Internet Based GIS Remote Sensing and Storm Chasing

On 22 May 2010, multiple tornadoes swept across the Northern Plains near Bowdle, South Dakota. These storms produced upwards of six tornadoes, the most destructive receiving an EF-4 rating. Real-time forecasting through Internet based geographic information systems (GIS) remote sensing data integrated with a Windows® based radar program contributed greatly to a successful intercept of these tornadoes by the author. This article will illustrate the special uses of Internet based GIS data for use in real-time forecasting and applications while storm chasing.

GRLevel3, or Gibson Ridge Level 3 (www.grlevelx.com), is a Windows® based software program that is used for National Weather Service (NWS) level 3 radar and Terminal Doppler Weather Radar (TDWR) data interpretation. This program also allows users to perform customized data integrations utilizing third party remote sensing GIS data obtained through the Internet. With the increasing availability and speed of cell tower based Internet services, storm chasers are now able to quickly get the most current weather data overlayed in the program. Some third party remote sensing GIS data providers are now providing users with current Automated Surface Observing System (ASOS) data, various mesonet station data, Storm Prediction Center (SPC) products, NWS warnings, NWS local storm reports, high resolution Geostationary Operational Environmental Satellite (GOES) image overlays, basic RUC model data, and many other tools needed for more successful storm chasing. These overlays update automatically and immediately in the radar program as data are received. This is particularly of use to storm spotters and storm chasers in the field who need hands-off data collection and display capabilities.

These data integrations, combined with the radar data, contributed to the successful intercept of the Bowdle tornadoes by the author. Using these tools, the most viable area for supercell initiation was more predictable. Surface station observations were used throughout the chase day forecast period (1300 UTC 22 May to 0000 UTC 23 May) in order to monitor various synoptic and microscale boundaries closely, as their position would ultimately dictate the best storms to chase. GOES visible satellite overlay was used in determining the best area for storm initiation by watching a cumulus and horizontal convective roll field develop in central South Dakota indicating the erosion of the CAP. These two data integrations were used extensively for confirming visual observations made prior to the event start. As the chase continued, radar signatures began appearing around 2200 UTC near Akaska, SD (Walworth County) on the Aberdeen (KABR) radar signaling the initiation of the event. The radar data continued to indicate a maturing supercell in the 2200-2300 UTC timeframe, with a more pronounced “hook echo” forming just west of Bowdle around 2320 UTC. Radar also indicated a cell merger occurring around 0000 UTC, potentially shifting the focus for the chase to training cells to the south. With the availability of the radar scans, it was quickly determined to stay on the chase with the initial event cells. The chase concluded in Aberdeen, SD around 0200 23 May with the storm mode transitioning from discreet cells to a Mesoscale Convective System (MCS). Using the remote sensing data before and during the chase resulted in a safe and successful storm chase by the author.

The use of the radar program with GIS integration also has a second primary role in storm chasing - integration with the Spotter Network. The Spotter Network (www.spotternetwork.org) is a free program that allows users to submit reports of severe weather conditions and have them transmitted via the Internet to the local NWS office. A user’s position is determined through a user supplied GPS unit, or manually entered in a latitude/longitude format into the program by a user. These reports are available as an overlay in the radar software. The Spotter Network is quality controlled and users are required to take a test before reporting is allowed, in order to maintain the integrity of the program. These reports

could be particularly useful to storm chasers, spotters, SKYWARN coordinators, emergency managers and broadcast meteorologists.

An illustration of the radar program is shown in Figure 1 during a severe weather episode in Michigan on 31 May 2010 with a third party data feed integration displayed. This image depicts ASOS data, GOES imagery, National Centers for Environmental Prediction (NCEP) fronts, SPC Day 1 severe weather outlooks, North American Precision Lightning Network (NAPLN) data, spotter locations, storm attributes and a severe thunderstorm warning.

More information can be obtained by contacting Michael Stanga at michael@thewxpage.com.

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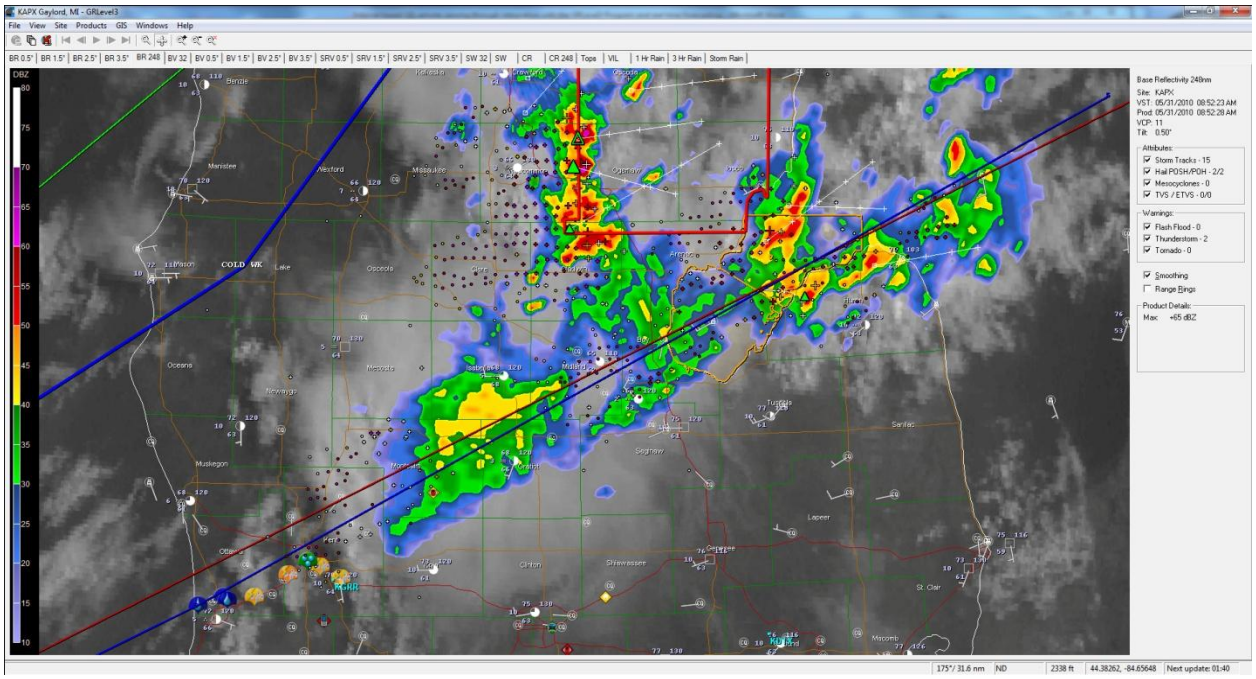

Figure 1 – GRLevel3 with a third party Internet based GIS data integration valid 1352 UTC 31 May 2010.