Comments on ''A Quantitative Assessment of the NESDIS Auto-Estimator''

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The National Environmental Satellite, Data, and Information Service (NESDIS) Satellite Analysis Branch (SAB) computes operational quantitative precipitation estimates (Borneman 1988) and provides real-time satellite precipitation estimates (SPEs) and outlooks to field forecasters. This information is transmitted to the field via satellite precipitation estimate messages called SPENES. These SPENES alert forecasters and hydrologists of the potential for heavy precipitation and flash floods over their watch and warning areas. For over 20 years, SPEs have been a manual/interactive process using the interactive flash flood analyzer (IFFA) technique (Scofield and Oliver 1977; Scofield 1987). IFFA was designed for high-intensity precipitation events. However, due to the manual/interactive nature of the IFFA methodology, precipitation estimates cover limited areas for limited periods of time and can take a significant amount of time to produce.

In order to improve the spatial and temporal coverage of SPEs while improving timeliness, NESDIS/Office of Research and Application (ORA) developed an automatic algorithm for high-intensity precipitation called the Auto-Estimator (A-E). The A-E was designed for cold-topped (less than $-60°C$) mesoscale convective systems (Vicente et al. 1998). In addition, the original A-E was based on 10.7-μm rain rate information at 30-min intervals, growth, gradient, and a precipitable water/relative humidity adjustment from the National Centers for Environmental Prediction Eta Model. This original version was the one evaluated by Rozumalski.

As stated in Rozumalski's (2000) final paragraph, NESDIS has continued to develop the A-E since this evaluation, and progress is being made toward operational implementation. Recent enhancements include the addition of 15-min Geostationary Operational Environmental Satellite (GOES) 10.7-μm imagery, 15-min Weather Surveillance Radar-1988 Doppler (WSR-88D) reflectivity data (as a rain/no rain indicator), and adjustments for orography and warm cloud-top precipitation events. Vicente et al. discuss some of these enhancements.

During the summer of 1999, this new enhanced version of the A-E was evaluated in ORA and tested by SAB and selected field offices. Validation (Jun–Aug 1999) between this new version and the original one showed an improved bias of 75% (34.4–8.6 mm), rmse of 34% (30.2–19.9 mm), and correlation coefficient of 30% (0.36–0.48). However, more importantly, a conclusion from the National Weather Service (NWS) assessment found the timeliness of the A-E to be acceptable and that the A-E was of value and will be more so once it is available on the Advanced Weather Interactive Processing System (AWIPS). Another request from the field is for SAB to monitor the A-E and provide statements on how the A-E is performing. These statements would be accomplished through the operational SPENES messages. SAB's assessment was that the A-E was operationally useful and reliable. The A-E allowed more time for SAB meteorologists to devote to weather analysis, outlooks, and SPENES messages. Additionally, there was an increased frequency of the messages and more precipitation events were covered. The ''bottom line'' recommendation was to make A-E operational for most types of convective systems (cold and warm top), but that the IFFA would be used for winter storms and convective events not being handled by the A-E. In addition, SAB would put out messages as to how the A-E is performing for a particular convective event.

In July 2000, the A-E became operational. The A-E joins a suite of techniques (winter storm, lake effect, etc) on the IFFA system. Plans are to have both the A-E and IFFA graphics product on AWIPS in the fall 2001. The transition to the A-E has been extremely successful (more messages and events covered). Additionally, SAB meteorologists have been able to keep up with the numerous rainfall events instead of trying to ''play catch-up'' or fall behind. In some cases, SPENESs were issued before an event unfolded alerting the field offices to the possibility of heavy rainfall occurring.

Finally, a collaborative effort has been established between NESDIS/ORA, NWS/Office of Hydrology, and

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the NWS/West Gulf River Forecast Center. This pilot project is tackling the problem of how to best use SPEs to supplement WSR-88D and gauge observations. Initial results are encouraging; SPEs were used as a basis for a flash flood warning in which a flood actually occurred.

NESDIS is extremely excited about the future as even more accurate and robust precipitation algorithms come online that will make use of the many GOES channels combined with the more physical microwave data on the Special Sensor Microwave/Imager, Advanced Microwave Sounding Unit-B, and Tropical Rainfall Measurement Mission. Later this year, I hope to submit a more in depth article to *Weather and Forecasting* on the status and outlook of operational SPE algorithms for extreme precipitation events.

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