

JMA 's Activities



1. JRA-55
(Japanese 55-years
Reanalysis)
2. JMA Global Model

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1. JRA-55

JMA 55-year Reanalysis

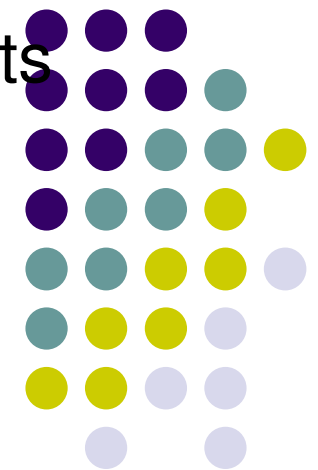
· Experience in previous JRA

Good points

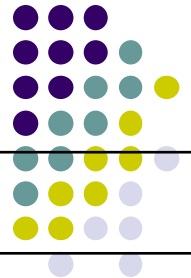
1. high quality in global precipitation fields
2. Representation of tropical cyclones
3. Lower stratus in west coast of continents

Shortcomings

1. Relatively short target period
2. Dry bias in Amazonian area
3. Lower bias in stratospheric temperature

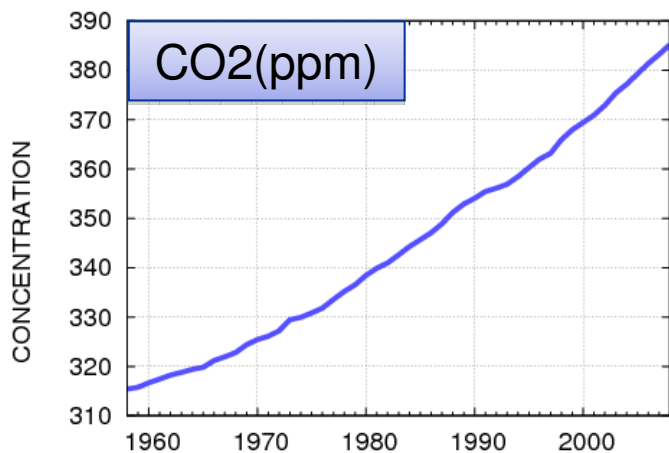


Improvement from JRA-25

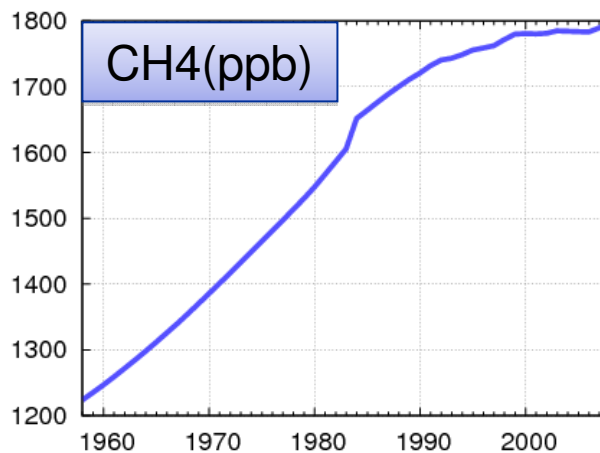


		JRA-25	JRA-55
Target period		1979 – 2004 (26yr)	1958 - 2012 (55yr)
Model	Resolution	T106L40 Top:0.4hPa Horizontal:120km	TL319L60 Top : 0.1hPa Horizontal : 60km
	Time integration	Euler	Semi-Lagrangean
	Physics	As of Mar.2004	New radiation
	Green House Gas	CO2:375ppm(Const)	CMIP5 or other CO2、CH4、N2O、CFC-11、 CFC-12、HCFC-22
Assimilation		3D-VAR	4D-VAR
Bias Correction		[Upper Air] RAOB(Andrae et al.,2004)	[Upper Air] RAOBCORE Satellite Variational bias correction

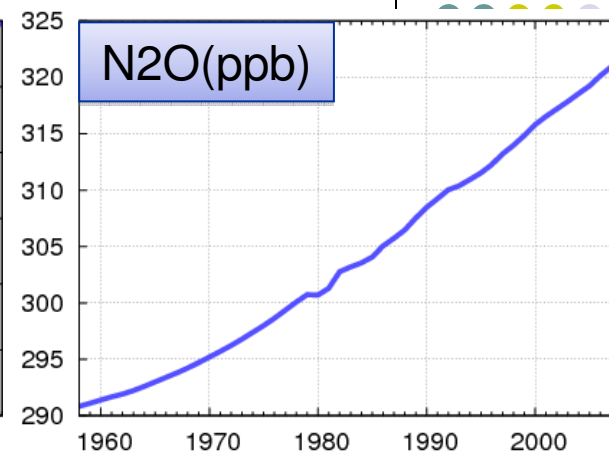
Green House Gases



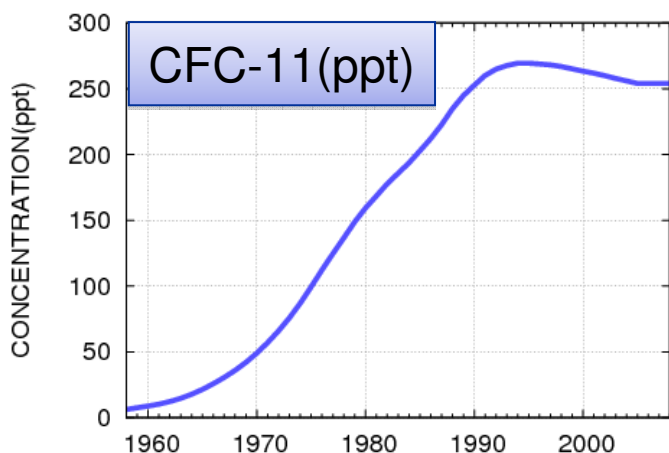
1958:Ice Core(Etheridge et al.)
 1989~1979:Keeling MLO
 1980~:WDCGG



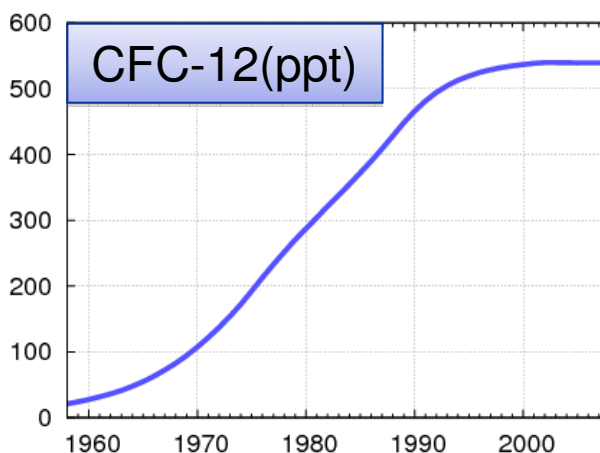
1958~1983:CMIP5
 1984~:WDCGG



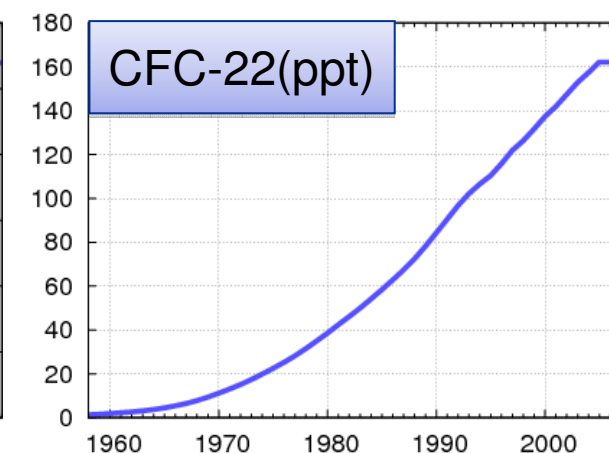
1958~1979:CMIP5
 1980~:WDCGG



1958~2005:CMIP5
 2006~:CMIP5 for 2005



1958~2005:CMIP5
 2006~:CMIP5 for 2005

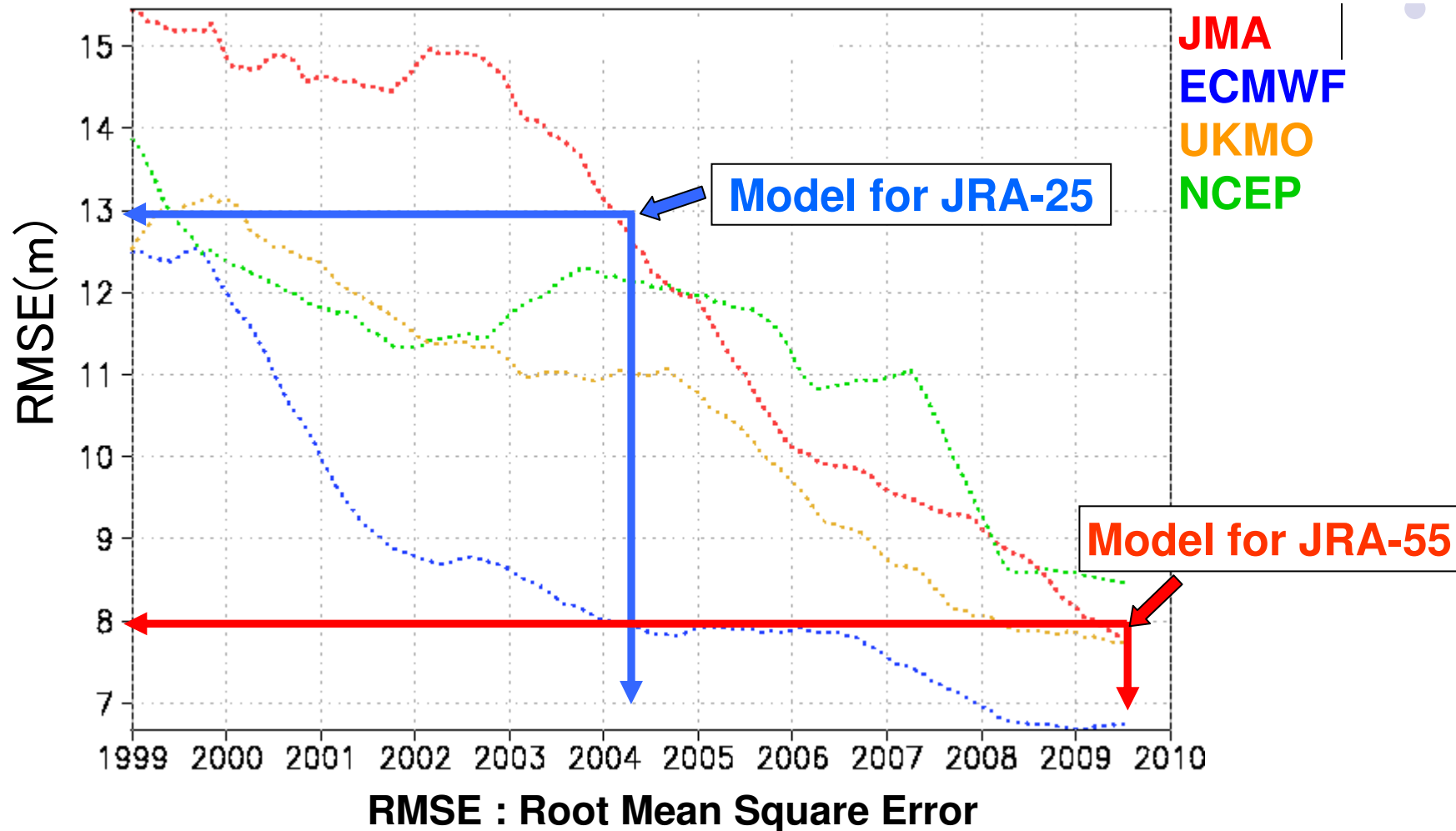


1958~2005:CMIP5
 2006~:CMIP5 for 2005

Improvements in Global Models

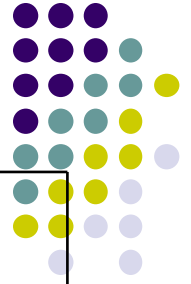


RMSE for 24hour 500hPa geopotential height in NH(m)



Lower RMSE means higher quality reanalysis products.

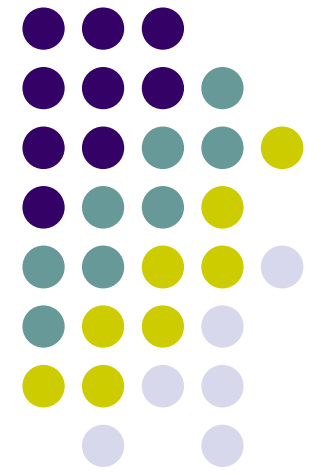
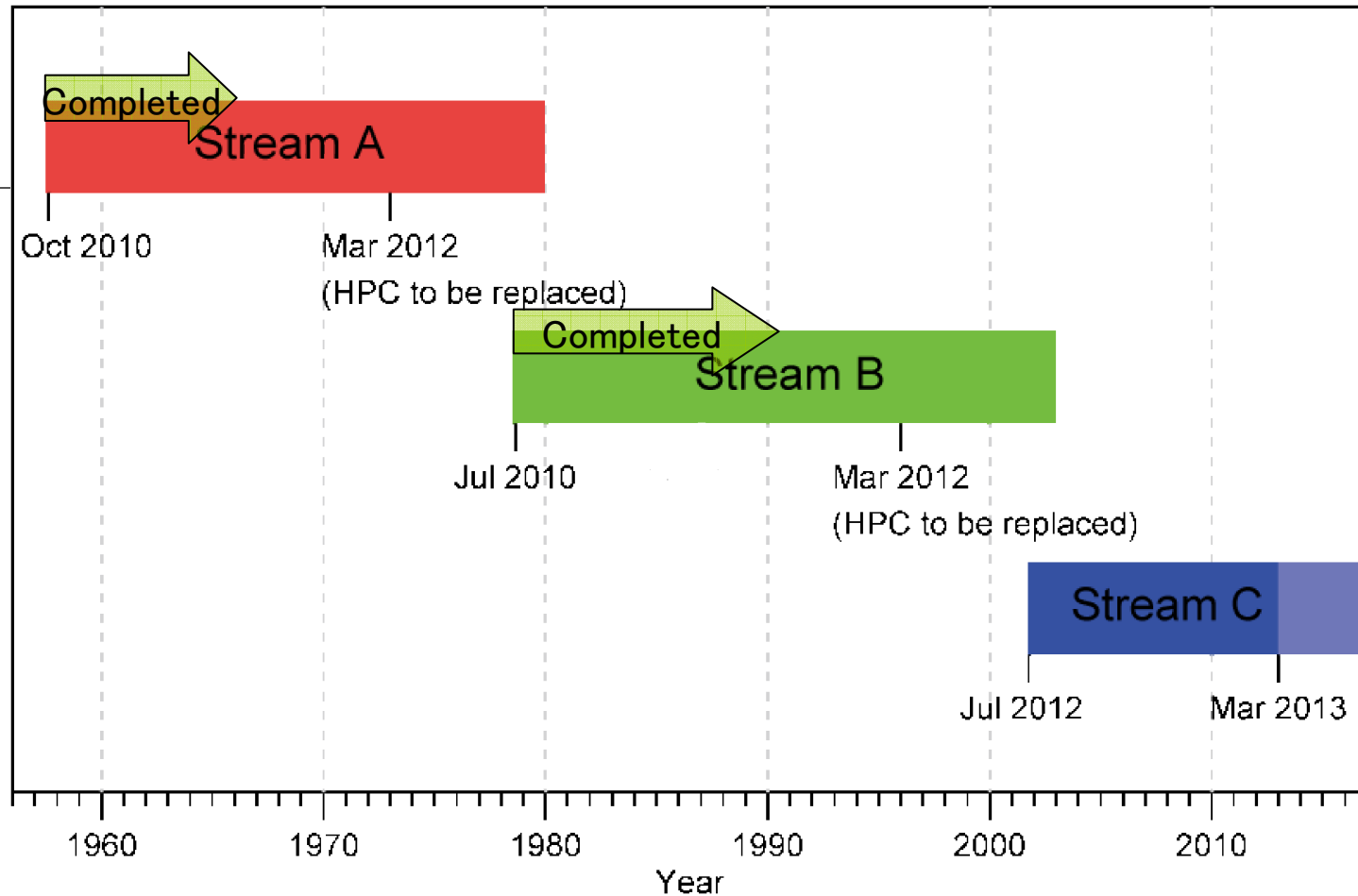
Previous Reanalyses



Name	Organizarion	target	Assimilation Resolution	Status
R1	NCEP/NCAR	1948-present	3D-Var T62L28(200km)	Ongoing
R2	NCEP/DOE	1979-present	3D-Var T62L28(200km)	Ongoing
ERA-15	ECMWF	1979—1993	3D-OI T106L31(120km)	Completed
GEOS1	NASA/DAO	1980—1995	3D-OI + IAU 2×2.5deg L20	Completed
ERA-40	ECMWF	1957—2002	3D-Var TL159L60(120km)	Completed
ERA-interim	ECMWF	1979-present	4D-Var TL255L60(80km)	Ongoing
JRA-25	JMA/CRIEPI	1979-present	3D-Var T106L40(120km)	Ongoing
JRA-55	JMA	1958-present	4D-Var TL319L60(60km)	

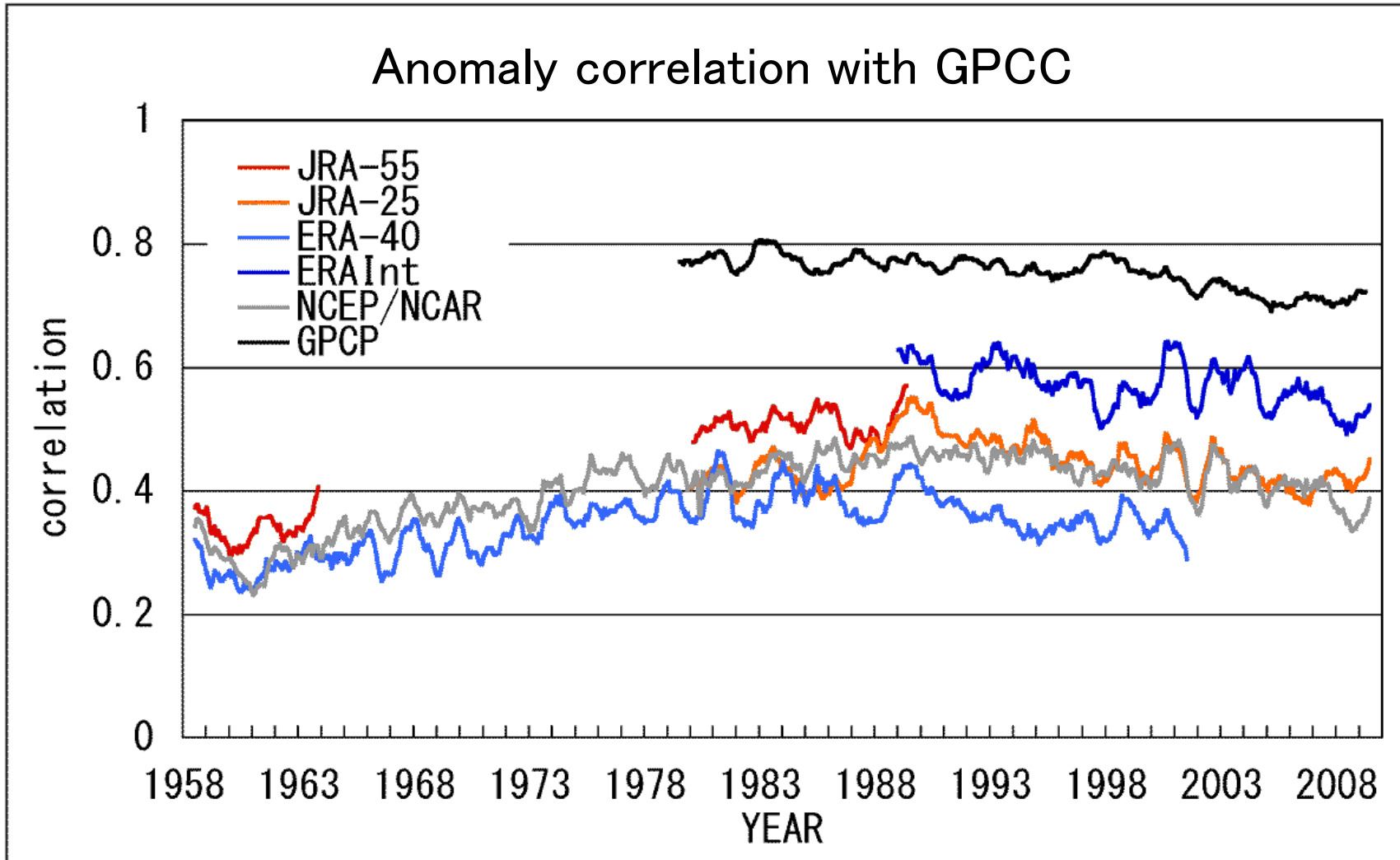
Stream and Progress

Whole period is divided to 3 stream.



Preliminary Result

Quality of Land Precipitation

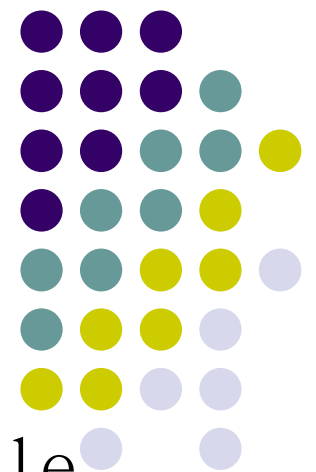


JRA-25 is Opened for Research Use

Research users can download JRA-25 products, after registration.

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

The JRA-55 products will be also available in 2013 summer.



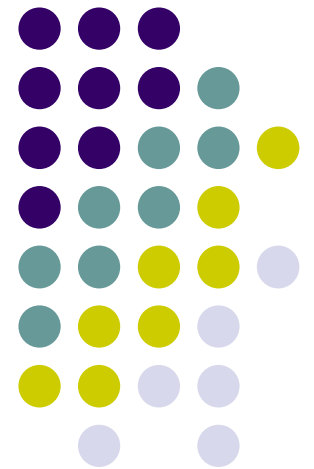
Summary in JRA-55



- JRA-55 calculation is now ongoing.
- We can make higher quality products than JRA-25 by various developments and improvements.
- JRA-55 will be completed in 2013 spring, and released in 2013 summer for research use.

2. JMA

Operational Global Model



Operational Global Models at JMA



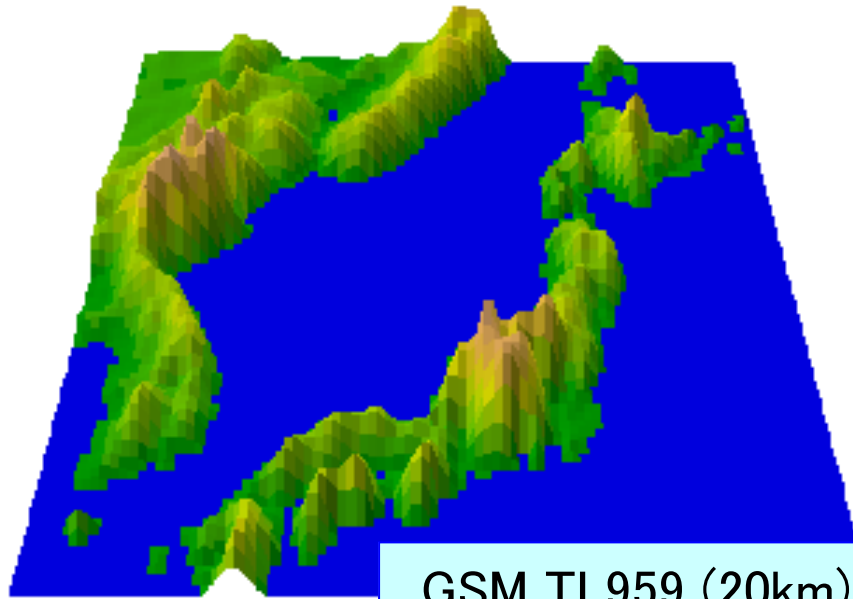
	Global Model (GSM)	Typhoon Ensemble Model	One-week Ensemble Model	One-month Ensemble Model	Three-month Ensemble Model	Warm/Cold season Ensemble Model
Purposes	Short- and medium-range forecast	Typhoon forecast	One week forecast	One month forecast	Three month forecast	Warm/Cold season outlook
Forecast domain	Global					
Grid size and/or Number of grids	0.1875deg. (TL959) 20km	0.5625deg. (TL319) 60km		1.125deg. (TL159) 120km	1.875deg. (TL95) 180km	
Vertical levels/ Top	60 / 0.1hPa	60 / 0.1hPa			40 / 0.4hPa	
Forecast hours (initial time)	84 hours (00, 06, 18 UTC), 216 hours (12 UTC)	132 hours (00, 06, 12, 18 UTC) 11 members	9 days (12 UTC) 51 members	34 days (12 UTC; Wed. & Thu.) 25 members x2	120 days (12 UTC; once a month) 51 members	150-210 days (12 UTC; 5 times a year (Feb., Mar., Apr., Sep. & Oct.) 51 members
Analysis	4D-Var	Global analysis with ensemble perturbations				

Roles of GSM

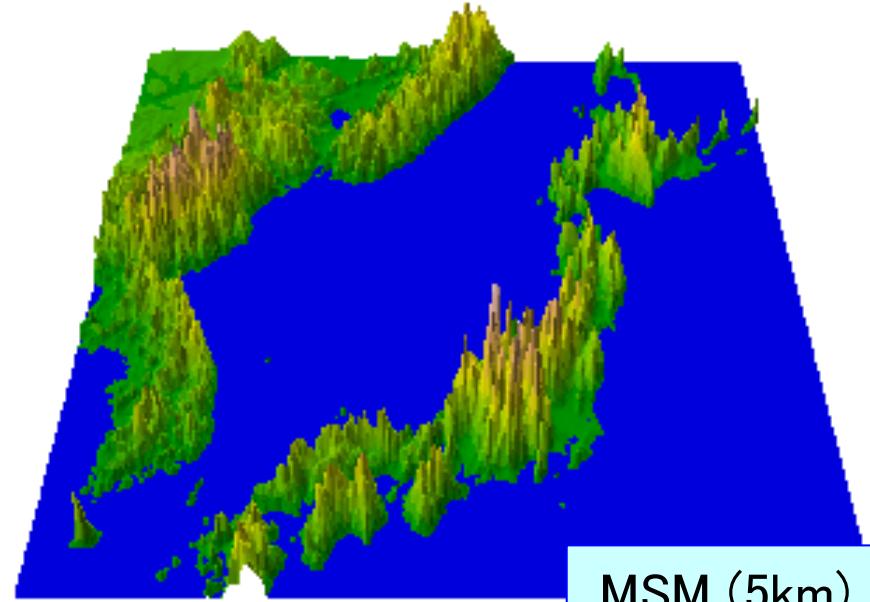


- Main purpose of GSM is to provide :
 - Basic information for a short- and medium-range, one week, one month and seasonal forecasts
 - Basic information for typhoon track and intensity forecasts
 - Basic information to assist aviation and ship routing forecasts
 - Lateral boundary condition for Meso-scale Model
 - Input data for ocean wave model
 - Input data for ocean data assimilation
 - Input data for chemical transport model

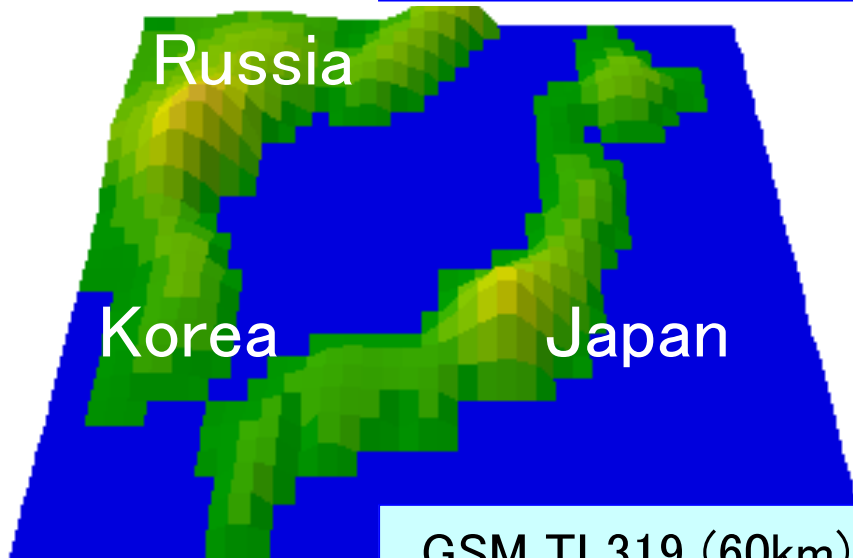
Orography of JMA's Model



GSM TL959 (20km)



MSM (5km)



GSM TL319 (60km)

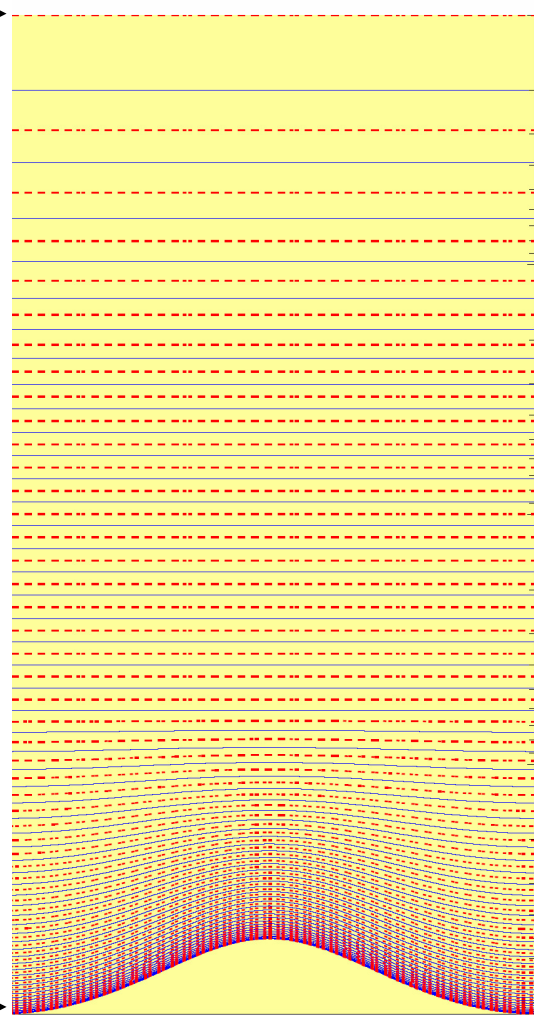
Orographic effects are better captured by higher resolution models. The surface parameters such as temperatures and winds, might be predicted more realistically by those models.

ma-P hybrid vertical level



top=0.1 hPa
about 65 km

lowest level
about 20 m

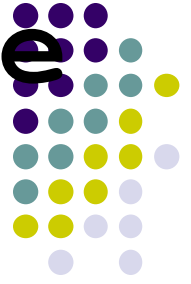


0.1
1
10
100
1000

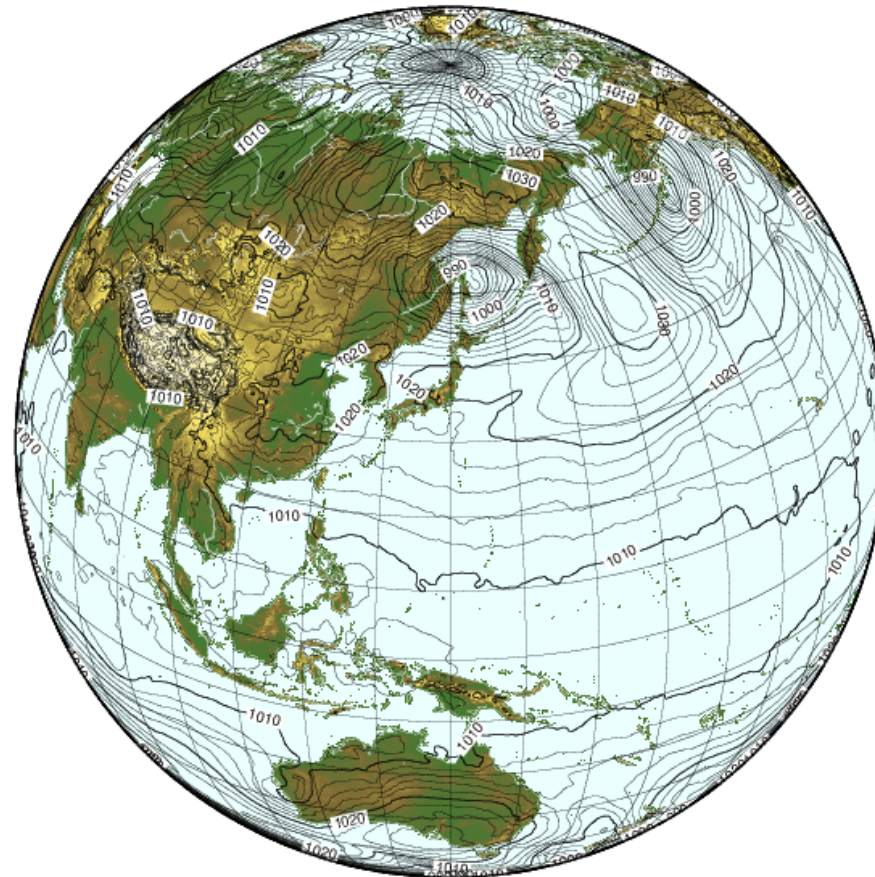
Stratosphere
(25 layers)

Troposphere
(35 layers)

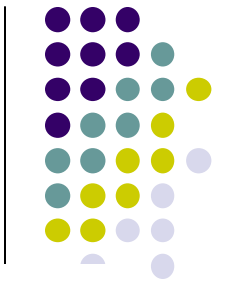
Example of graphical image by GSM forecast



GSM-TL959L60 2010.09.29.12UTC FT=000
(Valid Time: 09.29.12UTC)

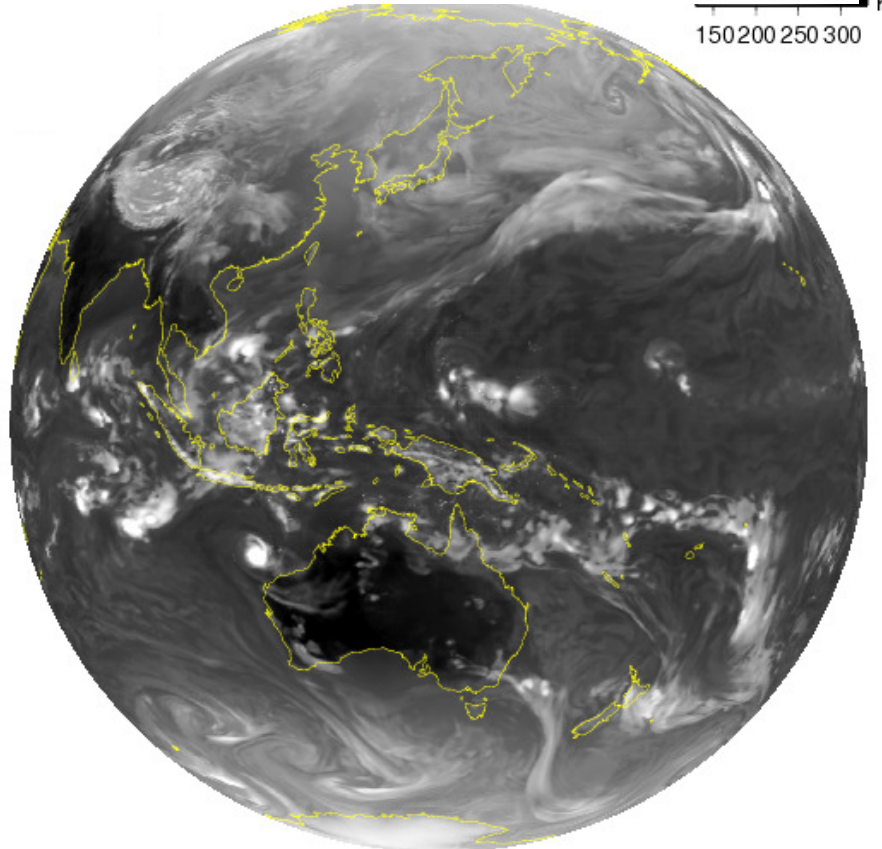
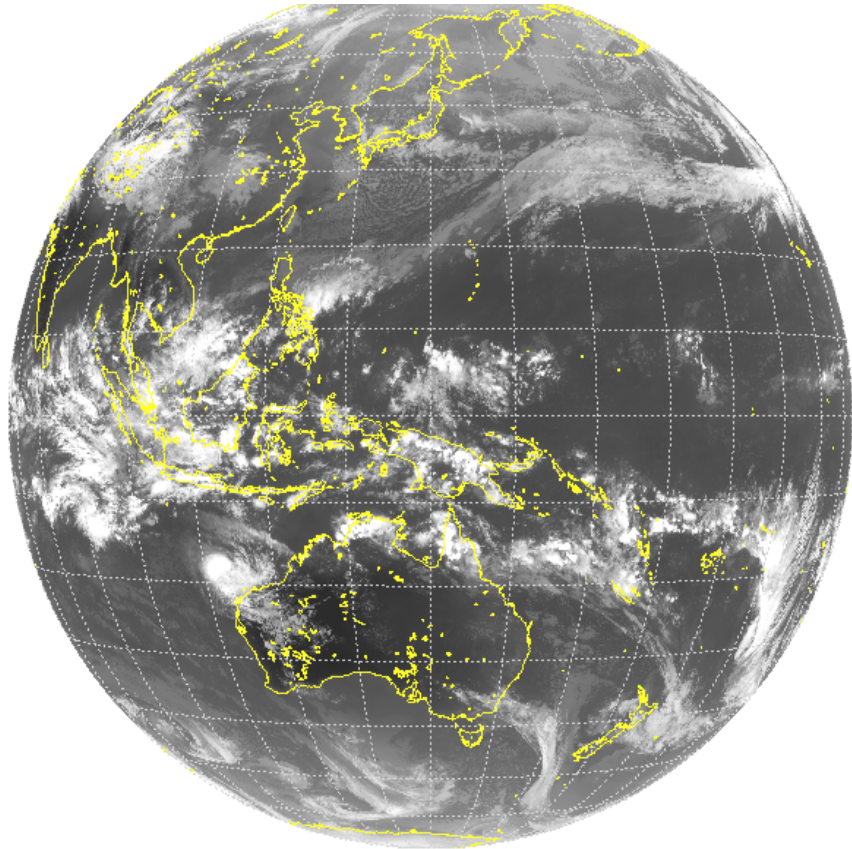


Observation vs. Model



Satellite Observation (IR)

20km GSM Simulation

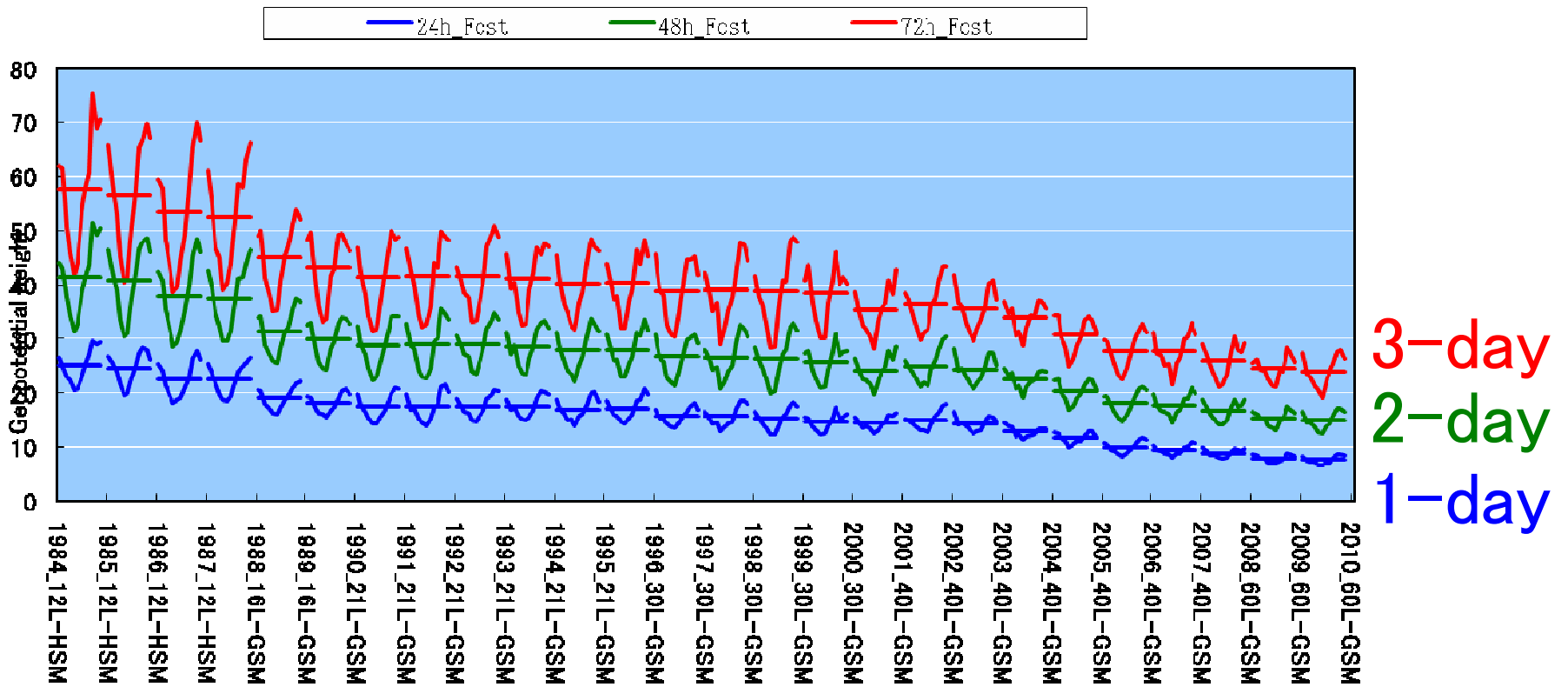


150 200 250 300 K

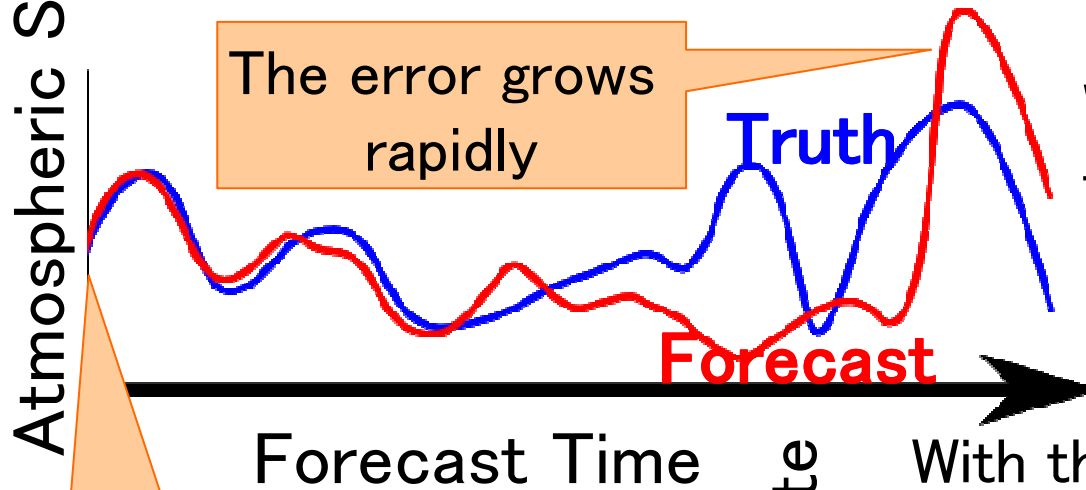
Verification Score forecast error in Z500



GSM Z500 (20N-90N) RMSE 00UTC/12UTC



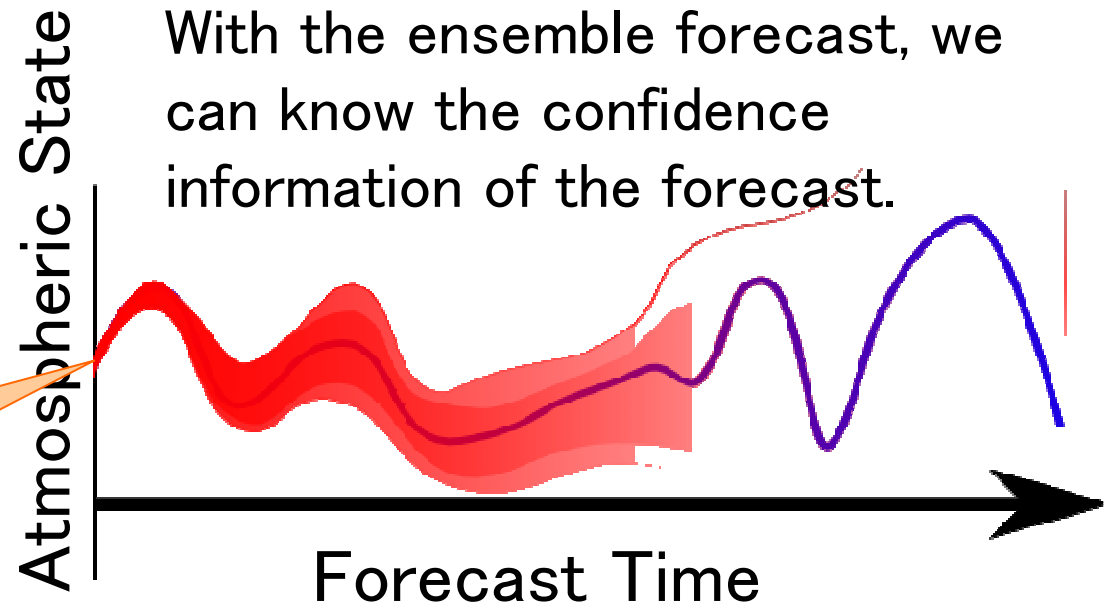
Ensemble Forecast



With the integration time, forecast error becomes larger.

Very small initial error

The range of initial error

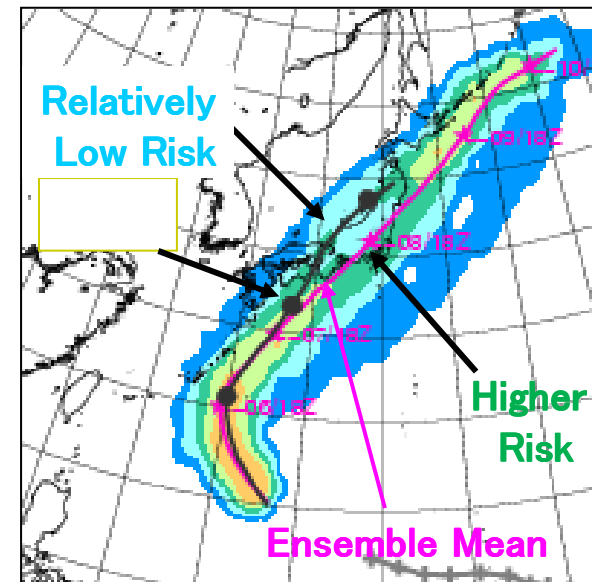
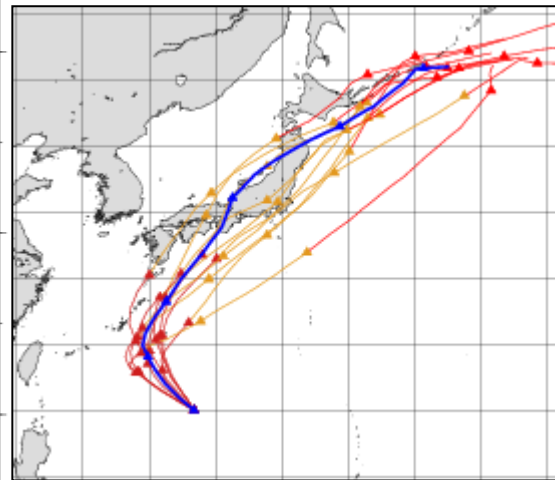
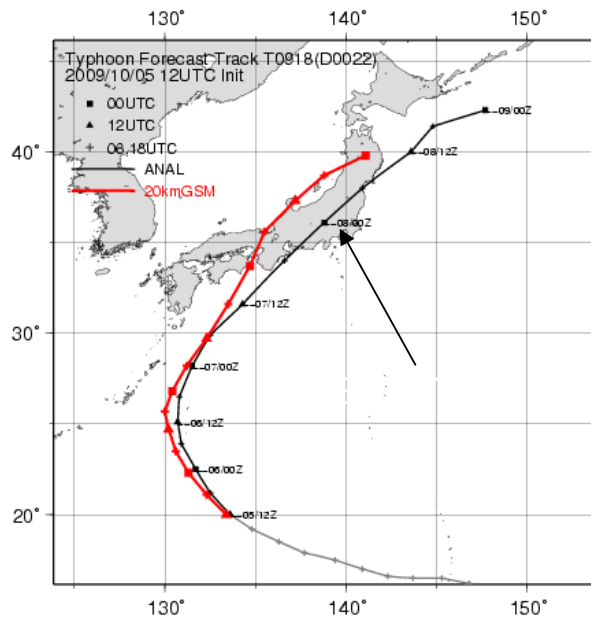


Color shows probability

typhoon Ensemble Prediction Syst



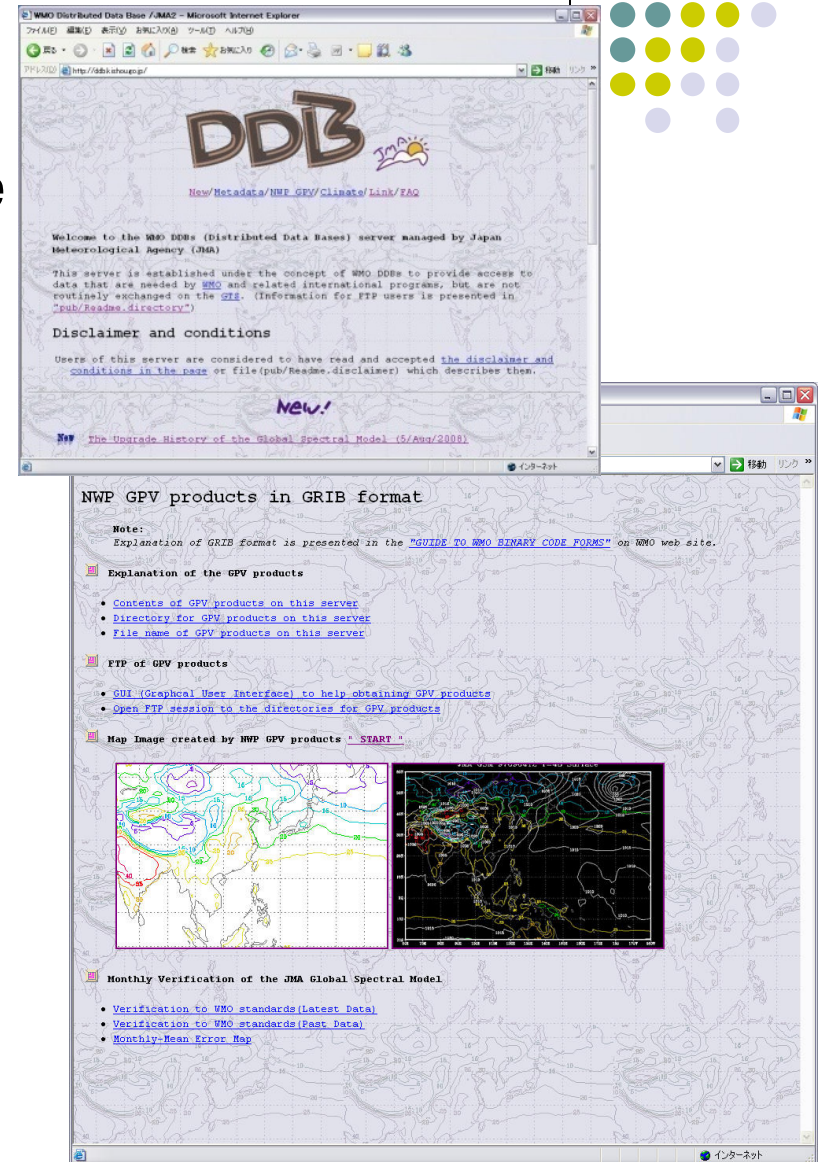
- For 5-day typhoon track forecast
 - 6hourly, 11member, 132hours forecast
 - Used in typhoon track probability forecast



We can make strike probability from ensemble forecast.

JMA DDBs (Distributed Data Bases)

- ... has been established under the concept of the WMO DDBs to provide access to data that are needed by WMO and related international programs, but are not operationally exchanged on the GTS.
- Latest GSM forecast data are available at <http://ddb.kishou.go.jp/>
- You can easily obtain GSM forecast GPV in the WMO GRIB format
 - up to 72 hours ahead for the Asian region
 - 120 hours ahead for the Northern and Southern Hemisphere
 - Forecast elements: surface pressure, geopotential height, winds, air temperature, precipitation, etc.



Summary in JMA's GSM



- The outline of JMA Global Model was introduced. With its high resolution, GSM supports short- to seasonal-range, and typhoon forecast.
- The “forecast confidence information” is important for the disaster risk management. To provide such information, JMA operates EPS (Ensemble Prediction System) for Typhoon, One week, One month, and Seasonal forecasts.
- Forecast products are available at DDBs.



Thank you very much