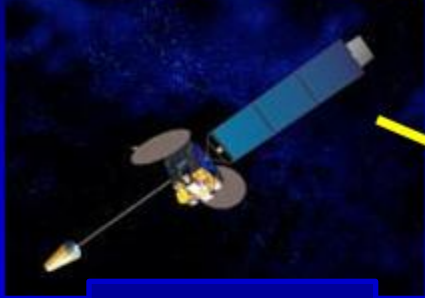


The Japanese 55-year Reanalysis “JRA-55” Go! Go!

S. Kobayashi, Y. Ota, Y. Harada, A. Ebita, M. Moriya, H. Onoda,
K. Onogi, H. Kamahori, C. Kobayashi, H. Endo, K. Miyaoka, K. Takahashi

Kazuto Takemura (Presentator)
Japan Meteorological Agency
気象庁

Reanalysis



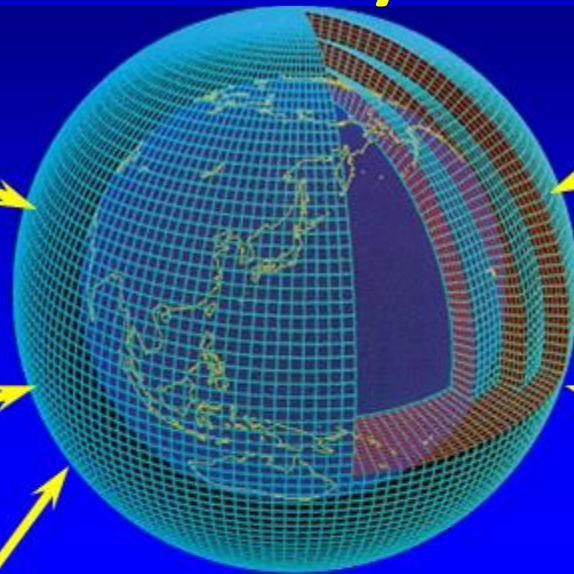
Satellite



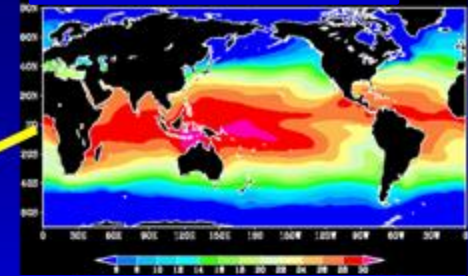
Surface, Upper



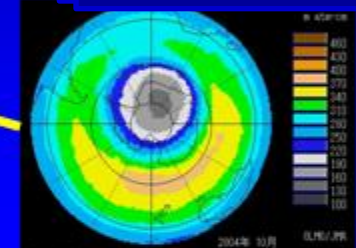
Ship, aircraft
Observation



Boundary



SST, sea ice



ozone

Assimilate past observational data

Data assimilation cycle

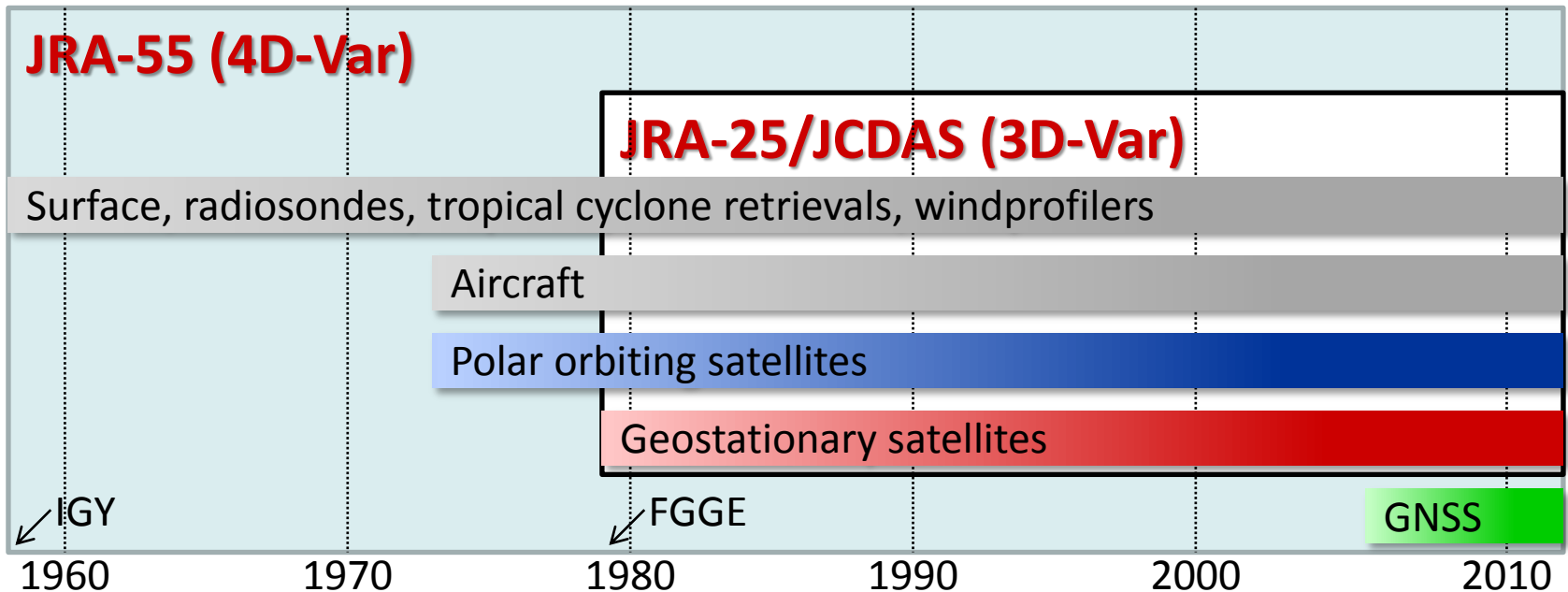
Consistent quality Reanalysis Product

- Provide Initial Condition and Verification data for seasonal forecast
- Climate Monitoring
- Research on climate system and water circulation etc.



Outline of JRA-55

- The second Japanese global reanalysis after the first one (JRA-25)
- The first comprehensive global atmospheric reanalysis that applies 4D-Var to the last half century
- Aiming at providing a comprehensive atmospheric dataset that is suitable for studies of climate change and multi-decadal variability





Data assimilation system

	JRA-25/JCDAS	JRA-55
Period	1979-2004	1958-2012
Model Version	Operational as of Mar. 2004	Operational as of Dec. 2009
Resolution	T106L40 (~ 120 km) top layer at 0.4 hPa	TL319L60 (~ 60 km) top layer at 0.1 hPa
Assimilation scheme	3D-Var 6-hour time window T106 resolution	4D-Var 6-hour time window T106 inner model

Table. Comparison of JRA-25 and JRA-55 data assimilation systems

- JRA-25 project was conducted by JMA and the Central Research Institute of Electric Power Industry. JCDAS (JMA Climate Data Assimilation System) is the same data assimilation system as used in JRA-25 and the production on a near real-time basis.
- JRA-55 project continues the production on a near real-time basis using the same data assimilation system.



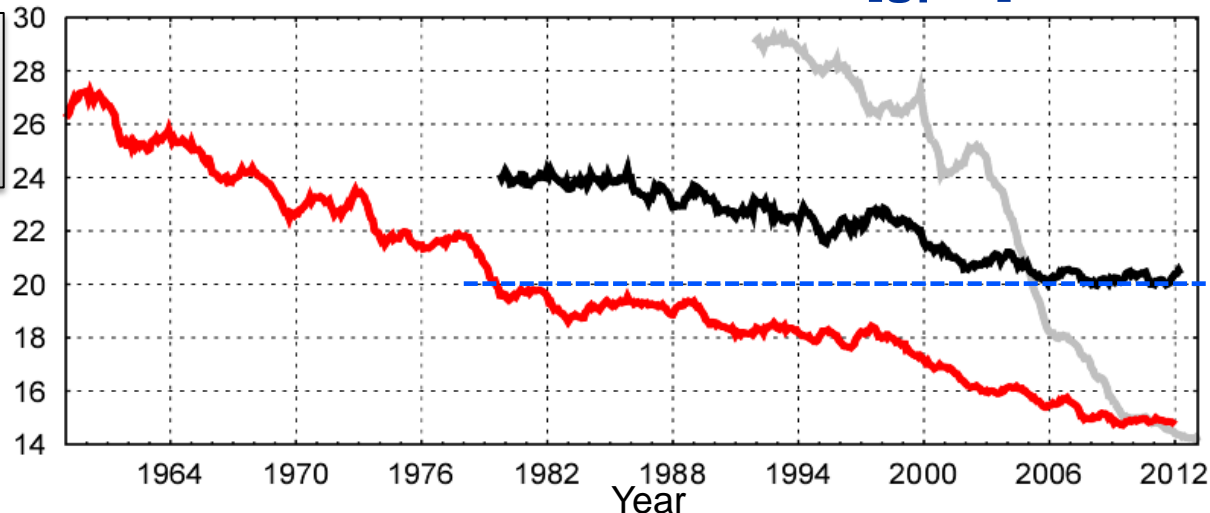
Quality of JRA

Forecast [FT=48] Scores

RMSE of Z500 for N.H. and S.H. [gpm]



Northern Hemisphere

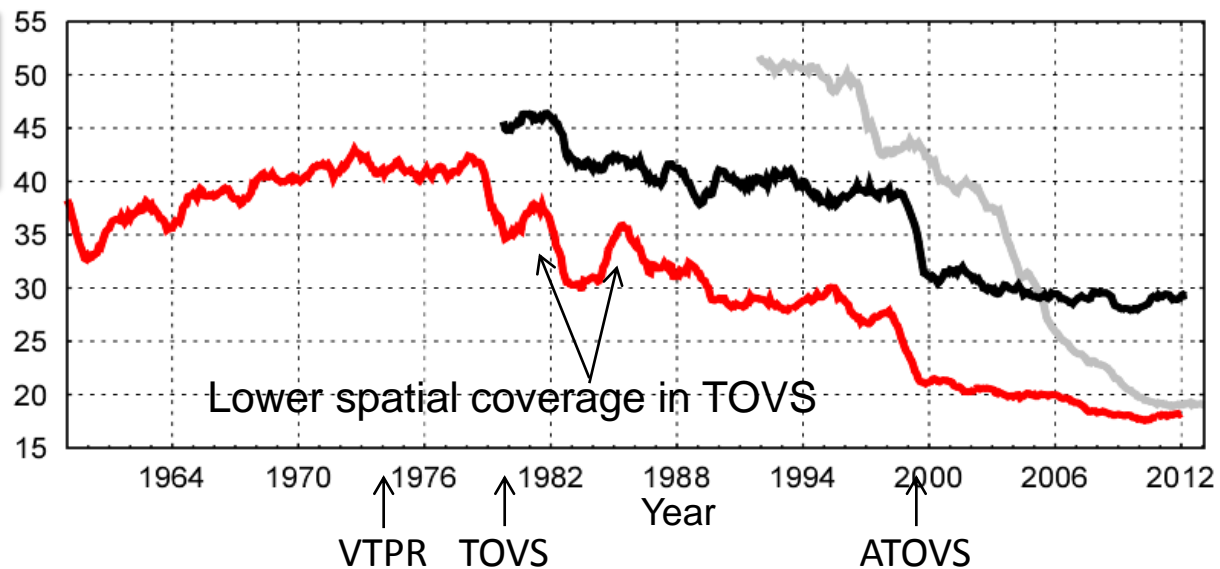


JRA-55

JRA-25

Operation

Southern Hemisphere



Lower spatial coverage in TOVS

VTPR TOVS ATOVS

Fig. Time-series representation of RMS errors in two-day forecasts of 500-hPa geopotential height (gpm) verified against their own analyses



Temporal consistency of temperature analysis

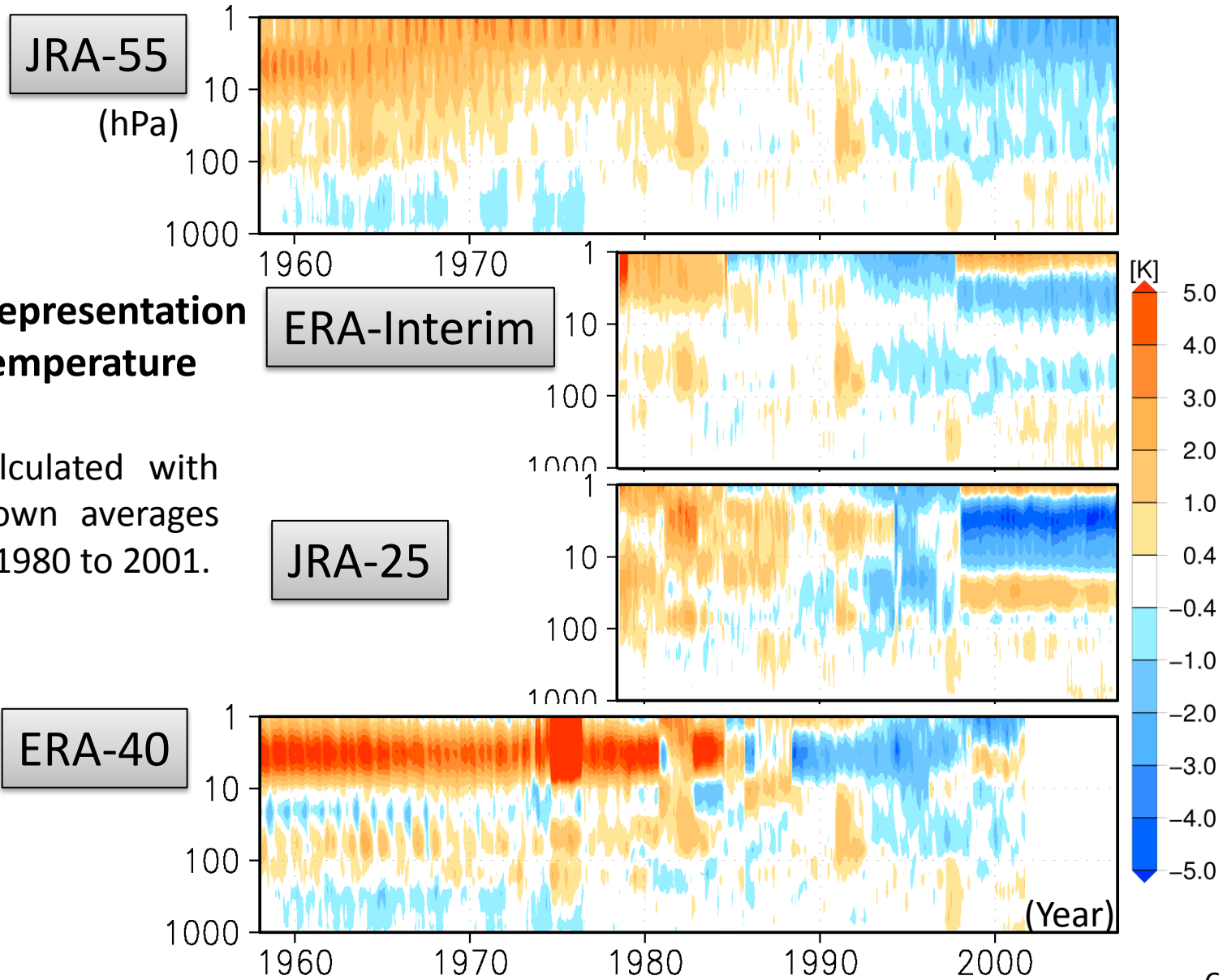


Fig. Time-series representation of global mean temperature anomalies

Anomalies are calculated with respect to their own averages for the years from 1980 to 2001.



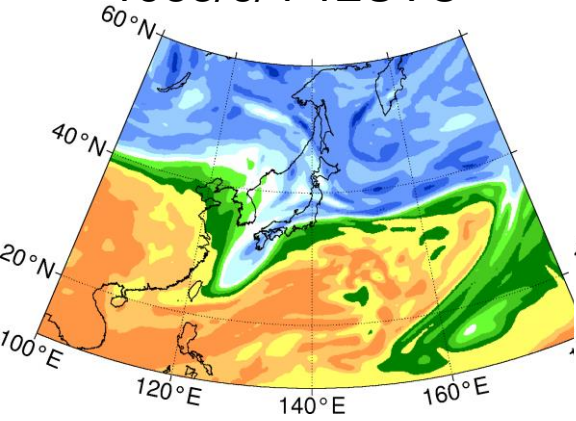
Potential Vorticity

on the 360-K isentropic surface

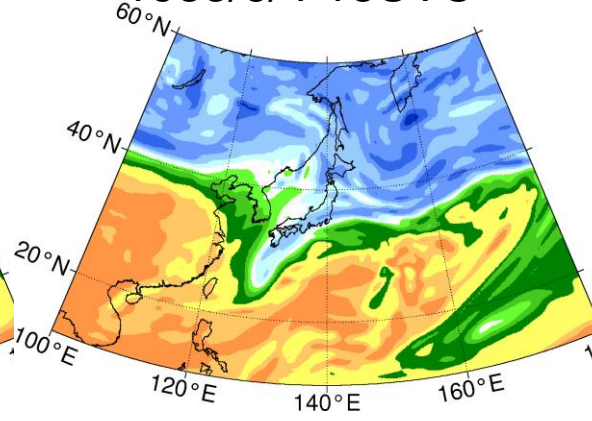


JRA-55 (4D-var)

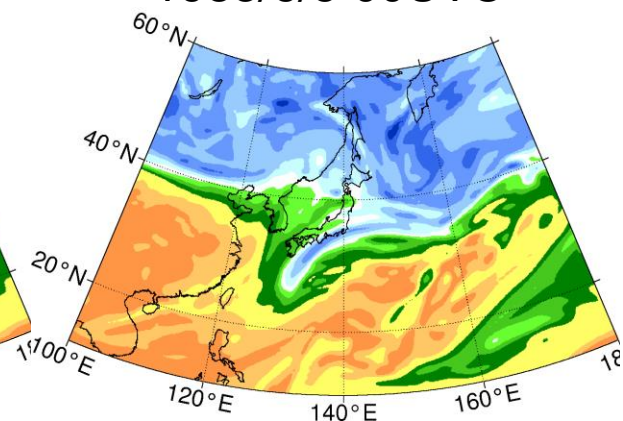
1983/6/4 12UTC



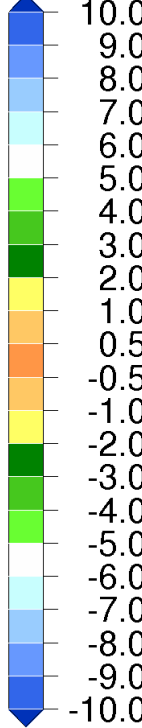
1983/6/4 18UTC



1983/6/5 00UTC

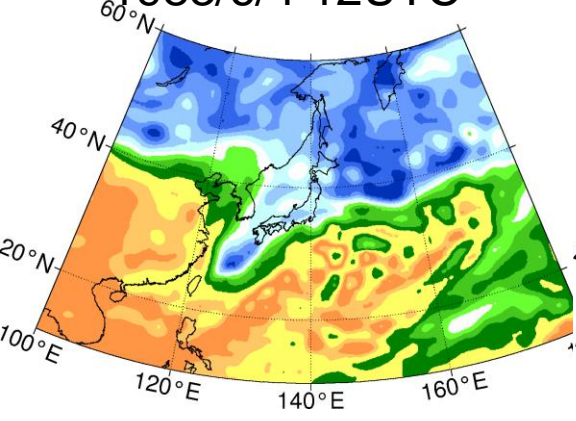


[PVU]

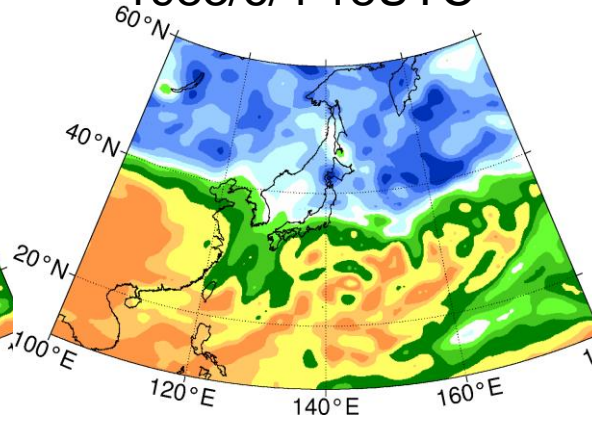


JRA-25 (3D-var)

1983/6/4 12UTC



1983/6/4 18UTC



1983/6/5 00UTC

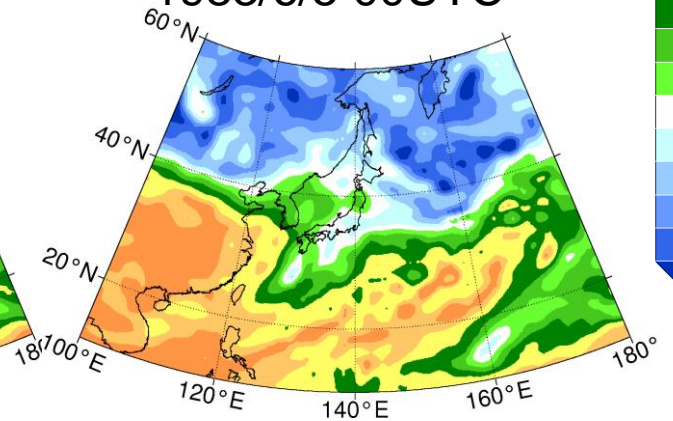
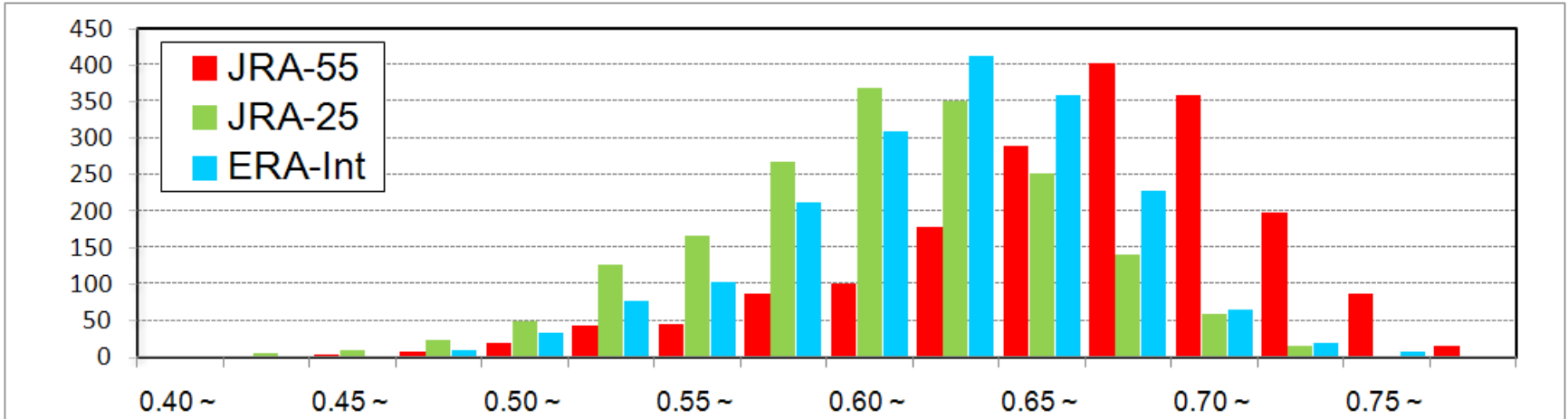


Fig. Potential vorticity (PV) on the 360-K isentropic surface at (Left) 12 UTC, (Middle) 18 UTC on 4 June, (Right) 00 UTC on 5 June

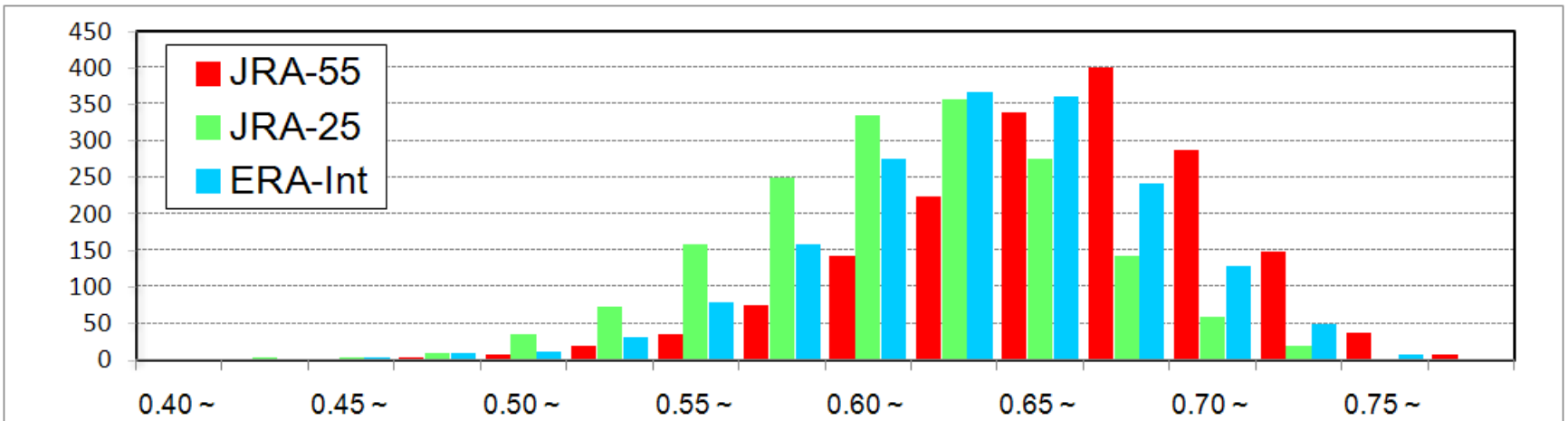


Frequency of daily precipitation correlation against TRMM

Warm season in the Northern hemisphere (1 May. – 30 Sep.)



Cold season in the Northern Hemisphere (1 Nov. – 31 Mar.)



Frequency of spatial correlation of daily precipitation over tropical region (22°S-22°N) against TRMM from 1998 to 2009

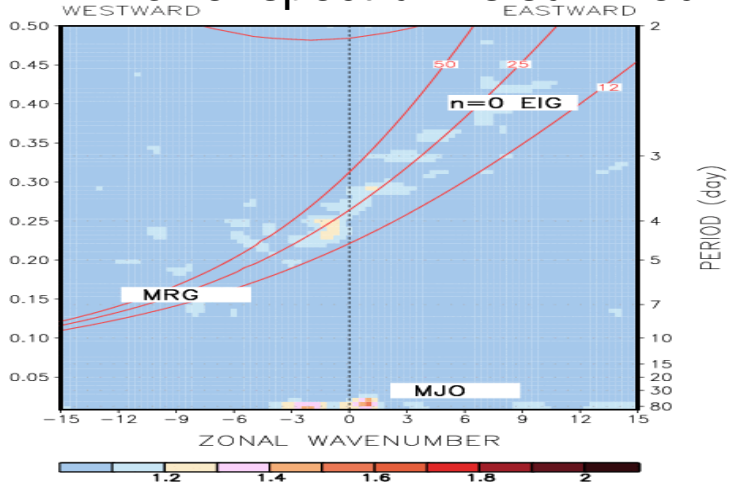
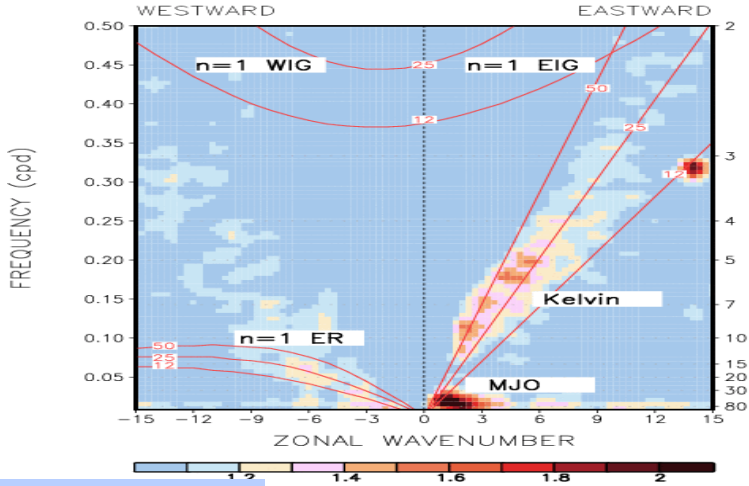
The red, green and blue bars show JRA-55, JRA-25/JCDAS and ERA-Interim.



Spectral analysis of equatorial waves for 21 years (1981-2001)

JRA-25

†: Data used for spectral analysis is OLR [W/m²]
Power spectrum is summed from 15°S to 15°N



- Kelvin:
Kelvin wave
- ER:
Equatorial Rossby wave
- MJO:
Madden-Julian Oscillation
- MRG:
Mixed Rossby Gravity wave

NOAA

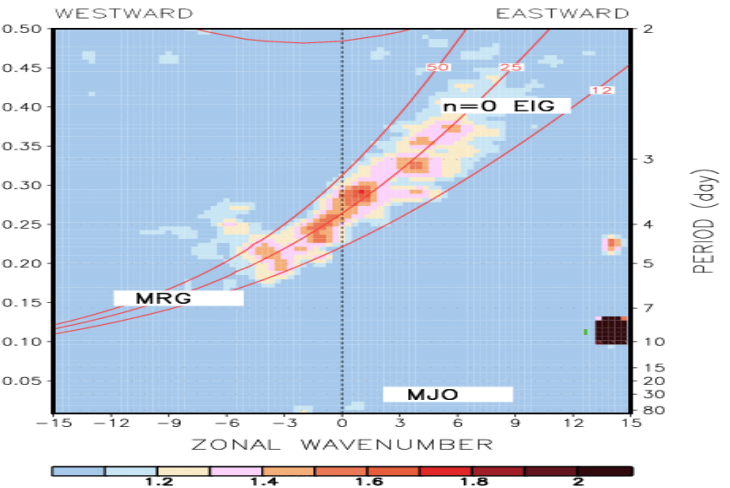
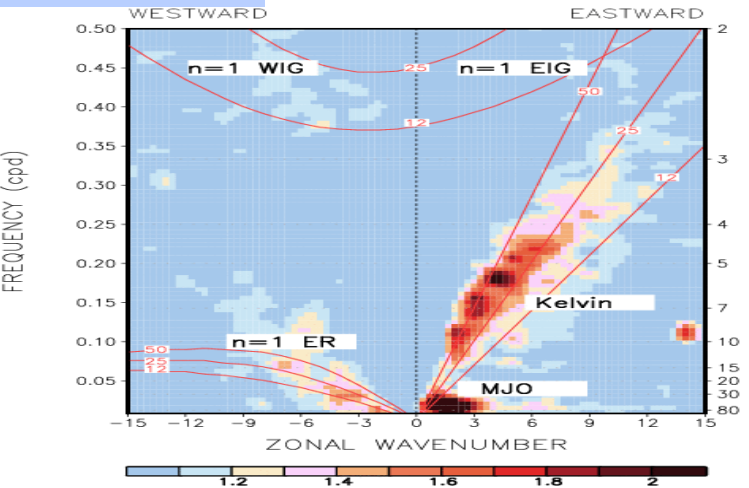


Fig. Wavenumber–frequency power spectrum from 1981 to 2001

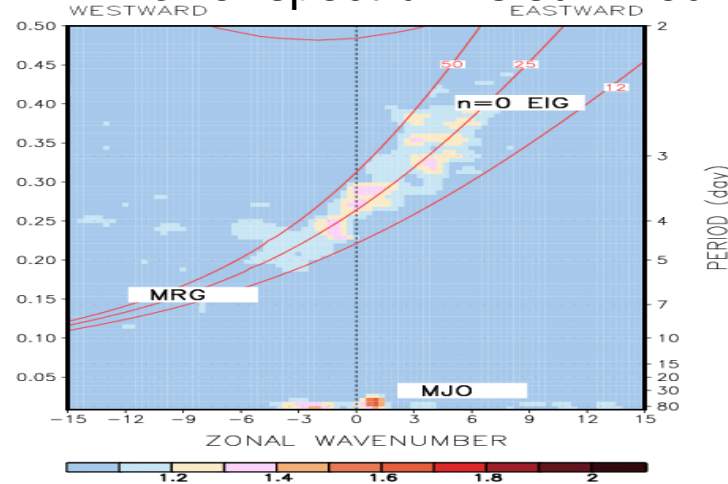
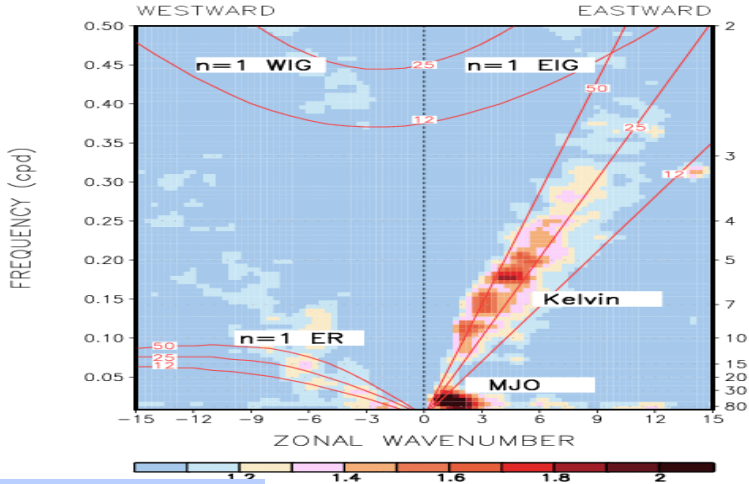
Left and right panels show the spectrum ratio of symmetric and asymmetric components.



Spectral analysis of equatorial waves for 21 years (1981-2001)

JRA-55

†: Data used for spectral analysis is OLR [W/m²]
Power spectrum is summed from 15°S to 15°N



- Kelvin: Kelvin wave
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- MJO: Madden-Julian Oscillation
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NOAA

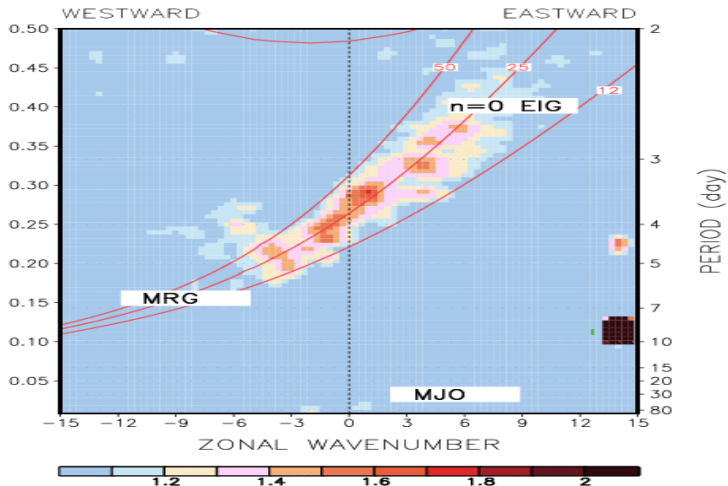
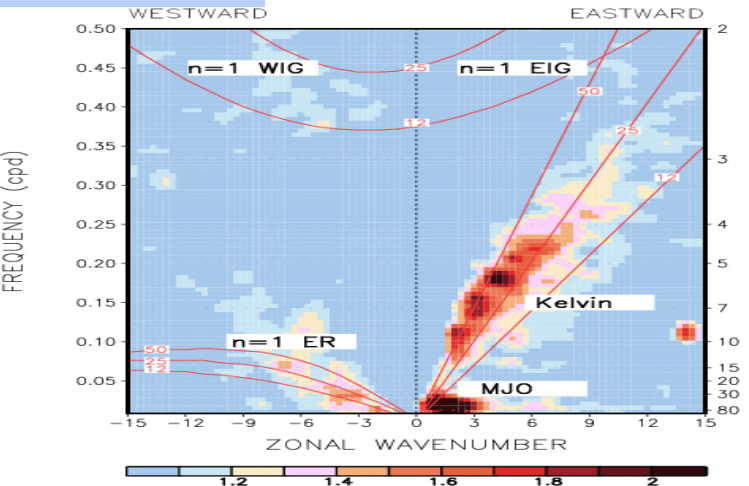


Fig. Wavenumber–frequency power spectrum from 1981 to 2001

Left and right panels show the spectrum ratio of symmetric and asymmetric components.



JRA-55 product availability



JMA: <http://jra.kishou.go.jp/>

DIAS: <http://dias-dss.tkl.iis.u-tokyo.ac.jp/acc/storages/filelist/dataset:204>

NCAR

JRA project

JRA-55 : Japanese 55-year Reanalysis



気象庁55年長期再解析

1958年以降を対象とした、気象庁による日本で2回目の長期再解析プロジェクト。

Japanese 55-year Reanalysis

The second Japanese reanalysis project conducted by the Japan Meteorological Agency (JMA), which covers the period from 1958 onward.

日本語

JRA-55

English

JRA-55



Summary

- Production of JRA-55 has been completed. Early results of quality assessment have suggested that many of deficiencies in JRA-25 have been diminished or reduced in JRA-55.
- Temporal consistency of temperature analysis of JRA-55 has the best performance with few jumps among the reanalyses.
- For further improvement of temporal consistency, issues such as performance of data assimilation system under reduced observing systems and model biases need to be addressed.



Contact Us

- If you have any questions regarding JRA-55, please contact us at the following email address.

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Global Environment and Marine Department,
Japan Meteorological Agency

Email: jra@met.kishou.go.jp

