J3.21

ENHANCING THE AWIPS BASELINE METEOROLOGICAL FIELDS VIA THE VOLUME BROWSER

Dan A. Baumgardt*
NOAA/National Weather Service
La Crosse, Wisconsin

I. INTRODUCTION

The AWIPS baseline code did not include a number of meteorological fields which are useful for operational analysis and forecasting in the National Weather Service (NWS) Forecast Office. Although the Product Maker software was designed as a flexibility tool for creating new meteorological fields in AWIPS locally, many NWS users found the software hard to manage. Since relic systems such as PC-GRIDDS or GEMPAK could provide these needed fields, NWS forecasters were forced into using two platforms.

Thus, the Volume Browser web page was born in April of 2000 as a collaboration effort of, and for, NWS offices around the country. The site has grown since its inception and now offers over 80 fields for AWIPS use. These fields support more complex analysis of operationally significant weather and bring science to the forefront on the AWIPS system.

2. VOLUME BROWSER ABILITIES

The AWIPS Volume Browser provides NWS meteorologists with a medium to incorporate the latest scientific advancements into operations. Included in the functionality of the Volume Browser are mathematical operators for use with the model-output atmospheric parameters. Through these manipulations, many operationally useful parameters can be obtained, called "virtual fields", and then placed into the Volume Browser graphical user interface.

A complete listing of the mathematical operators available is located in the gridTable.doc file under the documentation directory on AWIPS. Some of these operators include: Difference, Add, Multiply, Divide, LinTrans, Average, Exp, Ln, Power, Derivative, Magnitude, Dot, Cross, Rotate, Gradient, Laplacian, and Vorticity. Although most equations can be solved through the use of a number of intermediate fields leading up to the resultant field, the technique can become quite cumbersome. For example, calculating Fn Vectors demands over 20 separate virtual field calculations. Each of these adds to both the overhead of the code and to the run-time for the "-grids" localization.

3. SHORTFALLS

The AWIPS Volume Browser technique to add virtual fields does have shortcomings. When the technique was first used, it was on a limited basis. To create more complex virtual fields, the user must define many sub-fields before finally arriving at the desired resultant. These numerous sub-fields have caused the virtualFieldTable.txt file to grow to an enormous size. Upon running the "-grids" localization, a file for D2D is created for the virtual fields. This file in Build 5.0 was near 10 MB; however, with the 80+ fields now available to add, this file is near 40 MB. The building of this file during the localization process has pushed the mainScript.csh -grids run time to over an hour.

One the other shortfalls of the technique to add fields to the volume browser is the requirement to keep an ordered, indexed list. If the user would change this order, or if the order of indices changes with a software upgrade, office procedures have undesirable outcomes on D2D. Thus, sites must be prudent with software upgrades.

With the widespread use and mission-oriented science the Volume Browser additions bring to the NWS forecast office, there needs to be national attention given to this area. A standardized, delivered suite of fields should accompany all software upgrades. Many of the fields incorporated into AWIPS using the Volume Browser need to be in the baseline code. Additional features and fields, including those that can be interpolated vertically in space (i.e., wet-bulb zero height) are needed.

4. USE IN OPERATIONS

Convective environment analysis on AWIPS increased substantially with the use of Volume Browser virtual fields. Many convective shear fields are available to the operational forecaster including 0-6 km Bulk and Cumulative Shear, 0-3 km Shear, Bulk-Richardson Number, storm-relative flow fields, and BRN Shear. Supercell and tornado diagnostics such as the Bunkers et. al. (2000) storm motion, Energy-Helicity index, Vorticity Generation Parameter, 0-1 km Storm-Relative Helicity approximation, and LCL Height can also be added. Mesoscale Convective Complex environmental analysis can be achieved through the use of Moisture Transport Vectors, Mean Wind, and Corfidi Vectors. Winter fields include precipitation type icons using partial thicknesses, ingredients-based diagnostics using EPV* and QG theory, and 60 hour total snowfall accumulation. Isentropic virtual fields are also available and the NWS fire program is supported through the Haines Index.

5. COLLABORATIVE WEB SITE

Operational forecasters using AWIPS are urged to enhance the scientific fields in the Volume Browser. This web page is maintained by the author but serves as a collaborative tool for all AWIPS users to share their Volume Browser developments:

* *Corresponding author address*: Dan Baumgardt, National Weather Service, N2788 County Road FA, La Crosse WI 54601; email: dan.baumgardt@noaa.gov.

http://www.crh.noaa.gov/arx/vb/

The web site contains documentation, meteorological fields to add, instructions on how to add those fields, and the literary references for the science involved. Also, support is given for software upgrades and problems experienced in the volume browser area.

6. ACKNOWLEDGMENTS

A great many in the NWS have contributed to this project. Some of those offices include, but are definitely not limited to: State College, Minneapolis, Billings, Binghamton, Sioux Falls, Birmingham, Midland, Wichita. Special thanks goes to Matthew Bunkers in Rapid City who developed a good amount of the convective fields, James Ramer (FSL) who answered many of my initial questions on the subject, and to La Crosse MIC Glenn Lussky who allows me to support the project.

7. REFERENCES

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