WDT DECISION SUPPORT SYSTEMS: TECHNOLOGY TRANSFER TO INTERNATIONAL WEATHER SERVICES, AVIATION OPERATIONS, AND OTHER CLIENTS

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ABSTRACT

Weather Decision Technologies Inc. (WDT) is a private company that specializes in meteorological data integration, algorithms, and international technology transfer with regard to the latest state-of-the-science developments in the fields of meteorology, hydrology, and aviation. WDT has developed and deployed several systems internationally including Italy, Greece, Indonesia, the Philippines, the UAE, China, and Thailand. Technologies deployed include the following components:

HydroMet Decision Support System (HDSS) which integrates weather radars, satellite, rain gauges, NWP, and other data sources to provide high resolution radar based products in real-time. Several key technologies utilized within HDSS are licensed from leading R&D organiztions such as the U.S. National Severe Storms Laboratory and the McGill University of Canada. HDSS components include radar data quality control, radar mosaics, Quantitative Precipitation Estimation (QPE), rain gauge analysis and gauge corrected QPE, reflectivity location and prediction with Quantitative Precipitation Forecasting (QPF), flash flood prediction, automated alerting of hazardous conditions, and customized displays.

Mesoscale Analysis and Prediction Support System (MAPSS) is a customized Numerical Weather Prediction (NWP) system based on Weather Research and Forecasting (WRF) model. MAPSS integrates all local data available and uses the Local Analysis and Prediction System (LAPS) and Four Dimensional Data Assimilation (FDDA) for data assimilation and model initialization. Multiple high resolution nests can be run depending on the customer requirements and available hardware.

Aviation Weather Decision Support System (AWDSS) combines multipe instrumentation sources such as weather radars, microwave profiling radiometers, radar wind profilers, lidars, and output from MAPSS to detect and predict weather phenomena that are hazardous to aviation. Weather hazards detected and predicted in AWDSS include fog detection and burnoff estimation, inversion strength and trending, microbursts, gust fronts, wind shear affecting approach and departure corridoors, thunderstorm location and movment, and general NWP forecast products such as turbulence, ceiling, visibility, lightning activity, etc. Customized data and product displays are built for both aviation forecasters and Air Traffic Controllers.

Lightning Decision Support System (LDSS) uses data from lightning detection networks integrated with radar data when available to produce nowcasts out to 60 minutes in advance of lightning location and intensity. This is coupled with

databases of customer asset locations to provide automated warnings of lightning activity and Estimated Times of Arrival/Departure for given customer assets.

Example Installations

Figure 1 shows an example of the radar display for Badan Meteorologi Klimatologi dan Geofisika (BMKG) in Indonesia. This project involves the integration of several radars from different manufacturers. The BMKG installation is a customized version of HDSS described above.

Figure 1. Example of BMKG radar display showing radar mosaic over Jakarta region.

Figure 2 shows an example of the display installed with the AWDSS (described above) at the Dubai International Airport.

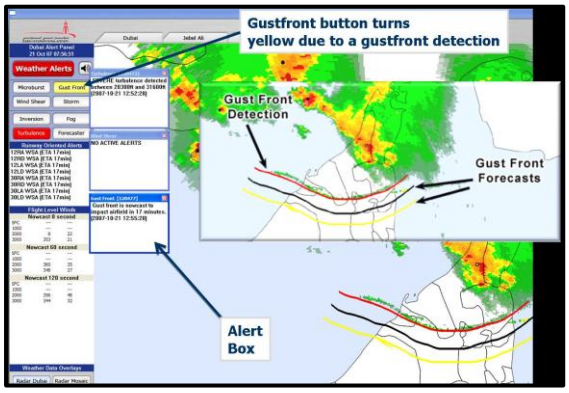

Figure 2. Example of AWDSS display in Dubai showing output from the gust front detection algorithm and automated altering (left panels).

The Dubai AWDSS system integrates data from a wind profiler, radiometer, weather radar, and also contains MAPSS (described above). The system detects and predicts weather phenomena that are hazardous to aviation.

Figure 3 shows an example of the radar display installed in Manila as part of the Philippine Atmospheric, Geophysical, and Astronomical Services Administration (PAGASA) Integrated High Performance Computing System (iHPCS). WDT installed HDSS and MAPSS as part of this system.

Figure 3. Example of PAGASA radar display showing radar mosaic over Manila region.

Figure 4 shows an example of LDSS (described above) installed for the Greek Hellenic National Meteorological Service (HNMS). In the figure radar data from the European network are overlain with lightning data and lightning activity forecasts.

Figure 4. Example of HNMS LDSS display showing lightning activity, predictions, and radar data.

Summary

This abstract has briefly discussed the types of technologies WDT has transferred internationally. The purpose of this presentation will be to discuss the successes of the transfer of various technologies to national weather services and other clients in the international marketplace.