PS12, #178 - The HydroMet Decision Support System: Transfer of Radar Technologies to Developing Countries

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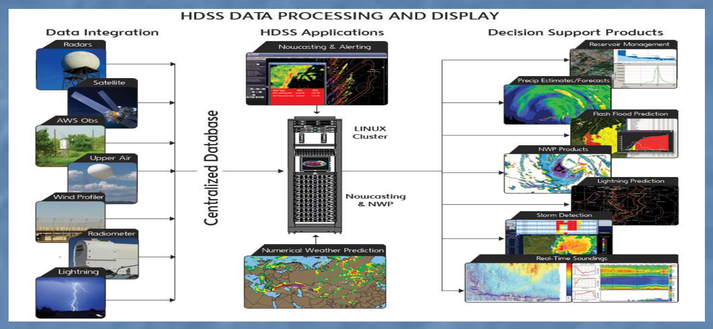
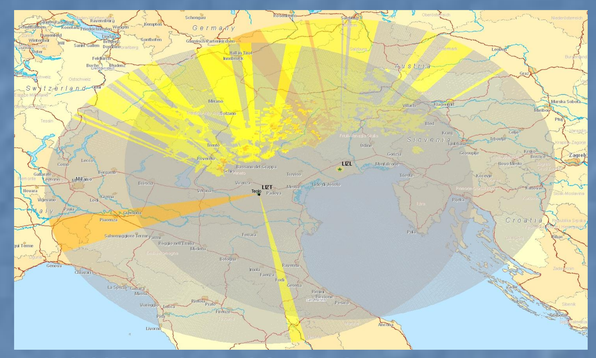
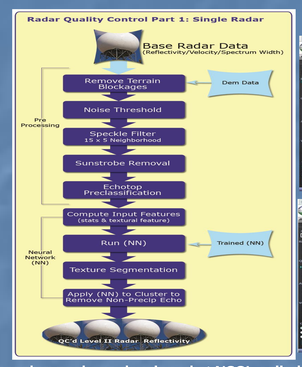
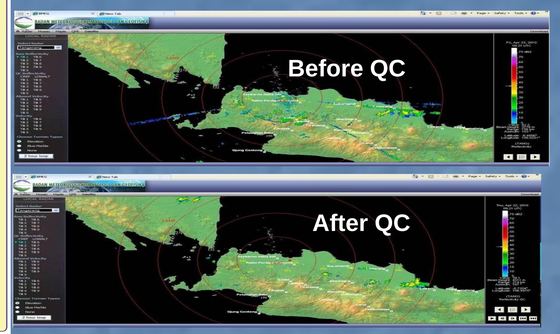
Purpose: The HydroMet Decision Support System (HDSS) is a hardware/software system designed for operational nowcasting and hydrological applications. HDSS is designed to ingest multiple data sources including radar, satellite, surface, model, and rain gauge data. HDSS includes applications from leading research organizations such as the US National Severe Storms Lab, the University of Oklahoma, and Canada's McGill University. These technologies have been operationalized and installed internationally.



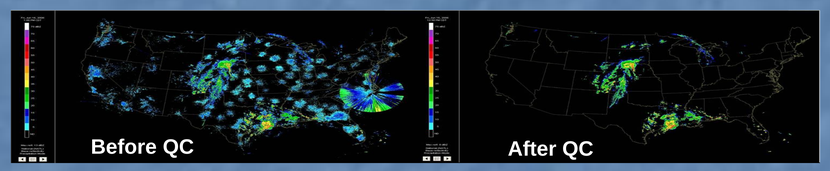
Data Integration: Data from all available data sources are integrated within HDSS and processed by a series of nowcasting and hydrological algorithms. Displays are customized for specific applications.



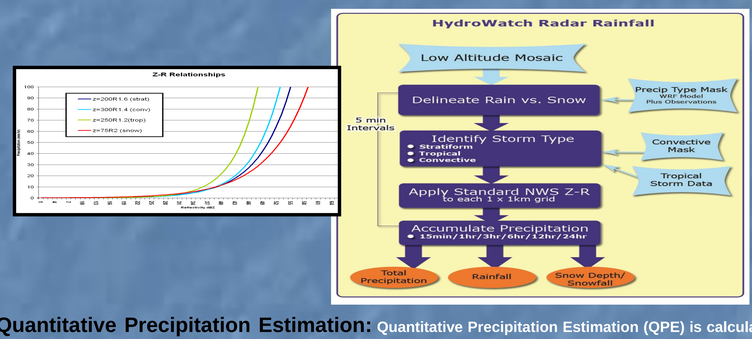


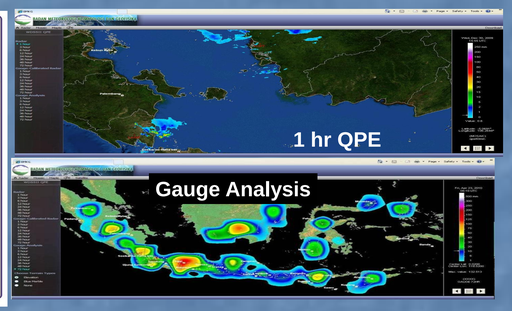


Hybrid Scanning and Quality Control: HDSS uses a radar processing package developed at NSSL called WDSS-II. Part of the WDSS-II software uses "hybrid scans" based on terrain data to identify beam blockage and other scanning problems. (left image from Italy installation). WDSS-II also performs quality control of the data (middle image – courtesy of NSSL). Before and after images of quality control routine are shown on the right from the HDSS installation in Indonesia.

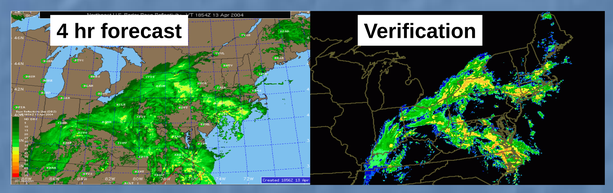


3D Mosaic: Radar data that have been quality controlled are put into a high resolution 3D mosaic grid using WDSS-II. The top panel shows an example over the US using before QC and after QC. Lower panel shows a mosaic over Indonesia.

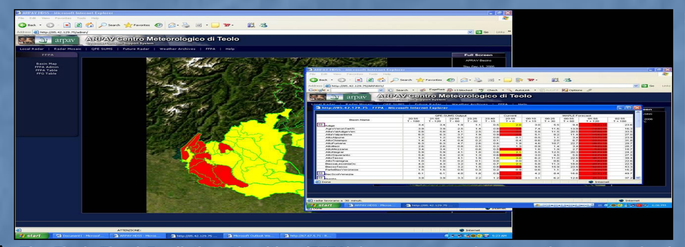


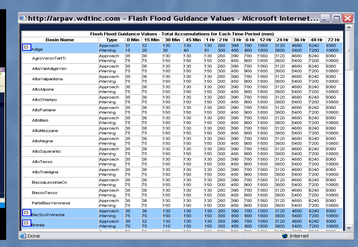


Quantitative Precipitation Estimation: Quantitative Precipitation Estimation (QPE) is calculated using a routine within WDSS-II and blended with WDT algorithms. The routines use variable Z-R relationships, precipitation phase (rain or snow) and type (convective or stratiform) to determine QPE values. Correction of the radar estimates is also performed using rain gauges. Precipitation amounts are calculated for the previous 72 hour period.



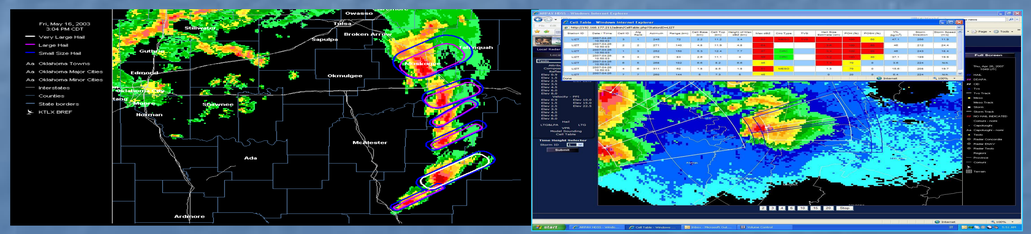
MAPLE: Mosaic radar data are processed with the McGill Algorithm for Precipitation Nowcasting Using Semi-Lagrangian Extrapolation (MAPLE) to produce forecasts of reflectivity location and intensity. The left panel shows an example of a MAPLE 4 hr reflectivity forecast using a national mosaic with the verifying image. MAPLE forecasts are used for Quantitative Precipitation Forecasting by applying variational Z-R and Z-S relationships. An example of a 4 hr precipitation accumulation forecast using the MAPLE forecast reflectivity over Indonesia is shown in the right panel.



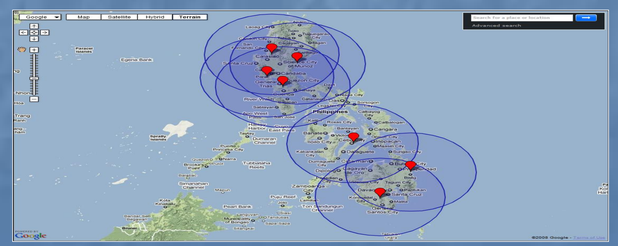


FFPA: The Flash Flood Prediction Algorithm (FFPA) is an automated system that constantly checks total and forecast rainfall accumulations in delineated basins against user defined Flash Flood Guidance (FFG) values for each basin. FFPA combines results from the QPE algorithm and MAPLE QPF to determine which basins are approaching or exceeding FFG. Warnings are output into basin tables and graphically by color coding warned basins. Right panel shows FFPA over northern Italy, left panel shows FFG interface.

Lightning Prediction Algorithm: The Lightning Prediction Algorithm (LPA) combines lightning density grids with output from MAPLE to predict the location and intensity of lightning activity out to 60 minutes in advance. The image above shows the implementation of LPA over Greece. The oval shapes show the predicted location of lightning activity overlain on radar data. Automated alerts are generated along with ETA/ETD information for customer assets.



Hail and Storm Nowcasting: WDT combines output from the storm and hail detection components of WDSS-II to produce forecasts of hail size and location (hailswath) out to 30 minutes in advance. The image on the left shows output from the Hailswath Prediction Algorithm and the image on the right shows output from the Storm Cell Tracking and Identification (SCIT) algorithm.



Philippines Project: WDT has installed WDSS-II and several other radar applications at PAGASA headquarters in Manila. The image above shows the locations of the radars that are being networked.

iMap Interactive: WDT uses data and products from HDSS installations, along with our global data server in the US to provide customized services to both high-end and consumer users, including many industries such media and utility companies.

iMap Mobile: WDT has developed applications for iPad, Android, and iPhone users. Data and products are served out of WDT's data center.