The Impact Weather Update – 10 Years of Successfully Communicating Impact Based Weather with Florida Residents

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1. INTRODUCTION

The Melbourne (MLB) National Weather Service (NWS) has produced a weather blog (weblog) service that combines textual short term forecast information with annotated graphics. The product is called the Impact Weather Update (IWU), and has been composed routinely by forecasters at the MLB-NWS for over a decade. The IWU, leveraging the expertise of MLB meteorologists, combines both textual and graphical information that indicates expected weather conditions over the short term (1 to 6 hours) and is updated frequently dependent on the conditions. During the Florida warm season with nearly daily convective activity, the IWU may be updated as frequently as every hour. During more benign conditions the IWU is updated less often, but still on the order of 3 to 4 times per day.

The IWU has been successfully utilized by NWS customers and decision makers through a variety of different types of impact weather. These include hurricanes, severe convective weather including tornadoes, Florida freeze events, and high impact marine events. Florida has a large population exposed to weather hazards on any given day due to the extensive tourist attractions, popular beaches, an expansive agriculture base and a very large marine community. Individuals engaged in these endeavors increasingly desire and seek accurate and timely information regarding weather impacts, in a quick and easily interpretable format. IWUs serve this need and have been utilized favorably by local citizens and decision-makers through a variety of impact weather regimes. Direct feedback and web-utilization statistics have shown that IWUs are often the first go-to source for what to expect, weather-wise, over the next several hours.

This paper will describe the benefits of producing real-time blogs to communicate changing weather conditions to a varied customer base, including the emergency management community. The evolution of IWU content and the software methods by which the blog has been created and disseminated over the years will also be discussed. Feedback from customers will also be shared.

2. IWU PHILOSOPHY

NWS meteorologists prepare forecasts that encompass various time scales, with an enhanced emphasis through the first 12 hours. These forecasts include a spectrum of unique products from event driven decision support forecasts through routinely prepared Short Term Forecasts – Nowcast (NOW), aviation forecasts and spot forecasts. The Nowcast text based product has existed in its current form since the early 1990s and has been the primary delivery method for providing forecast detail over the short term. Unfortunately, the Nowcast can be ineffective when attempting to describe a high level of specificity or detail within a text product of reasonable length. More recently, graphical-based products called Graphicasts were introduced to NWS web pages in the mid-2000s. These graphics have the ability to provide significant spatial detail and can include icons and various annotated graphics. In many cases the Graphicasts are updated once per day in order to create a snapshot of expected conditions across a County Warning Area (CWA) over time intervals such as today, tonight, and tomorrow. However, current Graphicast strategies tend to lack temporal details and trends and often become inaccurate or even obsolete as impact conditions evolve during the fixed time intervals depicted.

IWUs (blogs) were developed at the MLB Weather Forecast Office (WFO) in order to merge the benefits of the frequently updated text only Nowcast with the graphical depictions contained within Graphicasts. IWUs afford forecasters the ability to communicate in a modern web 2.0 style interface, with an emphasis upon proactive refreshing of imminent impacts.

The development of IWUs evolved over a multi-year period, always with the specific goal of improving the delivery of short term forecast information for the general public, media and community decision makers. Combining the benefits of both graphics and text to enhance short term information both spatially and temporally and present them in a modern weblog format was paramount. The overriding IWU philosophy was to start each day with a fresh focus on expected impact weather over the short term, up to 24 hours depending on the timeline and potential severity of impacts. Subsequent updates would then refine the weather depiction and provide enhanced details over shorter time intervals. The updates would be issued

approximately every three hours, but would be issued more frequently depending on the degree of expected impacts.

3. IWU EVOLUTION

The first version of the IWU weblog came together in the summer of 2006, as an experimental service off the WFO MLB webpage. Initial IWUs were composed by a NOAA Hollings Scholar, who interacted closely with MLB operational forecasters as part of an experimental mesoscale forecast desk. IWUs in their earliest form consisted of frequently composed text based entries during the convective (wet) season. To generate IWU entries, a standalone weblog text editor (Thingamablog, 2006-2016) was configured to communicate with the MLB version of the NWS webpage. The Hollings Scholar composed entries for IWUs mainly during the active summertime thunderstorm window from late morning through the afternoon.

Within the first year of development, graphical weather depictions were added to the weblog feed, with the intent of including an updated graphic with each text entry. Graphics were generated with several different tools over the years as local needs and capabilities evolved. Early on, the open source GNU Image Manipulation Program (GIMP, 2001-2016) was used. Scripts were created to handle the porting of images from GIMP output to the website for inclusion in the IWU.

By the end of the first year, graphic generation was enhanced by using the Forecast Systems Laboratory (FSL; later Global Systems Division; GSD), developed Forecasters Experimental Collaboration (FXC) tool. FXC is a real-time meteorological display system with collaborative capabilities. The tool allows the display of selected meteorological data and imagery over which graphics may be created and manipulated. FXC also possess powerful collaboration capabilities for display between remote locations. For IWUs, the FXC software was used in a local mode by which only the graphic display and annotation abilities were implemented. With the use of FXC, forecasters could easily add weather symbols, fronts, and icons onto a base map with imagery on it. These maps could then depict forecaster expectations via highlighting expected impacts using shading and color-coding within specific geographic regions. The timing and intensity of impacts could then be annotated on the maps. The enhanced graphics combined with text entries provided a cohesive depiction of expected short term weather conditions across the entire forecast area. With the arrival of AWIPS-2 in 2015, a replacement for FXC came online called the Annotation Tool (Grote 2012). This tool, installed as a plug-in to the new AWIPS system, was entirely based off the original FXC software and performed as a functional equivalent.

In 2016, migration away from a PC based tool for text composition was implemented. With this change, the entire IWU process is now performed on AWIPS-2 with blog text entries made through the AWIPS text editor.

Another IWU design consideration was to make the process time more efficient, since writing IWUs may take time away from duties such as Short Term Forecast composition. During active weather situations, forecasters are often busy with radar watch responsibilities and short-fused product issuances, such as Significant Weather Advisories (Special Weather Statements – SPS). To increase messaging efficiency, software was developed to allow IWUs to also become content for either a standalone Nowcast or SPS. In the process of composing IWUs, forecasters now have the ability to include the same text content in a Nowcast or SPS with minimal additional effort.

4. IWU DESIGN

The IWU web design has also evolved over the years, but maintained key elements through the life of the project. IWUs have been hosted on the MLB WFO webpage from the beginning with dynamic content weblog posts, graphics, and easy access quick links that would be of value to those concerned with short term impact weather (Figure 1). The general structure has been a main graphic window with the current graphic displayed near the top of the page, followed by several weblog posts below. These posts are chronologically ordered graphics available by clicking on the hotlink headline for those posts. Since current weather information is highly perishable, normally only the three latest posts are included on the IWU. The individual posts are dated at the top, written in plain language with the author named at the bottom and a link to send questions/comments via email. The email link is directed to a generic email box such as the storm spotter email address. Providing a way for customers to provide feedback has been highly beneficial to the design evolution of the IWU.

Along the top of the page are located the quick link buttons to items of interest for high impact weather. These include links to the local graphical Hazardous Weather Outlook (Sharp et. al, 2000), a Local analysis and Data Integration System (Blottman et. al., 2001) that provides high resolution graphical mesoscale analyses at 15 minute intervals, the national radar display web page (Radar Integrated Display with Geospatial Elements –

RIDGE; Kirkwood et. al.), regional satellite imagery, and Storm Prediction Center (SPC) outlook graphics. Each of these quick links have live graphical thumbnails associated with them.

The overall layout provides a one-stop shop of sorts for having short term forecast and impact guidance readily available. The IWU page

Figure 1. Example IWU weblog page.

automatically refreshes at a set interval, usually every five minutes, such that IWUs themselves could be used as a situational awareness monitoring tool for some customers.

5. EXAMPLE IWU SEQUENCE

A significant advantage to producing IWUs in the form of a weblog is that information can flow continuously from a NWS meteorologist to a wide customer base. This is especially beneficial during high impact weather. An example of message delivery through IWUs for an actual severe weather event occurring in February 2014 is shown in figures 2-4. For central Florida, the late winter and early spring is the climatological peak for significant severe weather (Hagemeyer and Schmocker, 1993).

Early in the afternoon of February 12th, a vigorous QLCS was approaching the Florida west coast from the Gulf of Mexico. The system was still several hours away from having any impact on east central Florida which is the area of forecast responsibility for the MLB WFO. The IWU issued at midday was used to bring attention to the potential weather impacts later that afternoon and evening (Figure 2). This information is often best handled with text, and was done so with the blog entry at that time as well as a window on the graphic containing concise yet descriptive text bullets. The graphical depiction presented discrete timeline information as to when these impact would arrive across the CWA from northwest to southeast. This information combined both textual and graphical components, providing decision makers with details concerning the expecting timing and intensity of impacts. The benefits of graphically depicting the timeline gives any interested party across the entire area, not just a single point or major city, actionable information.

Wednesday, February 12, 2014

Posted at 11:04 AM

Warm Today; Storms Expected This Evening

Partly cloudy skies will combine with southerly winds to produce another warm day across East Central Florida. High temperatures are expected to be in the low to mid 80s today.

Our attention later this afternoon will turn to a developing area of low pressure across the northern Gulf Coast. A line of showers and thunderstorms developing out ahead of the low pressure system is expected to move through East Central Florida this evening and tonight. The best chance for thunderstorms will be between 5 and 9 p.m. near and north of the I-4 corridor, between 8 p.m. and midnight across Osceola and Brevard Counties, and between 11 p.m. and 3 a.m. from Okeechobee County to the Treasure Coast.

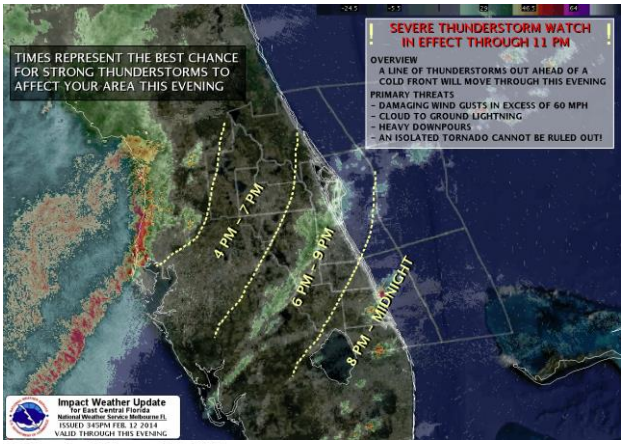
The primary threats from the line of thunderstorms will be damaging straight line wind gusts around 60 mph, cloud to ground lightning strikes, and heavy rainfall. While the primary threat will be straight line winds, an isolated tornado will be possible. Remain weather aware and stay tuned for further updates from the National Weather Service including our website at http://www.weather.gov/melbourne, your local television outlets, or through social media.

Posted by Will Ulrich

Figure 2. Midday IWU post.

Early in the afternoon it became apparent

that the line of convection was moving quicker than earlier anticipated. In order to keep all customers aware of the changing thinking on timing, another updated IWU post was made to refine the timing of impact weather across the CWA (Figure 3). At the same time, SPC had very recently issued a severe thunderstorm watch encompassing all of east central Florida. This new IWU shows the benefit of having a communication forum – weblog, which can be refreshed quickly with the latest information. Instead of potentially obsolete today, tonight, tomorrow graphic depictions updated once or twice a day, IWUs have the ability to both alert decision makers as well as the general public as to rapidly evolving impact and timing forecasts.



Wednesday, February 12, 2014

Posted at 2:06 PM

Clouds Overspreading the Area

At 1:00 p.m., mid and high level clouds were beginning to spread over most of the area. Isolated showers have developed out ahead of a large squall line that is pushing towards the west coast of Florida.

Through 4:00 p.m., isolated showers will affect parts of East Central Florida. This activity is expected to be relatively light in comparison to the showers and thunderstorms expected to affect our area later today into this evening. A squall line out ahead of a cold front continues to push across the eastern Gulf of Mexico. This line of storms is expected to impact East Central Florida this evening.

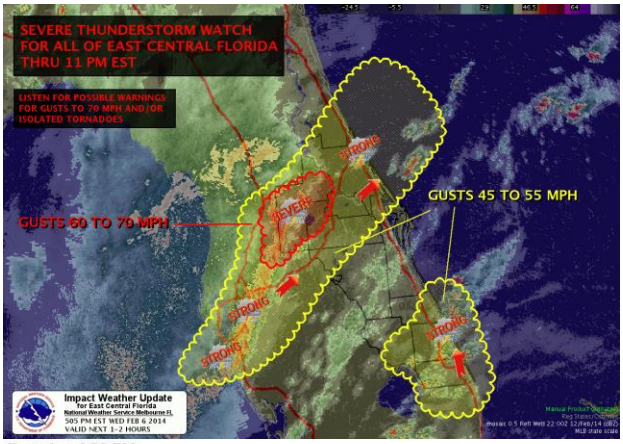
Due to the rapid movement of the squall line, it will likely arrive into our forecast area a little earlier than previously anticipated. We expect the line to approach areas near and north of the I-4 corridor between 4 p.m. and 7 p.m., between 6 p.m. and 9 p.m. across Osceola and Brevard Counties, and between 8 p.m. and midnight across Okeechobee County and the Treasure Coast.

The primary threat from the squall line is expected to be damaging straight line wind gusts in excess of 60 mph. In addition, dangerous cloud to ground lightning strikes and brief heavy downpours will accompany the activity as it moves through. In addition, isolated tornadoes are possible. Remain weather aware today into tonight and stay tuned for further updates from the National Weather Service, your local television outlets, or through social media.

Posted by Will Ulrich

Figure 3. Early Afternoon IWU post.

By late afternoon the QLCS was moving into western sections of the MLB CWA, The severe thunderstorm watch was still in effect, and strong to severe thunderstorms were beginning to impact the area. Another updated IWU was issued, and in this case the focus of the update was to highlight specific convective activity locations and the imminent threat potential (Figure 4). Shaded areas and colors were utilized to draw attention to areas expected to experience greater impacts. Strong wording, bright colors, and textual details, can draw attention for decision makers. This IWU post represented an example of the disposition of the weblog in a warning situation. In fact, the examples shown here represent just a small subset of the total number of IWU posts created during this event. On this particular day, a total of 14 posts were made over an 8 hour period. As noted above, IWUs can be utilized as powerful communication tools to facilitate a continual flow of impact weather information to a wide range of customers and decision makers.



Posted at 4:28 PM

Edited on: Wednesday, February 12, 2014 4:59 PM

STRONG TO SEVERE STORMS MOVING THROUGH LAKE COUNTY

THROUGH LATE AFTERNOON...STRONG TO SEVERE THUNDERSTORMS ACROSS WEST CENTRAL FLORIDA WILL MOVE NORTHEAST THROUGH LAKE COUNTY. INDIVIDUAL STORMS AHEAD OF THE SQUALL LINE MAY DEVELOP SOME ROTATION AS THEY TRANSITION INLAND. STRONG WIND GUSTS TO 45 TO 55 MPH WILL ACCOMPANY THE SQUALL LINE AS IT MOVES TOWARD LAKE COUNTY BETWEEN 430 PM AND 530 PM. THE STORMS WILL THEN MOVE INTO WESTERN PORTIONS OF THE ORLANDO METRO AREA AND NORTHWEST VOLUSIA COUNTY. SOME STORMS MAY BECOME SEVERE TO PRODUCE GUSTS OF 60 TO 70 MPH.

AGAIN, STORMS WERE MOVING EAST NORTHEAST AT 35 TO 40 MPH.

LOCATIONS IN THE PATH OF THE STORM WHICH MAY EXPERIENCE STRONG TO SEVERE WINDS INCLUDE MASCOTTE, LAKE LOUISA, CLERMONT, LEESBURG, FERNDALE, TAVARES, ZELLWOOD, AND WINTER GARDEN.

OTHER STRONG STORMS WILL OCCUR ALONG THE LOWER TREASURE COAST BETWEEN STUART AND FORT PIERCE, AND TOWARD COASTAL SECTIONS OF VOLUSIA COUNTY BETWEEN NEW SMYRNA BEACH AND ORMOND BEACH.

THE PRIMARY THREAT WILL BE CLOUD TO GROUND LIGHTNING STRIKES AND GUSTY WINDS OF 45 TO 55 MPH, WHICH CAN CAUSE UNSECURED OBJECTS TO BLOW AROUND, SNAP TREE LIMBS OR CAUSE POWER OUTAGES. HEAVY RAINFALL WILL TEMPORARILY REDUCE VISIBILITY. SEEK SHELTER INDOORS UNTIL THE STORM PASSES.

Posted by Dave Sharp

Figure 4. Late Afternoon IWU post.

6. SUMMARY

The IWU project was developed in 2006 as an experimental service and has evolved over the last decade. The modifications were a result of both customer feedback and technological advancement. The IWU provides detailed text and graphical information for impact weather that is frequently updated throughout the day. The IWU focuses on providing actionable information in the zero to six hour time window, but also used for longer lead times if the degree of impact warrants. The IWU is

uniquely different from other web based Graphicasts in that it provides greater spatial and temporal detail with more frequent updates and refinement. The IWU is a natural evolution of the original text only short term forecast – NOWcast product developed in the early 1990s. The web page that contains the IWU also provides quick links to essential impact weather information often utilized by decision makers.

Customer feedback has been important to the evolution of the IWU project. This same feedback has also been a catalyst for motivation to the WFO staff in producing timely and accurate IWU posts. Below are some unsolicited feedback from the general public as well as key partners:

…" Gives me up to date info on what's happening with the weather. As a layperson you try to read the radar and figure out what's happening but you guys ***give me insight to where the storms are going to develop and move.*** *No other site does that, you guys provide graphics (which are easy to read) along with text. Not even the local TV stations offer this kind of live information.* ***Keep up the GREAT work****."…*

They say a picture is worth a thousand words and ***this one page gives a significant amount of useful information*** *at a glance with enough links to underlying information to get detail information to gain insight information to provide help in making additional decisions regarding weather impact."…*

…"This service added to your website is very valuable. *While the "discussions" are interesting, they are often just a bit out of the realm of the average citizen.* ***The Impact Weather Update is both timely and very helpful.*** *Thank you for the fine work you do on behalf of all of us in Central Florida.*

*Should you ever need support at "Congressional Budget Time," please feel free to use me as a reference. We're "****getting our tax-money's worth****" from the National Weather Service Melbourne FL office and we're grateful for the dedication of those who staff it."…*

*…" Living in Florida I tend at this time of year to visit various sites each morning and afternoon, mainly to see if any hurricanes are coming****. I find your IWU blog helpful as a concise summary that gets to the point on the daily conditions****. . . The only thing I would consider, if I were you, is how to get the IWU into INBOX's as a several-times-each-day weather update. I'd subscribe."…*

7. REFERENCES

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