium (2020)	
	Ice Sheet Mass Balance Inter-comparison Exercise (IMBIE) 2018, Antarctic Dataset.	Input dataset	imbie_dataset-2018_07_23.xlsx			http://imbie.org/data-downloads/ (accessed 27/1/2022)	Antarctic: IMBIE Consortium (2018)	
Figure 2.25	State of Climate in 2019 Arctic Permafrost Temperature Data.	Input dataset				https://gtnp.arcticportal.org/ (accessed 27/1/2022)	Romanovsky et al.(2017, 2020); updated from SROCC Ch 3	Regions are those described in Romanovsky et al. (2017, 2020). Nordic region and Russia/Siberia 1974–2019 (note: six sites started 1998 or later); high and eastern Canadian Arctic 1978–2019 (note: four sites initiated 2008); northern Alaska, Northwest Territories and eastern Siberia 1978–2019 (note: four sites initiated 2003 or later); Interior Alaska and Central Mackenzie Valley discontinuous permafrost 1983–2019 (note: one site initiated 2001).
Figure 2.26	CSIRO.	Input dataset	gmts.2019-11-27.mat			www.dropbox.com/sh/1crel1zq3bcmjq9/AADiidW4nJwVI5_kdLzKIB7Ba?dl=0	Roemmich et al. (2015); Wijffels et al. (2016)	
	ISAS-15.	Input dataset	GOHC_2005_2018.mat			www.dropbox.com/sh/rqc99ra61q8y2wq/AAD4I3wZ5uBTFVrrXjcy5Hmaa?dl=0	Gaillard et al. (2016); Kolodziejczyk et al. (2017)	
	LEGOS.	Input dataset	/V1.2/OHC_LEGOS1.dat			www.dropbox.com/sh/vyz1091l104lrpz/AAC_zyqrXhaNORGtNVPdL8iIa?dl=0 https://marine.copernicus.eu/access-data (accessed 27/1/2022) https://academic.oup.com/gji/article/215/1/415/5056720/	Blazquez et al. (2018)	This OHC solution is based on the altimetry-based sea level from CMEMS (www.marine.copernicus.eu), the gravimetry-based ocean mass from the GRACE LEGOS V1.2 updated from Blazquez et al. (2018), and the expansion efficiency of heat from Meyssignac et al. (2019). Annual/Sub annual frequencies have been removed. Uncertainties are expressed at the 90% confidence level (1.65 sigma).

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Figure 2.26 *(continued)*	NOC.	Input dataset				www.dropbox.com/sh/a3wtx5rr2rns4bh/AAA8HoXLBs4qig5tFXHrIUJ3a?dl=0	King B.A.; McDonagh E.; Desbruyeres D. (2021)	
	CORA v5.2 Area-Averaged Ocean Heat Content Anomaly.	Input dataset		http://marine.copernicus.eu/services-portfolio/service-commitments-and-licence/		www.dropbox.com/sh/gwgmia1xns6t1mt/AAAkx1244scq_TOmfaQsqKn8a?dl=0 http://marine.copernicus.eu (accessed 27/1/2022)	Cabanes et al. (2013)	Period: 2005–2018. Used climatology: 2005–2017. Global between 60°N–60°S.
	CSIRO-BOA Area-Averaged Ocean Heat Content Anomaly (0–700m).	Input dataset				www.dropbox.com/sh/g4yysjvw9mqpkb5/AAAMYwMSHiGiZ9uKj0IAAS-Ja?dl=0	CSIO website (argo): www.argo.ucsd.edu/Gridded_fields.html	Period: 2005-2018. Used climatology: 2005–2017. Global between 60°N–60°S.
	IPRC.	Input dataset	global_ohc_iprc_20052018_0-2000m_lat60-60_potential_ZJ.nc			www.dropbox.com/sh/yc9jclqrdyh14uc/AAByo_4H0e-ITCig6Xgjebs1a?dl=0 IPRC website (argo): http://apdrc.soest.hawaii.edu/projects/Argo/data/gridded/On_standard_levels/index-1.html (accessed 27/1/2022)	http://apdrc.soest.hawaii.edu/projects/Argo/data/Documentation/gridded-var.pdf	Period: 2005–2018. Used climatology: 2005–2017. Global between 60°N–60°S.
	JAMSTEC.	Input dataset	global_ohc_jamstec_20052018_0-2000m_lat60-60_ZJ_potential.nc			www.dropbox.com/sh/gm67r4qm1r3lxp2/AABBgtEvsibMXrPOSxsu7emma?dl=0	JAMSTEC website (argo): www.jamstec.go.jp/ARGO/argo_web/argo/?page_id=83&lang=en	Period: 2005–2018. Used climatology: 2005–2017. Global between 60°N–60°S.
	Scripps.	Input dataset	global_ohc_scripps_20052018_0-2000m_lat60-60_ZJ.nc		Argo (2021)	www.dropbox.com/sh/9ojeql7caccjqcl/AAD1gg5Ake0sn9nCLxEF4_9na?dl=0		Period: 2005–2018. Used climatology: 2005–2017. Global between 60°N–60°S.
	KvS11.	Input dataset	CORA5.1: INSITU_GLO_TS_REP_OBSERVATIONS_013_001_b.	http://marine.copernicus.eu/services-portfolio/service-commitments-and-licence/		www.dropbox.com/sh/lca41zwv9vv4i2m/AADsRmKtofG9prda_eTKiKO_a?dl=0	von Schuckmann and Le Traon (2011)	Period: 2005–2018. Used climatology: 2005–2017. Global between 60°N–60°S.

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Figure 2.26 *(continued)*	Cheng17.	Input dataset	2019_10_25/IAP_OHC_ estimate_update.txt			www.dropbox.com/sh/ tskdbmvntpmnm0g/AADKpG7Am-wQLqD1oAHS1n-Na?dl=0	Cheng and Zhu (2016); Cheng et al. (2017)	Unit of OHC: *10^22 joules. Smoothed-OHC is a 12-month running mean. Baseline: 2006–2015. Note: in this version (v3), we included the Arctic Ocean, an improved land mask and used an updated CH14 XBT correction. Information on the updated CH14 scheme for XBT data is provided in http://159.226.119.60/cheng/ and www.nodc.noaa.gov/OC5/ XBT_BIAS/xbt_bias.html Note: reliable records are after 1955. Link to Ocean Gridded Temperature Analysis: ftp://ds1.iap.ac.cn/ftp/cheng/ CZ16_v3_IAP_Temperature_ gridded_1month_netcdf/ OR: http://www.ocean.iap.ac.cn/.
	GCOS20.	Input dataset	GCOS_all_heat_ content_1960-2018_ZJ_ v22062020.nc			www.dropbox.com/sh/99xpvl4tlc9r5c2/ AADDvOnKGYzVU__NcW-Eabwma?dl=0	von Schuckmann et al. (2020)	Period: 1960–2018.
	EN4.	Input dataset				www.dropbox.com/sh/te1ol2kazaet1gs/ AAAyUSAXSG969PGbnstnbccga?dl=0 www.metoffice.gov.uk/hadobs/en4/ download-en4-2-1.html (accessed 27/1/2022)	Good et al. (2013)	
	Lev12-NCEI.	Input dataset				www.dropbox.com/sh/un7zkln9d0mfjgj/ AADtaHXhF1oZJjMck8hOahcya?dl=0 www.ncei.noaa.gov/access/global-ocean-heat-content/ (accessed 27/1/2022)	Levitus et al. (2012)	
	Ish17v7.3.	Input dataset			Ishii et al. (2017)	www.dropbox.com/sh/ pct4t51wg3e8ggh/AAAV0wGWXn8 KARNvW49gn5WZa?dl=0 https://climate.mri-jma.go.jp/pub/ocean/ ts/v7.3/ (accessed 27/1/2022)		
	PMEL.	Input dataset				www.dropbox.com/ sh/8ken8wamye6rxk6/ AADy_1InfSqpUFF0BNmmcT7ja?dl=0	Lyman and Johnson (2014); Johnson et al. (2018)	

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Figure 2.26 *(continued)*	Su20-OPEN.	Input dataset	OHC_recons_ Su/2020_11_14_WF/ OPEN_ToCatia.mat			www.dropbox.com/sh/o5l3gqararkxddv/ AABBstLQnLks-LyHdc-ukGdBa?dl=0	Su et al. (2020)	
	Zanna.	Input dataset				www.dropbox.com/sh/1wd75jd5umilvdf/ AAABHlBwQZxCJa3GIMWgspq2a?dl=0 https://laurezanna.github.io/#about (accessed 27/1/2022) https://zenodo.org/record/4603700#. YG5vEC3L0lI (accessed 27/1/2022)	Zanna et al. (2019)	
	Desb17.					www.dropbox.com/ sh/82uxqu2ew4ankgi/AADuy_ aDsdl1mw1Gj0cbmXi5a?dl=0	Purkey and Johnson (2010); Desbruyères et al. (2017)	Desbruyères et al. (2017) published an estimate of the full-depth GOHC and ThSLR during the 2000s using a blended Argo-hydrography product: 1.45 ZJ yr^{-1} and 0.2 mm yr^{-1}, respectively.
Table 2.7	Cheng ocean heat content.	Input dataset			Cheng et al. (2017)	http://159.226.119.60/cheng/ (accessed 27/1/2022)		
	CSIRO ocean heat content/thermosteric sea level.	Input dataset			Domingues et al. (2008)	www.cmar.csiro.au/sealevel/thermal_ expansion_ocean_heat_timeseries.html (accessed 27/1/2022)		
	EN4 ocean subsurface profiles.	Input dataset		Non-Commerical Government License (UK)	Good et al. (2013)	www.metoffice.gov.uk/hadobs/en4/ (accessed 27/1/2022)		
	Ishii et al. ocean heat content/thermosteric sea level.	Input dataset		www.jma.go.jp/jma/ en/copyright.html	Ishii et al. (2017)	www.data.jma.go.jp/gmd/kaiyou/ english/ohc/ohc_data_en.html (accessed 27/1/2022)		
	NCEI ocean heat content/thermosteric sea level.	Input dataset			Levitus et al. (2012)	www.ncei.noaa.gov/access/ global-ocean-heat-content/ (accessed 27/1/2022)		
	Purkey and Johnson ocean heat content/ thermosteric sea level.	Input dataset			Purkey and Johnson (2010)	https://cchdo.ucsd.edu/search?q=cf_ netcdf (accessed 27/1/2022)	Desbruyères et al. (2016)	
	Zanna et al. ocean heat content/thermosteric sea level.	Input dataset			Zanna et al. (2019)	https://laurezanna.github.io/post/ohc_ pnas_dataset/ (accessed 27/1/2022)		

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Figure 2.27	Durack and Wijffels (2010).	Input dataset	DurackandWijffels_ GlobalOceanChanges_ 19500101-20191231__ 210122-205355_beta.nc DurackandWijffels_ GlobalOceanChanges_ 19700101-20191231__ 210122-205448_beta.nc		Durack and Wijffels (2010)	www.cmar.csiro.au/oceanchange/download.php (accessed 27/1/2022)		
Figure 2.28	KE2018 Kemp et al. (2018).	Input dataset				www.dropbox.com/s/6nna1xdsfvqziwn/sealevel.xlsx?dl=0	Kemp et al. (2018)	
	RD2011 Ray and Douglas (2011).	Input dataset				www.dropbox.com/s/6nna1xdsfvqziwn/sealevel.xlsx?dl=0	Ray and Douglas (2011)	
	JE2014 Jevrejeva et al. (2014).	Input dataset				www.dropbox.com/s/6nna1xdsfvqziwn/sealevel.xlsx?dl=0 www.psmsl.org/products/reconstructions/gslGPChange2014.txt (accessed 27/1/2022)	Jevrejeva et al. (2014)	
	DA2017 Dangendorf et al. (2017).	Input dataset				www.dropbox.com/s/6nna1xdsfvqziwn/sealevel.xlsx?dl=0	Dangendorf et al. (2017)	
	DA2019 Dangendorf et al. (2019).	Input dataset				www.dropbox.com/s/6nna1xdsfvqziwn/sealevel.xlsx?dl=0	Dangendorf et al. (2019)	
	CW2011 Church and White (2011).	Input dataset				www.dropbox.com/sh/yqxi73t6l7mbapp/AABdh4zVUjTlmpon4nstYgXca?dl=0 www.cmar.csiro.au/sealevel/GMSL_SG_2011_up.html www.cmar.csiro.au/sealevel/sl_data_cmar.html (accessed 27/1/2022)	Church and White (2011); Church et al. (2011)	

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Figure 2.28 *(continued)*	WS2014 Wenzel and Schröter (2014).	Input dataset				www.dropbox.com/sh/e9n2p4d89br233q/AABDMt4ZFPlgdS658LXkFk8Fa?dl=0 http://store.pangaea.de/Publications/WenzelM_SchroeterJ_2014/WS2014_RSLA_EOF_decomposition.nc (accessed 27/1/2022)	Wenzel and Schröter (2014)	
	HA2015 Hay et al. (2015).	Input dataset				www.dropbox.com/sh/ubvlpanfjkj9oxt/AAB5GekySRF-80pVzCnWWfQ6a?dl=0 https://static-content.springer.com/esm/art%3A10.1038%2Fnature14093/MediaObjects/41586_2015_BFnature14093_MOESM60_ESM.xls (accessed 27/1/2022)	Hay et al. (2014, 2015, 2017)	
	FR2018 Frederikse et al. (2018).	Input dataset				www.dropbox.com/sh/89sh77lvjpadwpl/AADiSEDBA-nzbzKa2-tfD9JFa?dl=0	Frederikse et al. (2018)	
	FR2020 Frederikse et al. (2020).	Input dataset				www.dropbox.com/sh/lvrysjuccqic5je/AACWcbC4gmbEvvdUzorED8kLa?dl=0 https://github.com/thomasfrederikse/sealevelbudget_20c (accessed 27/1/2022) https://zenodo.org/record/3862995#.YG3rQxNKglI (accessed 27/1/2022)	Frederikse et al. (2020)	
	AVISO.	Input dataset	netcdf file: MSL_Serie_MERGED_Global_AVISO_GIA_Adjust_Filter2m.nc			www.dropbox.com/sh/jzjbzqx0x2ehtlv/AAAvdT6bLYyNgpMjTkkLyo5oa?dl=0 www.aviso.altimetry.fr/index.php?id=1599 (accessed 27/1/2022)	www.aviso.altimetry.fr/fileadmin/documents/data/products/indic/msl/MSL_reprocessing_201402.pdf	
	EU CMEMS.	Input dataset				www.dropbox.com/sh/8zaziptcs40tk2o/AAB_s8m5C6Lm_BU2jvObU4DOa?dl=0 www.esa-sealevel-cci.org/products (accessed 27/1/2022)	Ablain et al. (2017, 2019); WCRP Global Sea Level Budget Group (2018)	
	CSIRO.	Input dataset				www.dropbox.com/sh/y2eb3uqx99gjox4/AAA8AhrhpUiRakna9gKJ1y6Pa?dl=0 www.cmar.csiro.au/sealevel/sl_data_cmar.html (accessed 27/1/2022)	Church and White (2011); Watson et al. (2015)	

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Figure 2.28 *(continued)*	CU (Nerem et al., 2018).	Input dataset				www.dropbox.com/sh/4930xp6v110q65k/AABk5b2oSkPWXnuScFL7iD07a?dl=0 https://sealevel.colorado.edu/ (accessed 27/1/2022)	Nerem et al. (2018)	
	ESA (Legeais et al., 2018).	Input dataset				www.dropbox.com/sh/prso9p9sa99nw9l/AAAmhADZJWyINLX5bd5EeItda?dl=0	Quartly et al. (2017); Legeais et al. (2018)	
	NASA (Beckley et al., 2017).	Input dataset	GMSL_TPJAOS_199209_201411.txt		Beckley et al. (2017)	www.dropbox.com/sh/giqkd23763fqbjs/AABOSOoMojE3cSuajM5LoA0Aa?dl=0 https://podaac.jpl.nasa.gov/MEaSUREs-SSH?sections=about%2Bdata (accessed 27/1/2022)		If this data is used please cite Beckley et al. (2016).
	NOAA.	Input dataset	slr_sla_gbl_free_txj1j2_90.nc			www.dropbox.com/sh/5sccjwsijplbc9b/AADbU26hWwrbyd4_mvD5uCNUa?dl=0 www.star.nesdis.noaa.gov/socd/lsa/SeaLevelRise/LSA_SLR_timeseries.php (accessed 27/1/2022)		
	LEGOS (Blazquez et al., 2018).	Input dataset			Blazquez et al. (2018)	www.dropbox.com/sh/j6mgodlgtt0fnto/AAArZyPhbsV3dCgpnGb4vXMPa?dl=0 ftp://ftp.legos.obs-mip.fr/pub/soa/gravimetrie/grace_legos/V1.2/ocean_mass_and_contributors.dat (accessed 27/1/2022)		
	Palmer et al. (2021) (1901–1993) + WCRP GSLB group (1993–2018).	Input dataset	gmsl_altimeter+TG_ensemble_12022021.mat		WCRP Global Sea Level Budget Group (2018); Palmer et al. (2021)	www.dropbox.com/s/a5wx1k15fd84czh/GOHC_GThSL_timeseries.mat?dl=0		
	Spratt and Lisiecki (2016).	Input dataset				www.dropbox.com/sh/ahprl53ibnqfp3f/AABjeYtZBcDjVjBnRmGiISqIa?dl=0 www.ncdc.noaa.gov/paleo/study/19982 (accessed 27/1/2022)	Spratt and Lisiecki (2016)	Preferred reconstruction: Figure 2c – composite of the short (0–431 ka) and long (431–798 ka) time windows.

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Figure 2.29a	High-resolution boron isotope-based CO_2 record. Table mmc5 for the Pliocene (0–3.5 Ma and the older than 3.5 Myr data from Table mmc4, using the G17 reconstruction of seawater d11B. OA_IPCC_clean.R Panel a.	Input dataset	Anag2020.txt Sos.GR.txt	CC BY 4.0	Sosdian et al. (2018); Anagnostou et al. (2020)	DOI:10.1038/s41467-020-17887-x (accessed 27/1/2022) DOI:10.1594/PANGAEA.904186 (accessed 27/1/2022)	Hönisch et al. (2009); Pearson et al. (2009); Seki et al. (2010); Bartoli et al. (2011); Foster et al. (2012); Badger et al. (2013); Greenop et al. (2014); Martínez-Botí et al. (2015); Anagnostou et al. (2016); Chalk et al. (2017); Gutjahr et al. (2017); Sosdian et al. (2018); Harper et al. (2020); Henehan et al. (2020)	
Figure 2.29b	Data from mmc5 – Sosdian et al. (2018). OA_IPCC_clean.R Panel b.	Input dataset	Plio.pH.txt	CC BY 4.0	Sosdian et al. (2018)	DOI:10.1594/PANGAEA.904186 (accessed 27/1/2022)	Hönisch et al. (2009); Seki et al. (2010); Bartoli et al. (2011); Martínez-Botí et al. (2015); Anagnostou et al. (2016); Chalk et al. (2017); Gutjahr et al. (2017); Sosdian et al. (2018)	
Figure 2.29c	Boron isotope records. OA_IPCC_clean.R Panel c.	Input dataset	Shao.txt		Shao et al. (2019)	DOI:10.1594/PANGAEA.901229 (accessed 27/1/2022)	Palmer and Pearson (2003); Foster (2008); Palmer et al. (2010); Henehan et al. (2013); Foster and Sexton (2014); Martínez-Botí et al. (2015); Naik et al. (2015); Ezat et al. (2017); Gray et al. (2018); Shao et al. (2019)	

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Figure 2.29d	BATS pH.	Input dataset	Ocean_pH_BAT.txt		http://bats.bios.edu/bats-data/	http://bats.bios.edu/bats-data/ (accessed 27/1/2022)	Bates and Johnson (2020)	
	HOT pH.	Input dataset	Ocean_pH_HOT.txt		Karl and Lukas (1996)	https://hahana.soest.hawaii.edu/hot/crequest/main.html (accessed 27/1/2022)	Dore et al. (2009)	
	Copernicus Marine Environment Monitoring Service (CMEMS) pH.	Input dataset	global_omi_health_carbon_ph_area_averaged_1985_P20200930.nc		Gehlen et al. (2020)	https://resources.marine.copernicus.eu/?option=com_csw&view=details&product_id=GLOBAL_OMI_HEALTH_carbon_ph_area_averaged (accessed 27/1/2022)	Gehlen et al. (2020)	
	OceanSODA-ETHZ.	Input dataset	ipcc_oceanSODA_pH_65N-65S_1985-2019_annualAvg_areaWeighted.csv		Gregor and Gruber (2021)	www.ncei.noaa.gov/access/metadata/landing-page/bin/iso?id=gov.noaa.nodc:0220059 (accessed 27/1/2022)	Gregor and Gruber (2021)	
Figure 2.30	Barrow CO_2.	Input dataset		Open access		www.esrl.noaa.gov/gmd/dv data/index.php?site=BRW&parameter_name=Carbon%2BDioxide (accessed 27/1/2022)	Graven et al. (2013)	
	Mauna Loa CO_2.	Input dataset		Open access		www.esrl.noaa.gov/gmd/dv/data/index.php?site=MLO&parameter_name=Carbon%2BDioxide (accessed 27/1/2022)	Graven et al. (2013)	
Figure 2.31	Ocean Colour Climate Change Initiative (OC-CCI Version 4.2).	Input dataset	OC-CCI Version 4.2	Free and Open		https://catalogue.ceda.ac.uk/uuid/99348189bd33459cbd597a58c30d8d10 (accessed 27/1/2022) https://climate.esa.int/en/projects/ocean-colour/ (accessed 27/1/2022) www.oceancolour.org (accessed 27/1/2022)	Santer et al. (2008); Sathyendranath et al. (2019)	The climatology and trends are calculated from climate-quality ocean-colour products generated as part of the Climate Change Initiative of the European Space Agency. These are multi-sensor products, with inter-sensor bias correction applied to minimise artefacts in trends, with processing algorithms selected after round-robin comparisons.
Figure 2.32a	Cherry blossom peak bloom in Kyoto, Japan.	Input dataset		Open access		http://atmenv.envi.osakafu-u.ac.jp/aono/kyophenotemp4/ (accessed 27/1/2022)	Aono and Saito (2010)	
Figure 2.32b	Grape harvest in Beaune, France.	Input dataset				www.euroclimhist.unibe.ch/en/ (accessed 27/1/2022)	Labbé et al. (2019)	
Figure 2.32c	Spring phenology index in eastern China.	Input dataset					Ge et al. (2014)	

Figure/Table Number	Dataset/Code Name	Type	File Name/ Specificities	License Type	Dataset/Code Citation	Dataset/Code URL	Related Publication/ Software Used	Notes
Figure 2.32d	Full flower of Piedmont species in Philadelphia, USA.	Input dataset					Panchen et al. (2012)	
Figure 2.32e	Grape harvest in Central Victoria, Australia.	Input dataset					Webb et al. (2011)	
Figure 2.32f	Start of growing season in the Tibetan Plateau, China.	Input dataset		Open access		www.ncdc.noaa.gov/paleo-search/study/22641 (accessed 27/1/2022)	Yang et al. (2017)	
Figure 2.33	MERIS.	Input dataset		Open access		http://earth.esa.int/level3/meris-level3/ (accessed 27/1/2022)	Gobron (2018)	
	MODIS-TIP.	Input dataset		Open access		https://ladsweb.modaps.eosdis.nasa.gov/ (accessed 27/1/2022)	Gobron (2018)	
	SeaWIFS v 2010.0.	Input dataset		Open access		http://fapar.jrc.ec.europa.eu/ (accessed 27/1/2022)	Gobron (2018)	
Figure 2.34 CO_2	Refer to Table 2.1 and Section 2.2.3.							LM age range is from 1000 to 1750 CE; MPWP value is for interglacial KM5c, 95% range.
Figure 2.34 CO_2 rate of change	Refer to Table 2.1 and Section 2.2.3.							LM age range is from 1000 to 1750 CE based on data from Law Dome; last deglacial transition is maximum rate based on data from WAIS Divide.
Figure 2.34 Temperature relative to 1850–1900	Refer to Section 2.3.1.1 and four-dataset mean for the modern period and 1850–1900.							Modern period and 1850–1900 is based on four-dataset mean; LM warmest and coldest 20-year periods are 873–892 CE and 1454–1473 CE, respectively, from PAGES 2k Consortium (PAGES 2k Consortium, 2019).
Figure 2.34 Glacier extent relative to 1850–1900	Refer to Section 2.3.2.3 and Cross-Chapter Box 2.4 for MPWP.							1850–1900 and LM are based on Solomina et al. (2016); MH is based on Solomina et al. (2015).
Figure 2.34 Northern tree line relative to 1850–1900	Refer to Section 2.3.4.3.2.							Modern based on Binney et al. (2009); LM and MH are based on MacDonald et al. (2008) and Binney et al. (2017); LGM is based on Williams et al. (2011) and Binney et al. (Binney et al., 2017); LIG is based on CAPE Last Interglacial Project Members (2006); MPWP is based on Salzmann et al. (2008, 2013).

Figure/Table Number	Dataset/Code Name	Type	File Name/ Specificities	License Type	Dataset/Code Citation	Dataset/Code URL	Related Publication/ Software Used	Notes
Figure 2.34 Sea level relative to 1900	Refer to Section 2.3.3.3.							Modern is for 2018; 1850–1900 and LM are from Kemp et al. (Kemp et al., 2018); LIG and EECO are *likely* ranges.
Figure 2.34 Sea level rate of change	Refer to Section 2.3.3.3.							Modern is for 1993–2018; LM values are maximum centennial rates of lowering and rising: –1.1 to –0.2 (1020–1120 CE) and –0.1 to 0.7 (1460–1560 CE), respectively, from Kemp et al. (Kemp et al., 2018); LGT is for meltwater pulse 1A about 14.6–14.3 ka.
Cross-Chapter Box 2.4, Figure 1a (left side)	Multi-model mean, annual near-surface air temperature (PlioMIP2). The Pliocene Model Intercomparison Project Phase 2.	Input dataset	Replotted from Haywood et al. (2020) (Figure 1b); supplement file: data_for_1b_1d.nc			DOI:10.5194/cp-16-2095-2020-supplement (accessed 27/1/2022)	Haywood et al. (2020)	
	Site-level proxy data, sea surface temperature for KM5c.	Input dataset	McClymont et al. (2020a) (UK37 using BAYSPLINE (column 14), and Mg/Ca using BAYMAG (column 16), both for KM5c). Same as Figure 7.13k.	CC BY-4.0		DOI:10.1594/PANGAEA.911847 (accessed 27/1/2022)	McClymont et al. (2020b)	
	Site-level proxy data, terrestrial temperature for MPWP.	Input dataset	Same as Figure 7.13b				Salzmann et al. (2013); Vieira et al. (2018)	

Figure/Table Number	Dataset/Code Name	Type	File Name/ Specificities	License Type	Dataset/Code Citation	Dataset/Code URL	Related Publication/ Software Used	Notes
Cross-Chapter Box 2.4, Figure 1a (right side)	Multi-model mean, annual precipitation rate (PlioMIP2). The Pliocene Model Intercomparison Project Phase 2.	Input dataset	Replotted from Haywood et al. (2020) (Figure 5b) supplement file: data_for_5b_5c.nc			DOI:10.5194/cp-16-2095-2020-supplement (accessed 27/1/2022)	Haywood et al. (2020)	
	Site-level proxy data, terrestrial precipitation rate for MPWP.	Input dataset					Ager et al. (1994); Fauquette et al. (1999); Demske et al. (2002); Dodson and Macphail (2004); Brigham-Grette et al. (2013); Sniderman et al. (2016); Vieira et al. (2018)	Site-level data from individual studies.
Cross-Chapter Box 2.4, Figure 1b (top)	Biome distributions MPWP (PRISM4).	Input dataset	Replotted from Dowsett et al. (2016) (Figure 3c)				Dowsett et al. (2016)	
Cross-Chapter Box 2.4, Figure 1b (bottom)	Biome distributions present-day (BOME4).	Input dataset	Replotted from Salzmann et al. (2008) (Figure 1b)				Salzmann et al. (2008)	
Cross-Chapter Box 2.4, Figure 1c (top)	Modelled ice sheet extent, Greenland, MPWP.	Input dataset	Replotted from Haywood et al. (2019) (Figure 4a)				Haywood et al. (2019)	
Cross-Chapter Box 2.4, Figure 1c (bottom)	Modelled ice sheet extent, Antarctica, MPWP.	Input dataset	Replotted from Dolan et al. (2018) (Figure 3e)				Dolan et al. (2018)	

Figure/Table Number	Dataset/Code Name	Type	File Name/ Specificities	License Type	Dataset/Code Citation	Dataset/Code URL	Related Publication/ Software Used	Notes
Figure 2.35	Southern Annular Mode (SAM) Index 1000-Year Annual Reconstruction – Dätwyler et al. (2018).	Input dataset	Reconstructions_ Annual_LC.txt			https://www1.ncdc.noaa.gov/pub/data/paleo/reconstructions/datwyler2017/ (accessed 27/1/2022)	Dätwyler et al. (2018)	
	Southern Annular Mode (SAM) Index 1000-Year DJF Reconstruction – Dätwyler et al. (Dätwyler et al., 2018).	Input dataset	Reconstructions_ DJF_LC.txt			https://www1.ncdc.noaa.gov/pub/data/paleo/reconstructions/datwyler2017/ (accessed 27/1/2022)	Dätwyler et al. (2018)	
	Southern Annular Mode (SAM) Index 600-Year DJF Tree Ring Reconstruction – Villalba et al. (2012).	Input dataset	villalba2012sam.txt			https://www.ncei.noaa.gov/pub/data/paleo/contributions_by_author/abram2014/abram2014sam.txt (accessed 27/1/2022) www.ncdc.noaa.gov/paleo-search/ (accessed 27/1/2022)	Villalba et al. (2012)	
	Southern Annular Mode (SAM) Index 1000-Year Reconstruction – Abram et al. (2014).	Input dataset	abram2014sam.txt			ftp://ftp.ncdc.noaa.gov/pub/data/paleo/contributions_by_author/abram2014/abram2014sam.txt (accessed 27/1/2022) www.ncdc.noaa.gov/paleo-search/ (accessed 27/1/2022)	Abram et al. (2014)	
	Observation-based Southern Hemisphere Annular Mode Index (SAM Marshall).	Input dataset	newsam.1957.2007.txt			https://legacy.bas.ac.uk/met/gjma/sam.html (accessed 27/1/2022)	Marshall (2003)	
	Southern Annular Mode (SAM) 20th-Century Reanalysis, v2c (20CRv2c).	Input dataset	sam.20crv2c.long.data			https://psl.noaa.gov/data/20thC_Rean/timeseries/monthly/SAM/sam.20crv2c.long.data (accessed 27/1/2022)	Gong and Wang (1999)	
	Seasonal Southern Hemisphere Annular Mode (SAM) Reconstructions – SAM Fogt.	Input dataset	recons_mean7100.txt			http://polarmet.osu.edu/ACD/sam/sam_recon.html (accessed 27/1/2022)	Fogt et al. (2009); Jones et al. (2009)	
	Antarctic Oscillation (AAO/NCEP) – SAM NCEP.	Input dataset	monthly.aao.index.b79.current.ascii			www.cpc.ncep.noaa.gov/products/precip/CWlink/daily_ao_index/aao/aao.shtml (accessed 27/1/2022)	Mo (2000)	

Figure/Table Number	Dataset/Code Name	Type	File Name/ Specificities	License Type	Dataset/Code Citation	Dataset/Code URL	Related Publication/ Software Used	Notes
Figure 2.36	Stahle et al. (1998), Southern Oscillation, index reconstruction.	Input dataset				www.ncdc.noaa.gov/paleo-search/study/6238 (accessed 27/1/2022)	Stahle et al. (1998)	Individual studies represented with grey lines, while the overlying thick blue line is the mean reconstruction and the dashed black lines are the *very likely* range for the period where there are sufficient data to estimate it.
	Nino 3 index reconstruction.	Input dataset				www.ncdc.noaa.gov/paleo-search/study/6250 (accessed 27/1/2022)	Cook (2000)	
	Mann et al. (2000), El Niño reconstructions.	Input dataset				www.meteo.psu.edu/holocene/public_html/shared/research/old/mbh99b.html (accessed 27/1/2022)	Mann et al. (2000)	
	Evans et al. (2001), proxy-based Pacific SST reconstructions.	Input dataset				ftp://ftp.ncdc.noaa.gov/pub/data/paleo/coral/east_pacific/sst_evans2002/ (accessed 27/1/2022)	Evans et al. (2001)	
	Evans et al. (2002), proxy-based Pacific SST reconstructions.	Input dataset				www.ncdc.noaa.gov/paleo-search/study/6348 (accessed 27/1/2022)	Evans et al. (2002)	
	Cook et al. (2008), 700-year tree ring ENSO index reconstructions.	Input dataset				www.ncdc.noaa.gov/paleo-search/study/8704 (accessed 27/1/2022) https://agupubs.onlinelibrary.wiley.com/doi/abs/10.1029/2008EO240007 (accessed 22/4/2022)	Cook et al. (2008)	
	Braganza et al. (2009), multi-proxy ENSO reconstructions.	Input dataset				www.ncdc.noaa.gov/paleo-search/study/8409 (accessed 27/1/2022)	Braganza et al. (2009)	
	McGregor et al. (2010), 350-year unified ENSO proxy reconstructions.	Input dataset				www.ncdc.noaa.gov/paleo-search/study/8732 (accessed 27/1/2022)	McGregor et al. (2010)	
	Niño 3.4 SST 460-year reconstructions.	Input dataset				www.ncdc.noaa.gov/paleo-search/study/11749 (accessed 27/1/2022)	Wilson et al. (2010)	
	1100-year ENSO index reconstruction.	Input dataset				www.ncdc.noaa.gov/paleo-search/study/11194 (accessed 27/1/2022)	Li et al. (2011)	
	700-year ENSO Niño 3.4 index reconstruction.	Input dataset				www.ncdc.noaa.gov/paleo-search/study/14632 (accessed 27/1/2022)	Li et al. (2013)	
	Central Equatorial Pacific Niño 3.4 850-year SST reconstruction.	Input dataset				www.ncdc.noaa.gov/paleo-search/study/13684 (accessed 27/1/2022)	Emile-Geay et al. (2013)	
	PAGES Ocean 2K 400-year coral data and tropical SST record.	Input dataset				www.ncdc.noaa.gov/paleo-search/study/17955 (accessed 27/1/2022)	Tierney et al. (2015)	
	Southern Oscillation Index (SOI).	Input dataset		CC BY 3.0		http://www.bom.gov.au/climate/enso/soi/	Troup (1965)	

Figure/Table Number	Dataset/Code Name	Type	File Name/ Specificities	License Type	Dataset/Code Citation	Dataset/Code URL	Related Publication/ Software Used	Notes
Figure 2.36 *(continued)*	Niño 3.4 (from Extended Reconstructed Sea Surface Temperature (ERSST) v5).	Input dataset				www.cpc.ncep.noaa.gov/data/indices/ (accessed 27/1/2022)	Huang et al. (2017)	
Figure 2.37	Centennial-scale sea surface temperature analysis and its uncertainty, version 2 (COBE).	Input dataset	ftp://ftp.cdc.noaa.gov/Datasets/COBE2/sst.mon.mean.nc			https://psl.noaa.gov/data/gridded/data.cobe2.html (accessed 27/1/2022)	Hirahara et al. (2014)	
	NOAA Extended Reconstructed Sea Surface Temperature version 5 (ERSST).	Input dataset	https://www.ncei.noaa.gov/pub/data/cmb/ersst/v5/netcdf/			https://psl.noaa.gov/data/gridded/data.noaa.ersst.v5.html (accessed 27/1/2022)	Huang et al. (2017)	
	Hadley Centre Sea Ice and Sea Surface Temperature dataset (HadISST).	Input dataset	www.metoffice.gov.uk/hadobs/hadisst/data/HadISST_sst.nc.gz	www.nationalarchives.gov.uk/doc/non-commercial-government-licence/version/2/		www.metoffice.gov.uk/hadobs/hadisst/ (accessed 27/1/2022)	Rayner et al. (2003)	
	Kaplan Extended SST, version 2 (KAPLAN).	Input dataset	ftp://ftp.cdc.noaa.gov/Datasets/kaplan_sst/sst.mon.anom.nc			www.psl.noaa.gov/data/gridded/data.kaplan_sst.html (accessed 27/1/2022)	Kaplan et al. (1998)	
	NOAA Optimum Interpolation (OI) Sea Surface Temperature, version 2 (OISST).	Input dataset	ftp://ftp.cdc.noaa.gov/Datasets/noaa.oisst.v2/sst.mnmean.nc			www.psl.noaa.gov/data/gridded/data.noaa.oisst.v2.html (accessed 27/1/2022)	Reynolds et al. (2002)	
Figure 2.38	Centennial-scale sea surface temperature analysis and its uncertainty, version 2 (COBE).	Input dataset	ftp://ftp.cdc.noaa.gov/Datasets/COBE2/sst.mon.mean.nc			https://psl.noaa.gov/data/gridded/data.cobe2.html (accessed 27/1/2022)	Hirahara et al. (2014)	Both indices are based on annual data, with the long-term mean and linear trend removed using the least-squares method and then low-pass filtered using a 10-year running mean.
	NOAA Extended Reconstructed Sea Surface Temperature, version 5 (ERSST).	Input dataset	ftp://ftp.cdc.noaa.gov/Datasets/noaa.ersst.v5/sst.mnmean.nc			https://psl.noaa.gov/data/gridded/data.noaa.ersst.v5.html (accessed 27/1/2022)	Huang et al. (2017)	
	Hadley Centre Sea Ice and Sea Surface Temperature dataset (HadISST).	Input dataset	www.metoffice.gov.uk/hadobs/hadisst/data/HadISST_sst.nc.gz			www.metoffice.gov.uk/hadobs/hadisst/ (accessed 27/1/2022)	Rayner et al. (2003)	
	Kaplan Extended SST, version 2 (KAPLAN).	Input dataset	ftp://ftp.cdc.noaa.gov/Datasets/kaplan_sst/sst.mon.anom.nc			www.psl.noaa.gov/data/gridded/data.kaplan_sst.html (accessed 27/1/2022)	Kaplan et al. (1998)	

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