Year-one progress report for a Joint Hurricane Testbed Project:

Development of a unified dropsonde quality assurance and visualization capability

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Current Status

Although the beginning of work on the project was significantly delayed due to the late delivery of project funding to NCAR, in October of 2010, substantial progress has been achieved and the project remains on schedule.

Accomplishments include:

A formal meeting was held in 2009 among the primary users of dropsonde quality assurance software users to identify the major requirements for the development of the project. These requirements included retaining the basic structure and graphical capabilities of ASPEN while adding additional capabilities that are available in Editsonde. The highest priorities for these capabilities are the use of synoptic maps to more easily analyze and correct observations from individual flights and more control of the data editing features. The requirements of this project are further refined during meetings at the NCAR-sponsored AVAPS (dropsonde users) meeting this past Spring.

An extensive recruitment process resulted in the hiring of the lead software engineer for the project. Xuanyong Xu holds Master's degrees in both Computer Science and Meteorology, and thus is an excellent match for this work. Mr. Xu has undergone training and has since become proficient in all of the various aspects of ASPEN and the associated computer environment.

Reconciliation of quality control algorithms between the ASPEN and Editsonde software packages is a major goal of this project. Significant progress has been made in this area, especially for the critical near-surface region of the sounding. Differences between ASPEN and Editsonde were carefully studied and the causes of discrepancies were documented. ASPEN was modified so that the near-surface processing produces results very close to the output from Editsonde.

The final product of the project will be a unified sounding analyses program. It will be derived from Editsonde and the current ASPEN version 2 (ASPENV2), with ASPEN as the primary software source. Modernization of the ASPEN user interface system has now been accomplished by migrating from the Microsoft MFC framework to the Nokia-Trolltech Qt graphical user interface system. Porting of ASPENV2 to Qt is complete.

This software branch becomes the prototype for the new unified software, which is known as ASPEN version 3 (ASPENV3).

Another project milestone is the creation of a software package which is multi-platform capable. Qt, along with utilization of the "scons" software build environment, makes this possible. An initial scons configuration has been completed, and the ASPENV3 prototype is now operating on the Windows, Linux, and Mac OS X platforms. Automatic builds of installers have been created for the Mac and Windows versions, which allow one-click installations of ASPEN on these platforms. The Linux installer is currently under development. The prototype software package, ASPENV3, has been tested for basic functionality and is currently undergoing more stringent testing and refinements.

The primary users of ASPEN met in person and via a teleconference at the AVAPS users meeting held last April at NCAR in Boulder. These users included representatives from NOAA research (HRD), NCAR, AOC, and the 53rd AFRC. The requirements of the new software package and the initial priorities of added capabilities were discussed and agreed upon. A working group for the development and testing of ASPENV3 was formed at this meeting. Each of the 4 groups represented selected one member to serve as the point of contact for this working group.

A conversion of the HRD software package, Editsonde is currently underway so that it may run in a standard X-windows operating environment. This will allow NCAR software engineers and ASPEN-Editsonde users to run both Editsonde and ASPENV3 concurrently for comparisons and implementation of new algorithms in ASPENV3.

A web-based project management toolbox and issue-tracking center using the commercial software, JIRA, was implemented for the development of ASPENV3. Here, members of the APENV3 working group, or other invited participants, can easily view and upload issues relating to this project. Project managers can then view any issues, make changes or additions to the software and post the results on the website. This allows for a very efficient mean of tracking and fixing any issues that arise with the software package during the development stages.

Extensive inter-comparisons between ASPENV2 and ASPENV3 are underway by EOL and NOAA scientists in order to verify that the V2 functionality and integrity has been replicated. The tests have been positive to date with minor fixes noted. The use of the JIRA project management tools are being used in the evaluation.

Two webinars that provided training on ASPENV3 have been given to scientists and students involved in the NASA GRIP, NSF/NCAR PREDCIT, and NOAA IFEX tropical cyclone field campaigns this summer. Scientists and students will be using ASPENV3 for real-time processing and transmission to the GTS of dropsonde data collected during these field experiments. The software will be used on all dropsondes released by the NASA DC-8 and Global Hawk aircraft, the NCAR GV and, to a limited extent, on some flights with the NOAA aircraft. The use of ASPENV3 will not only provide a thorough test of the operational use of ASPENV3 but will provide the basis for further developments of the software and to produce a sonde database for use during the second year development.

Near Term Goals

The following milestones are planned for the next few months, beginning in mid-late summer of 2010:

- An “auto-save” feature, which automatically saves the quality control output products, is currently being added to ASPENV3 and should be available near the start of the aforementioned field campaigns (August 15).
- A synoptic analyses and visualization feature will be added to ASPENV3. This functionality is currently found in Editsonde, and is what the working group decided is the most critical addition for ASPEN.
- Additional editing capability of ASPEN V3 will be developed based upon recommendations from the working group and JHT point of contacts.
- Work will begin on the development of an automated validation system, which will provide an objective method for comparing processing results between Editsonde and ASPENV3. It will also provide a method for validating software modifications to unified software package as development continues in future years.