

STATE OF THE CLIMATE IN 2022

RELEVANT DATASETS AND SOURCES



Special Online Supplement to the *Bulletin of the American Meteorological Society* Vol. 104, No. 9, September, 2023

https://doi.org/10.1175/2023BAMSSStateoftheClimate_Chapter8.1

Corresponding author: Jessica Blunden / jessica.blunden@noaa.gov

© 2023 American Meteorological Society

For information regarding reuse of this content and general copyright information, consult the [AMS Copyright Policy](#).

Cover Credit:

Mauna Loa observatory, island of Hawai'i, site of atmospheric carbon dioxide measurements since March, 1958.

(Image credits: Left image: Susan Cobb, Global Systems Laboratory; Right upper image: Brian Vassel, Global Monitoring Laboratory; Right lower image: Susan Cobb, Global Systems Laboratory).

8. RELEVANT DATASETS AND SOURCES

Chapter 2: Global Climate – Datasets and Sources

Section 2b Temperature			
Sub-section	General Variable or Phenomenon	Specific dataset or variable	Source
2b1	Temperature, [Near] Surface	Berkeley Earth	http://berkeleyearth.org/data/
2b1, 2b3	Temperature, [Near] Surface	ERA5	https://www.ecmwf.int/en/forecasts/datasets/reanalysis-datasets/era5
2b1	Temperature, [Near] Surface	HadCRUT5 Global Temperature	https://www.metoffice.gov.uk/hadobs/hadcrut5/
2b1	Temperature, [Near] Surface	CRUTEM5	https://www.metoffice.gov.uk/hadobs/crutem5/
2b1, 2b3	Temperature, [Near] Surface	HadSST4	https://www.metoffice.gov.uk/hadobs/hadsst4/
2b1, 2b4	Temperature, [Near] Surface	JRA-55 Atmospheric Reanalysis	https://search.diasjp.net/en/dataset/JRA55
2b1, 2b2	Temperature, [Near] Surface	NASA/GISS Global Temperature V4	https://data.giss.nasa.gov/gistemp/
2b1	Temperature, [Near] Surface	NOAA/NCEI NOAA GlobalTemp	https://www.ncei.noaa.gov/products/land-based-station/noaa-global-temp
2b2	Lake Temperature	ERA5	https://doi.org/10.24381/cds.adbb2d47
2b2	Lake Temperature	National Buoy Data Center Great Lakes Buoys	https://www.ndbc.noaa.gov/mobile/region.php?reg=great_lakes
2b2	Lake Temperature	Balaton Lakes	https://odp.met.hu/climate/observations_hungary/hourly/historical/
2b2	Lake Temperature	Canadian Lakes	https://www.meds-sdmm.dfo-mpo.gc.ca/isdm-gdsi/waves-vagues/data-donnees/index-eng.asp
2b2	Lake Temperature	Douglas Lake	https://uglos.mtu.edu/station_page.php?station=UMBIO
2b2	Lake Temperature	Trout Lake	https://portal.edirepository.org/nis/mapbrowse?scope=knb-lter-ntl&identifier=116&revision=27
2b2	Lake Temperature	ESA CCI LAKES LSWT v2.0.2	https://catalogue.ceda.ac.uk/uuid/a07deacaffb8453e93d57ee214676304

Sub-section	General Variable or Phenomenon	Specific dataset or variable	Source
2b2	Lake Temperature	Sentinel 3 Sea and Land Surface Temperature Radiometer (SLSTR)	https://sentinel.esa.int/web/sentinel/user-guides/sentinel-3-slstr/overview
2b3	Nighttime marine Air Temperature	CLASSnmat	https://catalogue.ceda.ac.uk/uuid/5bbf48b128bd488dbb10a56111feb36a
2b3	Nighttime marine Air Temperature	UAHNMATv1	https://www.nsstc.uah.edu/climate/ , https://doi.org/10.1002/joc.6354
2b4	Sea Surface Temperature	NOAA Optimum Interpolation Sea Surface Temperature (OISST) v2.1	https://www.ncei.noaa.gov/products/optimum-interpolation-sst
2b4	Temperature, [Near] Surface	GHCNDEX	www.climdex.org/
2b4	Temperature, [Near] Surface	MERRA-2	http://gmao.gsfc.nasa.gov/reanalysis/MERRA-2/
2b4	Temperature, Upper Atmosphere	ERA5	https://www.ecmwf.int/en/forecasts/datasets/reanalysis-datasets/era5
2b4	Temperature, Upper Atmosphere	JRA-55 Atmospheric Reanalysis	http://jra.kishou.go.jp/JRA-55/index_en.html
2b5	Temperature, Upper Atmosphere	ERA5	https://www.ecmwf.int/en/forecasts/datasets/reanalysis-datasets/era5
2b5	Temperature, Upper Atmosphere	JRA-55 Atmospheric Reanalysis	http://jra.kishou.go.jp/JRA-55/index_en.html
2b5	Temperature, Upper Atmosphere	MERRA-2	http://gmao.gsfc.nasa.gov/reanalysis/MERRA-2/
2b5	Temperature, Upper Atmosphere	NOAA/NESDIS/STAR MSU v5	https://www.star.nesdis.noaa.gov/pub/smcd/emb/mscat/data/MSU_AMSU_v5.0/Monthly_Atmospheric_Layer_Mean_Temperature/
2b5	Temperature, Upper Atmosphere	RAOBCORE, RICH	https://imgw.univie.ac.at/forschung/klimadiagnose/raobcore/
2b5	Temperature, Upper Atmosphere	RATPAC A2	https://www.ncei.noaa.gov/products/weather-balloon/radiosonde-atmospheric-temperature-products
2b5	Temperature, Upper Atmosphere	RSS v4.0	https://www.remss.com/measurements/upper-air-temperature/
2b5	Temperature, Upper Atmosphere	UAH MSU v6.0	https://www.nsstc.uah.edu/data/msu/v6.0/
2b5	Temperature, Upper Atmosphere	UW MSU v1.0	https://pochedls.github.io/#!/data.md
2b5	Sea Surface Temperature	Niño 3.4 Index	https://psl.noaa.gov/gcos_wgsp/Timeseries/Nino34/
2b6	Temperature, Upper Atmosphere	Aura MLS	https://mls.jpl.nasa.gov/eos-aura-mls/data-products/temperature

Section 2c Cryosphere			
Sub-section	General Variable or Phenomenon	Specific dataset or variable	Source
2c1	Permafrost	Global Terrestrial Network for Permafrost (GTN-P)	http://gtnpdatabase.org/
2c1	Permafrost	GTN-P global mean annual ground temperature data for permafrost	https://doi.org/10.1594/PANGAEA.884711
2c1	Permafrost	Permafrost Temperature at Chinese (QTP) sites	https://nsidc.org/data/GGD700/versions/1
2c1	Permafrost	Permafrost Temperature at French sites	permafrance.osug.fr
2c1	Permafrost	Permafrost Temperature at Norwegian sites	https://cryo.met.no/
2c1, 2c2	Permafrost	Permafrost Temperature at Swiss sites (PERMOS)	www.permos.ch , https://www.permos.ch/doi/permos-dataset-2022-1
2c2	Rock Glacier Velocity	Regional Rock Glacier Velocity	Available from authors upon request. Austria: V. Kaufmann and A. Kellerer-Pirklbauer, Central Asia: A. Kääb, Dry Andes: S. Vivero, France: X. Bodin, D. Cusicanqui and E. Thibert, Switzerland: R. Delaloye, J. Noetzli and C. Pellet
2c3	Glacier Mass, Area or Volume	World Glacier Monitoring Service	http://dx.doi.org/10.5904/wgms-fog-2022-09
2c3	Glacier Area	Copernicus Sentinel-2 MSI image	https://sentinels.copernicus.eu/web/sentinel/user-guides/sentinel-2-msi/overview
2c4	Lake Ice	ERA5	https://doi.org/10.24381/cds.adbb2d47
2c4	Lake Ice	Lake ice clearance and formation data for Green Lakes Valley, 1968 - ongoing. ver 5. Environmental Data Initiative	https://portal.edirepository.org/nis/mapbrowse?packageid=knb-lter-nwt.106.5
2c4	Lake Ice	Global Lake and River Ice Phenology Database, Version 1	https://doi.org/10.7265/N5W66HP8
2c4	Lake Ice	Mountain Lake Biology, Chemistry, Physics, and Climate Data since 1959 at Castle Lake ver 1. Environmental Data Initiative	https://doi.org/10.6073/pasta/a8e3b81cfe5864731b29ad42506c65d7
2c4	Lake Ice	Great Lakes Annual Maximum Ice Cover (%)	https://www.glerl.noaa.gov/data/ice/
2c4	Lake Ice	Great Lakes Ice	www.glerl.noaa.gov/data/ice

Sub-section	General Variable or Phenomenon	Specific dataset or variable	Source
2c4	Lake Ice	Geographic variation and temporal trends in ice phenology in Norwegian lakes during a century, Dryad	https://datadryad.org/stash/dataset/doi:10.5061/dryad.bk3j9kd9x
2c4	Temperature, [Near] Surface	NASA/GISS Global Temperature	https://data.giss.nasa.gov/gistemp/
2c5	Snow Properties	Northern Hemisphere (NH) Snow Cover Extent (SCE), Version 1	doi:10.7289/V5N014G9, www.snowcover.org

Section 2d Hydrological Cycle			
Sub-section	General Variable or Phenomenon	Specific dataset or variable	Source
2d1, 2d2	Humidity, [Near] Surface	ERA5	https://www.ecmwf.int/en/forecasts/datasets/reanalysis-datasets/era5
2d1, 2d2	Humidity, [Near] Surface	HadISDH	www.metoffice.gov.uk/hadobs/hadisdh , https://catalogue.ceda.ac.uk/uuid/251474c7b09449d8b9e7aeaf1461858f
2d1	Humidity, [Near] Surface	JRA-55 Atmospheric Reanalysis	http://jra.kishou.go.jp/JRA-55/index_en.html
2d1, 2d2	Humidity, [Near] Surface	MERRA-2	https://gmao.gsfc.nasa.gov/reanalysis/MERRA-2/
2d2	Water Vapor, Total Column	COSMIC	https://cdaac-www.cosmic.ucar.edu/
2d2	Water Vapor, Total Column	ERA5	https://www.ecmwf.int/en/forecasts/datasets/reanalysis-datasets/era5
2d2	Water Vapor, Total Column	GNSS Ground-Based Total Column Water Vapor	https://doi.org/10.25326/68
2d2	Water Vapor, Total Column	JRA-55 Atmospheric Reanalysis	http://jra.kishou.go.jp/JRA-55/index_en.html
2d2	Water Vapor, Total Column	MERRA-2	https://gmao.gsfc.nasa.gov/reanalysis/MERRA-2/
2d2	Water Vapor, Total Column	SSM/I -AMSR-E Ocean Total Column Water Vapor	http://www.remss.com
2d3	Humidity, Upper Atmosphere	Upper Troposphere Humidity (UTH)	Available on request to Brian Soden
2d3	Humidity, Upper Atmosphere	ERA5	https://www.ecmwf.int/en/forecasts/datasets/reanalysis-datasets/era5
2d3	Humidity, Upper Atmosphere	High Resolution Infrared Sounder (HIRS)	https://www.ncei.noaa.gov/products/climate-data-records/hirs-ch12-brightness-temperature

Sub-section	General Variable or Phenomenon	Specific dataset or variable	Source
2d3	Temperature, Upper Atmosphere	NOAA/NESDIS/STAR MSU v5	https://www.star.nesdis.noaa.gov/pub/smcd/emb/mscat/data/MSU_AMSU_v5.0/Monthly_Atmospheric_Layer_Mean_Temperature/
2d4, 2d5	Precipitation	GPCP	www.dwd.de/EN/ourservices/gpcc/gpcc.html
2d4	Precipitation	Global Precipitation Climatology Project (GPCP) v2.3	https://www.ncei.noaa.gov/products/global-precipitation-climatology-project
2d5	Precipitation	Global Historical Climatology Network daily (GHCNd)	https://www.ncei.noaa.gov/products/land-based-station/global-historical-climatology-network-daily
2d5	Precipitation	Climate Hazards Group InfraRed Precipitation with Station data (CHIRPS)	https://www.chc.ucsb.edu/data/chirps
2d5	Precipitation	Climate Extremes Index Component 4	https://www.ncdc.noaa.gov/extremes/cei/
2d5	Precipitation	ERA5	https://www.ecmwf.int/en/forecasts/datasets/reanalysis-datasets/era5
2d5	Precipitation	GHCN v4	www.ncdc.noaa.gov/temp-and-precip/ghcn-gridded-products/precipitation
2d5	Precipitation	GHCINDEX	www.climdex.org/
2d5	Precipitation	GPCP	www.dwd.de/EN/ourservices/gpcc/gpcc.html
2d5	Precipitation	MERRA-2	https://gmao.gsfc.nasa.gov/reanalysis/MERRA-2/
2d6	Cloud properties	PATMOS-x v6.0	https://www.ncei.noaa.gov/products/climate-data-records/avhrr-hirs-cloud-properties-patmos
2d6	Cloud Properties	Aqua MODIS C6.1 MYD08_M3	https://ladsweb.modaps.eosdis.nasa.gov/missions-and-measurements/products/MYD08_M3
2d6	Cloud Properties	Clouds and the Earth's Radiant Energy System Energy Balance and Filled (CERES EBAF) v4.2	https://ceres.larc.nasa.gov/data/
2d7	Lake Water Levels	NASA/CNES Topex/Poseidon and Jason satellite missions through the Global Reservoir and Lake Monitoring (G-REALM) project v2.5	https://ipad.fas.usda.gov/cropexplorer/global_reservoir/
2d7	Lake Water Levels	Theia's Hydroweb database	https://hydroweb.theia-land.fr
2d7	Lake Surface Area	HydroLAKES database	https://www.hydrosheds.org/products/hydrolakes
2d7	Lake Water Levels	Kraemer (2023) Lake Water Levels	https://zenodo.org/record/7635482

Sub-section	General Variable or Phenomenon	Specific dataset or variable	Source
2d8	Groundwater and terrestrial water storage	GRACE / GRACE-FO	https://podaac.jpl.nasa.gov/dataset/TELLUS_GRAC-GRFO_MASCON_CRI_GRID_RL06.1_V3
2d8	Lake Water Level	Database for Hydrological Time Series of Inland Waters (DAHITI) - Lake Kariba	https://dahiti.dgfi.tum.de/en/31/time_series/
2d9	Soil Moisture	Copernicus Climate Change Service (C3S) v202012 product based on the ESA Climate Change Initiative for Soil Moisture (ESA CCI SM) v05.2 merging algorithm	https://cds.climate.copernicus.eu/cdsapp#!/dataset/satellite-soil-moisture?tab=form
2d10	Drought	Climatic Research Unit gridded Time Series (CRU TS) 4.07	https://crudata.uea.ac.uk/cru/data/hrg/cru_ts_4.07/
2d11	Land Evaporation	Climatic Research Unit gridded Time Series (CRU TS) 4.07	www.gleam.eu/
2d11	Modes of Variability	Southern Oscillation Index	https://crudata.uea.ac.uk/cru/data/soi/

Section 2e Atmospheric Circulation

Sub-section	General Variable or Phenomenon	Specific dataset or variable	Source
2e1	Modes of Variability	Antarctic Oscillation (AAO)/Southern Annular Mode (SAM)	https://ftp.cpc.ncep.noaa.gov/cwlinks/norm.daily.aao.index.b790101.current.ascii
2e1	Pressure, Sea Level or Near-Surface	ERA5	https://www.ecmwf.int/en/forecasts/datasets/reanalysis-datasets/era5
2e1	Pressure, Sea Level or Near-Surface	NCEP/NCAR Reanalysis	www.esrl.noaa.gov/psd/data/gridded/data.ncep.reanalysis.html
2e2	Modes of Variability	Antarctic Oscillation (AAO)/Southern Annular Mode (SAM)	https://ftp.cpc.ncep.noaa.gov/cwlinks/norm.daily.aao.index.b790101.current.ascii
2e2	Wind, [Near] Surface	ERA5	https://www.ecmwf.int/en/forecasts/datasets/reanalysis-datasets/era5
2e2	Wind, [Near] Surface	HadISD v3.3.0.2022f	https://hadleyserver.metoffice.gov.uk/hadisd/v330_2022f/index.html
2e2	Wind, [Near] Surface	Modern-Era Retrospective Analysis for Research and Applications version 2 (MERRA-2)	http://gmao.gsfc.nasa.gov/reanalysis/MERRA-2/
2e2	Wind [Near Surface]	Remote Sensing System (RSS) Merged 1-deg monthly radiometer winds	https://www.remss.com/measurements/wind/

Sub-section	General Variable or Phenomenon	Specific dataset or variable	Source
2e2	Wind [Near Surface]	Remote Sensing System (RSS) Advanced Scatterometer (ASCAT)	https://www.remss.com/missions/ascats/
2e2	Wind [Near Surface]	Remote Sensing System (RSS) QuickScat4	https://www.remss.com/missions/qscats/
2e3	Wind [Upper Atmosphere]	Integrated Global Radiosonde Archive (for Quasi biennial Oscillation, QBO)	https://www.ncei.noaa.gov/products/weather-balloon/integrated-global-radiosonde-archive
2e3	Modes of Variability	Antarctic Oscillation (AAO), Southern Annular Mode (SAM)	https://www.cpc.ncep.noaa.gov/products/precip/CWlink/daily_ao_index/ao/ao.shtml , http://www.nerc-bas.ac.uk/icd/gjma/sam.html
2e3	Wind [Upper Atmosphere]	ERA5 hourly data on pressure levels from 1940 to present. Copernicus Climate Change Service (C3S) Climate Data Store (CDS)	https://cds.climate.copernicus.eu/cdsapp#!/dataset/reanalysis-era5-pressure-levels?tab=overview
2e3	Wind [Upper Atmosphere]	ERA-Interim	www.ecmwf.int/en/research/climate-reanalysis/era-interim
2e3	Wind [Upper Atmosphere]	MERRA-2	http://gmao.gsfc.nasa.gov/reanalysis/MERRA-2/
2e3	Wind [Upper Atmosphere]	JRA-55 Atmospheric Reanalysis	http://jra.kishou.go.jp/JRA-55/index_en.html
2e4	Lightning	Lightning Imaging Sensor (LIS) on International Space Station (ISS) Science Data Version 1	http://dx.doi.org/10.5067/LIS/ISSLIS/DATA108
2e4	Lightning	Lightning Imaging Sensor (LIS) on TRMM Science Data V4	http://dx.doi.org/10.5067/LIS/LIS/DATA201
2e4	Lightning	Optical Transient Detector (OTD) Lightning v1	http://dx.doi.org/10.5067/LIS/OTD/DATA101
2e4	Lightning	GOES-R Geostationary Lightning Mapper (GLM) Gridded Data Products V1	http://dx.doi.org/10.5067/GLM/GRID/DATA101

Section 2f Earth's Radiation Budget			
Sub-section	General Variable or Phenomenon	Specific dataset or variable	Source
2f1	TOA Earth Radiation Budget	CERES Energy Balanced and Filled version 4.2	https://ceres-tool.larc.nasa.gov/ord-tool/jsp/EBAFTOA42Selection.jsp
2f1	TOA Earth Radiation Budget	CERES FLASHflux version 4A	https://ceres-tool.larc.nasa.gov/ord-tool/jsp/FLASH_TISASelection.jsp
2f1	TOA Earth Radiation Budget	TSIS TIM Level 3 Total Solar Irradiance 24-hour Means	doi:10.5067/TSIS/TIM/DATA306
2f2	Solar Transmission, Apparent	HYSPLIT	https://www.ready.noaa.gov/HYSPLIT.php
2f2	Solar Transmission, Apparent	Mauna Loa Observatory	https://www.esrl.noaa.gov/gmd/webdata/grad/mloapt/mauna_loa_transmission.dat
2f2	Cloud Aerosol	Cloud-Aerosol LIDAR and Infrared Pathfinder Satellite Observations (CALIPSO)	http://www-calipso.larc.nasa.gov
2f2	Ozone, Stratospheric	Ozone Mapping and Profiler Suite (OMPS)	https://ozoneaq.gsfc.nasa.gov/data/ozone/
2f2	Ozone, Stratospheric	Stratospheric Aerosol and Gas Experiment (SAGE) limb sounder	https://asdc.larc.nasa.gov/project/SAGE%20III-ISS

Section 2g Atmospheric Composition			
Sub-section	General Variable or Phenomenon	Specific dataset or variable	Source
2g1	Trace Gases	Atmospheric Gas trends	www.esrl.noaa.gov/gmd/ccgg/trends
2g1	Trace Gases	Global Greenhouse Gas Reference Network	https://gml.noaa.gov/ccgg/about.html
2g1	Trace Gases	Atmospheric Greenhouse Gas Index (AGGI)	www.esrl.noaa.gov/gmd/aggi
2g2	Trace Gases	Halocarbons and other Atmospheric Trace Species	https://gml.noaa.gov/aftp/data/hats/
2g2	Trace Gases	Advanced Global Atmospheric Gases Experiment	https://agage2.eas.gatech.edu/data_archive/global_mean/global_mean_ms.txt
2g2	Trace Gases	Ozone-Depleting Gas Index (ODGI)	www.esrl.noaa.gov/gmd/odgi
2g3	Aerosols	Advanced Along Track Scanning Radiometer (AATSr)	https://earth.esa.int/eogateway/instruments/aatsr

Sub-section	General Variable or Phenomenon	Specific dataset or variable	Source
2g3	Aerosols	Copernicus Atmosphere Monitoring Service Reanalysis (CAMSRA)	https://ads.atmosphere.copernicus.eu/cdsapp#!/dataset/cams-global-radiative-forcing-auxilliary-variables?tab=overview
2g4	Ozone, Total Column and Stratospheric	GOME/SCIAMACHY/GOME2 (GSG) Merged Total Ozone	http://www.iup.uni-bremen.de/UVSAT/datasets/merged-wfdoas-total-ozone
2g4	Ozone, Total Column and Stratospheric	GOME/SCIAMACHY/GOME2 (GTO) Merged Total Ozone	https://atmos.eoc.dlr.de/gto-ecv
2g4	Ozone, Total Column and Stratospheric	GOZCARDS ozone profiles	https://www.earthdata.nasa.gov/esds/competitive-programs/measures/gozcards
2g4	Ozone, Total Column and Stratospheric	Multi Sensor Reanalysis (MSR-2) of total ozone	http://www.temis.nl/protocols/O3global.html
2g4	Ozone, Total Column and Stratospheric	NASA BUV/SBUV/OMPS v8.7 (MOD) Merged Ozone	https://acd-ext.gsfc.nasa.gov/Data_services/merged/
2g4	Ozone, Total Column and Stratospheric	NOAA SBUV V8.6 OMPS V4r1 cohesive data set (COH)	ftp://ftp.cpc.ncep.noaa.gov/SBUV_CDR/
2g4	Ozone, Total Column and Stratospheric	Network for the Detection of Atmospheric Composition Change (NDACC) lidar, microwave and FTIR	https://www-air.larc.nasa.gov/missions/ndacc
2g4	Ozone, Total Column and Stratospheric	SAGE/OSIRIS	Bourassa et al. (2018) doi:10.5194/amt-11-489-2018
2g4	Ozone, Total Column and Stratospheric	SAGE-SCIA-OMPS	Arosio et al., (2018) doi:10.5194/amt-2018-275
2g4	Ozone, Total Column and Stratospheric	SWOOSH	www.esrl.noaa.gov/csd/groups/csd8/swoosh/
2g4	Ozone, Total Column and Stratospheric	WOUDC Ground-based Ozone	ftp://tor.ec.gc.ca/cd/pub/woudc/Projects_Campaigns/ZonalMeans
2g5	Stratospheric Water Vapor	the Aura Microwave Limb Sounder version 5.0 data, as merged into SWOOSH	www.esrl.noaa.gov/csd/groups/csd8/swoosh/
2g5	Tropopause Temperature	MERRA-2	http://gmao.gsfc.nasa.gov/reanalysis/MERRA-2/
2g5	Stratospheric Water Vapor	NOAA Frostpoint Hygrometer (FPH)	https://gml.noaa.gov/aftp/data/ozwv/WaterVapor/
2g5	Stratospheric Water Vapor	Cryogenic Frostpoint Hygrometer (CFH)	https://ndacc.org
2g6	Ozone, Tropospheric	NOAA Global Monitoring Laboratory	https://gml.noaa.gov/aftp/data/ozwv/SurfaceOzone/
2g7	Trace Gases	Copernicus Atmosphere Monitoring Service Reanalysis (CAMSRA) for Carbon Monoxide	https://ads.atmosphere.copernicus.eu/cdsapp#!/dataset/cams-global-radiative-forcing-auxilliary-variables?tab=overview

Section 2h Land Surface Properties			
Sub-section	General Variable or Phenomenon	Specific dataset or variable	Source
2h1	Albedo	MODIS/Terra+Aqua BRDF/Albedo Albedo Daily L3 Global 0.05Deg CMG V061	https://lpdaac.usgs.gov/products/mcd43c3v061/
2h2	fraction of absorbed photosynthetically active radiation (FAPAR)	JRC TIP MODIS	https://fapar.jrc.ec.europa.eu
2h2	FAPAR	MERIS	https://fapar.jrc.ec.europa.eu
2h2	FAPAR	SeaWiFS FAPAR	http://fapar.jrc.ec.europa.eu/
2h3	Biomass, Greenness or Burning	GFAS v1.4	ftp://ftp.mpic.de/GFAS/sc17 (special reprocessing)
2h3	Biomass, Greenness or Burning	Modis Fire Power Radiative Product	https://lpdaac.usgs.gov/products/mod14v061/ , https://lpdaac.usgs.gov/products/myd14v061/
2h3	Biomass, Greenness or Burning	Global Fire Emissions Database	https://www.globalfiredata.org/data.html
2h3	Deforestation	PRODES Amazonia	http://www.obt.inpe.br/OBT/assuntos/programas/amazonia/prodes
2h4	Phenology	MODIS Normalized Difference Vegetative Index	https://modis.gsfc.nasa.gov/data/dataproduct/mod13.php
2h4	Temperature [Near] Surface	MERRIS-2 monthly temperature	https://goldsmr4.gesdisc.eosdis.nasa.gov/data/MERRA2_MONTHLY/M2TMNXLND.5.12.4/
2h4	Phenology	USA-National Phenology Network (NPN)	https://www.usanpn.org/data/observational
2h4	Phenology	German oak phenology data	https://opendata.dwd.de/
2h4	Phenology	Harvard Forest	https://harvardforest1.fas.harvard.edu/exist/apps/datasets/showData.html?id=hf003
2h4	Phenology	Natures Calendar	https://naturescalendar.woodlandtrust.org.uk/
2h4	Phenology	PhenoCam	http://phenocam.sr.unh.edu
2h4	Phenology	UK Cumbrian lakes data	https://catalogue.ceh.ac.uk/documents/bf30d6aa-345a-4771-8417-ffbfc8c08c28/
2h5	Vegetation Optical Depth	Global Long-term Microwave Vegetation Optical Depth Climate Archive (VODCA_	https://zenodo.org/record/2575599
2h5	Modes of Variability	Southern Oscillation Index	http://www.bom.gov.au/climate/enso/soi/

Sidebar 2.1 Assessing Humid heat extremes over land

Sub-section	General Variable or Phenomenon	Specific dataset or variable	Source
SB2.1	Temperature [Near] Surface	WMO Climpact indices	https://climpact-sci.org/
SB2.1	Temperature [Near] Surface	HadISDH.extremes v1.0.0.2022f	https://catalogue.ceda.ac.uk/uuid/2d1613955e1b4cd1b156e5f3edbd7e66 , https://www.metoffice.gov.uk/hadobs/hadisdh/

Sidebar 2.2 Hunga Tonga–Hunga Ha‘apai eruption

Sub-section	General Variable or Phenomenon	Specific dataset or variable	Source
SB2.2	Stratospheric Aerosol	Suomi National Polar-Orbiting Partnership OMPS Limb Profiler data.	https://www.earthdata.nasa.gov/sensors/omps
SB2.2	Ozone, Total Column and Stratospheric	Aura MLS	https://disc.gsfc.nasa.gov/datasets?page=1&source=AURA%20MLS
SB2.2	Stratospheric Water Vapor	Aura MLS	https://disc.gsfc.nasa.gov/datasets?page=1&source=AURA%20MLS
SB2.2	Temperature upper atmosphere	Aura MLS	https://disc.gsfc.nasa.gov/datasets?page=1&source=AURA%20MLS

Section 3b Sea Surface Temperature			
Sub-section	General Variable or Phenomenon	Specific dataset or variable	Source
3b	Sea Surface Temperature	ERSSTv5	https://doi.org/10.7289/V5T72FNM
3b	Sea Surface Temperature	HadSST4	https://www.metoffice.gov.uk/hadobs/hadsst4/
3b	Sea Surface Temperature	NOAA Daily Optimum Interpolated Temperature (DOISST)	https://doi.org/10.25921/RE9P-PT57

Section 3c Ocean Heat Content			
Sub-section	General Variable or Phenomenon	Specific dataset or variable	Source
3c	Ocean Heat Content	Argo	http://doi.org/10.17882/42182#98916
3c	Ocean Heat Content	Argo monthly climatology	https://sio-argo.ucsd.edu/RG_Climatology.html
3c	Ocean Heat Content	CLIVAR and Carbon Hydrographic Data Office	https://cchdo.ucsd.edu/
3c	Ocean Heat Content	IAP/CAS	http://www.ocean.iap.ac.cn/pages/dataService/dataService.html
3c	Ocean Heat Content	MRI/JMA	www.data.jma.go.jp/gmd/kaiyou/english/ohc/ohc_global_en.html
3c	Ocean Heat Content	NCEI	https://www.ncei.noaa.gov/access/global-ocean-heat-content/
3c	Ocean Heat Content	PMEL/JPL/JIMAR	http://oceans.pmel.noaa.gov
3c	Ocean Heat Content	UK Met Office EN4.2.2	https://www.metoffice.gov.uk/hadobs/en4/download-en4-2-2.html
3c	Ocean Salinity	Argo	https://usgodae.org/argo/argo.html

Section 3d Salinity			
Sub-section	General Variable or Phenomenon	Specific dataset or variable	Source
3d2	Ocean Salinity	Aquarius V3.0	http://podaac.jpl.nasa.gov/aquarius
3d2	Ocean Salinity	Argo	https://usgodae.org/argo/argo.html
3d2	Ocean Salinity	Blended Analysis for Surface Salinity	ftp://ftp.cpc.ncep.noaa.gov/precip/BASS
3d2	Ocean Salinity	SMAP	https://podaac.jpl.nasa.gov/SMAP
3d2	Ocean Salinity	SMOS	https://earth.esa.int/eogateway/missions/smos

Sub-section	General Variable or Phenomenon	Specific dataset or variable	Source
3d2	Ocean Salinity	World Ocean Atlas 2013	www.nodc.noaa.gov/OC5/woa13/
3d3	Ocean Salinity	NCEI salinity anomaly	https://www.ncei.noaa.gov/access/global-ocean-heat-content/
3d3	Ocean Salinity	World Ocean Atlas 2018	www.nodc.noaa.gov/OC5/woa18/

Section 3e Global ocean heat, freshwater, and momentum flux

Sub-section	General Variable or Phenomenon	Specific dataset or variable	Source
3e1	Air-sea fluxes (shortwave/longwave radiation)	CERES Energy Balanced and Filled version 4.2	https://asdc.larc.nasa.gov/project/CERES/CERES_EBAF_Edition4.2
3e1	Air-sea fluxes (shortwave/longwave radiation)	CERES FLASHflux 4A product	https://cmr.earthdata.nasa.gov/search/concepts/C1719147151-LARC_ASDC.html
3e1	Air-sea fluxes (latent heat/sensible heat)	ERA5	https://www.ecmwf.int/en/forecasts/datasets/reanalysis-datasets/era5
3e2	Precipitation	Global Precipitation Climatology Project (GPCP) v2.3	https://psl.noaa.gov/data/gridded/data.gpcp.html
3e2	Evaporation	ERA5	https://www.ecmwf.int/en/forecasts/datasets/reanalysis-datasets/era5
3e3	Wind stress	ERA5	https://www.ecmwf.int/en/forecasts/datasets/reanalysis-datasets/era5

Section 3f Sea Level variability and change

Sub-section	General Variable or Phenomenon	Specific dataset or variable	Source
3f	Ocean Heat Content	Argo monthly climatology	https://sio-argo.ucsd.edu/RG_Climatology.html
3f	Ocean Mass	GRACE/GRACE FO	https://grace.jpl.nasa.gov/data/get-data
3f	Sea Level / Sea Surface Height	Argo	https://usgodae.org/argo/argo.html
3f	Sea Level / Sea Surface Height	NASA MEaSURES	https://podaac.jpl.nasa.gov/dataset/SEA_SURFACE_HEIGHT_ALT_GRIDS_L4_2SATS_5DAY_6THDEG_V_JPL2205
3f	Sea Level/Sea Surface Height	NASA Sea Level Change Program	https://podaac.jpl.nasa.gov/dataset/MERGED_TP_J1_OSTM_OST_ALL_V51
3f	Sea Level / Sea Surface Height	NCEI steric sea level	https://www.ncei.noaa.gov/access/global-ocean-heat-content/
3f	Sea Level / Sea Surface Height	NOAA Laboratory for Sea Level Altimetry	www.star.nesdis.noaa.gov/sod/lsa/SeaLevelRise/LSA_SLR_timeseries.php

Sub-section	General Variable or Phenomenon	Specific dataset or variable	Source
3f	Sea Level / Sea Surface Height	Tide Gauge	http://uhslc.soest.hawaii.edu/
3f	Sea Level / Sea Surface Height	University of Texas Center for Space Research Gravity field	https://podaac.jpl.nasa.gov/dataset/TELLUS_GRAC_L3_CSR_RL06_OCN_v04

Section 3g Surface Currents			
Sub-section	General Variable or Phenomenon	Specific dataset or variable	Source
3g	ocean currents	Global Drifter Program	https://www.aoml.noaa.gov/phod/gdp/
3g	ocean currents	Ocean Surface Current Analysis - Real time (OSCAR)	https://www.esr.org/research/oscar/oscar-surface-currents/
3g3	ocean currents	Atlantic ocean monitoring	https://www.aoml.noaa.gov/phod/altimetry/cvar/

Section 3h Meridional Overturning Circulation and Heat Transport in the Atlantic Ocean			
Sub-section	General Variable or Phenomenon	Specific dataset or variable	Source
3h	ocean currents	Atlantic Ship of Opportunity XBT	https://www.aoml.noaa.gov/phod/goos/xbt_network/
3h	ocean currents	Argo	https://usgodae.org/argo/argo.html
3h	ocean currents	Florida Current transport	https://www.aoml.noaa.gov/phod/floridacurrent/data_access.php
3h	ocean currents	Global Temperature and Salinity Profile Program (GTSPP)	https://www.ncei.noaa.gov/products/global-temperature-and-salinity-profile-programme
3h	ocean currents	MOVE array	http://www.oceansites.org/tma/move.html
3h	ocean currents	OSNAP	https://www.o-snap.org/
3h	ocean currents	RAPID array	https://rapid.ac.uk/rapidmoc/
3h	ocean currents	SAMBA	http://www.oceansites.org/tma/samba.html

Section 3i Global Ocean Phytoplankton			
Sub-section	General Variable or Phenomenon	Specific dataset or variable	Source
3i	Phytoplankton, Ocean Color	MODIS-Aqua	https://oceancolor.gsfc.nasa.gov/reprocessing/

Section 3j Global Ocean Carbon Cycle			
Sub-section	General Variable or Phenomenon	Specific dataset or variable	Source
3j2	Ocean Carbon	SOCAT version 2022	https://doi.org/10.25921/r7xa-bt92
3j2	Sea Surface Temperature	NOAA Optimum Interpolation SST (OISST) v2.1	https://www.ncei.noaa.gov/products/optimum-interpolation-sst
3j2	Chlorophyll	GlobColour	https://www.globcolour.info/
3j2	Atmospheric Carbon Dioxide	NOAA Greenhouse Gas Marine Boundary Layer Reference	https://gml.noaa.gov/ccgg/mb/mb.html
3j2	Winds [Near] Surface	ERA5	https://www.ecmwf.int/en/forecasts/datasets/reanalysis-datasets/era5
3j2	Ocean Salinity	Hadley Center EN4	https://www.metoffice.gov.uk/hadobs/en4/
3j3	Ocean Temperature	Argo monthly climatology	https://sio-argo.ucsd.edu/RG_Climatology.html
3j3	Ocean Salinity	Argo monthly climatology	https://sio-argo.ucsd.edu/RG_Climatology.html

Sidebar 3.1 The 2020–22 triple-dip La Niña			
Sub-section	General Variable or Phenomenon	Specific dataset or variable	Source
SB3.1	Sea Surface Temperature	ERSSTv5	https://doi.org/10.7289/V5T72FNM
SB3.1	Winds [Upper Atmosphere]	NCEP/DOE Reanalysis 2	https://www.cpc.ncep.noaa.gov/products/wesley/reanalysis2/
SB3.1	Precipitation	NCEP/DOE Reanalysis 2	https://www.cpc.ncep.noaa.gov/products/wesley/reanalysis2/
SB3.1	Precipitation	Global Precipitation Climatology Project (GPCP)	https://www.ncei.noaa.gov/products/climate-data-records/precipitation-gpcp-monthly
SB3.1	Sea Surface Temperature	HadISST	https://www.metoffice.gov.uk/hadobs/hadisst/
SB3.1	Temperature [Near] Surface	Global Temperature Anomalies	https://www.ncei.noaa.gov/access/monitoring/global-temperature-anomalies/anomalies

Sidebar 3.2 Tracking global ocean oxygen content			
Sub-section	General Variable or Phenomenon	Specific dataset or variable	Source
SB3.2	Ocean dissolved oxygen content	GLODAP v2	https://www.ncei.noaa.gov/access/ocean-carbon-acidification-data-system/oceans/GLODAPv2_2022/
SB3.2	Ocean dissolved oxygen content	GOBAI-O ₂	https://www.pmel.noaa.gov/gobai/

Section 4b ENSO and the tropical Pacific			
Sub-section	General Variable or Phenomenon	Specific dataset or variable	Source
4b	Sea Surface Temperature	ERSSTv5	https://doi.org/10.7289/V5T72FNM
4b1	Sea Surface Temperature	NOAA Optimum Interpolation SST (OISST)v2.1	https://www.ncei.noaa.gov/products/optimum-interpolation-sst
4b1	Subsurface ocean temperature	Global Ocean Data Assimilation System (GODAS, Behringer, 2007)	https://www.cpc.ncep.noaa.gov/products/GODAS/
4b2	Outgoing longwave radiation	NCEP CPC OLR (Liebmann and Smith, 1996)	https://www.cpc.ncep.noaa.gov/products/global_precip/html/wpage_olr.html
4b3	wind vectors/wind speed	NCEP NCAR reanalysis 1	https://psl.noaa.gov/data/gridded/data.ncep.reanalysis.html

Section 4c Tropical Intraseasonal Activity			
Sub-section	General Variable or Phenomenon	Specific dataset or variable	Source
4c	Outgoing longwave radiation	HIRS OLR (Schreck et al. 2018)	https://www.ncei.noaa.gov/access/metadata/landing-page/bin/iso?id=gov.noaa.ncdc:C00875
4c	wind velocity potential anomalies	Climate Forecast System Reanalysis (CFSR)	https://climatedataguide.ucar.edu/climate-data/climate-forecast-system-reanalysis-cfsr
4c	Subsurface ocean heat content	Global Ocean Data Assimilation System (GODAS, Behringer et al. 1998)	https://www.cpc.ncep.noaa.gov/products/GODAS/

Section 4d Intertropical Convergence Zone			
Sub-section	General Variable or Phenomenon	Specific dataset or variable	Source
4d1	Precipitation	Multisource weighted ensemble precipitation (MSWEP v2.8)	https://www.gloh2o.org/mswep/
4d2	Sea level pressure	NCEP NCAR reanalysis 1	https://psl.noaa.gov/data/gridded/data.ncep.reanalysis.html
4d2	Precipitation	Integrated Multi-satellitE Retrievals for GPM (IMERG)	https://gpm.nasa.gov/data/imerg
4d2	Outgoing Longwave Radiation	NCEP CPC OLR (Liebmann and Smith, 1996)	https://www.cpc.ncep.noaa.gov/products/global_precip/html/wpage_olr.html
4d2	Sea Surface Temperature	NOAA Optimum Interpolation SST (OISST)v2.1	https://www.ncei.noaa.gov/products/optimum-interpolation-sst

Section 4e Global Monsoon Summary			
Sub-section	General Variable or Phenomenon	Specific dataset or variable	Source
4e	Precipitation	Global Precipitation Climatology Project (GPCP)	https://www.ncei.noaa.gov/products/climate-data-records/precipitation-gpcp-monthly
4e	Sea Surface Temperature	ERSSTv5	https://doi.org/10.7289/V5T72FNM
4e	Sea Surface Temperature	HadISST	https://www.metoffice.gov.uk/hadobs/hadisst/
4e	Wind, [Near] Surface	ERA5	https://www.ecmwf.int/en/forecasts/datasets/reanalysis-datasets/era5
4e	Wind, Upper Atmosphere	ERA5	https://www.ecmwf.int/en/forecasts/datasets/reanalysis-datasets/era5

Section 4f Indian Ocean Dipole			
Sub-section	General Variable or Phenomenon	Specific dataset or variable	Source
4f	Precipitation	Climate Prediction Center (CPC) Merged Analysis of Precipitation (CMAP)	https://www.cpc.ncep.noaa.gov/products/global_precip/html/wpage.cmap.html
4f	Sea Surface Temperature	NOAA Optimum Interpolation SST (OISST)v2	https://www.ncei.noaa.gov/products/optimum-interpolation-sst
4f	Wind, [Near] Surface	JRA-55 Atmospheric Reanalysis	http://jra.kishou.go.jp/JRA-55/index_en.html

Section 4g Tropical Cyclones			
Sub-section	General Variable or Phenomenon	Specific dataset or variable	Source
4g1, 4g5, 4g6, 4g7	Tropical Cyclone Data	International Best Track Archive for Climate Stewardship (IBTrACS)	https://www.ncei.noaa.gov/products/international-best-track-archive
4g2	Tropical Cyclone Data	Hurdat2	www.aoml.noaa.gov/hrd/hurdat/Data_Storm.html
4g2, 4g4	Sea Surface Temperature	ERSSTv5	https://doi.org/10.7289/V5T72FNM
4g2	Outgoing Longwave Radiation	NCEP CPC OLR (Liebmann and Smith, 1996)	https://www.cpc.ncep.noaa.gov/products/global_precip/html/wpage.olr.html
4g2, 4g4	Wind, [Near] Surface	ERA5	https://www.ecmwf.int/en/forecasts/datasets/reanalysis-datasets/era5
4g3, 4g5, 4g6	Sea Surface Temperature	NOAA Optimum Interpolation SST (OISST)v2	https://www.ncei.noaa.gov/products/optimum-interpolation-sst

Sub-section	General Variable or Phenomenon	Specific dataset or variable	Source
4g3	Wind, [Near] Surface	Climate Forecast System Reanalysis (CFSR)	https://climatedataguide.ucar.edu/climate-data/climate-forecast-system-reanalysis-cfsr
4g3, 4g5	Outgoing longwave radiation	HIRS OLR (Schreck et al. 2018)	https://www.ncei.noaa.gov/access/metadata/landing-page/bin/iso?id=gov.noaa.ncdc:C00875
4g4	Tropical Cyclone Data	RSMC-Tokyo, JMA best-track data	www.jma.go.jp/jma/jma-eng/jma-center/rsmc-hp-pub-eg/besttrack.html
4g5	Wind, [Near] Surface	Climate Forecast System Reanalysis (CFSR)	https://climatedataguide.ucar.edu/climate-data/climate-forecast-system-reanalysis-cfsr
4g6	Temperature, [Near] Surface	GHCNDEX	www.climdex.org/
4g6	Wind, [Near] Surface	Climate Forecast System Reanalysis (CFSR)	https://climatedataguide.ucar.edu/climate-data/climate-forecast-system-reanalysis-cfsr
4g8	Tropical Cyclone Data	Southwest Pacific Enhanced Archive of Tropical Cyclones (SPEARTC)	http://apdrc.soest.hawaii.edu/projects/speartc

Sidebar 4.1 Hurricanes Fiona and Ian: A pair of impactful North Atlantic major hurricanes

Sub-section	General Variable or Phenomenon	Specific dataset or variable	Source
SB4.1	Floods	United States Geological Survey Flood Event Viewer	https://stn.wim.usgs.gov/FEV/

Sidebar 4.2 Tropical cyclone contributions during the 2022 North American Monsoon

Sub-section	General Variable or Phenomenon	Specific dataset or variable	Source
SB4.2	Precipitation	Parameter-elevation Relationships on Independent Slopes Model (PRISM)	https://prism.oregonstate.edu/

Section 5b Surface Air Temperature			
Sub-section	General Variable or Phenomenon	Specific dataset or variable	Source
5b2	Temperature, [Near] Surface	NASA GISTEMP v4	https://data.giss.nasa.gov/gistemp/
5b3	Temperature, [Near] Surface	NCEP/NCAR Reanalysis 1	https://psl.noaa.gov/data/gridded/data.ncep.reanalysis.html
5b3	Pressure, Sea Level or Near-Surface	ERA5	https://www.ecmwf.int/en/forecasts/datasets/reanalysis-datasets/era5
5b3	Precipitation	ERA5	https://www.ecmwf.int/en/forecasts/datasets/reanalysis-datasets/era5

Section 5c Precipitation			
Sub-section	General Variable or Phenomenon	Specific dataset or variable	Source
5c2, 5c3, 5c4	Precipitation	ERA5	https://www.ecmwf.int/en/forecasts/datasets/reanalysis-datasets/era5
5c3	Precipitation	GPCC	https://opendata.dwd.de/climate_environment/GPCC/html/download_gate.html

Section 5d Sea Surface Temperature			
Sub-section	General Variable or Phenomenon	Specific dataset or variable	Source
5d	Sea Surface Temperature	NOAA Optimum Interpolation SST (OISST) v2	https://www.ncei.noaa.gov/products/optimum-interpolation-sst
5d	Sea Ice Concentration	NOAA NSIDC Climate Data Record of Passive Microwave Sea Ice Concentration, Version 4	https://nsidc.org/data/g02202
5d	Sea Ice Concentration	NOAA/NSIDC Climate Data Record of Passive Microwave Sea Ice Concentration, Version 2	https://nsidc.org/data/g10016

Section 5e Sea Ice			
Sub-section	General Variable or Phenomenon	Specific dataset or variable	Source
5e1	Sea Ice Extent	NSIDC Sea Ice Extent	https://nsidc.org/data/g02135
5e2	Sea Ice Thickness	Cryosat-2/SMOS	https://earth.esa.int/eogateway/catalog/smos-cryosat-l4-sea-ice-thickness
5e2	Sea Ice Thickness	ICESat-2	https://icesat-2.gsfc.nasa.gov/icesat-2-data

Section 5f Greenland Ice Sheet			
Sub-section	General Variable or Phenomenon	Specific dataset or variable	Source
5f	Albedo	MODIS (Greenland)	https://nsidc.org/data/MODGRNLD/versions/1
5f	Glacier Ablation	PROMICE Glacier Front Line (Greenland)	https://doi.org/10.22008/promice/data/calving_front_lines
5f	Glacier Mass, Area or Volume	Gravity Recovery and Climate Experiment Follow-on (GRACE-FO)	https://grace.jpl.nasa.gov/data/get-data/
5f	Air temperature	DMI/PROMICE Weather Stations	http://polarportal.dk/en/weather/historisk-vejr/#:~:text=DMI%20has%20a%20number%20of,go%20back%20almost%20250%20years.&text=One%20cannot%20expect%20that%20temperature%20observations%20spanning%20centuries%20are%20homogeneous.
5f	Ice Sheet Melt	Special Sensor Microwave Imager/Sounder (SSMIS)	https://nsidc.org/data/nsidc-0001
5f	Ice Sheet Albedo	Moderate Resolution Imaging Spectroradiometer (MODIS)	https://nsidc.org/data/MODGRNLD/versions/1
5f	Ice Sheet Albedo	Sentinel-3	https://cds.climate.copernicus.eu/cdsapp#!/dataset/satellite-albedo?tab=overview
5f	Ice Sheet Discharge	Ice Discharge (Greenland)	https://doi.org/10.22008/promice/data/ice_discharge/d/v02
5f	Ice Sheet Surface Mass Balance	Modèle Atmosphérique Régionale surface mass	https://mar.cnrs.fr/

Section 5g Terrestrial Snow Cover			
Sub-section	General Variable or Phenomenon	Specific dataset or variable	Source
5g	Snow Mass	GRACE / GRACE-FO	https://grace.jpl.nasa.gov/data/get-data/
5g	Snow Properties	Crocus Snowpack Model	http://www.umr-cnrm.fr/spip.php?article265
5g	Snow Properties	ERA5	https://www.ecmwf.int/en/forecasts/datasets/reanalysis-datasets/era5
5g	Snow Properties	MERRA-2	http://gmao.gsfc.nasa.gov/reanalysis/MERRA-2/
5g	Snow Properties	NOAA Interactive Multi-sensor Snow and Ice Mapping System (Snow Cover Duration)	https://usicecenter.gov/Products/ImsHome
5g	Snow Properties	Northern Hemisphere (NH) Snow Cover Extent (SCE), Version 1	http://doi.org/10.7289/V5N014G9
5g	Snow Properties	Snow CCI	http://snow-cci.enveo.at/

Section 5h Arctic river discharge			
Sub-section	General Variable or Phenomenon	Specific dataset or variable	Source
5h	River Discharge	ArcticGRO Discharge	https://arcticgreativers.org/

Section 5i Permafrost			
Sub-section	General Variable or Phenomenon	Specific dataset or variable	Source
5i1	Permafrost	Global Terrestrial Network for Permafrost (GTN-P)	http://gtnpdatabase.org/
5i1	Permafrost	Permafrost Temperature	http://permafrost.gi.alaska.edu/sites_map
5i1	Temperature, [Near] Surface	ERA5 Copernicus Climate Store	https://cds.climate.copernicus.eu
5i2	Permafrost	CALM Active Layer Thickness	www2.gwu.edu/~calm/

Section 5j Tundra Greenness			
Sub-section	General Variable or Phenomenon	Specific dataset or variable	Source
5j	Vegetative Index	Global Inventory Modeling and Mapping Studies (GIMMS) 3gv1	https://iridl.ldeo.columbia.edu/SOURCES/.NASA/.ARC/.ECOCAST/.GIMMS/.NDVI3g/.v1p0/index.html?Set-Language=en
5j	Vegetative Index	MODIS Normalized Difference Vegetative Index (NDVI)	https://modis.gsfc.nasa.gov/data/dataproduct/mod13.php

Section 5k Ozone and UV Radiation			
Sub-section	General Variable or Phenomenon	Specific dataset or variable	Source
5k1	Ozone, Total Column and Stratospheric	Aura OMI/MLS	https://disc.gsfc.nasa.gov/datasets/ML203_004/summary
5k1	Ozone, Total Column and Stratospheric	Bodeker Scientific	http://www.bodekerscientific.com/data/total-column-ozone
5k2	Ozone, Total Column and Stratospheric	OMTO3	https://disc.gsfc.nasa.gov/datasets/OMTO3_003/summary

Section 6b Atmospheric circulation and surface observations			
Sub-section	General Variable or Phenomenon	Specific dataset or variable	Source
6b	Modes of Variability	Marshall Southern Annular Mode Index	http://www.nerc-bas.ac.uk/icd/gjma/sam.html
6b	Temperature, [Near] Surface	ERA5	https://www.ecmwf.int/en/forecasts/datasets/reanalysis-datasets/era5
6b	Geopotential Height	ERA5	https://www.ecmwf.int/en/forecasts/datasets/reanalysis-datasets/era5
6b	Pressure, Sea Level or Near-Surface	ERA5	https://www.ecmwf.int/en/forecasts/datasets/reanalysis-datasets/era5
6b	Pressure, Sea Level or Near-Surface	University of Wisconsin Madison automated weather stations - Antarctic Meteorological Research and Data Center	https://amrdcdata.ssec.wisc.edu
6b	Temperature, [Near] Surface	University of Wisconsin Madison automated weather stations - Antarctic Meteorological Research and Data Center	https://amrdcdata.ssec.wisc.edu
6b	Temperature, Upper Atmosphere	ERA5	https://www.ecmwf.int/en/forecasts/datasets/reanalysis-datasets/era5
6b	Wind, Upper Atmosphere	ERA5	https://www.ecmwf.int/en/forecasts/datasets/reanalysis-datasets/era5

Section 6c ice-sheet surface mass balance			
Sub-section	General Variable or Phenomenon	Specific dataset or variable	Source
6c	Ice-sheet surface mass balance	ERA5	https://www.ecmwf.int/en/forecasts/datasets/reanalysis-datasets/era5
6c	Ice-sheet surface mass balance	MERRA-2	http://gmao.gsfc.nasa.gov/reanalysis/MERRA-2/

Section 6d ice-sheet melt extent and duration			
Sub-section	General Variable or Phenomenon	Specific dataset or variable	Source
6d	Ice-Sheet Surface Melt	DMSP-SSMIS	https://nsidc.org/data/nsidc-0001/versions/6
6d	Sea Ice Extent / Area / Concentration	Nimbus-7 SMMR Sea Ice Concentration	https://nsidc.org/data/nsidc-0007

Section 6e Ice-sheet Mass Balance			
Sub-section	General Variable or Phenomenon	Specific dataset or variable	Source
6e	Ice-Sheet Surface Height	ATLAS/ICESat-2 Land Height	https://nsidc.org/data/atl06/versions/5
6e	Ice-Sheet Mass	GRACE - GRACE FO CRI	https://podaac.jpl.nasa.gov/dataset/TELLUS_GRAC-GRFO_MASCON_CRI_GRID_RL06_V2
6e	Ice-Sheet Surface Height	ICESat-2	https://icesat-2.gsfc.nasa.gov/

Section 6f Sea Ice Extent, Concentration, and Seasonality			
Sub-section	General Variable or Phenomenon	Specific dataset or variable	Source
6f	Sea Ice Duration	Near-Real-Time DMSP SSM/I-SSMIS Daily Polar Gridded	https://nsidc.org/data/nsidc-0081/versions/2
6f	Sea Ice Duration	Nimbus-7 SMMR and DMSP SSM/I (Bootstrap)	https://nsidc.org/data/nsidc-0079/versions/3
6f	Sea Surface Temperature	NOAA Optimum Interpolation SST (OISST) v2.1	https://www.ncei.noaa.gov/products/optimum-interpolation-sst

Section 6g Southern Ocean			
Sub-section	General Variable or Phenomenon	Specific dataset or variable	Source
6g1	Sea Surface Temperature	NOAA Optimum Interpolation SST (OISST) v2	https://www.ncei.noaa.gov/products/optimum-interpolation-sst
6g1, 6g2, 6g3	Ocean Heat Content	Argo monthly climatology	https://sio-argo.ucsd.edu/RG_Climatology.html
6g1	Sea Surface Salinity	Argo monthly climatology	https://sio-argo.ucsd.edu/RG_Climatology.html
6g1	Mixed Layer Depth	Argo monthly climatology	https://sio-argo.ucsd.edu/RG_Climatology.html
6g3	Surface Heat flux	ERA5	https://www.ecmwf.int/en/forecasts/datasets/reanalysis-datasets/era5
6g3	Dissolved Oxygen	Argo profiling floats	https://argo.ucsd.edu/data/
6g3	Ocean Chlorophyll	GlobColour	https://doi.org/10.48670/moi-00281

Section 6h 2022 Antarctic Ozone Hole			
Sub-section	General Variable or Phenomenon	Specific dataset or variable	Source
6h	Cloud Volume	CALIPSO	http://www-calipso.larc.nasa.gov
6h	Temperature, upper atmosphere	MERRA-2	https://gmao.gsfc.nasa.gov/reanalysis/MERRA-2/
6h	Ozone, Total Column and Stratospheric	Aura MLS	https://disc.gsfc.nasa.gov/datasets?page=1&source=AURA%20MLS
6h	Ozone, Total Column and Stratospheric	Ozone Mapping Instrument (OMI) Ozone Mapping & Profiler Suite (OMPS), Total Ozone Mapping Spectrum (TOMS), Earth Probe TOMS (EPTOMS)	https://ozoneaq.gsfc.nasa.gov/data/ozone/ , http://ozonewatch.gsfc.nasa.gov
6h	Ozone, Lower Stratosphere	Ozonesonde	https://gml.noaa.gov/dv/spo_oz/
6h	Temperature, [Near] Surface	MERRA-2	http://gmao.gsfc.nasa.gov/reanalysis/MERRA-2/

Section SB6.1 The Antarctic Heat Wave of March 2022			
Sub-section	General Variable or Phenomenon	Specific dataset or variable	Source
SB6.1	Ice-Sheet Surface Melt	DMSPP-SSMIS	https://nsidc.org/data/nsidc-0001/versions/6
SB6.1	Temperature, [Near] Surface	University of Wisconsin Madison automated weather stations - Antarctic Meteorological Research and Data Center	https://amrdcdata.ssec.wisc.edu
SB6.1	Water Vapor Transport	ERA5	https://www.ecmwf.int/en/forecasts/datasets/reanalysis-datasets/era5
SB6.1	Water Vapor Transport	MERRA-2	http://gmao.gsfc.nasa.gov/reanalysis/MERRA-2/
SB6.1	Geopotential Height	MERRA-2	http://gmao.gsfc.nasa.gov/reanalysis/MERRA-2/
SB6.2	Ice Extent (photographic)	LANDSAT-8	https://www.usgs.gov/landsat-missions/landsat-data-access
SB6.2	Sea Ice Concentration	AMSR-2	https://seaice.uni-bremen.de/sea-ice-concentration/amsre-amsr2/
SB6.2	Wave propagation direction	WaveWatch III	https://polar.ncep.noaa.gov/waves/ensemble/download.shtml
SB6.2	Wave height	ERA5	https://www.ecmwf.int/en/forecasts/datasets/reanalysis-datasets/era5
	Ice-sheet surface mass balance	ERA5	https://www.ecmwf.int/en/forecasts/datasets/reanalysis-datasets/era5

SB6.2 Larsen B Fast Ice Breakout and Initial Glacial Response

Sub-section	General Variable or Phenomenon	Specific dataset or variable	Source
SB6.2	Ice Extent (photographic)	LANDSAT-8	https://www.usgs.gov/landsat-missions/landsat-data-access
SB6.2	Sea Ice Concentration	AMSR-2	https://seaice.uni-bremen.de/sea-ice-concentration/amsre-amsr2/
SB6.2	Wave propagation direction	WaveWatch III	https://polar.ncep.noaa.gov/waves/ensemble/download.shtml
SB6.2	Wave height	ERA5	https://www.ecmwf.int/en/forecasts/datasets/reanalysis-datasets/era5
	Ice-sheet surface mass balance	ERA5	https://www.ecmwf.int/en/forecasts/datasets/reanalysis-datasets/era5

