

Description of GEM-NEMO-v20190731 C3S contribution

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1. Forecast system version

Identifier code: GEM-NEMO

First operational forecast run: August 1, 2019

2. Configuration of the forecast model

Is the model coupled to an ocean model? Yes

Coupling frequency: every hour

2.1 Atmosphere and land surface

Model	GEM
Horizontal resolution and grid	256×128 grid points (~155 km)
Atmosphere vertical resolution	79 levels
Top of atmosphere	0.075 hPa
Soil levels	2
Time step	60 minutes

Detailed documentation: Lin, H., J. Merryfield; R. Muncaster; G. C. Smith; M. Markovic; F. Dupont; F. Roy; J.-F. Lemieux; A. Dirkson; V. V. Kharin; W.-S. Lee; M. Charron, and A. Erfani, 2020: The Canadian Seasonal to Interannual Prediction System Version 2 (CanSIPsv2), Weather and Forecasting. <https://doi.org/10.1175/WAF-D-19-0259.1>

2.2 Ocean and cryosphere

Ocean model	NEMO
Horizontal resolution	1°×1° (1/3 degree meridionally near the equator)
Vertical resolution	50 levels
Time step	30 minutes
Sea ice model	CICE
Sea ice model resolution	Same as NEMO
Sea ice model levels	5 ice-thickness categories
Wave model	N/A

Wave model resolution	N/A
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Detailed documentation:

3. Initialization and initial condition (IC) perturbations

3.1 Atmosphere and land

	Hindcast	Forecast
Atmosphere initialization	ERA-interim	GEPS
Atmosphere IC perturbations	Random isotropic perturbations	Ensemble Kalman Filter
Land Initialization	Off-line Surface Prediction System (SPS) forced by ERA-interim	SPS forced by the CCMEP analysis
Land IC perturbations	None	None
Soil moisture initialization	Off-line Surface Prediction System (SPS) forced by ERA-interim	SPS forced by the CCMEP analysis
Snow initialization	Off-line Surface Prediction System (SPS) forced by ERA-interim	SPS forced by the CCMEP analysis
Unperturbed control forecast?	none	none

Data assimilation method for control analysis:

Horizontal and vertical resolution of perturbations:

Perturbations in +/- pairs:

Detailed documentation:

3.2 Ocean and cryosphere

	Hindcast	Forecast
Ocean initialization	ORAP5	CCMEP GIOPS analysis
Ocean IC perturbations	None	None
Unperturbed control forecast?	None	None

Detailed documentation:

4. Model Uncertainties perturbations:

Model dynamics perturbations	None
Model physics perturbations	implicit and explicit surface flux numerical formulation for 5 members each
If there is a control forecast, is it perturbed?	No

Detailed documentation:

5. Forecast system and hindcasts

Forecast frequency	once a month
Forecast ensemble size	10
Hindcast years	1980-2010
Hindcast ensemble size	10
On-the-fly or static hindcast set?	static

6. Other relevant information

7. Where to find more information