Tropical Cyclones Represented in JRA-55

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TC Best Track : JTWC, NHC

greater than 10 gpm.

2. Data

1. Introduction

How Tropical cyclone (TC) is represented in reanalysis?

How about its frequency (detection rate) ? How about intensity of detected TC?

In JRA-55, TC retrieval wind data (Fiorino 2002) is utilized and we expect relevant TC circulation fields in JRA-55 as well as JRA-25.

4. Detection rate



JRA-55 Global TC detection rate (%) 100 100 80 80 60 60 40 40 20 20 0 1979 1984 1989 1994 1999 2004 2009 1979



Annual TC detection rate is 93% in JRA-55, and is improved by 4% from JRA-25 for 19 years of 1980 – 1998, and is the highest among 3 reanalyses. There is no large basin dependency of the detection rate in JRA-55. However, ERA-Interim has the large dependency with the maximum of 76% in WP and the minimum of 37% in EP. This fact indicates importance of the TC retrieval winds.

Annual global TC detection rate (%) for 1980-1998

Reanalysis : JRA-25*, JRA-55*, and ERA-Interim** (* 1.25deg, **1.5deg)

The 850 hPa relative vorticity has a local maximum exceeding 1.0E-4 sec⁻¹.
The SLP have a local minimum and is lower than average of the surrounding 2

3. The cyclone has a warm core, as defined by the 700-200 hPa thickness anomaly

from the average of the surrounding 2 grid rows, and the warm core anomaly is

3. TC Detection Criterion (as Hatsushika et el., 2006)

grid rows, and that the difference is lower than 1.5hPa.

a is	Annual global TO detection rate (70) for 1900-1990										
0 –	(%)	WP	EP	AT	NI	SI	SP	GL			
tion Irge	JRA-55	93	92	90	84	94	95	93			
the nce	JRA-25	88	98	98	72	82	85	89			
	ERA-Int	76	37	67	56	64	73	65			

5. Relationship between Analyzed Pmin and Observed Vmax

Vmax-Pmin relationship by Atkinson and Holliday(1977) Vmax=6.7(1010-Pmin)^{0.644} -> red lines



In JRA-55, correlation Obs-Vmax vs RA-Pmin is large in all basins, and there is definite relation between them as expected from observations. In JRA-25 or ERA-Interim, there are low correlations in some basins.

Correlation Obs-Vmax and RA-Pmin for 1980-1998

	WP	EP	AT	NI	SI	SP
JRA-55	-0.61	-0.50	-0.31	-0.46	-0.63	-0.63
JRA-25	-0.52	-0.48	-0.35	-0.10	-0.40	-0.38
ERA-Int	-0.26	-0.20	-0.10	-0.17	-0.12	-0.22

6. Mean Structure of Analyzed TC Precipitation Anomaly

Both reanalyses reasonably represent TC precipitation anomaly from monthly mean.



7. Conclusion

- 1. JRA-55 represent 93% of global tropical cyclones.
- A detection rate in JRA-55 is improved by 4% from JRA-25.
- Correlation between Obs-Vmax and RA-Pmin in JRA-55 is also improved from JRA-25.
- Represented TC circulation is much weaker than observed one, but JRA-55 indicates definite Obs-Pmin and RA-Vmax relationships.
- 5. Represented precipitation fields are also reasonable compared with observation.