Web-ATCF, User Requirements and Intensity Consensus
Final Report for Second Year (2009)

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Introduction

This report describes progress for the second year of a two-year JHT project developing a web version of Automated Tropical Cyclone Forecasting System (ATCF; Sampson and Schrader 2000), addressing NHC user requirements as discussed at our yearly requirements meeting, and updating the intensity consensus for both the Atlantic and eastern North Pacific basins. An estimate of the progress on each goal is included in the final report.

Web-ATCF

The ATCF is a computer-based application designed to automate and optimize much of the forecast drudgery in a typical forecast cycle at the NHC. The Web-ATCF is an extension of that core capability outside the few workstations at NHC, NCEP and CPHC. For example, it should save time for setting up yearly training of NHC customers (e.g., WMO sites) and provide an avenue for dissemination of forecast information to its core users (NWS and warning coordinators) during conference calls. The web solution desired by NHC is complete, and a server is currently set up at NRL Monterey to demonstrate its current capability (Fig. 1). The server is currently ip address restricted, but can be made available to static ip addresses upon request.

The Web-ATCF uses standard web protocols (SSL, port 443) and has been tested through stringent Navy firewalls. The application is initiated from a web page, uses Java Web Start to download a small (1MB) program that communicates with the ATCF server – sending commands to the ATCF server and then rendering graphics and other instructions back on the client workstation. Although the Web-ATCF is surprisingly fast, it is not recommended for day-to-day forecasting. It is, however, ideal for display and analysis of ATCF data for clients (e.g., back office staff, NWS offices and emergency managers). It could also be used for training and exercises. The remaining work on this task is to install the solution on NHC provided hardware. Time and resources have been allocated to accomplish this, and it is estimated that the task is currently 95% complete.
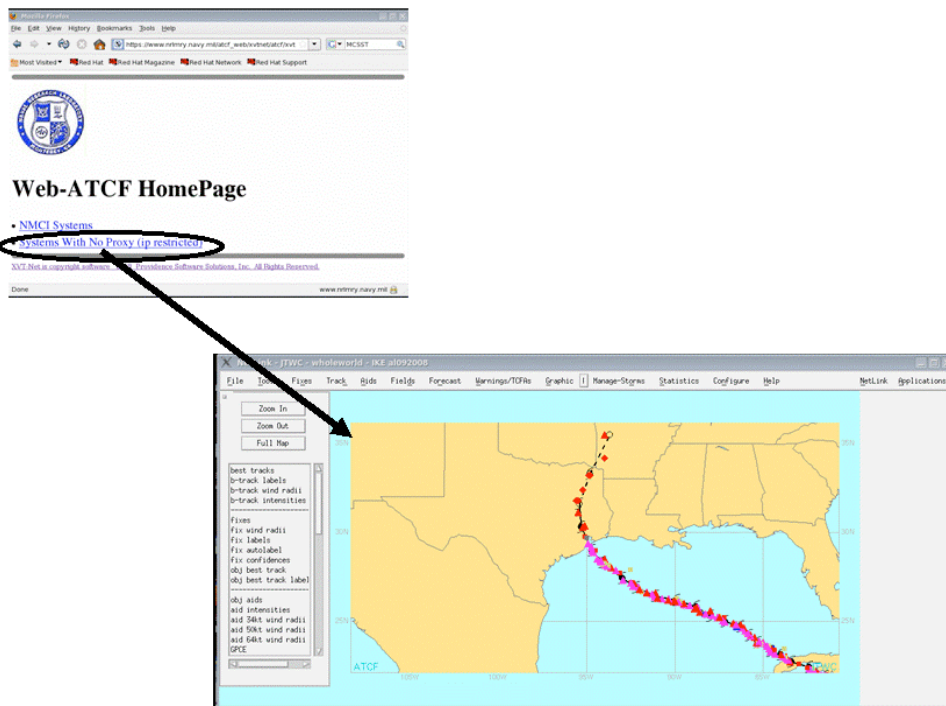
Figure 1. The Web-ATCF. Clients click on a web page, an interpreter is downloaded, and the end result is the capability, look and feel of ATCF on the client desktop without the lengthy installation involved in setting up a version of ATCF with a live data feed on each client.

User Requirements

NRL addressed approximately 65 requirements in the two years. The highlights for 2009 are a partial best track display (Fig. 2a) and off-synoptic position entry and display (Fig. 2b). Some other requirements addressed are listed in Appendix A, all of which have been implemented in operations. The user requirements work is complete.
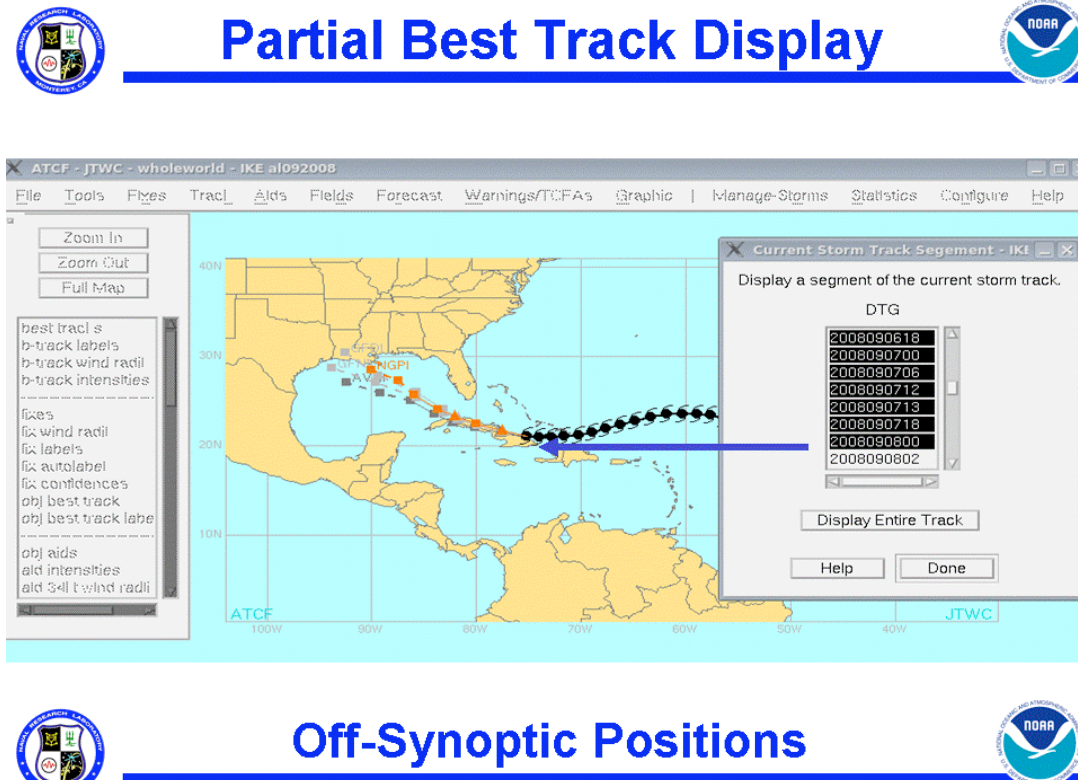

Figure 2. (a) Display partial best track, and (b) Off-synoptic position entry and display. These are examples of functions were added to ATCF for the 2009 season.

Intensity Consensus

NRL and NHC collaborated on updating intensity consensus aids (Sampson et al. 2008) running operationally at NHC, based on initial work done in 2005-2007. The original suite of marginally skillful objective aids included GHMI (the GFDL model; Bender et al. 2007), DSHP (the SHIPS model; DeMaria et al. 2005) and GFNI (the Navy version of the GFDL model; Rennick 1999), which was upgraded to include improvements from the GFDL in 2009. This set was subsequently expanded to include the newly operational LGEM (Logistic Regression Equation Model; DeMaria 2009) and HWFI (the HWRF; Surgi et al. 2006). We developed and implemented a four-aid consensus (ICON =HWFI+ GHMI+DSHP+ LGEM) consensus in which all aids must be available to compute the resultant forecast, and also developed a variable consensus (IVCN =HWFI+GHMI+DSHP+LGEM+GFNI) for which only two aids need be available to compute the forecast. Results from independent tests with 2008 and 2009 data indicate that consensus aids perform as well or better than their members. ICON performance to date has been on par with or better than IVCN (Fig 3), but the availability is lower (ICON is available for 95% of verifying NHC forecasts while IVCN is available for 100%). Both aids serve as baselines for more complex intensity forecast techniques such as weighted averages. To date, experiments with weighted averages have not yielded significant improvements over the evenly-weighted ICON and IVCN. This task is complete and follow-on work is scheduled as part of another JHT project for 2009-2010.

Conclusions

Tasks in the original proposal are on target for completion in 2009. Here is a summary of the tasks and their completion percentages.
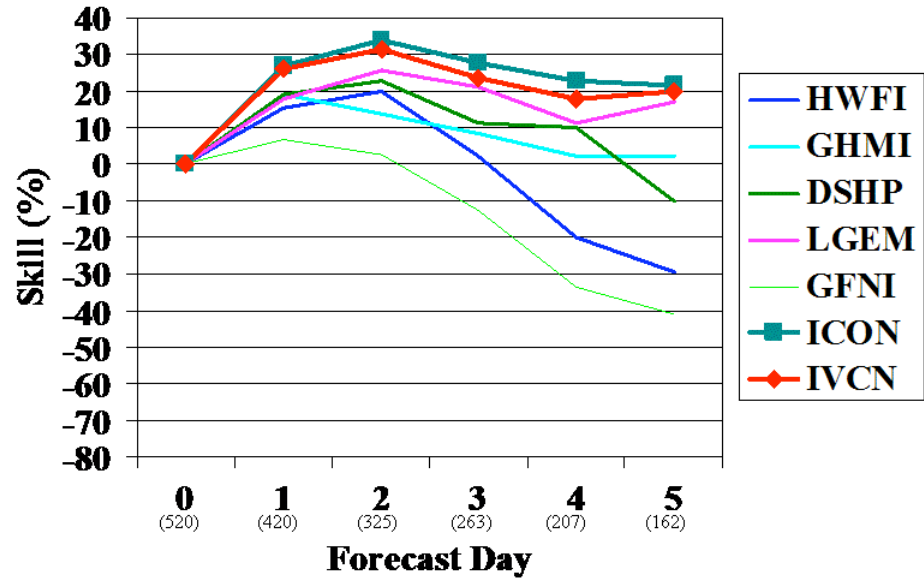
- ➢ Develop a Web-ATCF capability to reduce maintenance associated with training and increase interaction with NWS and warning coordinators (95%). This task will be completed when hardware and software are made available for installation at the NHC.
- ➢ Address requirements levied during ATCF Requirements Meetings and during season (100%),
- ➢ Update and evaluate intensity consensus (100%)

Acknowledgements
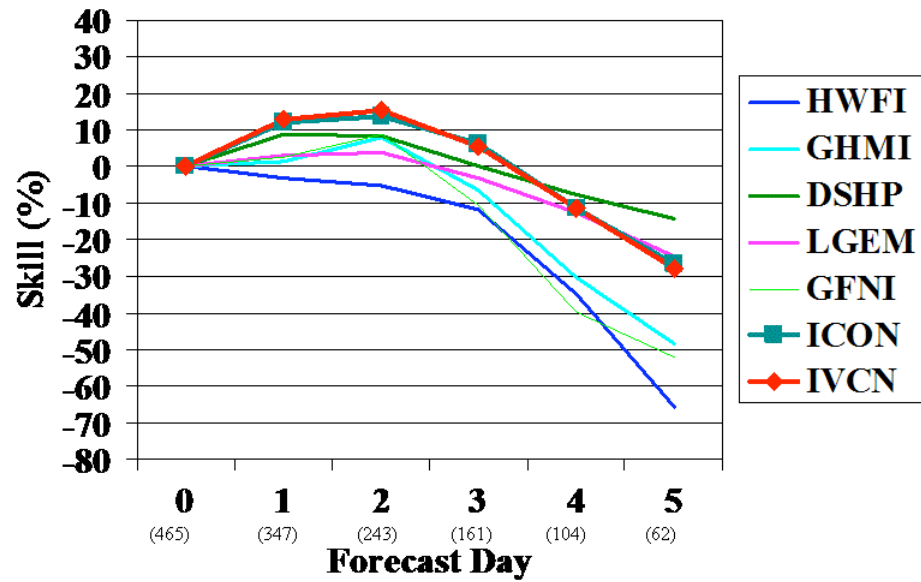
2008-2009 Atlantic Intensity Skill

Figure 3. Top-performing intensity objective aids and consensus aids. The consensus aids (ICON and IVCN) generally outperforms their members (HWFI=HWRF, GHMI=GFDL, DSHP=SHIPS, LGEM=Logistic Regression Model, GFDN=Navy GFDL model). Number of cases included in parentheses, except for GFDN (available only about 70% of time). Skill baseline is the five-day SHIFOR (Knaff et al. 2003).

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Appendix A
Partial List of NHC Requirements Addressed

Guidance Related Items:
- GPCE update for 2007 seasons.
- Probability data update for 2007, optimized code.
- Add corrected consensus (CCON, CGUN) for 2007 season.
- Evaluated/updated intensity consensus aids (ICON and IVCN).
- Evaluated/updated track consensus aids (TCON and TVCN)
- Added corrected consensus for new track aids (TCCN for TCON and TVCC for TVCN).
- Add "Run Your Own Consensus" (RYOC) to interpolator code. Evaluated results after 2007 season.
- Add GHMI to generalized interpolator.
- Updated GPCE coefficients for 2008, 2009
- Implemented GPCE-AX (Atlantic) for 2009 season

User Interface Related Items:
- Menu changes.
- Wind radii graph modifications:
  - Don't want the wind radii plot to jump when toggling taus or radii.
  - -Add menu options for scaling the graph axes.
  - Add mouse readout of radii like lat/lon readout storm display
- Add mouse-over label for fixes, track, aids, and forecast track
- Generate CPA from best track.
- Allow off-synoptic hour best track points in best track dialogs.
- Differentiate off-synoptic hour on storm display.
- Add "make 12 ft seas forecast" to forecast menu forecast wind radii.
- Modified "list latest forecast" so it lists the 12 ft seas radii.
- Add capability to highlight a select objective aid (toggle).
- ATCF trigger to run wind probabilities for specials.
- Retain 12-foot seas from special advisories for use in next advisory.
- Prevent setting of advisory wind intensity from modifying synoptic time (best track) wind intensity.
- Modify distance tool to display as you roam over the map
- Add Saffir-Simpson color scheme legend (cat 1, cat2...).
- Allow edit of bogus/compute parameters in edit best track.
- Label Objective best track position.
- Capability to display certain segments or ranges of the track.
- Add a zoom out function rather than toggle back and forth in "unzoom".
- Add capability to handle multiple techlists for viewing purposes,
- Remove "do you want to save" alert from text edit window.
- Suppress wind radii pop-up error dialogs beyond 72h.
- Add "Run Your Own Consensus" (RYOC) dialog.
- Show list of compute parameters for previous 24 hours.

- Trigger ATCF wind speed probabilities push for prelim graphic.
- Revise special advisory times to 30 minute intervals.
- Added code from Chris Sisko to do the archiving of 90's series storms.
- Added "Over water" to the NHC advisory dead/dying dialog.
- Worked on the NHC shapefile scripts and code, got it to compile and make on our RHEL5 boxes.
- Added code to check for an inactive forecast. This is to handle the situation where the current forecast has been designated inactive and the user brings up the "advisory comp" dialog and saves. Want the forecast to be saved in this case as OFCP not OFCL.
- Fixed a problem reported by Chris S. about garbage in storms.txt when starting with a zero length storms.txt and retrieving a storm from the archives.
- Fixed a problem reported by Chris S. regarding the user selected scale for the radial wind radii graph.
- Modified the fix time-intensity graph to graph fixes based on both fix site and type vs. just fix site.
- Added a "Select Map Area" option to the File menu and the sidebar.
- Added "select a storm" to the sidebar.
- Changed non-editable text windows to use fileview, this is a work-around for the text-edit problem with XVT_NET.