

Case Studies of Tropical to Extra-Tropical Cyclone Conversion in the Western North Atlantic: Wind Field Kinematics and Wave Response

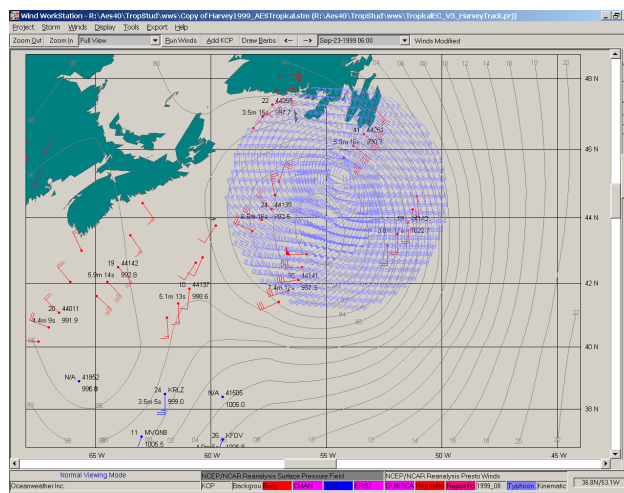
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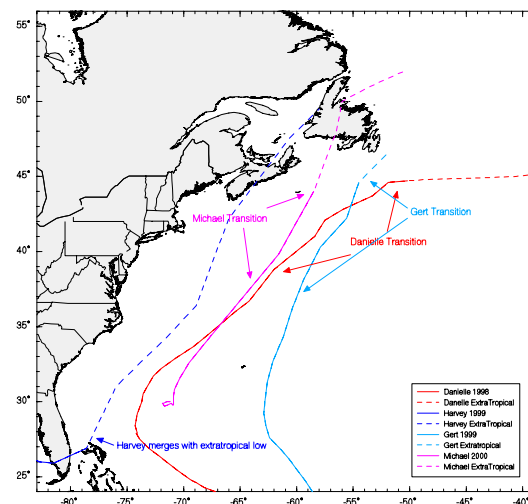
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Presented here are three cases in an expanding library of tropical to extra-tropical cyclone conversion cases in the Western North Atlantic. The overall goal of this study is to increase our understanding of the marine surface wind transformation and its ocean wave response.

Wind fields were developed for three cases: Danielle 1998, Gert/Harvey 1999 and Michael 2000. In each case, a tropical boundary layer model was run using inputs developed from aircraft observations. All available wind data including buoys, ships, ERS-2 and QUIKSCAT scatterometer, and aircraft flight level winds reduced to the surface were plotted for each storm to be used in a classical kinematic analysis of the wind field. The kinematic wind fields were run through a 3rd generation wave model and results presented here.

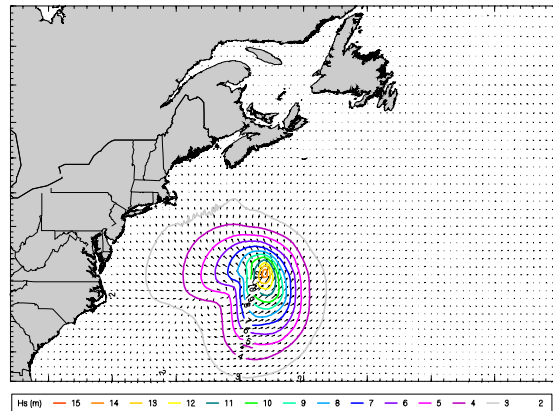
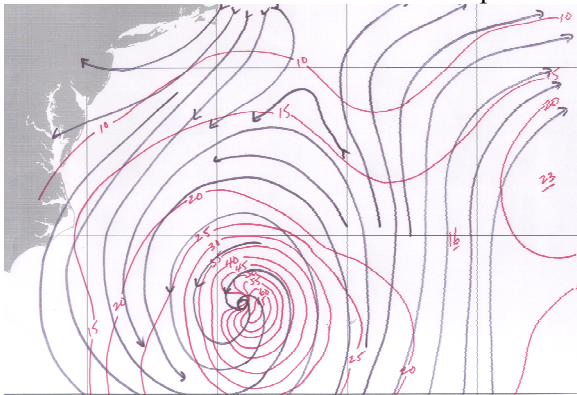


Wind WorkStation snapshot showing buoy wind observations (red, knots) repositioned with respect to Gert (1999) with tropical model output winds (purple), ship reports (blue) and NCEP/NCAR Reanalysis pressures contours (gray, mb).

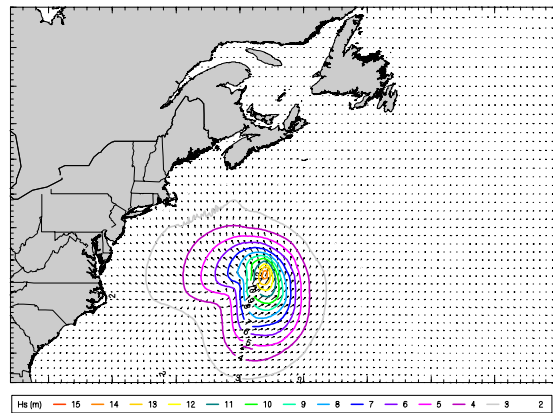
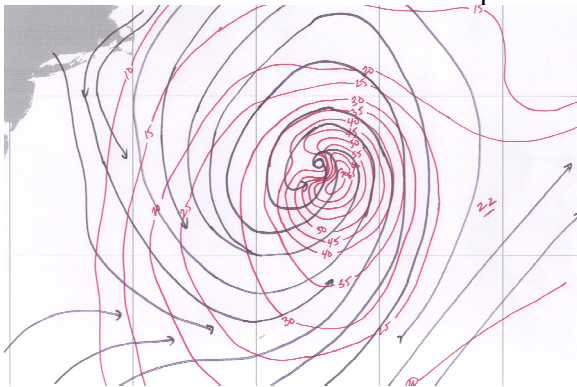


Storm tracks of Danielle (1998), Gert (1999), Harvey (1999) and Michael (2000).

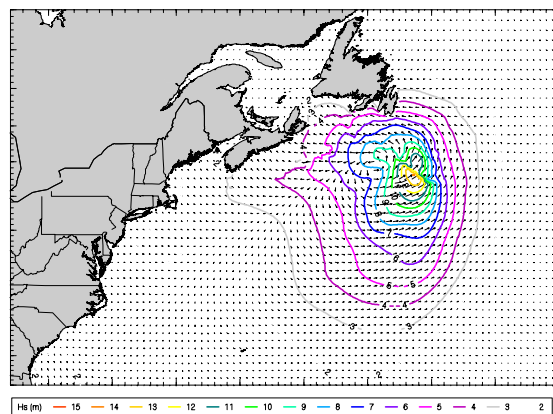
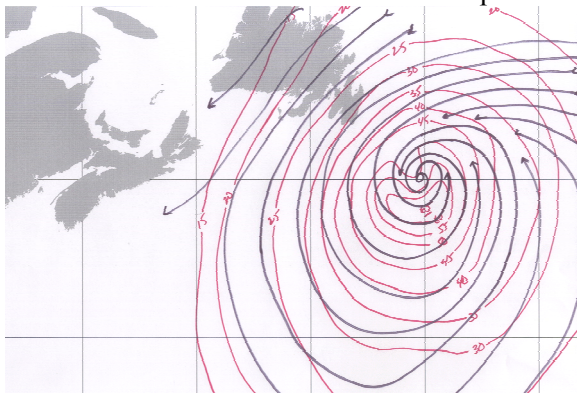
September 2 1998 00 GMT



September 2 1998 18 GMT

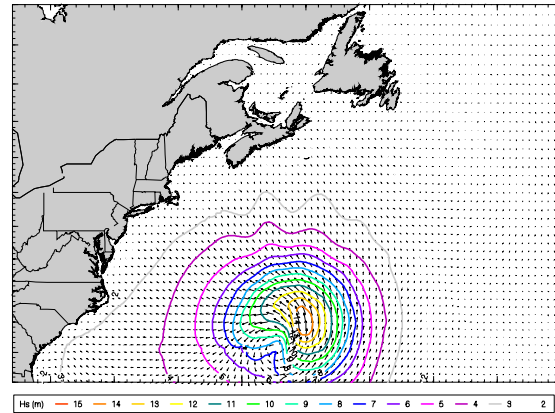
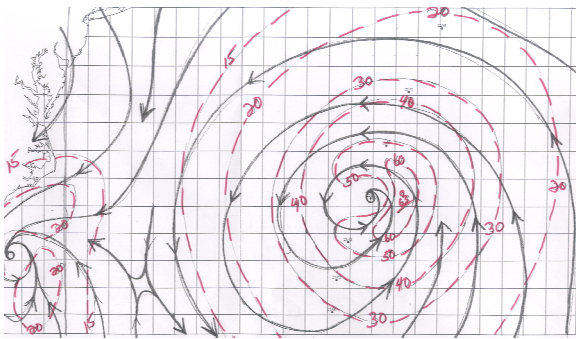


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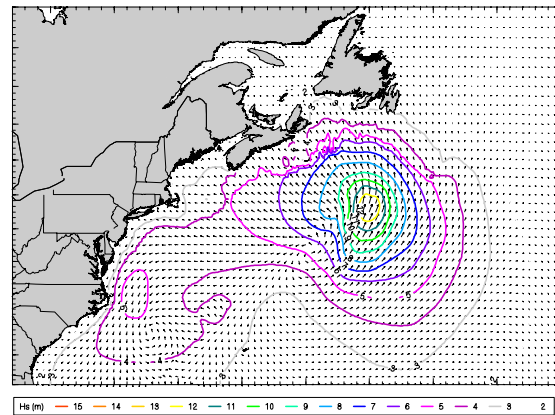
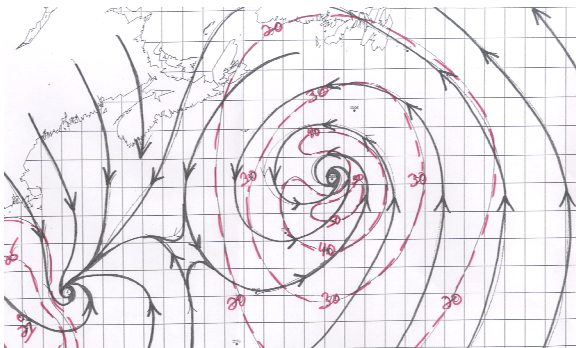


Streamline and isotach kinematic analysis (left, winds in knots) and resulting wave fields (right, significant wave height in meters) for three snapshots during Danielle 1998.

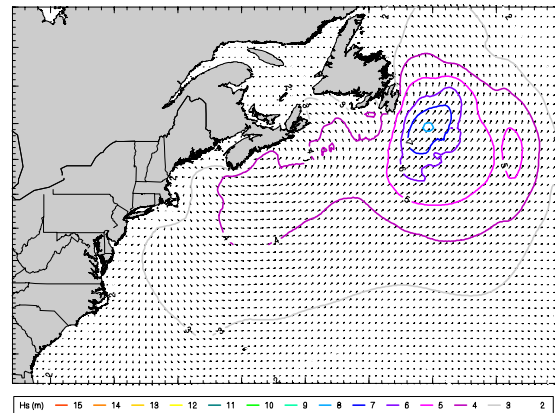
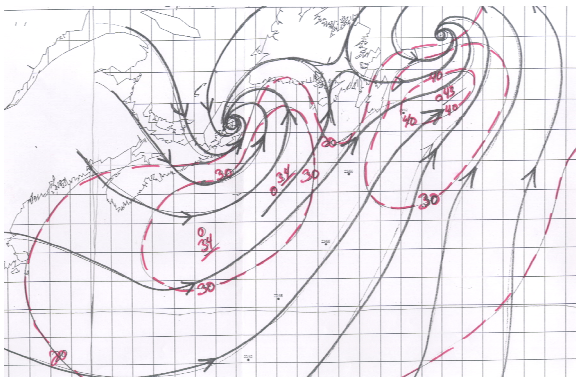
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September 23 1999 00 GMT

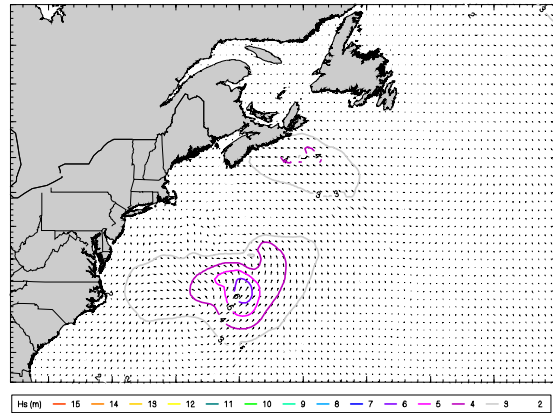
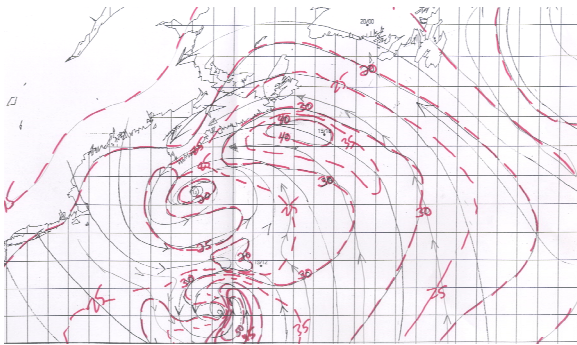


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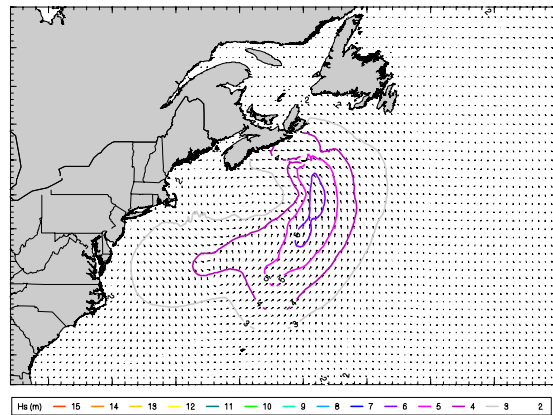
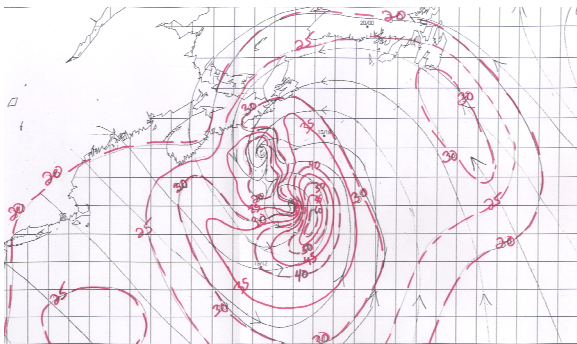


Streamline and isotach kinematic analysis (left, winds in knots) and resulting wave fields (right, significant wave height in meters) for three snapshots during Harvey and Gert 1999.

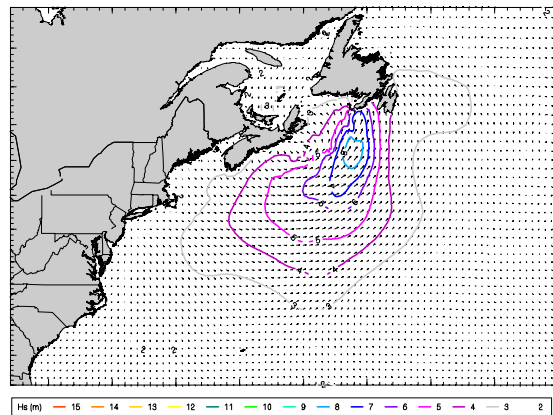
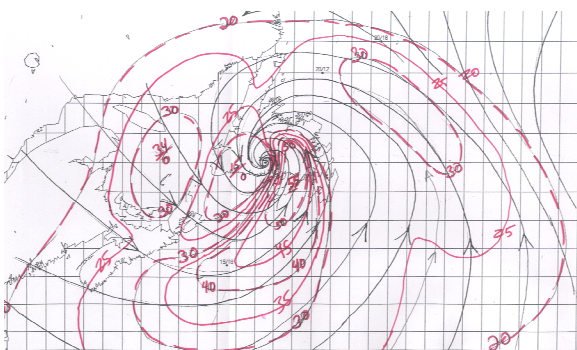
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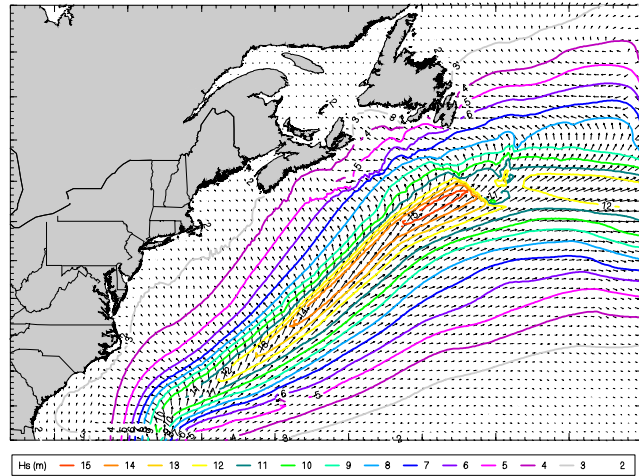
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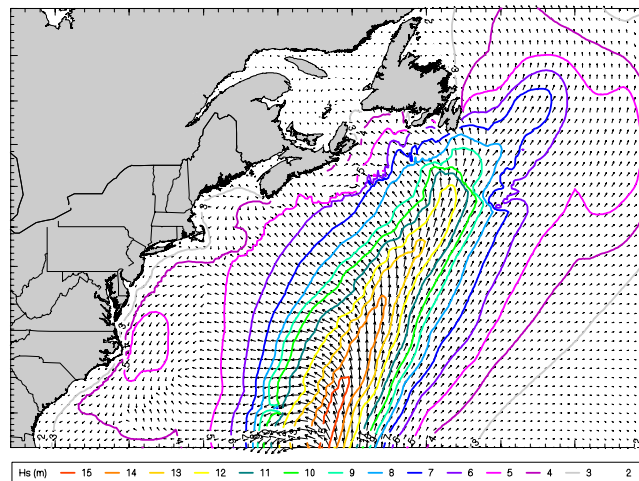
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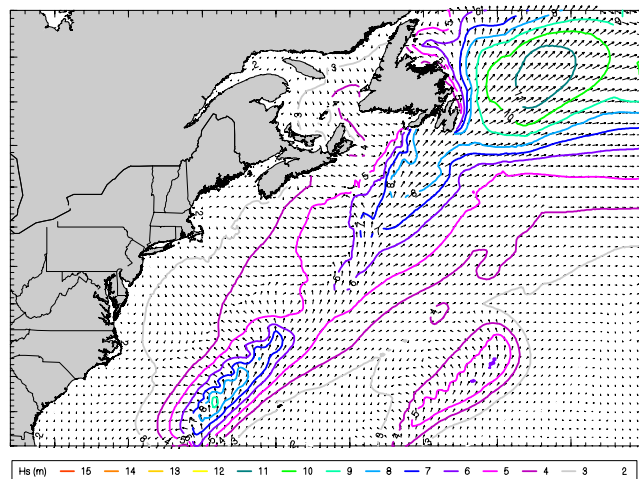
Streamline and isotach kinematic analysis (left, winds in knots) and resulting wave fields (right, significant wave height in meters) for three snapshots during Michael 2000.



Maximum significant wave height (m) hindcast during Danielle 1998.



Maximum significant wave height (m) hindcast during Harvey and Gert 1999.



Maximum significant wave height (m) hindcast during Michael 2000.