

# The MSC50 Wind and Wave Reanalysis



## Abstract

The AES40 wind and wave hindcast has been shown to be a good description of the wave climatology of the North Atlantic. This hindcast has been widely used in wave climate and engineering studies for the North Atlantic, particularly for the areas offshore the east coast of Canada.

The purpose of the MSC50 project was to improve AES40 by modeling the Canadian East Coast at significantly higher resolution while including shallow water physics in the same 3G model applied in AES40, increase the spatial resolution of the basin-grid as well and increase the temporal resolution of the archive, increase accuracy in order to reduce the uncertainty in any climate or design data statistics produced from the hindcast database.

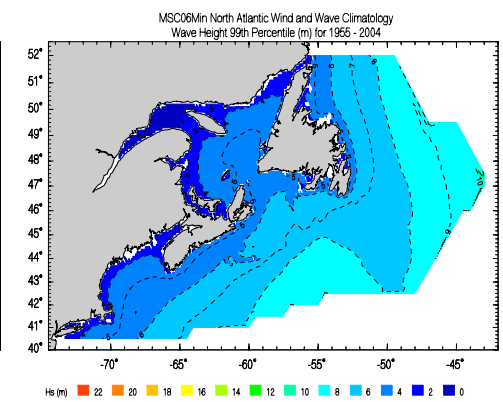
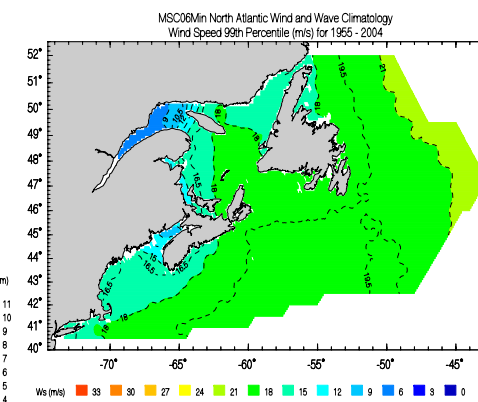
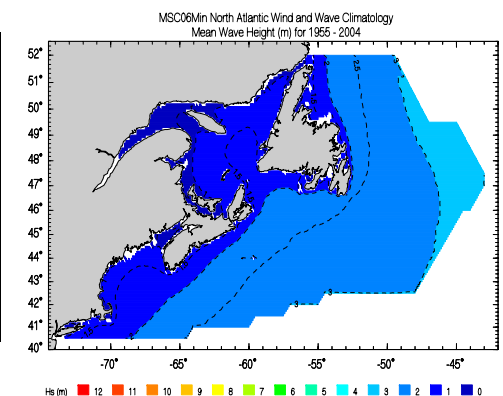
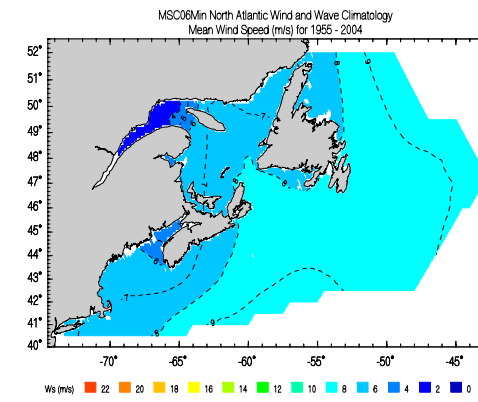
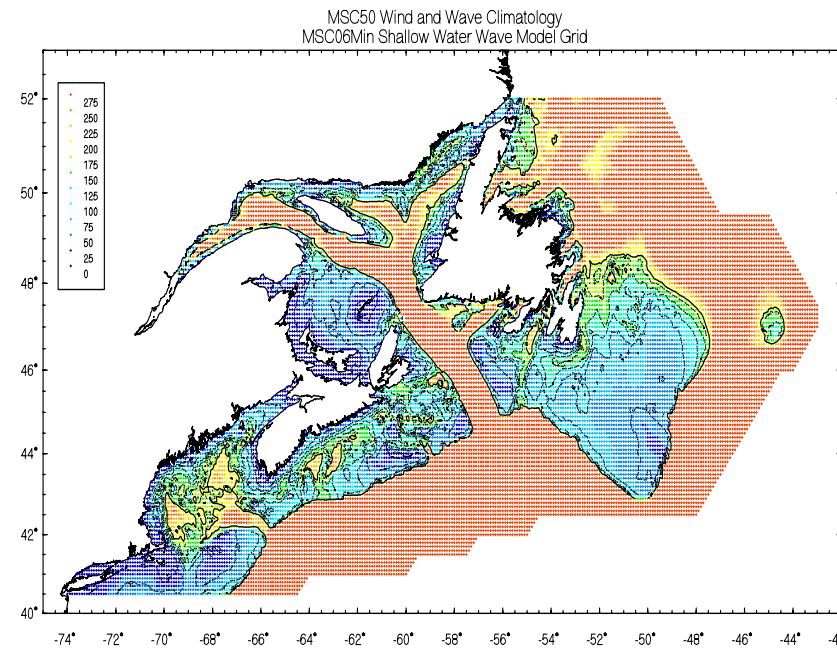
The MSC50 hindcast takes advantage of all of the high quality inputs to the AES40, and introduces some important enhancements, particularly for the Canadian east coast offshore regions. These include a finer grid, 0.5 degrees coarse over the entire North Atlantic, and 0.1 degrees fine over the northwest Atlantic, shallow water effects, better bathymetry and sea ice information, increased use of scatterometer wind data, and storm track information.

When the MSC50 basin hindcast is compared to the original AES40 hindcast using *in situ* observations the results show similar wave height bias (0.10 to 0.08 m) and with scatter index reduction by 43% (0.23 to 0.16). Comparison of the two hindcasts using altimeter data also show similar bias (-0.01 to 0.04) with reduction in scatter index of 29% (0.22 to 0.17).

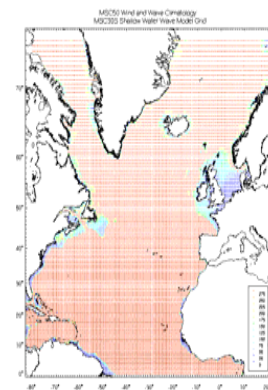
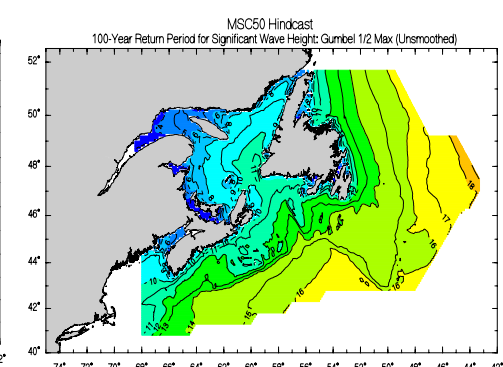
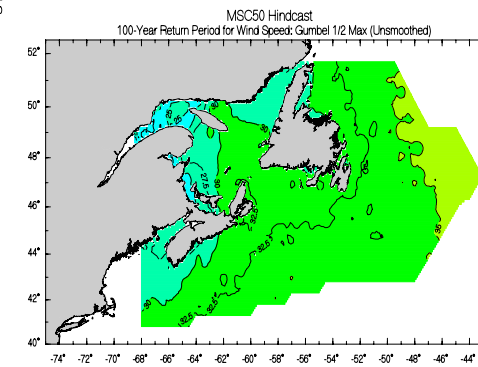
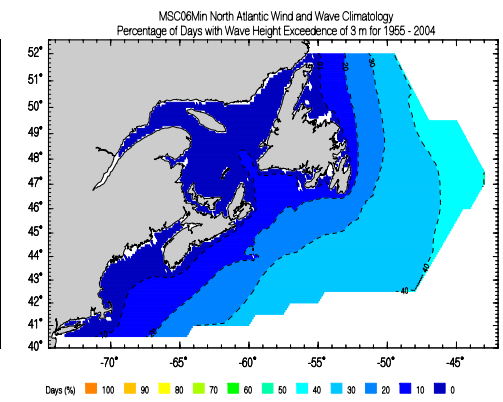
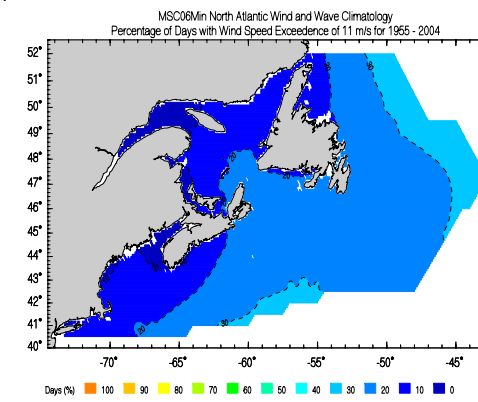
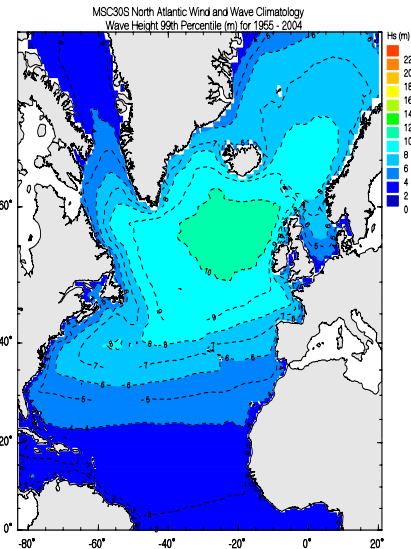
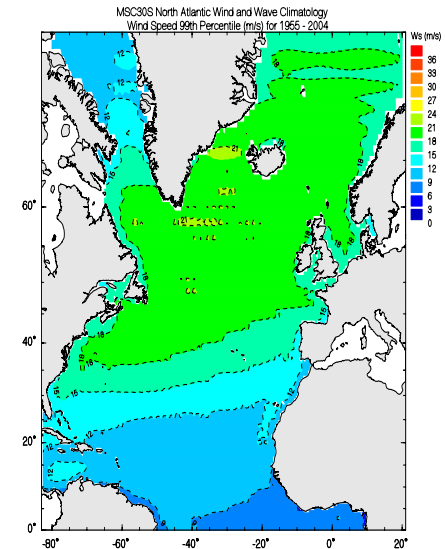
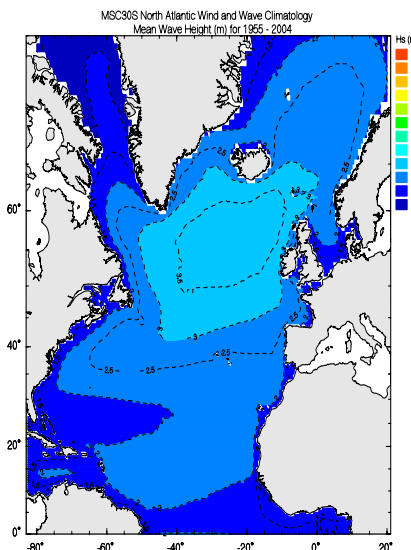
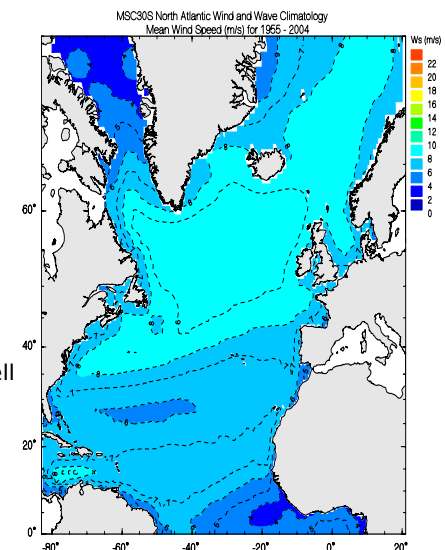
The MSC50 project was funded by the Climate Research Division of Environment Canada and the Federal Program of Energy Research and Development.

## Reanalysis Data and Climate Products

- 17 wind and wave parameters archived at all model locations (includes sea/swell partitions), 1-hourly time step
- Full 23 frequency by 24 direction band wave spectra at select locations
- Pre-computed extremes of wind speed and wave height
- Graphical wave atlas ([www.oceanweather.com/MSC50WaveAtlas/](http://www.oceanweather.com/MSC50WaveAtlas/))
- Canadian-waters archive with analysis tool for offshore operators



MSC50 Fine Domain Water Model with Water Depths (m)



MSC50 Coarse Domain Water Model

AES40	MSC50
0.625 x 0.833	0.5 x 0.5 Coarse 0.1 x 0.1 Fine
9023 Grid Points	18637 Coarse Grid Points 18541 Fine Grid Points
OWI 3G52 Deep	OWI 3G52 Shallow
Monthly Ice Fields	Dynamically Updated Weekly Ice Fields
Kinematic Reanalysis of Wind Fields	Enhanced Kinematic Analysis of Winds