

Description of cps2-v20150526 C3S contribution

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1. Forecast system version

Identifier code: JMA/MRI-CPS2

First operational forecast run: June 2015

2. Configuration of the forecast model

Is the model coupled to an ocean model? Yes

Coupling frequency: 1 hour

2.1 Atmosphere and land surface

Model	JMA-GSM
Horizontal resolution and grid	TL159 (approx. 110km)
Atmosphere vertical resolution	L60
Top of atmosphere	0.1hPa
Soil levels	Soil temperature : 1 Soil moisture : 3
Time step	30 minutes

Detailed documentation: [JMA, 2013: Outline of the operational numerical weather prediction at the Japan Meteorological Agency, Appendix to WMO Technical Progress Report on the Global Data-processing and Forecasting System \(GDPFS\) and Numerical Weather Prediction \(NWP\) Research. Japan Meteorological Agency, Tokyo, Japan.](#)

2.2 Ocean and cryosphere

Ocean model	MRI.COM v3
Horizontal resolution	1°x0.3° -0.5° on a tripolar grid (See Toyoda et al. 2013 for more information on a tripolar grid)
Vertical resolution	L52 + Bottom Boundary Layer (BBL)
Time step	20 minutes
Sea ice model	part of MRI.COM v3
Sea ice model resolution	same as ocean model
Sea ice model levels	5 categories + open water

Wave model	None
Wave model resolution	N/A

Detailed documentation: [Tsujino, H., T. Motoi, I. Ishikawa, M. Hirabara, H. Nakano, G. Yamanaka, T. Yasuda, and H. Ishizaki, 2010: Reference manual for the Meteorological Research Institute Community Ocean Model \(MRI.COM\) version 3. Technical Reports of the Meteorological Research Institute, 59, 273pp.](#)

3. Initialization and initial condition (IC) perturbations

3.1 Atmosphere and land

	Hindcast	Forecast
Atmosphere initialization	Japanese 55-year Reanalysis (JRA-55)	Japanese 55-year Reanalysis (JRA-55)
Atmosphere IC perturbations	Breeding Growth Method (BGM)	Breeding Growth Method (BGM)
Land Initialization	JRA-55	JRA-55
Land IC perturbations	None	None
Soil moisture initialization	JRA-55	JRA-55
Snow initialization	JRA-55	JRA-55
Unperturbed control forecast?	None	None

Data assimilation method for control analysis: 4D-VAR (atmosphere) and 3D-VAR (ocean)

Horizontal and vertical resolution of perturbations: TL159L60

Perturbations in +/- pairs: Yes

Detailed documentation: [Kobayashi, S., Y. Ota, Y. Harada, A. Ebata, M. Moriya, H. Onoda, K. Onogi, H. Kamahori, C. Kobayashi, H. Endo, K. Miyaoka, and K. Takahashi, 2015: The JRA-55 reanalysis: General specifications and basic characteristics. J. Meteor. Soc. Japan, 93, 5-48.](#)

3.2 Ocean and cryosphere

	Hindcast	Forecast
Ocean initialization	Multivariate Ocean Variational Estimation (MOVE)/MRI.COM Global 2 system (MOVE/MRI.COM-G2)	Multivariate Ocean Variational Estimation (MOVE)/MRI.COM Global 2 system (MOVE/MRI.COM-G2)
Ocean IC perturbations	MOVE/MRI-COM-G2 driven by JRA-55 with BGM perturbation	MOVE/MRI-COM-G2 driven by JRA-55 with BGM perturbation
Unperturbed control forecast?	None	None

Detailed documentation: [Toyoda T., Y. Fujii, T. Yasuda, N. Usui, T. Iwao, T. Kuragano, and M. Kamachi, 2013: Improved analysis of seasonal-interannual fields using a global ocean data assimilation system. Theor Appl Mech Jpn, 61, 31-48.](#)

4. Model Uncertainties perturbations:

Model dynamics perturbations	None
Model physics perturbations	Stochastically Perturbed Parametrization Tendencies (SPPT) scheme
If there is a control forecast, is it perturbed?	Yes

Detailed documentation: [Yonehara, H. and M. Ujiie, 2011: A stochastic physics scheme for model uncertainties in the JMA one-week ensemble prediction system. *CAS/JSC WGNE Res. Act. Atmos. Ocean Model/WMO*, 41, 6.09–6.10.](#)

5. Forecast system and hindcasts

Forecast frequency	Every 5 days
Forecast ensemble size	13
Hindcast years	1981-2016
Hindcast ensemble size	10 (5 members with 15-day Lagged Average Forecast)
On-the-fly or static hindcast set?	static

6. Other relevant information

The available start dates are as follows:

(NOTE: **hindcasts** are just available for dates highlighted in **bold and underlined**)

Start Month	Available Start Days
January	1, 6, 11, <u>16</u> , 21, 26 and <u>31</u>
February	5, <u>10</u> , 15, 20 and <u>25</u>
March	2, 7, <u>12</u> , 17, 22 and <u>27</u>
April	1, 6, <u>11</u> , 16, 21 and <u>26</u>
May	1, 6, <u>11</u> , <u>16</u> , 21, 26 and <u>31</u>
June	5, 10, <u>15</u> , 20, 25 and <u>30</u>
July	5, 10, <u>15</u> , 20, 25 and <u>30</u>
August	4, 9, <u>14</u> , 19, 24 and <u>29</u>
September	3, 8, <u>13</u> , 18, 23 and <u>28</u>
October	3, 8, <u>13</u> , 18, 23 and <u>28</u>
November	2, 7, <u>12</u> , 17, 22 and <u>27</u>
December	2, 7, <u>12</u> , 17, 22 and <u>27</u>

7. Where to find more information

General information:

[Takaya, Y., S. Hirahara, T. Yasuda, S. Matsueda, T. Toyoda, Y. Fujii, H. Sugimoto, C. Matsukawa, I. Ishikawa, H. Mori, R. Nagasawa, Y. Kubo, N. Adachi, G. Yamanaka, T. Kuragano, A. Shimpo, S. Maeda, and T. Ose, 2018: Japan Meteorological Agency/Meteorological Research Institute-Coupled Prediction System version 2 \(JMA/MRI-CPS2\): atmosphere–land–ocean–sea ice coupled prediction system for operational seasonal forecasting. *Clim. Dyn.*, **50**, 751–765.](#)