

APPENDIX A, MAJOR ABBREVIATIONS AND TERMS

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- 20CR, *20th Century Reanalysis of NOAA and CIRES*
- 3D-FGAT, *3-dimensional variational assimilation scheme with first guess at the appropriate time*
- 3D-Var, *3-dimensional variational assimilation scheme*
- 4D-Var, *4-dimensional variational assimilation scheme*
- ACRE, *Atmospheric Circulation Reconstructions over the Earth*
- AERONET, *Aerosol Robotic Network*
- AIRS, *Atmospheric Infrared Sounder*
- AMDAR, *Aircraft Meteorological Data Relay*
- AMIP, *Atmospheric Model Intercomparison Project*
- AMSR, *Advanced Microwave Scanning Radiometer*
- AMSR-E, *Advanced Microwave Scanning Radiometer for EOS*
- AMSU, *Advanced Microwave Sounding Unit*
- AMV, *atmospheric motion vector*
- ANA, *analysis state (for MERRA and MERRA-2; see Sect. 4)*
- AOD, *aerosol optical depth*
- Aqua, *a satellite in the EOS A-Train satellite constellation*
- ASM, *assimilated state (for MERRA and MERRA-2; see Sect. 4)*
- ATMS, *Advanced Technology Microwave Sounder*
- ATOVS, *Advanced TIROS Operational Vertical Sounder*
- Aura, *a satellite in the EOS A-Train satellite constellation*
- AVHRR, *Advanced Very High Resolution Radiometer*
- BUOY, *surface meteorological observation report from buoys*
- CDAS, *Climate Data Assimilation System*
- CFC, *chlorofluorocarbon*
- CFS, *Climate Forecast System*
- CFSR, *Climate Forecast System Reanalysis of NCEP*
- CFSv2, *Climate Forecast System, version 2*
- CIRES, *Cooperative Institute for Research in Environmental Sciences (NOAA and University of Colorado Boulder)*
- CLIRAD, *Climate and Radiation Branch, NASA Goddard Space Flight Center*
- CMIP5, *Coupled Model Intercomparison Project Phase 5*
- COBE, *Daily Sea Surface Temperature Analysis for Climate Monitoring (JMA)*
- CRIEPI, *Central Research Institute of Electric Power Industry*
- CrIS, *Cross-track Infrared Sounder*
- CRTM, *Community Radiative Transfer Model*
- CTM, *chemical transport model*
- CU, *convective (cumulus) cloud parametrization*
- DAO, *Data Assimilation Office (now GMAO)*
- DOE, *Department of Energy*
- ECMWF, *European Centre for Medium-Range Weather Forecasts*
- EMC, *Environmental Modeling Center*

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- EnKF, *ensemble Kalman filter (a data assimilation scheme)*
- EOS, *NASA's Earth Observing System*
- ERA-15, *ECMWF 15-year reanalysis*
- ERA-20C, *ECMWF 20th century reanalysis*
- ERA-20CM, *10-member AMIP ensemble, companion to ERA-20C*
- ERA-40, *ECMWF 40-year reanalysis*
- ERA5, *a forthcoming reanalysis developed by ECMWF*
- ERA-Interim, *ECMWF interim reanalysis*
- EUMETSAT, *European Organisation for the Exploitation of Meteorological Satellites*
- ExUTLS, *extra-tropical upper troposphere and lower stratosphere*
- FGGE, *First GARP Global Experiment*
- GARP, *Global Atmospheric Research Programme*
- GCOS, *Global Climate Observing System*
- GEOS, *Goddard Earth Observing System Model of the NASA*
- GFS, *Global Forecast System of the NCEP*
- GISST, *Global sea Ice and Sea Surface Temperature (UK Met Office)*
- GLATOVS, *Goddard Laboratory for Atmospheres TOVS (radiative transfer model)*
- GMAO, *Global Modeling and Assimilation Office of NASA*
- GMS, *Geostationary meteorological satellite*
- GNSS-RO, *Global Navigation Satellite System Radio Occultation (see also GPS-RO)*
- GOCART, *Goddard Chemistry Aerosol Radiation and Transport*
- GOES, *Geostationary Operational Environmental Satellite*
- GOME, *Global Ozone Monitoring Experiment*
- GPS-RO, *Global Positioning System Radio Occultation (see also GNSS-RO)*
- GRUAN, *GCOS Reference Upper Air Network*
- GSICS, *Global Space-based Inter-Calibration System*
- GSM, *Global Spectral Model of the JMA*
- GTS, *Global Telecommunication System*
- HadISST, *Hadley Centre Sea Ice and Sea Surface Temperature data set*
- HALOE, *Halogen Occultation Experiment*
- HCFC, *hydrochlorofluorocarbon*
- HIRS, *High-resolution Infrared Radiation Sounder*
- IASI, *Infrared Atmospheric Sounding Interferometer*
- IAU, *incremental analysis update*
- ICSU, *International Council for Science*
- IFS, *Integrated Forecast System of the ECMWF*
- IGY, *International Geophysical Year*
- IOC, *Intergovernmental Oceanographic Commission of UNESCO*
- JCDAS, *JMA Climate Data Assimilation System*
- JIC, *Joint Ice Center (now Naval Ice Center)*
- JMA, *Japan Meteorological Agency*
- JRA-25, *Japanese 25-year Reanalysis*
- JRA-55, *Japanese 55-year Reanalysis*
- JRA-55AMIP, *Japanese 55-year Reanalysis based on AMIP-type simulations*
- JRA-55C, *Japanese 55-year Reanalysis assimilating Conventional observations only*
- LEO/GEO, *low earth orbit/geostationary*
- LS, *non-convective (large scale) cloud parametrization*
- LW, *longwave radiation parametrization*
- McICA, *Monte Carlo independent column approximation*
- MERRA, *Modern Era Retrospective-Analysis for Research*
- Meteosat, *series of geostationary meteorological satellites operated by EUMETSAT*
- MIPAS, *Michelson Interferometer for Passive Atmospheric Sounding*
- MISR, *Multi-angle Imaging SpectroRadiometer*

- MLS, *Microwave Limb Sounder*
- MODIS, *Moderate resolution Imaging Spectroradiometer*
- MRF, *Medium Range Forecast Version of the NCEP GFS*
- MRI-CCM1, *Meteorological Research Institute (JMA) Chemistry Climate Model, version 1*
- MSU, *Microwave Sounding Unit*
- MTSAT, *Multi-functional transport satellite*
- NASA, *National Aeronautics and Space Administration*
- NCAR, *National Center for Atmospheric Research*
- NCEP, *National Centers for Environmental Prediction of the NOAA*
- NH, *Northern Hemisphere*
- NMC, *National Meteorological Center (now NCEP)*
- NOAA, *National Oceanic and Atmospheric Administration*
- NON, *non-orographic gravity wave drag parametrization*
- OISST, *Optimum Interpolation Sea Surface Temperature*
- OMI, *Ozone Monitoring Instrument*
- ORO, *orographic gravity wave drag parametrization*
- OSTIA, *Operational Sea Surface Temperature and Sea Ice Analysis*
- PAOBS, *synthetic surface pressure data produced for the SH by the Australian Bureau of Meteorology*
- PIBAL, *pilot balloon*
- QBO, *quasi-biennial oscillation*
- R1, *NCEP-NCAR Reanalysis 1*
- R2, *NCEP-DOE Reanalysis 2*
- RAOBCORE, *Radiosonde Observation Correction using Reanalyses*
- RH, *relative humidity*
- RRTM, *Rapid Radiative Transfer Model developed by Atmospheric and Environmental Research*
- RRTMG, *RRTM for application to general circulation models*
- RTG, *Real-Time, Global sea surface temperature analysis*
- RTTOV, *Radiative Transfer for TOVS*
- SAO, *semi-annual oscillation*
- SBUV, *Solar Backscatter Ultraviolet Radiometer*
- SCIAMACHY, *Scanning Imaging Absorption Spectrometer for Atmospheric Chartography*
- SH, *Southern Hemisphere*
- SHIP, *surface meteorological observation report from ships*
- SMMR, *Scanning Multi-channel Microwave Radiometer*
- SOLARIS, *Solar Influences for SPARC*
- SPARC, *Stratosphere–troposphere Processes And their Role in Climate*
- S-RIP, *SPARC Reanalysis Intercomparison Project*
- SSM/I or SSMI, *Special Sensor Microwave Imager*
- SSMIS, *Special Sensor Microwave Imager Sounder*
- SST, *sea surface temperature*
- SSU, *Stratospheric Sounding Unit*
- SW, *shortwave radiation parametrization*
- SYNOP, *surface meteorological observation report from manned and automated weather stations*
- TCO, *total column ozone*
- Terra, *an EOS satellite*
- TIM, *Total Irradiance Monitor*
- TIROS, *Television Infrared Observation Satellite*
- TMI, *Tropical Rainfall Measuring Mission (TRMM) Microwave Imager*
- TOA, *top of the atmosphere*
- TOMS, *Total Ozone Mapping Spectrometer*
- TOVS, *TIROS Operational Vertical Sounder*
- TSI, *total solar irradiance*
- TTL, *tropical tropopause layer*

- UARS, *Upper Atmosphere Research Satellite*
- UNESCO, *United Nations Educational, Scientific and Cultural Organization*
- USLM, *upper stratosphere and lower mesosphere*
- UTLS, *upper troposphere and lower stratosphere*
- VTPR, *Vertical Temperature Profile Radiometer*
- WCRP, *World Climate Research Programme*
- WMO, *World Meteorological Organization*