Annex I: Observational Products

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AI.1 Introduction

The purpose of this Annex is to document observational data sets used by Working Group I in the Sixth Assessment Report. This includes details of the types and versions of data sets, the time period they cover, the chapters in which they appear, and citations and (where available) web links to the data.

This list includes those observational data sets that contribute to values reported in the text or in figures, unless they are citing a specific result from a paper (as opposed to an ongoing data set for which that paper is a reference).

Reanalyses are within the scope of this Annex, but historical climate model simulations are not. Proxy data sets are also outside the scope of this Annex.

Data sets which are updated regularly on an operational basis are shown as ending in 2020, even if no 2020 data have yet been published at the time of writing.

Data sets are sorted alphabetically according to the data set name or, if there is no formal name, the name of the responsible institution or lead author.

[START Table AI.1]

Table AI.1: Observational products used by Working Group I in the Sixth Assessment Report.

Name	Ver-sion	Type	Resolution (time and space)	Sect-ion(s)	Time period	Citation, link and DOI (where available)
NOAA-CIRES 20th Century Reanalysis (20CR)	2c	Reanalysis	3-hourly, 2 x 2°, 24 vertical levels	2.4.1	1851-2014	Compo et al., 2011 https://www.esrl.noaa.gov/psd/data/20thC_Rean/
NOAA-CIRES 20th Century Reanalysis (20CR)	3	Reanalysis	3-hourly, 0.5° x 0.5°	2.3.1 3.3.3 3.7.1	1851-2020	Slivinski et al., 2019 https://www.esrl.noaa.gov/psd/data/20thC_Rean/
Finland Climate (Aalto)		In situ	Daily 0.1° × 0.1°	10.2.1	1961-2010	Aalto et al., 2016 https://www.csc.fi/-/paituli
ACORN-SAT Australian temperature data	2.1	In situ	Daily, point-based	Atlas 6.2	1910-2020	Trewin et al., 2020 http://www.bom.gov.au/climate/data/acorn-sat/
AERONET AOD Level 2.0	3	Remote sensing	Monthly, point-based	2.2.6	1995-2020	Giles et al., 2019 https://aeronet.gsfc.nasa.gov/data_push/AOT_Level2_Monthly.tar.gz
Advanced Global Atmospheric Gases Experiment (AGAGE)		In situ	Up to 36 times per day, point-based	2.2.3 2.2.4 5.2.2 5.2.3	1978-2020	Prinn et al., 2018 http://agage.mit.edu/data
Australian Gridded Climate Data (AGCD)		In situ	Daily 0.05° × 0.05°	Atlas 6.2	1900-2020	Jones et al., 2009; Evans et al., 2020 http://www.bom.gov.au/climate/maps/rainfall
AIRS specific humidity	RetStd-v5	Remote sensing	Monthly,1° x1°	3.3.2	2003-2010	Susskind et al., 2006; Tian et al., 2013 https://esgf-node.llnl.gov/search/obs4mips/
AIRS-6 climate data products		Remote sensing	Various	2.3.1	2002-2020	Susskind et al., 2014 http://disc.sci.gsfc.nasa.gov/AIRS/data-holdings
Energy balance reconstruction (Allan)		Remote sensing	Monthly, 10 x 10°	7.2.2	1985-2012	Allan et al., 2014 http://met.reading.ac.uk/~sgs02rpa/research/DEEP-C/GRL/
AMOC data set		In situ and reanalysis	Monthly, regional time series	3.5.4	2004-2017	Smeed et al., 2018
Advanced Microwave Scanning Radiometer 2 (AMSR2)		Remote sensing	3-hourly	8.3.1	2012-2019	Kummerow, 2015 https://lance.nsstc.nasa.gov/amsr2-science/data/level2/rainocean/
Aqua's Advanced Microwave Scanning Radiometer for Earth Observing System (AMSR-E)		Remote sensing	5.4 to 56 km	8.3.1	2002-2011	Kawanishi et al., 2003
Arctic sea ice thickness from submarine transects		In situ	Intermittent, track-based	2.3.2	1975-2000	Rothrock et al., 2008
Asian Precipitation - Highly-Resolved Observ-ational Data Integration		In situ	Daily, 0.05° x 0.05°	8.3.2 10.2.1 10.6.3	1900-2020	Kamiguchi et al., 2010; Yatagai et al., 2012

Towards Evaluation (APHRO-DITE's) Precipitation						
Asian Precipitation -Highly-Resolved Observational Data Integration Towards Evaluation Monsoon Asia (APHRO-MA)	V1808	In situ	Daily, 0.5°	CCB 10.4	1961-2014	Yasutomi et al., 2011 http://aphrodite.st.hirosaki-u.ac.jp/products.html
Asian Precipitation -Highly-Resolved Observational Data Integration Towards Evaluation Monsoon Asia (APHRO-MA)	V1101	In situ	Daily, 0.5°	10.6.3	1956-2005	Yatagai et al., 2012 http://aphrodite.st.hirosaki-u.ac.jp/products.html
Advanced SCATtero-meter (ASCAT)		Remote sensing	Daily, 25 km	8.3.1	2006-2016	Wagner et al., 1999
Cross-calibrated multi-platform wind data set (Atlas)		Remote sensing and in situ	6-hourly, 25 km	2.3.1	1987-2020	Atlas et al., 2011 http://www.remss.com/measurements/ccmp/
Australian vineyard data		In situ	Annual, point-based	2.3.4	Varies by site	Webb et al., 2011
AVISO sea level observations		Remote sensing	Monthly, 0.25°	9.2.4	1995-2020	Legeais et al., 2018 https://www.aviso.altimetry.fr/en/data/products/ocean-indicators-products/mean-sea-level.html
Beaune grape harvest dates		In situ	Annual, point-based	2.3.4	1354-2018	Labbe et al., 2019 https://www.euroclimhist.unibe.ch/en/
Berkeley Earth surface air temperature		In situ	Monthly, 1 x 1° (or equivalent equal-area grid)	1.3.6 1.4.1 1.4.2 1.6.1 FAQ 1.2 2.3.1 CCB 2.3 3.3.1 3.7.3 10.3.3 10.6.4 Box 10.3 CCB10.4 Atlas	1750-2020	Rohde and Hausfather, 2020 http://www.berkeleyearth.org
Berlin City Measure-ment Network		In situ	1-minute	Box 10.3	On-going	www.geo.fu-berlin.de/en/met/service/stadtmessnetz/index.html
Bermuda Atlantic Time-series Study Data		In situ	Point-based	2.3.3	1988-2016	Bates et al., 2014; Bates and Johnson, 2020 http://bats.bios.edu/bats-data/

Czech Republic precipitation (Bližňák)		In situ	10 min 0.01° × 0.01°	10.2.1	2002-2011	Bližňák et al., 2018
Boulder stratospheric water vapour		In situ	Point-based, profiles approx.. monthly	2.2.5	1980-2010	Hurst et al., 2011
BUCL (Birming-ham)		In situ	Hourly	Box 10.3	2013-2020	Chapman et al., 2015
Global temperature data (Callendar)		In situ	Annual, global time series	1.3.3	1880-1935	Callendar, 1938; Hawkins and Jones, 2013
Cyprus precipitation (Camera)		In situ	Daily 0.01° × 0.01°	10.2.1	1980-2010	Camera et al., 2014
CAMS atmospheric composition reanalysis		Reanalysis	3-hourly, 1 x 1°	7.3.3	2003-2018	Inness et al., 2019 http://atmosphere.copernicus.eu
Data of CARIACO ocean time-series program in the Cariaco Basin		In situ	Point-based	5.3.2	1996-2017	Bates et al., 2014 http://imars.marine.usf.edu/cariaco
CCU 'IKI-Monitoring' satellite data archive		Remote sensing	Daily, resolution varies	Atlas	1984-2020	Loupian et al., 2015
Community Emissions Data System (CEDS)		In situ	Monthly, 50 km (nominal)	6.2.1	1750-2014	Hoesly et al., 2018 http://www.globalchange.umd.edu/ceds/
CERA-20C reanalysis		Reanalysis	3-hourly, 125 km, 91 levels	10.3.3	1901-2010	Laloyaux et al., 2018 https://www.ecmwf.int/en/forecasts/datasets/reanalysis-datasets/cera-20c
CERES EBAF	Ed2.8	Remote sensing	Monthly,1° x1°	3.8.2	2000-2018	Loeb et al., 2009, 2012 https://esgf-node.llnl.gov/search/obs4mips/
CERES EBAF	Ed4.0	Remote sensing	Monthly,1° x1°	7.2.2 9.2.1	2000-2016	Loeb et al., 2017, 2020 http://ceres-tool.larc.nasa.gov/ord-tool/jsp/EBAF4Selection.jsp
NCEP Climate Forecast System Reanalysis (CFSR)		Reanalysis	Hourly, T382 (approx. 38 km)	2.3.1 8.3.2	1979-2010	Saha et al., 2010 https://cfs.ncep.noaa.gov/cfsr/
High-Resolution Gridded Daily Meteorologi-cal Dataset over Sub-Saharan Africa (Chaney)		Reanalysis	Daily 0.1°×0.1°	10.2.1	1979-2005	Chaney et al., 2014
Cheng ocean heat content		In situ	Monthly, ocean basin	2.3.3	1960-2020	Cheng et al., 2017
Global mean sea level reconstructio n (Church and White)		In situ, remote sensing	Monthly, global time series	2.3.3	1880-2009	Church and White, 2011
Climate Hazards Group InfraRed	2.0	Remote sensing	Daily, Monthly 0.25°x 0.25°	10.2.1	1981-2018	Funk et al., 2015 https://www.chc.ucsb.edu/data/chirps

Precipitation with Station data (CHIRPS)						
CLIMATER		In situ	Daily, point-based	Atlas 5.2	1874-2020	Bulygina et al., 2014
China Land Surface Air Temperature (CLSAT)		In situ	Monthly, point-based	2.3.1	1900-2020	Xu et al., 2018
CPC Merged Analysis of Precipitation (CMAP)		Remote sensing	Monthly, 2.5°x2.5°	3.3.3 Atlas	1979-2020	Xie et al., 2007a https://www.esrl.noaa.gov/psd/data/gridded/data.cmap.html
Copernicus Marine Environment Monitoring Service (CMEMS) ocean pH		In situ	Annual, global mean	2.3.3	1985-2020	Gehlen et al., 2020 https://marine.copernicus.eu/access-data/ocean-monitoring-indicators
CMEMS global mean sea level		Remote sensing	10-day, global time series	2.3.3	1993-2020	Ablain et al., 2019
China Mean Surface Temperature (CMST)		In situ	Monthly, 5° x 5°	2.3.1	1854-2020	Sun et al., 2021
A gridded daily dataset over China CN05.1	5.1	In situ	Daily 0.25° × 0.25°	10.2.1	1961-2005	Wu and Gao, 2013
COBE Sea Surface Temperature	2	In situ	Daily, 1 x 1°	2.4.3 2.4.5 3.7.6 3.7.7	1845-2020	Hirahara et al., 2014 https://ds.data.jma.go.jp/tcc/tcc/products/elnino/cobesst/cobe-sst.html
Bootstrap Sea Ice Concent-rations from Nimbus-7 SMMR and DMSP SSM/I-SSMIS (Comiso)	3	Remote sensing	Monthly, 25 km	2.3.2 3.4.1	1979-2020	Comiso, 2017 https://nsidc.org/data/nsidc-0079
CORA Ocean Heat Content	5.2	In situ	Monthly, global time series	2.3.3	1950-2020	Cabanes et al., 2013 http://www.coriolis.eu.org/Science2/Global-Ocean/CORA
Co-WIN (Hong Kong)		In situ	15 minutes	Box 10.3	2007-2020	Hung and Wo, 2012
Cowtan and Way global temperature	2.0	In situ	Monthly, 5 x 5°	1.3.6 2.3.1 3.3.1	1850-2020	Cowtan and Way, 2014 http://www-users.york.ac.uk/~kdc3/papers/coverage2013/series.html
Climate Prediction Center (CPC) Niño indices		In situ	Monthly, regional time series	2.4.2 2.4.3	1950-2020	https://www.cpc.ncep.noaa.gov/data/indices/ Derived from ERSSTv5
Climate Prediction Centre (CPC) Precipitation		In situ	Hourly 2.0° x 2.5°, daily 0.25° x 0.25°	10.2.1	1948-2006	Higgins et al., 2000; Xie et al., 2007; Chen et al., 2008
CPC teleconnec-tion indices (AAO, AO, NAO, PNA)		In situ	Daily, regional means	2.4.1	1950-2020 (1979-2019 for AAO)	https://www.cpc.ncep.noaa.gov/products/precip/CWlink/daily_ao_index/teleconnections.shtml
CPC Unified Gauge-Based Analysis of Global Daily Precipitation		In situ and remote sensing	Daily, 0.5° x 0.5°	8.3.1	1979-2019	Xie et al., 2010 https://psl.noaa.gov/data/gridded/data.cpc.globalprecip.html

CloudSat Cloud Profiling Radar (CPR)		Remote sensing	1.5 km horizontal, 0.5 km vertical	8.3.1	2006-2019	Tanelli et al., 2008
CRU TS	4.02	In situ	Monthly, 0.5 x 0.5°	3.3.2 3.3.3 3.7.3 5.2.1	1901-2017	Harris et al., 2014 https://crudata.uea.ac.uk/cru/data/hrg/cru_ts_4.02/
CRU TS	4.03	In situ	Monthly, 0.5 x 0.5°	10.6.2	1901-2017	Harris et al., 2014 https://crudata.uea.ac.uk/cru/data/hrg/cru_ts_4.03/
CRU TS	4.04	In situ	Monthly, 0.5 x 0.5°	2.3.1 8.3.2 Box 8.1 10.3.3 10.3.4 10.4.2 10.6.3 10.6.4 Box 10.3 CCB10.4 Atlas	1901-2020	Harris et al., 2020 https://crudata.uea.ac.uk/cru/data/hrg/cru_ts_4.04/
CRUTEM	4	In situ	Monthly, 5 x 5°	10.6.4 Atlas	1850-2020	Jones et al., 2012 https://crudata.uea.ac.uk/cru/data/temperature/
CRUTEM	5	In situ	Monthly, 5 x 5°	Atlas	1850-2020	Osborn et al., 2021 https://crudata.uea.ac.uk/cru/data/temperature/
Cryosat Arctic sea ice thickness data		Remote sensing	Monthly, 25 x 25 km	2.3.2 9.4.1	2011-2020	Kwok and Cunningham, 2015; Bamber et al., 2018 http://nsidc.org/cryosphere/sotc/sea_ice.html https://science-pds.cryosat.esa.int/
CSIR-ML6 air-sea CO2 fluxes	2019	In situ	Monthly, 1° x 1°	5.2.1	1982-2015	Gregor, 2019 https://doi.org/10.6084/m9.figshare.7894976
CSIRO atmospheric gas measure-ments		In situ	Monthly, point-based	2.2.3 5.2.3	1976-2019	Langenfelds et al., 2002; Francey et al., 2003; Kirschke et al., 2013
CSIRO global mean sea level		Remote sensing	Monthly, 1° x 1°	2.3.3	1993-2020	Church and White, 2011
CSIRO ocean heat content		In situ	Annual, global	2.3.3	1950-2020	Domingues et al., 2008; Wijffels et al., 2016
Mexican climate (Cuervo-Robayo)		In situ	Monthly 30 arc sec	10.2.1	1910-2009	Cuervo-Robayo et al., 2014
3D-VAR regional reanalysis (Dahlgren)		Reanalysis	6-hourly, 0.2° x 0.2°	10.2.1	1989-2010	Dahlgren et al., 2016
Global sea level reconstructio n (Dangendorf)		In situ, remote sensing	Monthly, regional means	1.2.1 2.3.3	1900-2015	Dangendorf et al., 2017, 2019
DCNet (Washing-ton)		In situ	Hourly	Box 10.3	On-going	Hicks et al., 2012
Ethiopian precipitation (Dinku)		In situ	Sub-monthly 0.1° × 0.1°	10.2.1	1983-2013	Dinku et al., 2014
Data of DYFAMED station in the Ligurian Sea		In situ	Point-based	5.3.2	1991-2016	Merlivat et al., 2018 http://dyfbase.obs-vlfr.fr/
Eastern China spring phenology index		In situ	Annual, point-based	2.3.4	1834-2009	Ge et al., 2014
European Climate Assessment		In situ	Daily, point-based	10.6.4	1775-2020	Klein Tank et al., 2002 https://www.ecad.eu/

& Dataset (ECA&D)						
EDGARv4.3.2	2019	In situ	Monthly, 0.1° x 0.1°	6.7.1	1970-2012	Janssens-Maenhout et al., 2019 http://edgar.jrc.ec.europa.eu/overview.php?v=432_GHG&SECURE=123
EN4 ocean subsurface profiles		In situ	Monthly, point-based	2.3.3	1900-2020	Good et al., 2013 https://www.metoffice.gov.uk/hadobs/
E-OBS	V19.0	In situ	Daily, 0.1° and 0.25°	10.3.3 10.6.4 Atlas 8.2	1950-2020	Cornes et al., 2018 https://www.ecad.eu/
ERA 20th Century (ERA-20C) reanalysis		Reanalysis	3-hourly, ~125 km, 128 vertical levels	2.3.1 3.3.3 3.7.1	1900-2010	Hersbach et al., 2015; Poli et al., 2016 https://www.ecmwf.int/en/forecasts/datasets/reanalysis-datasets/era-20c
ERA-5		Reanalysis	Hourly, 30 km, 137 vertical levels	1.4.1 2.3.1 3.3.1 3.3.2 3.3.3 3.7.1 3.8.2 CCB 3.1 8.3.2 11.4.3 Box 11.4 Atlas	1979-2020	Hersbach et al., 2020 https://www.ecmwf.int/en/forecasts/datasets/reanalysis-datasets/era5
ECMWF ERA-Interim reanalysis		Reanalysis	6-hourly, T255 spectral (approx. 80 km), 60 vertical levels	2.3.1 3.3.3 3.7.1 8.3.2 10.3.3	1979-2019	Dee et al., 2011 https://www.ecmwf.int/en/forecasts/datasets/reanalysis-datasets/era-interim
ECMWF ERA-Interim reanalysis - Land		Reanalysis	6-hourly, T255 spectral (approx. 80 km), 60 vertical levels	10.2.1	1979-2010	Balsamo et al., 2015
NOAA ERSST sea surface temperature	5	In situ	Monthly, 2° x 2°	2.4.2 2.4.3 2.4.5 3.7.3 3.7.6 3.7.7 9.2.1 CCB 9.2 Atlas	1880-2020	Huang et al., 2017 https://www.ncdc.noaa.gov/data-access/marineocean-data/extended-reconstructed-sea-surface-temperature-ersst-v5
ESA CCI sea surface temperature	L4-GHRSST-SSTdepth-OSTIA-GLOB	Remote sensing	Monthly, 0.05°x0.05°	3.8.2	1992-2010	Merchant et al., 2014a, 2014b ftp://anon-ftp.ceda.ac.uk/neodc/esacci/sst/data/
ESA CCI Soil Moisture	L3S-SSMV-COMBINED-v4.2	Remote sensing	Monthly, 0.25°x0.25° ;daily, global images	3.8.2 8.3.1	1979-2016	Dorigo et al., 2017; Gruber et al., 2017; Liu et al., 2012 ftp://anon-ftp.ceda.ac.uk/neodc/esacci/soil_moisture/data/
European Station for Time series in the Ocean Canary Islands (ESTOC)		In situ	Point-based	5.3.2	1995-2018	González-Dávila et al., 2010 http://data.plocan.eu/thredds/catalog/aggregate/public/ESTOCInSitu/EMSOservices/Biogeochemistry/catalog.html
Alpine precipitation grid dataset (EURO4M-APGD)	1.0	In situ	Daily 0.04°× 0.04°	10.2.2	1971-2008	Isotta et al., 2014

FLO1K flow metrics data set		In situ	Annual, 1 km	2.3.1	1960-2015	Barbarossa et al., 2018
Fogt SAM recon-struction		In situ	Monthly, index	2.4.1	1865-2005	Fogt et al., 2009 http://polarmet.osu.edu/ACD/sam/sam_recon.html
Global mean sea level reconstruction (Frederikse)	2018	In situ	Annual, global time series	2.3.3	1958-2014	Frederikse et al., 2018
Global mean sea level reconstruction (Frederikse)	2020	In situ	Annual, global time series	2.3.3	1900-2018	Frederikse et al., 2020
GHCN precipitation	2	In situ	Monthly, 5°x5°	3.3.2 3.8.1 3.8.2	1900-2014	Jones and Moberg, 2003 https://www.esrl.noaa.gov/psd/data/gridded/data.ghcngridded.html
Global Historical Climatology Network (GHCN) - Monthly	4	In situ	Monthly, point-based	2.3.1 3.8.2 10.3.3	1880-2020	Menne et al., 2018 https://www.ncdc.noaa.gov/ghcnm/
GHCNDEX		In situ	Monthly, 2.5 x 2.5°	2.3.1	1951-2020	Donat et al., 2013b http://www.climdex.org
Global albedo change (Ghimire)		In situ	Monthly, 1 x 1°	2.2.7	1700-2005	Ghimire et al., 2014
GISTEMP	4	In situ	Monthly, 2°x2°	1.3.6 2.3.1 3.7.3 CCB 3.1 10.6.4 Box 10.3	1880-2020	Lenssen et al., 2019 https://data.giss.nasa.gov/gistemp/
Glacier Thickness Database (GlaThiDa)	3.0.1	In situ	Annual, point-based	9.5.1	1935-2018	GlaThiDa Consortium, 2019 https://www.gtn-g.ch/data_catalogue_glathida/ DOI: 10.5904/wgms-glathida-2019-03
GLDAS		Reanalysis	Monthly, 1°x1°	3.4.2 8.3.1	1951-2010	Rodell et al., 2004 https://hydro1.gesdisc.eosdis.nasa.gov/data/GLDAS/GLDAS_NOAH10_M.2.0/
Global Carbon Project		In situ	Global, spatial average	5.2.1 5.2.2	1959-2020	Friedlingstein et al., 2020; Saunois et al., 2020 https://www.globalcarbonproject.org/
Global Ocean Data Analysis Project (GLODAP)	2	In situ	Point-based	5.2.1	1972-2020	Olsen et al., 2019 https://www.glodap.info/
Global Space-based Strato-spheric Aerosol Climatology (GloSSAC)	1.0	Remote sensing	Monthly, 5° zonal means	2.2.2 7.3.2	1979-2016	Thomason et al., 2018 https://eosweb.larc.nasa.gov
Ghana Meteorologi-cal Agency (GMet) precipitation	1.0	In situ	Monthly 0.5°×0.5°	10.2.1	1990-2012	Aryee et al., 2018
GOME global total ozone (GTO) data set		Remote sensing	Monthly, 1 x 1°	2.2.5	1996-2020	Coldewey-Egbers et al., 2015 http://www.esa-ozone-cci.org/?q=node/163
GOME GSG ozone data set		Remote sensing	Monthly, 5° zonal means	2.2.5	1995-2020	Weber et al., 2018a http://www.iup.uni-bremen.de/gome/wfdoas/merged/
GOSAT	2019	Remote sensing	Hourly-monthly	5.2.1	2009-2017	Yoshida et al., 2013 www.gosat.nies.go.jp/en/recent-global-ch4.html

Global Precipitation Climatology Centre (GPCC)	8	In situ	Monthly, 0.25 x 0.25°	1.2.1 2.3.1 3.3.3 3.7.3 8.3.1 8.3.2 Box 8.1 10.3.3 10.4.2 10.6.3 10.6.4 11.6.2 Atlas	1981-2020	Becker et al., 2013; Schneider et al., 2017 ftp://ftp.dwd.de/pub/data/gpcc/html/fulldata-monthly_v2018_doi_download.html
Global Precipitation Climatology Project (GPCP)	2.3	Remote sensing and in situ	Monthly, 2.5 x 2.5°	2.3.1 3.3.2 3.3.3 3.7.3 3.8.2 8.2.3 8.3.1 9.2.1 10.4.2 Atlas	1979-2020	Adler et al., 2018 https://www.esrl.noaa.gov/psd/data/gridded/data.gpcp.html
Gravity Recovery and Climate Experiment (GRACE)		Remote sensing	3 days, 400 m	2.3.2 8.3.1	2002-2017	Tapley et al., 2004; Wouters et al., 2019 https://gracefo.jpl.nasa.gov/data/grace-fo-data/
Historical greenhouse gas concen-trations for climate modelling		In situ	Monthly, 15° zonal means	2.2.3	1850-2014	Meinshausen et al., 2017 http://www.climatecollege.unimelb.edu.au/cmip6
GRID-Sat		Remote sensing	15-minute, 4 km	8.3.1	1994-2016	Inamdar and Knapp, 2015
The oceanic sink for anthropogen ic CO2 from 1994 to 2007 – the data (Gruber)		In situ	1°x1°	5.2.1		Gruber et al., 2019 https://www.nodc.noaa.gov/archive/arc0132/0186034/1.1/data/0-data/
Global Streamflow Indices and Metadata Archive (GSIM)		In situ	Daily, point-based	2.3.1	1806-2016	Do et al., 2018
GSMaP		Remote sensing	Hourly 0.1°	10.3.3	2007-2020	Kubota et al., 2020
GEWEX Water Vapour Assessment (G-VAP)		Reanalysis, remote sensing	Monthly, 2 x 2°	2.3.1	1988-2009	Schröder et al., 201) http://gewex-vap.org/
HadAT	2	In situ	Monthly, 5° latitude by 10° longitude	Atlas	1958-2012	Thorne et al., 2005 https://www.metoffice.gov.uk/hadobs/hadat/
HadCRUT	5	In situ	Monthly, 5 x 5°	1.2.1 1.3.6 1.4.1 1.6.1 2.3.1 CCB 2.3 3.3.1 3.6.1 3.8.1 CCB 3.1 Box 10.3	1850-2020	Morice et al., 2020 https://www.metoffice.gov.uk/hadobs/
HadCRUT	4	In situ	Monthly, 5 x 5°	3.3.1 FAQ 3.1 8.2.3 10.3.3	1850-2020	Morice et al., 2012 https://www.metoffice.gov.uk/hadobs/hadcrut4/

				10.6.4		
HadEX	2	In situ	Monthly, 3.75 x 2.5°	2.3.1	1901-2010	Donat et al., 2013a http://www.climdex.org
HadEX	3	In situ	Monthly, 1.875 x 1.25°	CCB 3.2 11.1.4 11.3.2 11.4.3 11.6.2	1901-2020	Dunn et al., 2020 https://www.metoffice.gov.uk/hadobs/hadex3/
HadGHCND		In situ	Daily, 3.75 x 2.5°	Atlas	1950-2014	Caesar et al., 2006 https://www.metoffice.gov.uk/hadobs/hadghcnd/
HadISD	2.0.2. 2017f	In situ	Sub-daily, point-based	2.3.1	1973-2020	Dunn et al., 2012, 2016 https://www.metoffice.gov.uk/hadobs/hadisd/
HadISDH	1.0.0. 2019f	In situ	Monthly, 5 x 5°	2.3.1	1973-2020	Willett et al., 2014, 2020 https://www.metoffice.gov.uk/hadobs/hadisdh/
Hadley Centre Sea Ice and Sea Surface Temperature data set (HadISST)	1	In situ and remote sensing	Monthly, 1 x 1°	2.4.3 2.4.5 3.5.1 3.7.3 3.7.6 3.7.7 3.8.1 7.4.4 9.2.1	1871-2020	Rayner et al., 2003 https://www.metoffice.gov.uk/hadobs/hadisst/
Hadley Centre HadNMAT2 night marine air temperature	2	In situ	Monthly, 5° x 5°	CCB 2.3	1880-2010	Kent et al., 2013 https://www.metoffice.gov.uk/hadobs/hadnmat2/
Hadley Centre Sea Level Pressure (HadSLP)	2r	In situ and reanalysis	Monthly, 5 x 5°	3.3.3	1850-2020	Allan and Ansell, 2006 https://www.metoffice.gov.uk/hadobs/hadslp2/
Hadley Centre HadSST sea surface temperature	4	In situ	Monthly, 5° x 5°	9.2.1 Atlas	1850-2020	Kennedy et al., 2019 https://www.metoffice.gov.uk/hadobs/
HadUK-Grid	1.0	In situ	Daily 0.009° × 0.009°	10.2.1	1862-2019	https://www.metoffice.gov.uk/climate/uk/data/haduk-grid/haduk-grid
Hawaii Ocean Time-series Data		In situ	Point-based	2.3.3	1988-2018	Dore et al., 2009 http://hahana.soest.hawaii.edu/hot/hot-dogs/interface.html
Global mean sea level reconstruction (Hay)		In situ	Annual, global mean	2.3.3	1901-2010	Hay et al., 2015
Hamburg Ocean Atmosphere Parameters and Fluxes from Satellite data record (HOAPS4)		Remote sensing	6-hourly, 0.5° x 0.5°	2.3.1	1987-2014	Andersson et al., 2010, 2017 https://wui.cmsaf.eu/safira/action/viewDoiDetails?acronym=HOAPS_V002 DOI: 10.5676/EUM_SAF_CM/HOAPS/V002
Boulder stratospheric water vapor (Hegglin)		In situ		2.2.5	1980-2010	Hegglin et al., 2014
Glacier and ice sheet data set (Hugonnet)		Remote sensing	Annual, point-based	2.3.2	2000-2019	Hugonnet et al., 2021
Central European high-resolution gridded daily data sets (HYRAS)	1.0	In situ	Daily 0.5°×0.5° 0.25°×0.25	10.2.1	1951-2006	Frick et.al., 2014

IAGOS airborne ozone data		In situ	Intermittent	2.2.5 6.3.2	1994-2020	Cohen et al., 2018; Cooper et al., 2020; Gaudel et al., 2020 http://www.iagos-data.fr/ DOI: 10.25326/20
ICESat sea ice thickness data		Remote sensing	Intermittent, 25 x 25 km	2.3.1	2003-2008	Kwok et al., 2009 http://nsidc.org/cryosphere/sotc/sea_ice.html
International Compre-hensive Ocean - Atmosphere Data Set (ICOADS)	3.0	In situ	Point-based, frequency varies; monthly, 1 x 1°	2.3.1	1662-2019	Freeman et al., 2017 https://icoads.noaa.gov/
IFREMER4	4	Remote sensing	Daily, 0.25° x 0.25°	9.2.1	1992-2017	de Boyer Montégut et al., 2004; Bentamy et al., 2017
Integrated Global Radiosonde Archive (IGRA)		In situ	Point-based	8.3.1	1900-2019	Durre et al., 2006 https://data.noaa.gov/dataset/dataset/integrated-global-radiosonde-archive-igra-version-2
IMBIE Greenland and Antarctic ice sheet mass		Remote sensing	Regional aggregate	2.3.2 9.4.1 9.4.2	1992-2017	IMBIE Consortium, 2018, 2019, 2020
Indian Monsoon Data Assimilation and Analysis (IMDAA)		Reanalysis	Sub-daily 0.11°× 0.11°	10.2.1	1979-2016	Mahmood et al., 2018
Indian Institute of Tropical Meteorology (IITM) all-India rainfall		In situ	Monthly, time series	10.6.3	1871-1993	Parthasarathy et al., 1994
IPRC subsurface temperature data		In situ	Monthly, 1° x 1°	2.3.3	2005-2020	http://apdrc.soest.hawaii.edu/projects/Argo/data/gridded/On_standard_levels/index-1.html
ISAS-15 temperature and salinity gridded fields		In situ	Monthly, 1° x 1°	2.3.3	2002-2015	Gaillard et al., 2016; Kolodziejczyk et al, 2017 https://www.seanoe.org/data/00412/52367/
Ishii et al ocean heat content		In situ	Annual, time series	2.3.3 9.2.2	1955-2020	Ishii et al., 2017
JAMSTEC Database for time-series stations K2 and S1		In situ	Point-based	5.3.2	1997-2018	Wakita et al., 2017 http://www.godac.jamstec.go.jp/catalog/data_catalog/metadataDisp/JAMSTEC_K2_S1?lang=en
Jena-MLS air-sea CO2 fluxes	2018	In situ	Daily, 4° x 5°	5.2.1	1982-2017	Rödenbeck et al., 2013, 2014 http://www.bgc-jena.mpg.de/CarboScope/?ID=oc
Global mean sea level reconstruction (Jevrejeva)		In situ	Annual, global time series	2.3.3	1807-2009	Jevrejeva et al., 2014
JMA-TRANS-COM		Reanalysis	Monthly, 1°x1°	3.6.1 3.8.2	1985-2008	Gurney et al., 2003
Japanese Ocean Flux Data Sets with Use of Remote Sensing Observations (J-OFURO3)	3	Remote sensing	Daily, 0.25° x 0.25°	8.3.1	1988-2013	Tomita, 2017

Belgium precipitation (Journée)		In situ	Daily 4km²	10.2.1	1981-2010	Journée et al., 2015
Japan Meteorological Agency JRA-55 reanalysis		Reanalysis	3-hourly, TL319 (~55 km), 60 vertical levels	2.3.1 3.3.3 3.7.1 3.8.2 8.3.2 10.3.3 CCB10.4	1958-2020	Kobayashi et al., 2015; Harada et al., 2016 https://jra.kishou.go.jp/JRA-55/index_en.html
JRA-25		Reanalysis	6-hourly T106 (~120km)	10.3.3	1979-2004	Onogi et al., 2007 https://jra.kishou.go.jp/JRA-25/index_en.html
Kadow global temperature data set		In situ	Monthly, 5 x 5°	1.4.1 1.6.1 2.3.1 CCB 2.3 3.3.1 CCB 3.1	1850-2020	Kadow et al., 2020
Kaplan Extended SST data set	2	In situ	Monthly, 5 x 5°	2.4.3 2.4.5 Atlas	1856-2019	Kaplan et al., 1998 https://www.esrl.noaa.gov/psd/data/gridded/data.kaplan_sst.html
Greenland ice sheet discharge (King)		Remote sensing	Annual, regional time series	9.4.1	1985-2018	King et al., 2020 https://datadryad.org/stash/dataset/doi:10.5061/dryad.qrfj6q5cb DOI: 10.5061/dryad.qrfj6q5cb
Kyoto cherry blossom data		In situ	Annual, point-based	2.3.4	801-2020	Aono and Saito, 2010 http://atmenv.envi.osakafu-u.ac.jp/aono/kyophenotemp4/
LAI3g		Remote sensing	Monthly, 0.5°x0.5°	3.6.1 3.8.2	1982-2011	Zhu et al., 2013
LandFlux-EVAL		In situ	Monthly	3.8.2 8.3.1	2000-2004	Mueller et al., 2013 http://www.iac.ethz.ch/groups/seneviratne/research/LandFlux-EVAL
Landsat Global Land Survey (GLS) database		Remote sensing	Daily, global images	8.3.1	1972-2019	Gutman et al., 2013
LAQN (London)		In situ	15 minutes	Box 10.3	1993-2019	www.londonair.org.uk
LDEO Global Ocean Surface Water Partial Pressure of CO2 Database		In situ	Point-based	5.3.2	1957-2018	Takahashi et al., 2014 https://www.nodc.noaa.gov/ocads/oceans/LDEO_Underway_Database/NDP-088_V2018.pdf
LEGOS sea level budget		Remote sensing	Monthly, global time series	2.3.3	1993-2020	Blazquez et al., 2018
Combined satellite and station data (Maidment)		Remote sensing and in situ	10-day 0.0375°× 0.0375°	10.2.1	1983-2012	Maidment et al., 2014
Marshall SAM index		In situ	Monthly, regional means	2.4.1	1957-2020	Marshall, 2003 http://www.nerc-bas.ac.uk/icd/gjma/sam.html
Princeton MEaSURES		Reanalysis, remote sensing and in situ	Monthly, 0.5° x 0.5°	8.3.1	1950-2019	Pan et al., 2012
Multivariate ENSO Index (MEI)		In situ	Monthly	5.2.3	1977-2017	Wolter and Timlin, 1998 https://www.esrl.noaa.gov/psd/enso/mei/
MERRA reanalysis	1	Reanalysis	3-hourly, 0.5° x 0.66°	8.3.2	1979-2016	Rienecker et al., 2011
MERRA-2 reanalysis	2	Reanalysis	Hourly, 0.5 x 0.66°, 72 vertical levels	2.3.1 3.3.3 8.3.2	1980-2020	Gelaro et al., 2017 https://gmao.gsfc.nasa.gov/reanalysis/MERRA-2/

MERRA-2 reanalysis - Land	2	Reanalysis	6-hourly, 0.5 x 0.66°, 72 vertical levels	8.3.1	1980-2020	Reichle, 2012 http://gmao.gsfc.nasa.gov/pubs/office_notes.
METROS (Tokyo)		In situ	15 minutes	Box 10.3	2000-2005	Takahashi et al., 2011
MIROC4-ACTM emission flux data	2018	Reanalysis	Monthly, 1 x 1°	5.2.2	1996-2016	Patra et al., 2016, 2018; Saeki and Patra, 2017 https://ebcrpa.jamstec.go.jp/~prabir/data/co2l2r84/s042_FaChOt_srcdf1/ https://ebcrpa.jamstec.go.jp/~prabir/data/ch4l2r53/gcp2019/ https://ebcrpa.jamstec.go.jp/~prabir/data/n2ol2r84/s037_edgman1/
MISR Component Global Aerosol Product	V4, Level 3	Remote sensing	Yearly, 0.5° x 0.5° grid	2.2.6	2000-2020	Garay et al., 2017 https://eosweb.larc.nasa.gov/project/misr/mil3yaen_table
MOCCA (Ghent)		In situ	15 minutes	Box 10.3	2016-2020	Vandemeulebroucke et al., 2019; Caluwaerts et al., 2020
NASA Merged Ozone Data (MOD)	8.6	Remote sensing	Monthly, 5° zonal means	2.2.6	1970-2020	Frith et al., 2017 https://acd-ext.gsfc.nasa.gov/Data_services/merged/index.html
MODIS Aerosol optical depth 550nm	MYD08_M3	Remote sensing	Monthly, 1°x1°	2.2.6	2003-2011	Platnick et al., 2003 https://ladsweb.modaps.eosdis.nasa.gov/search/order
MODIS NDVI/EVI vegetation greenness index	6	Remote sensing	16-day; 1km	5.2.1	2000-2018	Myneni et al., 2015 doi:10.5067/MODIS/MCD15A2H.006
Moderate resolution imaging spectro-radiometer (MODIS)	MCD12Q1	Remote sensing	Annual, 500 m	8.3.1	2001-2019	Loveland and Belward, 1997
MPI-SOMFFN air-sea CO2 fluxes	2016	In situ	Monthly, 1° x 1°	3.8.2 5.2.1	1982-2015	Landschützer et al., 2016 https://www.nodc.noaa.gov/ocads/oceans/SPCO2_1982_2015_ETH_SOM_FFN.html
Ozone multi-sensor reanalysis (MSR)	2	Reanalysis	6-hourly, 1 x 1°	2.2.5	1970-2019	Braesicke et al., 2018; Chipperfield et al., 2018; Weber et al., 2018b, 2020 https://www.temis.nl/protocols/O3global.php
Multi-Source Weighted-Ensemble Precipitation dataset (MSWEP)		Reanalysis, remote sensing and in situ	3-hourly, 0.25° x 0.25°	8.3.1	1979-2015	Beck et al., 2017 https://wald.anu.edu.au/data_services/data/mswep-multi-source-weighted-ensem%C2%ADble-pre%C2%ADcip%C2%ADi%C2%ADta%C2%ADtion/
MTE Gross Primary Productivity	May12	Reanalysis	Monthly, 0.5°x0.5°	3.8.2	1982-2011	Jung et al., 2011
Northern Hemisphere Blended Snow Cover Extent and Snow Mass Time Series (Mudryk)		Remote sensing, in situ	Monthly, time series	2.3.2 3.4.2 9.5.3	1980-2018	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/
NASA global mean sea level	4.2	Remote sensing	10-day, global time series	2.3.3	1993-2020	Beckley et al., 2016
NASA Team Sea Ice Concent-rations from Nimbus-7 SMMR and DMSP SSM/I-	1	Remote sensing	Monthly, 25 km	3.4.1	1979-2019	Cavalieri et al., 1996 https://nsidc.org/data/nsidc-0051

SSMIS Passive Microwave Data						
NCEI Ocean Heat Content		In situ	Annual, 1° x 1°	2.3.3 9.2.2 9.3.2	1955-2020	Levitus et al., 2012 https://www.ncei.noaa.gov/access/global-ocean-heat-content/
NCEP-NCAR Reanalysis		Reanalysis	Daily and monthly, 2.5°x2.5°	3.7.1 3.8.2 10.3.3	1980-2020	Kalnay et al., 1996 http://www.esrl.noaa.gov/psd/data/gridded/data.ncep.reanalysis.html
New Zealand temperature and rainfall datasets		In situ	Daily, point-based	Atlas 6.2	1870-2020	NIWA, 2020
NIWA $\delta^{13}C$-CO_2	2019	In situ	Monthly	5.2.1	1957-2015	Turnbull et al., 2017
NOAA atmospheric gas measure-ments		In situ	Point-based, time resolution depends on gas	2.2.3 2.2.4 3.6.1 5.1.2 5.2.1 5.2.2 5.2.3	Varies depending on gas	Masarie and Tans, 2004; Montzka et al., 2009, 2015; Hall et al., 2011; Dlugokencky and Tans, 2019 https://www.esrl.noaa.gov/gmd/ccgg/
NOAA ESRL MLO Carbon dioxide		In situ	Monthly, point-based	3.6.1	1980-2014	Zeng et al., 2014 https://www.esrl.noaa.gov/gmd/ccgg/trends/data.html
NOAA Global Temp	5	In situ	Monthly, 5 x 5°	1.3.6 10.6.4	1880-2020	Huang et al., 2020 https://www.ncdc.noaa.gov/data-access/marineocean-data/noaa-global-surface-temperature-noaaglobaltemp
NOAA Global Temp - Interim		In situ	Monthly, 5 x 5°	1.4.1 1.6.1 2.3.1 3.3.1 CCB 2.3 CCB 3.1	1850-2020	Vose et al., 2021
NOAA Merge ozone data (SBUV)	8.6	Remote sensing	Daily, 5° zonal means	2.2.5	1978-2020	Wild et al., 2016 ftp://ftp.cpc.ncep.noaa.gov/SBUV_CDR/
NOAA reconstruct-ed snow cover data set		Remote sensing and in situ	Monthly, hemi-spheric time series	3.4.2 9.5.3	1915-1997	Brown, 2002; Brown and Robinson, 2011 https://nsidc.org/data/g02131
NOAA CDR of sea-ice concent-ration	3.0	Remote sensing	Monthly, 25 km	2.3.2	1979-2020	Peng et al., 2013 https://nsidc.org/data/g02202
NOAA STAR satellite temperature	3.0	Remote sensing	Monthly, 2.5 x 2.5°, 3 vertical layers	2.3.1	1979-2020	Zou and Wang, 2011 https://www.star.nesdis.noaa.gov/smcd/emb/mscat/
National Oceanography Centre (NOC) surface flux and meteorological dataset	2.0	In situ	Monthly, 1 x 1°	2.3.1	1973-2014	Berry and Kent, 2011 http://badc.nerc.ac.uk/data/nocs_flux/
African Rainfall Climatology (Novella and Thiaw)	2.0	Remote sensing	Daily 0.1°×0.1°	10.2.1	1983-2010	Novella and Thiaw, 2013
National Sea and Ice Data Center (NSIDC) sea ice index	3	Remote sensing	Daily, 25 km	2.3.2	1978-2020	Fetterer et al., 2017 https://nsidc.org/data/G02135/versions/3
NASA Water Vapor Project		Remote sensing	Daily, 1°	2.3.1	1988-2008	Vonder Haar et al., 2012 https://public.satproj.klima.dwd.de/data/GVAP_data_archive/v1.0/TCWV/long/

MEaSUReS (NVAP-M)						
NYCMET-NET (New York)	2.0.0	In situ	15 minutes	Box 10.3	On-going	http://nycmetnet.ccny.cuny.edu
OAFlux		Remote sensing	Daily, 0.25 x 0.25°	2.3.1 9.2.1	1987-2019	Yu et al., 2008 http://oaflux.whoi.edu/
Ocean Colour Climate Change Initiative (OC-CCI)	4.2	Remote sensing	Daily, 4 km	2.3.4	1997-2019	Sathyendranath et al., 2019 https://climate.esa.int/en/projects/ocean-colour/
Ocean Satellite Oceanographic Datasets for Acidification (OCEAN SODA-ETHZ)		Remote sensing	Monthly, 1°	2.3.3	1985-2018	Gregor and Gruber, 2021 DOI: 10.25921/m5wx-ja34
NOAA Optimum Interpolation SST (OISST)	2	In situ and remote sensing	Daily, 0.25 x 0.25°	2.4.3	1981-2020	Reynolds et al., 2002; Banzon et al., 2016 https://www.ncdc.noaa.gov/oisst
OSISAF/ CCI sea-ice concent-ration	450	Remote sensing	Monthly, 25 km	2.3.2 3.4.1	1979-2015	Lavergne et al., 2019 http://osisaf.met.no/p/ice/
USA temperature (Oyler)		In situ	Daily 30-arcsec	10.2.1	1948-2012	Oyler et al., 2015
Swiss Alps (Panziera)		Remote sensing	Sub-daily 0.01° × 0.01°	10.2.1	2005-2017	Panziera et al., 2018
Gridded dataset of hourly precipitation in Germany (Paulat)		In situ	Hourly 0.06°× 0.06°	10.2.1	2001-2004	Paulat et al., 2008
Portland State University (PDX) CH_4, $\delta^{13}C$- CH_4	2017	In situ	Daily-monthly	5.2.2	1977-2010	Rice et al., 2016
PERSIANN-CDR		Remote sensing	Daily, 0.25 x 0.25°	10.2.1	1982-2020	Ashouri et al., 2015 https://www.ncdc.noaa.gov/cdr/atmospheric/precipitation-persiann-cdr
Philadelphia plant data		In situ	Annual, point-based	2.3.4	1840-2010	Panchen et al., 2012
PIOMAS Arctic sea ice reanalysis	2.1	Reanalysis	Monthly, 4-5°	7.2.2	1979-2020	Zhang and Rothrock, 2003; Schweiger et al., 2011 http://psc.apl.uw.edu/research/projects/arctic-sea-ice-volume-anomaly/
PMEL ocean heat content		In situ	Annual, global time series	2.3.3	1950-2011	Lyman and Johnson, 2014
PROMICE Greenland ice sheet discharge		Remote sensing	Annual, regional time series	9.4.1	1986-2018	Mankoff et al., 2019 http://promice.org/PromiceDataPortal
PROMICE ice sheet mass balance		Remote sensing	Annual, regional time series	9.4.1	1995-2019	Colgan et al., 2019 http://promice.org/PromiceDataPortal
Purkey and Johnson ocean heat content		In situ	Annual, global mean	2.3.3	1981-2010	Purkey and Johnson, 2010
High Resolution Gridded Data for	1.0	In situ	Daily 1° × 1°	10.6.3	1951-2003	Rajeevan et al., 2006

India (Rajeevan)						
Randolph Glacier Inventory	6	Remote sensing	Decametric shape files of glacier outlines, global. 0.5° global grid of glacierized area	2.3.2 9.5.1	1955-2014	Scherler et al., 2018 http://www.glims.org/RGI/rgi60_dl.html
RAOB-CORE radiosonde data set	1.7	In situ	Monthly, 10 x 5°, 12 vertical levels	2.3.1 3.3.1	1958-2020	Haimberger et al., 2012 https://www.univie.ac.at/theoret-met/research/raobcore/
Global mean sea level reconstruction (Ray and Douglas)		In situ	Annual, global time series	2.3.3	1900-2010	Ray and Douglas, 2011
REGEN global precipitation	1	In situ	Daily, 1 x 1°	10.3.2	1950-2016	Contractor et al., 2020 https://researchdata.ands.org.au/rainfall-estimates-gridded-v1-2019/1408744 DOI: 10.25914/5ca4c380b0d44
RICH radiosonde data set	1.7	In situ	Monthly, 10 x 5°, 12 vertical levels	2.3.1 3.3.1	1958-2020	Haimberger et al., 2012 https://www.univie.ac.at/theoret-met/research/raobcore/
Antarctic ice mass balance (Rignot)		Remote sensing	Annual, regional average	2.3.2	1979-2017	Rignot et al., 2019
Daily Dataset Romania ROCADA	1.0	In situ	Daily 0.1°×0.1°	10.2.1	1961-2013	Dumitrescu et al., 2016
MSG-based gridded datasets of clouds, precipitation and radiation (Roebeling and Holleman)		Remote sensing	Daily, 0.27° x 0.27°	10.2.1	2005-2019	Roebeling and Holleman, 2009
ROM SAF radio occultation climate data record		Remote sensing	Monthly, 5° latitude bins, 200 m vertical resolution	2.3.1	2001-2020	Gleisner et al., 2020 http://www.romsaf.org
Arctic permafrost layer temperature (Romanovsky)		In situ	Annual, site-based	2.3.2	1977-2020	Romanovsky et al., 2020
Israel precipitation (Rostkier-Edelstein)		Reanalysis	Seasonal 0.02°× 0.02°	10.2.1	1991-2009	Rostkier-Edelstein et al., 2014
Remote Sensing Systems (RSS) precipitation and water vapour	7	Remote sensing	2 per day, 0.25° x 0.25°	2.3.1 3.3.2	1987-2020	Wentz, 2013 http://www.remss.com/measurements/rain-rate/
Remote Sensing Systems RSS satellite temperature	4.0	Remote sensing	Monthly, 2.5° x 2.5°, 5 vertical layers	2.3.1	1979-2020	Mears and Wentz, 2017 http://www.remss.com/measurements/upper-air-temperature/
NOAA/ Rutgers University	V01r01	Remote sensing	Weekly, 100-200 km	2.3.2 9.5.3	1966-2020	Estilow et al., 2015 https://climate.rutgers.edu/snowcover/

snow cover extent data set						
SAFRAN temperature and precipitation for France		Reanalysis	Hourly 8km^2	10.2.1	1958-2008	Vidal et al., 2010
SAT1 NASA satellite ozone data		Remote sensing	Daily, 1° x 1°	2.2.5	2004-2020	Ziemke et al., 2019 https://acd-ext.gsfc.nasa.gov/Data_services/cloud_slice/new_data.html
SAT2 NASA satellite ozone data		Remote sensing	Daily, 1° x 1°	2.2.5	2004-2020	Heue et al., 2016
SAT3 NASA satellite ozone data		Remote sensing	Daily, 1° x 1°	2.2.5	2004-2020	Leventidou et al., 2018
Scripps atmospheric CO_2 data		In situ	Weekly, point-based	1.2.1 2.2.3 5.2.1	1958-2019	Keeling et al., 2001, 2005 http://scrippsco2.ucsd.edu/data/atmospheric_co2/
SeaWIFS FAPAR data	V2010.0	Remote sensing	Monthly, 1 km	2.3.4	1998-2017	Gobron, 2018 https://fapar.jrc.ec.europa.eu/Home.php
Norwegian seNorge2 precipitation	2.0	In situ	Daily 0.008°× 0.008°	10.2.1	1957-2019	Lussana et al., 2018
Merged precipitation in China (Shen)		In situ	Hourly 0.01° × 0.01°	10.2.1	2015	Shen et al., 2018
The Surface Ocean CO2 Atlas (SOCAT)	6	In situ	Point-based	5.2.1	1957-2020	Bakker et al., 2016 https://www.socat.info/
Southern Oscillation Index (SOI)		In situ	Monthly, regional time series	2.4.2	1876-2020	Troup, 1965 http://www.bom.gov.au/climate/current/soihtm1.shtml
Spain02	5.0	In situ	Daily 0.1°×0.1°	10.2.1	1948-2002	Herrera et al., 2016
Arosa stratospheric ozone data (Staehelin)		In situ	Time resolution varies, point-based	2.2.5	1926-2020	Staehelin et al., 2018
STAMMEX		In situ	Daily, 0.1°, 0.25° and 0.5°	8.3.1	1931-2000	Zolina et al., 2014
State University of New York (SUNY) radiosonde data set		In situ	Monthly, 10° x 10°	2.3.1	1958-2020	Zhou et al., 2021
Strato-spheric Water and Ozone Satellite Homogen-ized (SWOOSH)	2.5	Remote sensing	Monthly, 2.5° zonal mean, 12 vertical levels	2.2.5	1984-2020	Davis et al., 2016 https://data.nodc.noaa.gov/cgi-bin/iso?id=gov.noaa.ncdc:C00958
Tibetan plateau growing season		In situ	Annual, point-based	2.3.4	1960-2014	Yang et al., 2017a
Merged TM4NO2A tropospheric NO2 data set		Remote sensing	Monthly, 0.25°	6.3.3	1996-2016	Georgoulias et al., 2019 https://www.temis.nl/airpollution/no2.php
Tropo-spheric Ozone Assessment Report		In situ	Hourly, point-based	6.3.2	1970-2020	Schultz et al., 2017; Tarasick et al., 2019 http://www.igacproject.org/activities/TOAR

(TOAR) surface ozone database						
Tohoku Univ. N_2O, $\delta^{15}N$, $\delta^{15}N\alpha$	2018	In situ	Irregular	5.2.3	1950-2000	Ishijima et al., 2007
TOST composite ozonesonde product		In situ	Monthly, 5° × 5° × 1 km	2.2.5 6.3.2	1965-2012	Tarasick et al., 2010; Liu et al., 2013; Gaudel et al., 2018
TRMM Precipitation Radar 3A25	7	Remote sensing	Monthly, 0.5°	8.3.1	1997-2014	Iguchi et al., 2000
TRMM GPOF	GPOF	Remote sensing	Daily, 0.25° x 0.25°	8.3.1	1997-2015	Stocker et al., 2018
TRMM Microwave Imager (TRMM TMI)	TMI	Remote sensing	3-days, 0.25° x 0.25°	8.3.1	1997-2015	Wentz et al., 2001
TRMM Multi-Satellite Precipitation Analysis	7.0	Remote sensing	3-hourly, 0.25° x 0.25°	10.2.1	1997-2018	Huffman et al., 2007; TRMM, 2011; Liu et al., 2012b https://disc.gsfc.nasa.gov/datasets/TRMM_3B42_7 / summary
Tropical Rainfall Measuring Mission Precipitation Radar (TRMM PR)	PR	Remote sensing	Monthly, 0.5° x 0.5°	8.3.1	1997-2015	Haddad et al., 1997
TWIN (Taipei)		In situ	Hourly	Box 10.3	2004-2020	Chang et al., 2010
University of Alabama at Huntsville (UAH) satellite temperature	6.0	Remote sensing	Monthly, 3 vertical layers	2.3.1	1979-2020	Spencer et al., 2017 https://www.nsstc.uah.edu/climate/
UC Berkeley, N_2O, $\delta^{15}N$, $\delta^{15}N\alpha$	2018	In situ	Event	5.2.3	1900-1995	Park et al., 2012
University of Colorado global mean sea level		Remote sensing	Monthly, global time series	2.3.3	1993-2017	Nerem et al., 2018
UCAR/ NOAA radio occultation data		Remote sensing	Monthly, 5° latitude bands	2.3.1	2002-2020	Steiner et al., 2020
University of California at Irvine (UCI) atmospheric gas measure-ments		In situ	Point-based, several sampling periods per year	2.2.3	1984-2020	Simpson et al., 2012 http://cdiac.ornl.gov/tracegases.html
UEA-SI air-sea CO2 fluxes	2015	In situ	Monthly, 2.5° x 2.5°	5.2.1	1985-2011	Jones et al., 2015 https://doi.pangaea.de/10.1594/PANGAEA.849262
UHH sea ice product		In situ, remote sensing	Monthly, area average	2.3.2	1850-2020	Doerr et al., 2021 https://www.fdr.uni-hamburg.de/record/8559#.YEtN09xxXIU DOI: 10.25592/uhhfdm.8525
UrBAN (Helsinki)		In situ	Sub-hourly	Box 10.3	2004-2020	Wood et al., 2013 http://urban.fmi.fi
Vaccaro et al global temperature data set		In situ	Monthly, 5° x 5°	2.3.1	1850-2020	Vaccaro et al., 2021

W5E5 bias-adjusted reanalysis	1.0	Reanalysis	Daily, 0.5° x 0.5°	Atlas	1979-2016	Lange, 2019 https://dataservices.gfz-potsdam.de/pik/showshort.php?id=escidoc:4855898 DOI: 10.5880/pik.2019.023
Walsh et al sea ice data		Remote sensing and in situ	Monthly	2.3.2	1850-2020	Walsh et al., 2017
WASWind marine wind data		In situ	Monthly, 4 x 4°	2.4.4	1950-2011	Tokinaga and Xie, 2011 https://climatedataguide.ucar.edu/climate-data/waswind-wave-and-anemometer-based-sea-surface-wind
WCRP/ Palmer global sea level		Remote sensing and in situ	Monthly, global time series	2.3.3	1901-2018	WCRP Global Sea Level Budget Group, 2018; Palmer et al., 2021
Wegener Centre radio occultation data set		Remote sensing	Monthly, 0.1 km vertical	2.3.1	2001-2020	Angerer et al., 2017
Global mean sea level reconstruction (Wenzel and Schröter)		In situ	Monthly, global time series	2.3.3	1900-2009	Wenzel and Schröter, 2014
WFDE5	1.0	Reanalysis	Hourly, 0.5 °	10.3.3	1979-2018	Cucchi et al., 2020
WMO Global Atmosphere Watch greenhouse gas measure-ments		In situ	Annual, point-based and global means.	2.2.3	1984-2020	Tsutsumi et al., 2009; WMO, 2019 https://gaw.kishou.go.jp/publications/global_mean_mole_fractions
World Ocean Atlas (WOA)	2018	In situ	Monthly, 1°x1°	3.5.1	2009	Levitus et al., 2012; Locarnini et al., 2019; Zweng et al., 2019 https://www.nodc.noaa.gov/OC5/woa18/woa18data.html
World Ozone and UV Data Center (WOUDC) ozone data set		In situ	Monthly, global and zonal means	2.2.5	1964-2020	Fioletov et al., 2002 https://woudc.org/
Global Earth Observation for Integrated Water Resource Assessment (Earth2Observe) Water Resources Reanalysis v2 (WRR2)	2	Reanalysis	Monthly, 0.5° x 0.5°	8.3.1	1979-2012	Schellekens et al., 2017
Brazil gridded met data 1980-2013 (Xavier)		In situ	Daily 0.25° × 0.25°	10.2.1	1980-2013	Xavier et al., 2016 http://careyking.com/data-downloads/
Chile precipitation (Yang)		In situ	Daily 0.04° × 0.04°	10.2.1	2009-2014	Yang et al., 2017 http://www.climatedatalibrary.cl/SOURCES/
Ocean heat content and thermosteric sea level reconstruction (Zanna)		In situ	Annual, global means	2.3.3	1871-2017	Zanna et al., 2019

[END TABLE AI.1 HERE]

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