JRA-55 FAMILY

JRA-55C (conventional) and JRA-55AMIP are provided as unique extra JRA-55 products to highlight the impacts of observational systems and model biases. JRA-55C is suitable for studies of climate change and multi-decadal variability because it is a homogeneous dataset covering an extended period.

JRA-55: Full observing system reanalysis
JRA-55C: Fixed observing system reanalysis
with conventional observations only, such as surface, radiosonde, tropical cyclone retrieval and windprofiler
JRA-55AMIP: AMIP-type run
without observation assimilation

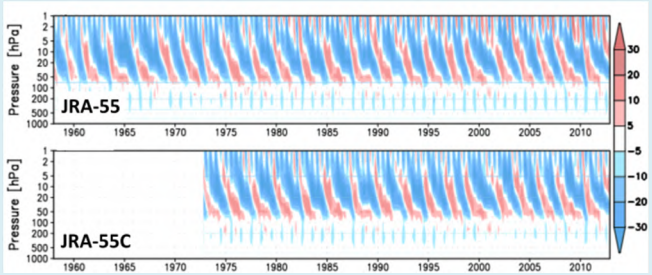


Fig: Time-height cross section of equatorial (5°S – 5°N) zonal mean U-wind from 1958 to 2012 shown in JRA-55 and JRA-55C. The unit is m/s.

The Quasi-Biennial Oscillation in the lower stratosphere is apparent in JRA-55C despite the low number of assimilated observational data.

REFERENCES

JRA-55:

Kobayashi, S. et al., 2015: The JRA-55 reanalysis: General specifications and basic characteristics, JMSJ, 93(1), 5-48, doi:10.2151/jmsj.2015-001.

Ebita, A. et al., 2011: The Japanese 55-year reanalysis "JRA-55": An interim report, SOLA, 7, 149-152, doi:10.2151/sola.2011-038.

JRA-55C:

Kobayashi, C. et al., 2014: Preliminary results of the JRA-55C, an atmospheric reanalysis assimilating conventional observations only, SOLA, 10, 78-82, doi:10.2151/sola.2014-016.

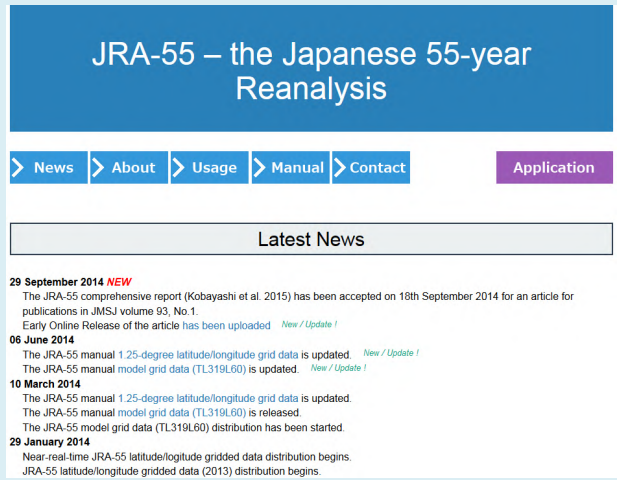
PRODUCT AVAILABILITY

JRA-55 can be downloaded free from the website shown below. Near-real-time data are updated daily on JDDS. JRA-55 provides data on a variety of physical elements in GRIB format. Basic JRA-55C and JRA-55AMIP products are scheduled for release in the future.

Register to set up an account!

JMA Data Distribution System (JDDS)
http://jra.kishou.go.jp/JRA-55/index_en.html
Data Integration and Analysis System (DIAS)
http://dias-dmg.tkl.iis.u-tokyo.ac.jp/dmm/doc/JRA-55-DIAS-en.html
NCAR
Daily three- and six-hourly data
http://rda.ucar.edu/datasets/ds628.0/
Monthly Means and Variances
http://rda.ucar.edu/datasets/ds628.1/

For more details, see the JRA-55 website
http://jra.kishou.go.jp/JRA-55/index_en.html



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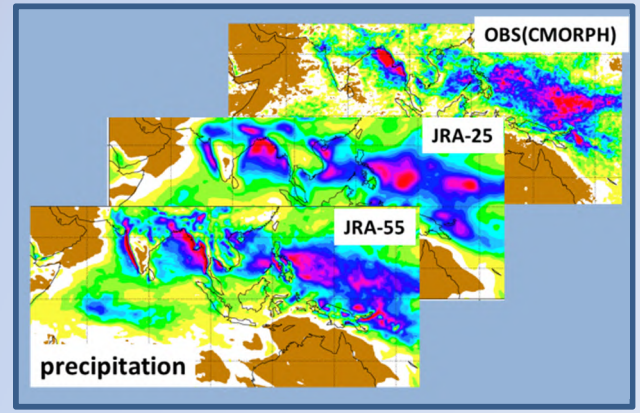
JRA-55

The Japanese 55-year Reanalysis

The number five is pronounced ***go*** in Japanese.
So the JRA-55 is called *JRA go! go!*



Japan Meteorological Agency

OUTLINE

In response to the success of JRA-25, JMA conducted the second Japanese global reanalysis, called JRA-55. The project involved comprehensive global atmospheric reanalysis based on four-dimensional variational analysis (4D-Var) for the last half of the 20th century (1958 onward). As a result, the two major biases found in JRA-25 have been significantly alleviated and the temporal consistency of temperature analysis is also better than that of previous analysis products.

The high-quality and long-term JRA-55 data produced are suitable for studies on climate change and multi-decadal variability as well as for the monitoring of current climate systems.

DATA ASSIMILATION SYSTEM

The data assimilation system is based on JMA's operational model as of December 2009, and improves on JRA-25 in many ways. Enhancements include a revision of the radiation scheme and the introduction of 4D-Var and variational bias correction (VarBC) for satellite radiances. These upgrades significantly reduce model biases, enhance the dynamical consistency of analysis fields and advance the handling of satellite radiances.

Resolution & levels	TL319 (~ 55 km), 60 levels up to 0.1 hPa
Advection scheme	Semi-Lagrangian
Assimilation	4D-Var, 6h time window, T106 inner model
Satellite radiance bias correction	VarBC (Dee and Uppala 2009)
Radiative transfer model for satellite	RTTOV-9.3 (Saunders et al. 2008)
Long wave radiation scheme	Line absorptions; Pre-computed Transmittance Tables and k-distribution (Chou et al. 2001) Water vapor continuum (e-type and p-type); Zhong and Haigh (1995) with MK_CKD V1.0 Radiatively active gases; H_2O, O_3, CO_2, CH_4, N_2O, CFC-11, CFC-12, HCFC-22
Short wave radiation	Absorptions by H_2O; Briegleb (1992) Absorptions by O_2, O_3 and CO_2; Freidenreich and Ramaswamy (1999)
Ozone	Until 1978; Climatology From 1979 onward; T42L68 version of MRI-CCM1 (Shibata et al. 2005)
Greenhouse gases	CO_2, CH_4, N_2O, CFC-11, CFC-12, HCFC-22 (historical concentrations)

DATA

The observational data adopted for JRA-55 were primarily those used in ERA-40 in addition to information archived by JMA. The ERA-40 observational dataset was supplied to JMA by ECMWF for use in JRA-25.

Observations for the period from 1979 onward are basically the same as those used in JRA-25. Newly available observational datasets were also collected and used whenever possible.

Major data source

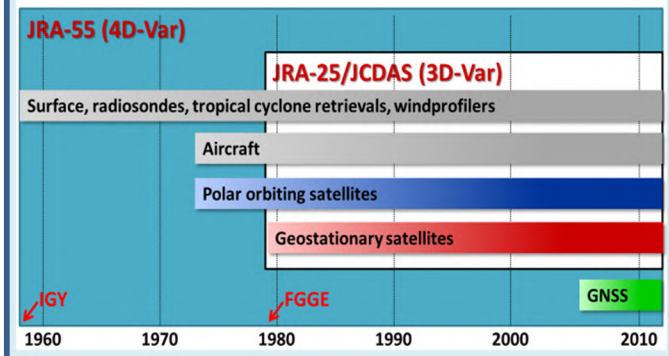
The ERA-40 observational dataset supplied by ECMWF

Homogenization

RAOBCORE v1.4 (Haimberger et al. 2008) 1958 – 2006
RAOBCORE v1.5 (Haimberger et al. 2012) 2007 – 2012

Reprocessed satellite observations

GMS, GOES-9 and MTSAT-1R (MSC/JMA), METEOSAT (EUMETSAT), TMI (NASA, JAXA), AMSR-E (JAXA), QuikSCAT(NASA/PO.DAAC), AMI(ESA), GNSS-RO (UCAR)



RESULTS

Thanks to a state-of-the art assimilation system and sophisticated observational data handling incorporating QC, the JRA-55 datasets generally shows better quality than other products.

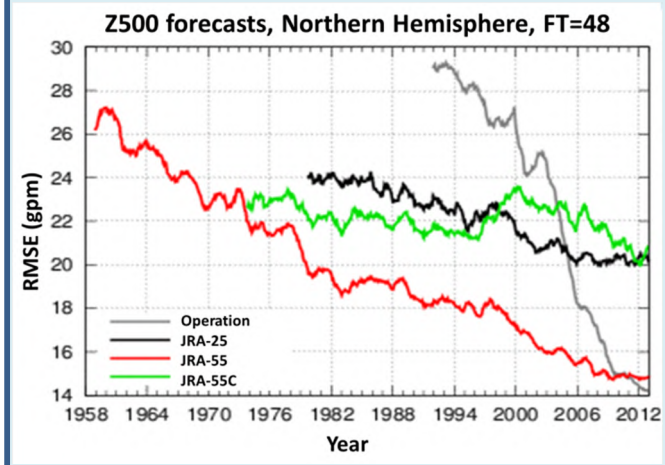


Fig: Time-series representation of RMS errors in 48-hour forecasts for geopotential height (gpm) at 500 hPa verified against own analysis.

RMS errors are significantly reduced in JRA-55 thanks to the application of the latest JMA data assimilation system.

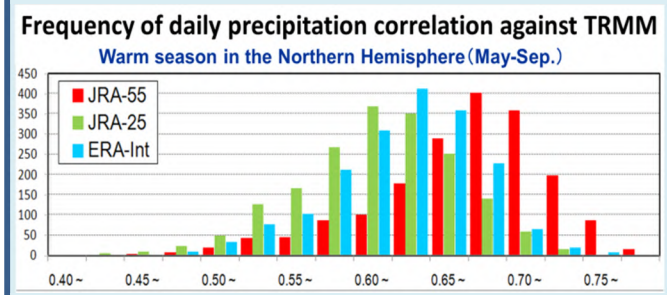


Fig: Frequency of spatial correlation for daily precipitation over the tropical region (22°S – 22°N) against TRMM from 1998 to 2009.

JRA-55 shows a higher spatial correlation for daily precipitation against TRMM observational data than JRA-25 and ERA-Int.