

APPENDIX I: RELEVANT DATASETS AND SOURCES

General Variable or Phenomenon	Specific Dataset or Variable	Source	Section
Aerosols	CAMS Reanalysis	http://macc.copernicus-atmosphere.eu/catalogue	2g3
Air–sea Fluxes	CERES Energy Balanced and Filled	https://ceres.larc.nasa.gov	3e1, 3e4
	CERES FLASHflux	https://eosweb.larc.nasa.gov/project/ceres/ebaf_surface_table	3e1
	Woods Hole Oceanographic Institute OAFflux	http://oafux.whoi.edu	3e1, 3e3, 3e4
Albedo	MODIS	http://ladsweb.nascom.nasa.gov	2h1, 5e
Biomass, Greenness, Burning	GFAS	www.gmes-atmosphere.eu/about/project_structure/global/g_idas/g_idas_2	2h3
	GFEDv4	https://daac.ornl.gov/VEGETATION/guides/fire_emissions_v4.html	2h3
	MODIS NDVI	https://modis.gsfc.nasa.gov/data/dataproduct/dataproducts.php?MOD_NUMBER=13	5h
Clouds, Cloudiness	CALIPSO	http://eosweb.larc.nasa.gov/PRODOCS/calipso/table_calipso.html	2d5
	CERES MODIS	https://ceres.larc.nasa.gov/science_information.php?page=ModisCloudRetr	2d5
	CLARA-A2	https://climatedataguide.ucar.edu/climate-data/clara-a1-cloud-properties-surface-albedo-and-surface-radiation-products-based-avhrr	2d5
	HIRS	www.ssec.wisc.edu/~donw/PAGE/CLIMATE.HTM	2d5
	MISR	http://eosweb.larc.nasa.gov/PRODOCS/misr/level3/overview.html	2d5
	PATMOS-x/AVHRR	www.ncdc.noaa.gov/cdr/atmospheric/avhrr-cloud-properties-patmos-x	2d5
	PATMOS-x/MODIS C6	http://ladsweb.nascom.nasa.gov	2d5
	SatCORPS	No public archive	2d5
Drought	scPSDI	https://crudata.uea.ac.uk/cru/data/drought	2d9
	CRU TS 3.25	https://crudata.uea.ac.uk/cru/data/hrg	2d9
Evaporation, Evapotranspiration, Sublimation	GLEAM	www.gleam.eu	2d10
FAPAR	MERIS	https://earth.esa.int/web/guest/missions/esa-operational-eo-missions/envisat/instruments/meris	2h2
	MODIS-TIP	http://modis.gsfc.nasa.gov/about	2h2
	SeaWiFS v 2010.0	http://oceancolor.gsfc.nasa.gov/cms/reprocessing	2h2
Geopotential Height	ERA-Interim	www.ecmwf.int/en/research/climate-reanalysis/era-interim	6b
	NCEP/NCAR Reanalysis I: Pressure	www.esrl.noaa.gov/psd/data/gridded/data.ncep_reanalysis.pressure.html	5b
Glacier Mass or Volume	World Glacier Monitoring Service	www.wgms.ch/mbb/sum12.html	2c3, 5f
	Randolph Glacier Inventory v3.2	www.glims.org/RGI	5f
Humidity, (near) Surface	Dai	by email to adai@ucar.edu	2d1
	ERA-Interim	www.ecmwf.int/research/era	2d1
	HadCRUH	www.metoffice.gov.uk/hadobs/hadcruh	2d1

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Humidity, (near) Surface (cont)	HadISDH	www.metoffice.gov.uk/hadobs/hadisdh	2d1
	HOAPS	http://wui.cmsaf.eu/safira/action/viewDoiDetails?acronym=HOAPS_V001	2d1
	JRA-55 Atmospheric Reanalysis	http://jra.kishou.go.jp/JRA-55/index_en.html	2d1
	MERRA-2	http://gmao.gsfc.nasa.gov/reanalysis/MERRA-2	2d1
	NOCS 2.0	www.noc.soton.ac.uk/noc_flux/noc2.php	2d1
Humidity, Upper Atmosphere	HIRS	www.ncdc.noaa.gov/cdr/fundamental/hirs-ch12-brightness-temperature	2d3
	NCEP/NCAR Reanalysis	www.esrl.noaa.gov/psd/data/gridded/data.ncep.reanalysis.html	4e2
	UTH	by email to Viju.John@eumetsat.int	2d3
Ice Sheet Characteristics	DMSP-SSMIS	http://nsidc.org/data/nsidc-0032	5e, 6e
	GRACE	http://podaac.jpl.nasa.gov/datasetlist?ids=Platform&values=GRACE	5e, 5f
	PROMICE (Greenland)	www.promice.dk/home.html	5e
Lake Temperature	Globalakes	www.globalakes.ac.uk	2b2
	Lake Vättern (Sweden)	Vättern Water Protection Association	2b2
	Lake Zurich (Switzerland)	City of Zurich Water Supply and Amt für Abfall, Wasser, Energie und Luft of the Canton of Zurich	2b2
	Mondsee (Austria)	http://hydro.ooe.gv.at/#Startseite	2b2
	Neusiedler See (Austria)	http://wasser.bgld.gv.at/hydrographie/online-daten.html	2b2
	Polish Lakes	www.imgw.pl	2b2
	Wörther See (Austria)	https://info.ktn.gv.at/asp/hydro/daten/hydroportal/see_wt.asp	2b2
Martian Climate	MARCI/MRO	https://mars.nasa.gov/mro/mission/instruments/marci/	SB2.1
	MCS/MRO	https://mars.nasa.gov/mro/mission/instruments/mcs	SB2.1
Modes of Variability	Arctic Oscillation (AO)	www.cpc.ncep.noaa.gov/products/precip/CWlink/daily_ao_index/teleconnections.shtml	2e1
	Atlantic Multidecadal Oscillation (AMO)	www.esrl.noaa.gov/psd/data/timeseries/AMO	3h
	Madden-Julian Oscillation (MJO) - Real-time Multivariate MJO	http://monitor.cicsnc.org/mjo/current/rmm	4c
	Madden-Julian Oscillation (MJO) - Real-time Multivariate MJO	www.bom.gov.au/climate/mjo/graphics/rmm.74toRealtime.txt	4c
	North Atlantic Oscillation (NAO)	ftp://ftp.cpc.ncep.noaa.gov/wd52dg/data/indices/tele_index.nh	2e1
	Oceanic Nino Index (ONI)	www.cpc.ncep.noaa.gov/products/analysis_monitoring/ensostuff/ensyears.shtml	2d6, 4b
	Pacific Decadal Oscillation (PDO)	www.cpc.ncep.noaa.gov/products/GODAS	2d6
	Southern Annular Mode (SAM)	www.antarctica.ac.uk/met/gjma/sam.html	6b
	Southern Annular Mode (SAM, AAO)	www.cpc.ncep.noaa.gov/products/precip/CWlink/daily_ao_index/aa0/aa0.shtml	2e1
	Southern Oscillation Index (SOI)	ftp://ftp.bom.gov.au/anon/home/ncc/www/sco/soi/soiplaintext.html	2d10, 2e1

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Modes of Variability (cont)	Southern Oscillation Index (EQ-SOI)	www.cpc.ncep.noaa.gov/data/indices	6d
Ocean Carbon	pCO ₂	www.socat.info	3j
	Global Ocean Ship-Based Hydrographic Investigations Program	www.go-ship.org	3j, 6g
	SOCCOM	https://socom.princeton.edu/content/float-data	SB6.1
Ocean Circulation	Atlantic Meridional Overturning Circulation (AMOC)	www.noc.soton.ac.uk/rapidmoc	3h
Ocean Heat Content	CSIRO/ACE CRC/IMAS-UTAS estimate	www.cmar.csiro.au/sealevel/thermal_expansion_ocean_heat_timeseries.html	3c
	PMEL/JPL/JIMAR	http://oceans.pmel.noaa.gov	3c
	MRI/JMA	www.data.jma.go.jp/gmd/kaiyou/english/ohc/ohc_global_en.html	3c
	NCEP Ocean Reanalysis	www.cpc.ncep.noaa.gov/products/GODAS	4h
	NCEI	www.nodc.noaa.gov/OC5/indprod.html	3c
	UK Met Office EN4.0.2	www.metoffice.gov.uk/hadobs/en4/download-en4-0-2-109.html	3c
Ocean Mass	NASA Gravity Recovery and Climate Experiment	https://grace.jpl.nasa.gov/data/get-data/monthly-mass-grids-ocean	3f
Ocean Salinity	Aquarius V3.0	http://podaac.jpl.nasa.gov/aquarius	3d
	Argo	http://doi.org/10.17882/42182	3c, 3d, SB3.2
	Blended Analysis for Surface Salinity	ftp://ftp.cpc.ncep.noaa.gov/precip/BASS	3d2
	World Ocean Atlas 2013	www.nodc.noaa.gov/OC5/woa13	3d2, 3d3
Outgoing Longwave Radiation	CERES FLASHFlux Project	http://flashflux.larc.nasa.gov	3e
	Daily OLR	www.ncdc.noaa.gov/cdr/atmospheric/outgoing-longwave-radiation-daily	4b2
Ozone, Total Column and Stratospheric	Bodeker Scientific	www.bodekerscientific.com/data/total-column-ozone	5j
	Calipso (Polar Stratospheric Clouds)	http://eosweb.larc.nasa.gov/PRODOCS/calipso/table_calipso.html	6h
	GOME/SCIAMACHY/GOME2 (GSG) Merged Total Ozone	www.iup.uni-bremen.de/gome/wfdoas	2g4, 6h
	GOME/SCIAMACHY/GOME2 (GTO) Merged Total Ozone	http://atmos.eoc.dlr.de/gome/gto-ecv.html www.esa-ozone-cci.org	2g4
	GOZCARDS ozone profiles	https://gozcards.jpl.nasa.gov http://mirador.gsfc.nasa.gov	2g4
	KNMI OMI	http://ozoneaq.gsfc.nasa.gov	6h
	Multi Sensor Reanalysis (MSR) of total ozone	www.temis.nl	2g4
	NASA Aura Microwave Limb Sounder	http://aura.gsfc.nasa.gov/instruments/mls.html	5j, 6h
	NASA BUV/SBUV v8.6 (MOD v8.6) Merged Ozone	http://acdb-ext.gsfc.nasa.gov/Data_services/merged	2g4
	NOAA BUV/SBUV v8.6 (MOD v8.6) Merged Ozone	ftp://ftp.cpc.ncep.noaa.gov/SBUV_CDR	2g4

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Ozone, Total Column and Stratospheric (cont)	Ozonesonde	www.esrl.noaa.gov/gmd/dv/spo_oz	6h
	SAGE II/OSIRIS	dataset linked to Bourassa et al. (2014)	2g4
	SWOOSH	www.esrl.noaa.gov/csd/groups/csd8/swoosh	2g4
	WOUDC Ground-based Ozone	ftp://ftp.tor.ec.gc.ca/pub/woudc/Project-Campaigns/ZonalMeans	2g4
Ozone, Tropospheric	Aura OMI/MLS	http://acd-ext.gsfc.nasa.gov/Data_services/cloud_slice/new_data.html	2g6
	MLO Observatory	www.esrl.noaa.gov/gmd/dv/iadv/graph.php?code=MLO&program=ozwv&type=ts	2g6
Permafrost	Active Layer Thickness	http://nsidc.org/data/docs/fgdc/ggd313_calm	5i
	Global Terrestrial Network for Permafrost (GTN-P)	http://gtnp.arcticportal.org	2c1
	Permafrost Temperature	http://permafrost.gi.alaska.edu/sites_map	5i
	Permafrost Temperature at French sites	permafrance.osug.fr	2c1
	Permafrost Temperature at Norwegian sites	www.tspnorway.com www.met.no	2c1
	Permafrost Temperature at Swiss sites	www.permos.ch	2c1
Phytoplankton, Ocean Color	MODIS-Aqua Reprocessing 2013.1	http://oceancolor.gsfc.nasa.gov/cms/reprocessing	3i
	SeaWiFS v 2010.0	http://oceancolor.gsfc.nasa.gov/cms/reprocessing	3i
	VIIRS v 2014.0	http://oceancolor.gsfc.nasa.gov/cms/reprocessing	3i
Precipitation	CAMS-OPI	ftp://ftp.cpc.ncep.noaa.gov/precip/data-req/cams_opi_v0208	4b3
	CMAP	ftp://ftp.cpc.ncep.noaa.gov/precip/cmap	4e
	CMORPH	www.cpc.ncep.noaa.gov/products/janowiak/cmorph_description.html	4d1, 4d2
	GHCN	www.ncdc.noaa.gov/temp-and-precip/ghcn-gridded-products.php	2d4
	GPCPv23	http://precip.gsfc.nasa.gov	2d4, 4e, 4h
	GPPC	www.gpcc.dwd.de	2d4
Precipitation (net), Freshwater Flux	JRA-55 Atmospheric Reanalysis	http://jra.kishou.go.jp/JRA-55/index_en.html	6d
	GPCPv23, OAFflux	http://precip.gsfc.nasa.gov , http://oafux.who.edu	3e
Pressure, Sea Level or Near-Surface	Antarctic Meteorological Research Center (AMRC) AWS	http://amrc.ssec.wisc.edu/data	6c
	ERA-Interim	www.ecmwf.int/en/research/climate-reanalysis/era-interim	6b
	HadSLP2r	www.metoffice.gov.uk/hadobs	2e1
	JRA-55 Atmospheric Reanalysis	http://jra.kishou.go.jp/JRA-55/index_en.html	6d
	READER	https://legacy.bas.ac.uk/met/READER	6c
River Discharge	ELSE	No public archive	2d6
Sea Ice Concentration	AMSR2 Daily	https://seaice.uni-bremen.de	6g
Sea Ice Duration	Near-Real-Time DMSP SSM/I-SSMIS Daily Polar Gridded	http://nsidc.org/data/nsidc-0081.html	6e

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Sea Ice Duration (cont)	Nimbus-7 SMMR and DMSP SSM/I (Bootstrap)	http://nsidc.org/data/nsidc-0079.html	6e
Sea Ice Extent	Nimbus-7 SMMR and DMSP SSM/I (Bootstrap)	http://nsidc.org/data/docs/daac/nsidc0079_bootstrap_seaice.gd.html	5c, 6f
Sea Ice Freeboard/ Thickness	CryoSat-2	https://earth.esa.int/web/guest/-/how-to-access-cryosat-data-6842	5c
Sea Level/Sea Surface Height	Ssalto/Duacs Multimission Altimeter Products	http://marine.copernicus.eu/services-portfolio/access-to-products/?option=com_csw&view=details&product_id=SEALEVEL_GLO_PHY_L4_NRT_OBSERVATIONS_008_046	3f, 6g
	Tide Gauge	http://uhslc.soest.hawaii.edu	3f
	Tide Gauge	https://tidesandcurrents.noaa.gov/noaatidepredictions/NOAATidesFacade.jsp?Stationid=8722670	3h
	TOPEX/Jason	http://sealevel.colorado.edu	3f
Sea Surface Temperature	ERSST v4	http://doi.org/10.7289/V5KD1VVF	3b, SB3.1, 4e2
	HadSST3	www.metoffice.gov.uk/hadobs/hadsst3	2b1, 3b
	NOAA Optimum Interpolation SST (OISST) v2	www.esrl.noaa.gov/psd/data/gridded/data.ncep.oisst.v2.html	3b, 4b1, 4d2, 4h, 5d, 6f
	OI SST (RSS)	www.remss.com	6g
Sea Subsurface Temperature	Argo	http://doi.org/10.17882/42182	SB3.2
	NCEP Ocean Reanalysis	www.cpc.ncep.noaa.gov/products/GODAS	4b1, 4h
Snow Cover	GlobSnow	http://nsidc.org/data/NSIDC-0595	5g
	NOAA daily Interactive Multi-sensor Snow and Ice Mapping System	http://nsidc.org/data/g02156	5g
	Snow Cover Extent and Duration	www.snowcover.org	2c2, 5g
Soil Moisture	ESA CCI SM	www.esa-soilmoisture-cci.org/node?page=3	2d8
Solar Transmission	NOAA/ESRL Mauna Loa Solar Transmission	www.esrl.noaa.gov/gmd/grad/mloapt.html	2f2
Stratospheric Water Vapor	Frost Point Hygrometer Data (Boulder, Hilo, Lauder)	ftp://afpt.cmdl.noaa.gov/data/ozwv/WaterVapor	2g5
	Frost Point Hygrometer Data (San Jose)	http://physics.valpo.edu/ozone/ticosonde.html	2g5
	NASA Aura Microwave Limb Sounder	http://aura.gsfc.nasa.gov/instruments/mls.html	2g5
Surface Current	Brazil-Malvina Region Confluence Region	www.aoml.noaa.gov/phod/altimetry/cvar/mal/BM_anm.php	3g
	Long Term Time Series of Surface Currents: Agulhas Current	www.aoml.noaa.gov/phod/altimetry/cvar/agu	3g
	Long Term Time Series of Surface Currents: North Brazil Current	www.aoml.noaa.gov/phod/altimetry/cvar/nbc	3g
	Ocean Surface Current Analysis - Real time (OSCAR)	www.oscar.noaa.gov	3g
	Yucatan Current	www.aoml.noaa.gov/phod/altimetry/cvar/yuc/transport.php	3g

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Temperature, (near) Surface	Antarctic Meteorological Research Center (AMRC) AWS	http://amrc.ssec.wisc.edu/data	6c
	Berkeley Earth Surface Temperature	www.berkeleyearth.org	2b1
	CRUTEM4	www.metoffice.gov.uk/hadobs/crutem4 http://www.cru.uea.ac.uk/cru/data/temperature	2b1, 5b
	ERA-Interim	www.ecmwf.int/en/research/climate-reanalysis/era-interim	2b1, 6b
	GHCNDEX	www.climdex.org/datasets.html	2b3
	HadCRUT4 Global Temperature	www.metoffice.gov.uk/hadobs/hadcrut4	2b1
	JMA Global Temperature	http://ds.data.jma.go.jp/tcc/tcc/products/gwp/temp/map/download.html	2b1
	JRA-55 Atmospheric Reanalysis	http://jra.kishou.go.jp/JRA-55/index_en.html	2b1
	MERRA-2	http://gmao.gsfc.nasa.gov/reanalysis/MERRA-2	2b1
	NASA/GISS Global Temperature	http://data.giss.nasa.gov/gistemp	2b1
	NCEP/NCAR Reanalysis	www.esrl.noaa.gov/psd/data/gridded/data.ncep.reanalysis.html	5b
	NOAAGlobalTemp	www.ncdc.noaa.gov/monitoring-references/faq/anomalies.php	2b1
	READER	https://legacy.bas.ac.uk/met/READER	6c
Temperature, Upper Atmosphere	ERA-Interim	www.ecmwf.int/en/research/climate-reanalysis/era-interim	2b4, 2b5, 6b, 6h
	JRA-55 Atmospheric Reanalysis	http://jra.kishou.go.jp/JRA-55/index_en.html	2b4, 2b5
	MERRA-2	http://gmao.gsfc.nasa.gov/reanalysis/MERRA-2	2b4, 2b5, 2g5, 6h
	NCEP CFSR	http://cfs.ncep.noaa.gov/cfsr	2b5
	RAOBCORE, RICH	www.univie.ac.at/theoret-met/research/raobcore	2b4, 2b5
	RATPAC A2	www.ncdc.noaa.gov/oa/climate/ratpac	2b4, 2b5
	RSS	www.remss.com	2b4, 2b5
	NOAA/NESDIS/STAR	www.star.nesdis.noaa.gov/smcd/emb/mscat	2b5
	UAH MSU	http://vortex.nsstc.uah.edu/public/msu	2b4, 2b5
University of New South Wales	http://web.science.unsw.edu.au/~stevensherwood/radproj/index.html	2b4, 2b5	
Terrestrial Groundwater Storage	GRACE	http://podaac.jpl.nasa.gov/star/index.php	2d7
TOA Earth Radiation Budget	CERES FLASHFlux	https://eosweb.larc.nasa.gov/project/ceres/ebaf_toa_table	2f1
	CERES EBAF Ed2.8	http://ceres.larc.nasa.gov/products.php?product=EBAF-TOA	2f1
Total Column Water Vapor	COSMIC GPS-RO	http://cdaac-www.cosmic.ucar.edu/cdaac/products.html	2d2
	ERA-Interim	www.ecmwf.int/en/research/climate-reanalysis/era-interim	2d2
	GNSS Ground-Based Total Column Water Vapor	http://dss.ucar.edu/datasets/ds721.1	2d2

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Total Column Water Vapor (cont)	JRA-55 Atmospheric Reanalysis	http://jra.kishou.go.jp/JRA-55/index_en.html	2d2
	MERRA-2	http://gmao.gsfc.nasa.gov/reanalysis/MERRA-2	2d2
	RSS SSM/I - AMSR-E Ocean Total Column Water Vapor	www.remss.com	2d2
Total Solar Irradiance	SORCE/TIM	http://science.nasa.gov/missions/sorce	2f1
Trace Gases	Atmospheric Greenhouse Gas Index (AGGI)	www.esrl.noaa.gov/gmd/aggi	2g1
	Carbon Dioxide	www.esrl.noaa.gov/gmd/dv/iadv	2g1
	Carbon Monoxide	http://macc.copernicus-atmosphere.eu/catalogue www2.acom.ucar.edu/mopitt	2g7
	Chlorine Monoxide - Aura MLS	http://mls.jpl.nasa.gov/products/clo_product.php	6h
	Halocarbons (CFCs, HFCs, HCFCs)	www.esrl.noaa.gov/gmd/hats/data.html	2g1
	Hydrogen Chloride - Aura MLS	http://disc.sci.gsfc.nasa.gov/datacollection/ML2HCL_V004.html	6h
	Methane	www.esrl.noaa.gov/gmd/dv/iadv	2g1
	Nitrous Oxide	www.esrl.noaa.gov/gmd/hats/combined/N2O.html	2g1
	Ozone-Depleting Gas Index (ODGI)	www.esrl.noaa.gov/gmd/odgi	2g2
	Perfluorocarbons	http://agage.eas.gatech.edu	2g1
Sulfur Hexafluoride	www.esrl.noaa.gov/gmd/hats/combined/SF6.html	2g1	
Tropical Cyclone Data	International Best Track Archive for Climate Stewardship (IBTrACS)	www.ncdc.noaa.gov/oa/ibtracs	4f
	JTWC Best-track Dataset (2011 preliminary)	www.usno.navy.mil/NOOC/nmfc-ph/RSS/jtwc/best_tracks	4e4, 4e5, 4e6, 4e7
	RSMC-Tokyo, JMA best-track data	www.jma.go.jp/jma/eng/jma-center/rsmc-hp-pub-eg/besttrack.html	4e4
	Southwest Pacific Enhanced Archive of Tropical Cyclones (SPEARTC)	http://apdr.c.soest.hawaii.edu/projects/spcartc	4e8
Wind, (near) Surface	Australian (McVicar)	http://doi.org/10.4225/08/56A85491DDED2	2e2
	ERA-Interim	www.ecmwf.int/en/research/climate-reanalysis/era-interim	2e2, 2e3
	ERAPreSAT		2e3
	GRASP	https://doi.pangaea.de/10.1594/PANGAEA.823617	2e3
	HadISD2	www.metoffice.gov.uk/hadobs/hadisd	2e2
	JRA-55 Atmospheric Reanalysis	http://jra.kishou.go.jp/JRA-55/index_en.html	2e2, 2e3, 4h
	MERRA-2	http://gmao.gsfc.nasa.gov/reanalysis/MERRA-2	2e2, 2e3
	RSS SSM/I Ocean Winds	www.remss.com/measurements/wind	2e2
WASWind	www.dpac.dpri.kyoto-u.ac.jp/tokinaga/waswind.html	2e2	
Wind, Upper Atmosphere	Climate Forecast System Reanalysis	www.ncdc.noaa.gov/data-access/model-data/model-datasets/climate-forecast-system-version2-cfsv2	4e3
	ERA-Interim	www.ecmwf.int/en/research/climate-reanalysis/era-interim	6b
	NCEP/NCAR Reanalysis	www.esrl.noaa.gov/psd/data/gridded/data.ncep_reanalysis.html	4c, 4e2, 4e4

