



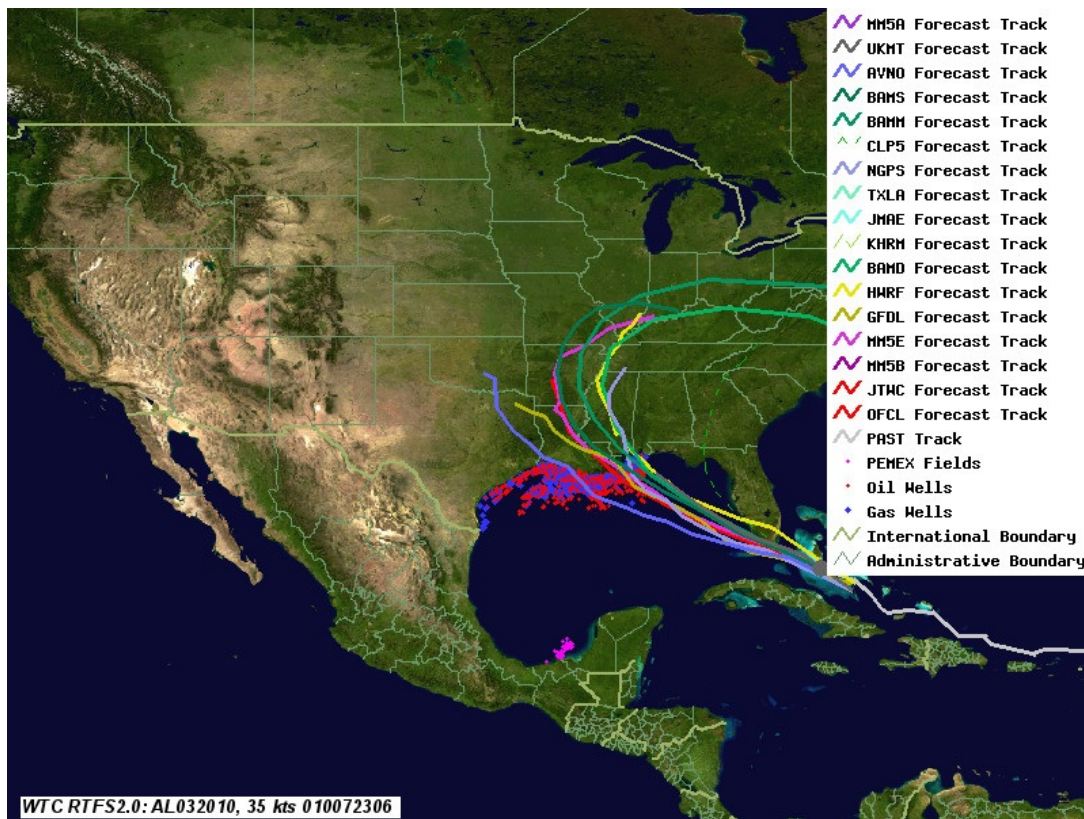
Storm Watch: Bonnie update, understanding wind fields

Posted by [methaz](#) on July 23, 2010 - 8:33am

Topic: [Supply/Production](#)

Tags: [deepwater horizon](#), [gulf of mexico](#), [hurricanes](#), [oil spill](#), [tropical storm](#) [[list all tags](#)]

Tropical Storm Bonnie (AL03) continues to move through the Bahamas towards south Florida. It's not much of a storm at this point, just barely a tropical storm, and is not forecast to intensify very much. In fact, several models show it degenerating into an open wave (in other words, lose its closed circulation, one of the key characteristics of a tropical cyclone). Here's the current tracking map:

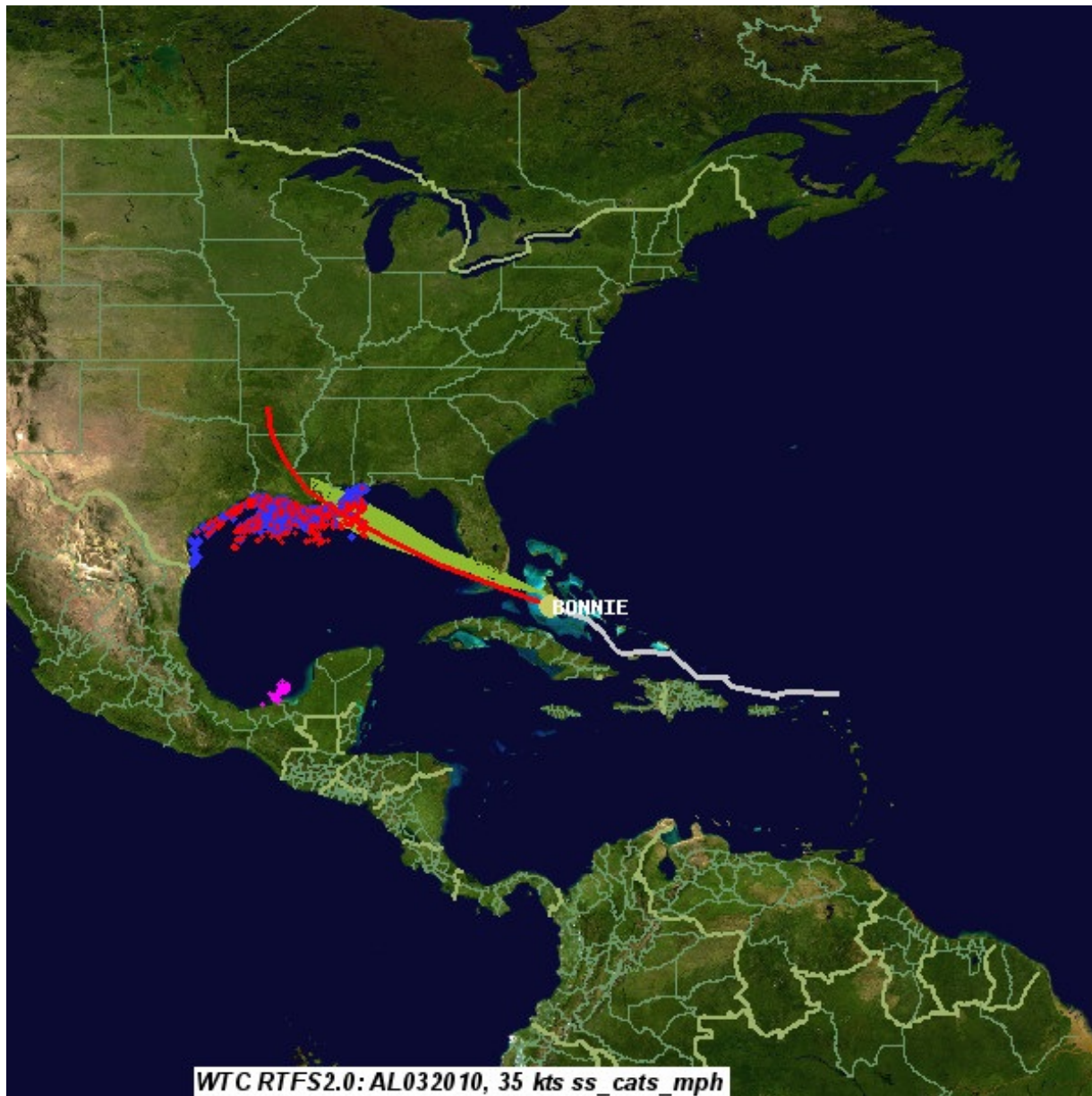


One important thing to remember about these storms is that, when the storm finally arrives, the area of peak winds is normally quite small. The reason why evacuations are needed over a wide area is at least in part because we cannot predict well in advance where that area will be.

Below I'll discuss the structure of wind fields, as well as potential impacts of this storm on both production and the oil spill.

Wind Fields

Here is the current Official forecast track from the National Hurricane Center, with the forecast



That thin green band is the region of tropical storm force winds, assuming the storm follows precisely the forecast path. People often vastly overestimate the size of the damaging wind field from storms. The news media doesn't help, showing colorized IR satellite images that emphasize the cold cloud tops over the storm. The outer cloud shield for a hurricane or even tropical storm can extend hundreds of miles from the center. Yet even for an intense storm, hurricane force winds are normally confined to an area of less than 100 miles from the center.

Another issue is that tropical cyclone winds are reported as "over water" winds. While that's fine for oil rigs and ships, it overestimates inland winds by 10 to 30 percent. Normally, storms are asymmetric - the stronger winds are to the right of the direction of travel in the Northern Hemisphere. Thus, while Katrina was a Category 3 or weak 4 as it hit the Mississippi coast, on the "weak" site, the New Orleans area only suffered from Category 1 winds at the surface. (Scary thought, isn't it?)

Here is an analysis of Bonnie from the Hurricane Research Division:

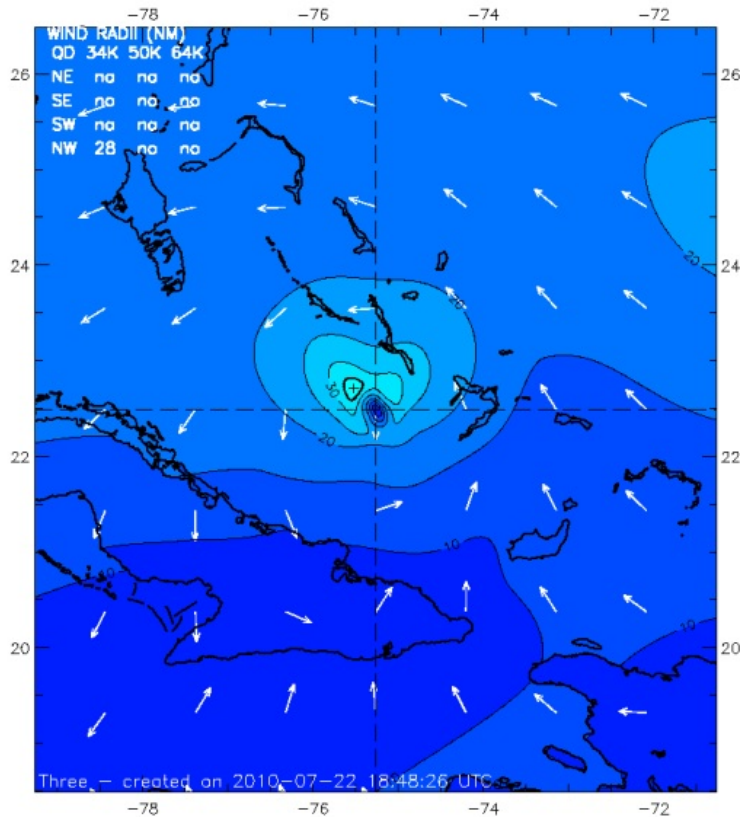
Tropical Depression Three 1930 UTC 22 JUL 2010

Max 1-min sustained surface winds (kt)

Valid for marine exposure over water, open terrain exposure over land

Analysis based on SFMR_AFRC from 1749 - 1931 z; CMAN from 1206 - 1912 z; GPSSONDE_WL150 from 1735 - 1735 z;
 GPSSONDE_SFC from 1735 - 1735 z; SHIP from 1300 - 1800 z;
 GPSSONDE_MBL from 1735 - 1735 z; MOORED_BUOY from 1209 - 1849 z;
 GOES from 1602 - 1602 z;

1930 z position interpolated from 1844 Estimator tool; mslp = 1007.0 mb



Integrated Kinetic Energy: for Winds > TS force: 0 TJ, for Winds > Hurricane Force: 0 TJ
 Destructive Potential Rating(0-6) Wind: 0.0, Surge/Waves: 0.0

Observed Max. Surface Wind: 36 kts, 24 nm NE of center based on 1839 z SFMR_AFRC
 Analyzed Max. Wind: 36 kts, 21 nm NW of center

Uncertainty -> mean wind speed error: 0.85 kt, mean direction error: -2.49 deg
 rms wind speed error: 6.26 kt, rms direction error: 23.78 deg

Research product of

NOAA / AOML / Hurricane Research Division

As can be seen as a small blob to the upper left of the center (inside the bold line), the area of tropical storm force winds is extremely small, and in this case, not even in the usual NE quadrant of the storm.

Impact on production

We may see as much as a 60% shut in for a few days from this storm due to evacuations and precautionary shut ins, with full production restored by the end of the month. There should be no longer term impact - most of this area experienced the storms between 2004 and 2008, and should be able to hold up to a weak to moderate tropical storm with no significant damage.

Impact on the Spill

As discussed [in this previous thread](#), we really don't know what will happen when a storm hits a large slick in an environment like the Gulf. As I've previously speculated, I suspect the benefits of mixing, dispersion, and rain flushing out the estuaries may outweigh the adverse impacts from a weak storm, but honestly we just don't know. Cleanup operations have already largely stopped.

As the storm passes, booms and other protective barriers will be torn apart and thrown inland. In fact, if not removed before the storm, these booms and barriers have the potential to do a lot of damage to the marshes.

Subsurface Impacts

Hurricanes are a surface phenomena. Their impacts rarely extend more than a few hundred meters (600-900 feet or so) down the water column. In the continental shelf, where the water is relatively shallow, they can cause considerable havoc. At the depth of the Deepwater Horizon (DWH) well site (over 5000 feet), however, there will be no impact. The problem is for surface ships, and pipes connected to fixed subsurface structures. With waves over 20 feet, the up and down motion puts considerable stress on these components, meaning they are normally disconnected.

In shallower water (500 ft or less), strong bottom currents stir up sediments, sometimes triggering massive undersea landslides. These have destroyed pipelines from submersible production assets to shore in previous storms. However, the DWH site is far enough out this should not be an issue.

Tracking Resources

Here are a few links for hurricane tracking and wind information.

- [National Hurricane Center](#)
- [NOAA real time weather and wave data from Thunder Horse complex, about 50 miles south of the Deepwater Horizon site](#)
- [South Florida WMD graphics, including model tracks](#)
- [CIMS/UW Tropical Cyclone Tracking Site](#)
- [Hurricane Research Division HWIND surface wind analysis](#)
- [Weather Underground Tropical Page.](#)
- [My experimental tracking page, with storm impacts and track model accuracy tables.](#)



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