FY2017 Joint Hurricane Testbed (JHT) NOAA-OAR-OWAQ-2017-2005004
NOAA grant NA17OAR4590137

# Evolutionary Programming for Probabilistic Tropical Cyclone Intensity Forecasts

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Board of Regents of the University of Wisconsin System
for the University of Wisconsin at Milwaukee
P.O. Box 340
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Project/Grant Period: 7/1/2017–6/30/2019

Reporting Period End Date: 1/30/2019

Report Term or Frequency (semi-annual)

Final Annual Report? Select Yes or **No**

## 1. ACCOMPLISHMENTS

Table 1 provides planned versus actual accomplishments as identified in the funded proposal. As shown in the Table, the project is on-track and on-schedule with the exception of the code port, which encountered some delays owing to Testbed personnel responsibilities, but is now close to completion.

| Action | Planned completion | Actual completion | Status (if not completed) |
|---|---|---|---|
| Finish development, cross-validation, and retrospective testing of EP and BMC intensity, RI, and RW forecasts. | 11-1-2017 | 12-15-2017 | Complete. |
| With JHT collaborators, finalize year one testbed evaluation plan. | 1-1-2018 | 1-22-2018 | Complete. |
| Port EP and BMC code to JHT computational infrastructure. | 3-1-2018 | 8-23-2018 | Complete – but development and refinement continues, with expected updates Spring 2019. |
| Interdepartmental Hurricane Conference in Miami, FL. Semiannual project meeting between PIs and NHC/JHT facilitators. | 3-15-2018 | 3-15-2018 | Complete. |
| 2018 AMS Conference on Hurricanes & Tropical Meteorology, Ponte Vedra, FL. | 4-20-2018 | 4-20-2018 | Complete. |
| Year one JHT evaluation. | Sept 2018 | Sept 2018 | Complete. |
| One-week PI visit to NHC/JHT for semiannual project meeting and EP method training activities. | Sept 2018 | 8-30-2018 | This visit was replaced by a year-one training call, with agreement from PIs and JHT collaborators. |
| Complete evaluation of 2018 real-time JHT forecasts. | 1-1-2019 | 11-1-2018 | Complete – based on results, we are modifying the procedure and are udating the code to reflect these changes. |
| With JHT collaborators, finalize year two testbed evaluation plan. | 3-1-2019 | | Pending |
| Interdepartmental Hurricane Conference, location TBD, and semiannual project meeting between PIs and NHC/JHT facilitators. | Spring 2019 | | Pending |

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|---|---|---|---|
| Year two JHT evaluation. | Sept 2019 | | Pending |
| One-week PI visit to NHC/JHT for semiannual project meeting. | Sept 2019 | | Pending |
| Complete evaluation of 2019 real-time JHT forecasts. Final report | 1-1-2020 | | Pending |

**Table 1**: Planned versus actual project accomplishments

With funding from the grant, we are supporting one masters-level research assistant, who presented some of the initial findings (from the training) at the 2018 AMS conference on Hurricanes and Tropical Meteorology in April 2018. In addition to this presentation, the student (Jesse Schaffer) reported on our activities at the Interdepartmental Hurricane Conference in Miami, FL in March 2018 and presented at the 2019 AMS Annual Meeting in January 2019 (Phoenix, AZ). A further presentation was made (by PI Evans) at AMS WAF/NWP conference in Denver in June 2018. Other dissemination will occur as summarized in Table 1.

As noted, the project is largely on-schedule and the activities as laid out in the proposal and listed in Table 1 impose a clear and robust timeline for continued progress towards the project goals and objectives.

## 2. PRODUCTS

As shown in Table 1, the project test plan was produced and submitted. Additionally, a research-to-operations transition plan, a previous progress report, and this report have been produced. Further deliverables are pending as per the schedule listed in Table 1.

## 3. PARTICIPANTS & OTHER COLLABORATING ORGANIZATIONS

At the University of Wisconsin at Milwaukee, the following individuals have worked on this project: PI Paul J. Roebber, Distinguished Professor of Atmospheric Sciences; co-PI Clark Evans, Associate Professor of Atmospheric Sciences; Jesse Schaffer, M.S. candidate, Atmospheric Sciences. No changes have been needed or made to the personnel identified in the proposal. Testbed point of contacts at the National Hurricane Center include Michael Brennan, John Cangialosi, and Christopher Landsea, and additional NOAA input has been provided by Mark DeMaria, Jose Salazar, and Matt Onderlinde.

## 4. IMPACT

It is too early in the project to provide information on this point at this stage.

## 5. CHANGES/PROBLEMS

There have been no significant problems or changes to the proposed research that have led to serious changes in the work plan. Some delays were initially encountered with respect to porting the code, related primarily to the need for time to interact with NHC personnel and their other obligations. These were resolved. The government shutdown in December 2018 – January 2019 prevented any interaction with JHT/NHC, but during this time, we have been actively engaged in updating the code following findings from the year-one real-time evaluation.

## 6. SPECIAL REPORTING REQUIREMENTS

For the Joint Hurricane Testbed, we have the following special reporting requirements:

- Assessment of the project's Readiness Level (current and at the start of project): at project start we were at RL5, we have established RL6 (demonstration of prototype system, subsystem, process, product, service or tool in relevant or test); and we are in the process of moving toward the primary test goal RL7: successful implementation of the models' codes into the JHT/NHC infrastructure for real-time model demonstration.
- Test Plan: we discussed a draft with NOAA POCs and submitted the Test plan on the 1-30-2018 deadline.
- Transition to operations activities in the last six months: an initial version of the model code was provided to and implemented on JHT infrastructure.
- Summary of testbed-related collaborations, activities, and outcomes: these are pending.
- Has the project been approved for testbed testing yet (if it's a testbed project)? Yes.
- What was transitioned to NOAA? In progress over the course of the project.

## 7. BUDGETARY INFORMATION

There are no budgetary anomalies or deviations from the original proposal.

## 8. PROJECT OUTCOMES

It is too early in the project to provide information on this point at this stage.