Spring 2003

Outlook

Wilkens Weather Technologies, L.P.

Member AR Group Inc.

NEWS FOR CLIENTS & COLLEAGUES OF WWT

Wilkens Weather Technologies: improving the way you receive your weather.

We have listened to your needs over the past year and we have improved, developed and added new services according to your feedback. It's time to share some of those innovations with you.

International Forecasts on your Web site

You asked for Internet access to your international forecasts. We continue to expand the geographical areas available to you on your customized Web sites. Here are some more of the features to provide you with detailed international weather data.

- **Forecast Format**
  International text forecasts now appear in a spreadsheet format, with tables and graphs to put emphasis on the weather data that is important for your daily operations. The tabular format makes it easy to find the winds, wind waves, primary swells, secondary swells, and significant and random seas at 6-hour intervals. Bar graphs depict winds and gusts at specific times of day in an easy to read format.

- **Computer Models**
  One of the tools used by meteorologists to create forecasts is a computer model. Meteorologists use models to predict the weather based on computer-generated trends taken from current conditions. Though meteorologists rarely base their forecasts exclusively on computer models, supplementing them with satellite and radar data, the models provide a graphical computer representation of likely weather patterns. This graphical model is available for your interpretation on your customized Internet page. This graphical display shows sea-level air pressure and precipitation patterns as they move across your region.

- **Graphical Tools**
  Global clients can benefit from Wilkens Weather's expanding Internet graphics capabilities previously available only to Gulf of Mexico customers.

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Upcoming Shows

Offshore Technology Conference (OTC)
Reliant Center at Reliant Park - Houston
May 5-8, 2003
Booth #2034
See You There!

LAGCOE
The CAJUNDOME
Lafayette, Louisiana
October 28-30, 2003

Did You Know?

Protection from the seas:

If you have been to Galveston, Texas, you are quite familiar with the city's seawall. Construction began in 1904 in response to the Great Hurricane of 1900, which devastated the city. The seventeen foot tall seawall spans 7 miles and took 7 years to build. Did you also know that, as part of the project, the whole city was elevated between 4 and 6 feet?

Check us out at www.wilkensweather.com

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Luz Sosa brings Cuban Meteorological Experience to WWT

Wilkens Weather is fortunate to have a variety of meteorologists on staff with diverse backgrounds and extensive experience. In this issue, we are proud to recognize Luz Sosa, a native of Cuba with a Ph.D. in Meteorology from the University of Havana. Luz has lived in the United States for 4 years, and has served at Wilkens Weather for the past year and a half.

Growing up in Cuba, an island of the Caribbean vulnerable to tropical weather, it is no wonder Luz held an interest in meteorology from an early age. She was always fascinated by the movement of clouds and the reasons for the kinds of storms experienced on her island. One of her teachers, who saw her interest and talent, encouraged her to pursue a career as a meteorologist. While she was inspired by this encouragement and fascinated by meteorology, she was surprised at how difficult the study of meteorology was. She persevered and earned her bachelors degree in meteorology in 1973.

Luz has almost 30 years experience in weather analysis and forecasting in the tropical latitudes and the Caribbean Basin, including forecasting severe weather and tropical cyclones. Luz worked as a senior meteorologist in her 25-year tenure at the Cuban National Weather Service, where she enjoyed forecasting for almost 20 years until her need for greater understanding led her to earn her Ph.D. in 1995. This leap opened the doors for Luz to pursue more advanced meteorological research.

As a Cuban, Luz follows a tradition of Cuban meteorologists, who "pioneered the art of hurricane prediction." This is a quote from Isaac's Storm by Erik Larson. In his book, Larson discusses the Cuban meteorological tradition through a historical account of the Great Hurricane of 1900 in Galveston. Larson recalls the banning by the U.S. Weather Bureau of all weather cables coming out of Cuba. This ban was an effort to avoid frightening people unnecessarily with inaccurate severe weather warnings, as well as a desire by the Bureau to put its own name on all hurricane predictions. In defense of the Cuban expertise in hurricane prediction, Larson tells of Father Benito Vines. Father Vines took over the Belen Observatory in Havana in 1870, "where he dedicated his life to finding the meteorological signals that warned of a hurricane's approach. It was he who discovered that high veils of cirrus clouds – *rabos de gallo*, or 'cock's tails' – often foretold the arrival of a hurricane."[1] The tradition of meteorological research at the Belen Observatory carried on for years until Castro took power and the Catholic schools in the country were closed. The research was retained in the library of the Cuban Institute of Meteorology, where the original hurricane maps used by the observatory can be found.

Luz left Cuba and came to America looking for an opportunity to apply her extensive experience in forecasting and meteorological research in a more challenging environment. Luz' unique experience is well suited to the needs of companies working in the Gulf of Mexico and the Caribbean. During the time she has served clients of Wilkens Weather, companies operating in the Bay of Campeche have benefited from Luz'


JUNIO CALUROSO
¿EL MAS RIGUROSO?

In 1985, Luz appeared in the Havana newspaper *Bohemia* discussing the higher than normal temperatures that occurred that June. Luz has appeared in a number of articles throughout her career, especially during Hurricane Gilbert in 1988. She also wrote weather and science related articles regularly for a children's column.

Spanish translation, forecasting ability and expertise in the field of tropical weather. She is a huge asset to Wilkens Weather's Mexican newspaper clients, who receive their daily weather reports from us.

Luz' research into tropical weather trends has benefited her peers, especially during the busiest time of the year, Hurricane Season. Luz' research has helped identify conditions, which increase the likelihood of the formation of a tropical wave, or a disturbance in the easterly flow in the tropical zone, that creates cyclonic activity. Understanding the behavior of tropical waves helps meteorologists to more accurately forecast hurricanes as well as all types of storms and severe weather, especially in the region of the Caribbean Islands.

1. *Larson, Erik. Isaac's Storm – A Man, a Time, and the Deadliest Hurricane in History. Vintage Books/Random House, New York, NY, USA, 1999 – p. 102*

Hurricane Season 2003

Statistical normals of storm frequencies for the North Atlantic hurricane season, based on the 1950-2000 average, are 10 named storms, 6 of which become hurricanes, and 2 of those typically become intense hurricanes. Last year in 2002, there were 12 named storms, 4 of which became hurricanes, and 2 of those became intense hurricanes. Only one of the hurricanes, Lili, made landfall while still a hurricane.

Although the number of named storms exceeded the normal seasonal total, the El Niño event that was then present, and still is, kept the number of hurricanes to below normal levels. In spite of this, some portion of the U.S. East and Gulf coasts from the Lower Texas coast to Cape Hatteras was impacted by these storms. This is likely to be the case again this year.

El Niño is an occurrence of warmer than normal sea surface temperatures in the equatorial Pacific Ocean. This year the warmer waters extend from Indonesia eastward across the Central Pacific but they are now less than 2° C warmer than usual. In the eastern Tropical Pacific, the sea surface temperatures (SST's) are near or slightly cooler than normal at

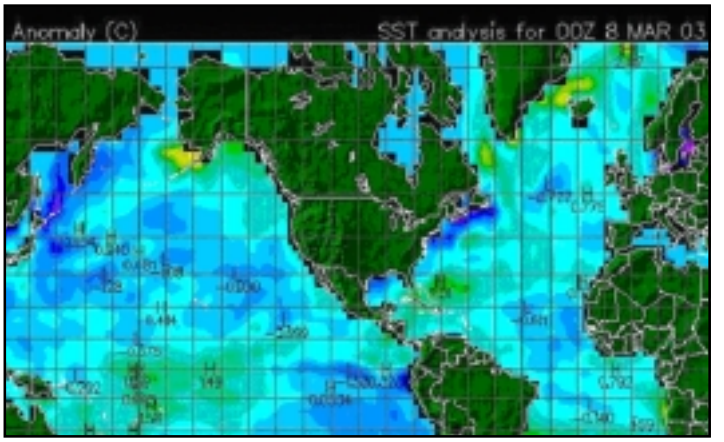

Figure 1. Sea surface temperature anomaly chart from 0000UTC 8 March 2003; courtesy of Unisys. Shades of green and yellow represent warmer than normal water; shades of blue are cooler than normal water.

and south of the equator (see figure 1). This El Niño event is different from the previous one (1997-1998), during which the Tropical Pacific waters were much warmer, primarily in the central and eastern protions of the equatorial waters (see figure 2).

We must keep in mind the fact that these two El Niño episodes are different when looking to the upcoming hurricane season. Additionally, the current El Niño appears to be weakening and sea surface temperatures may become near normal in the equatorial region of the Pacific Ocean by the first few months of hurricane season.

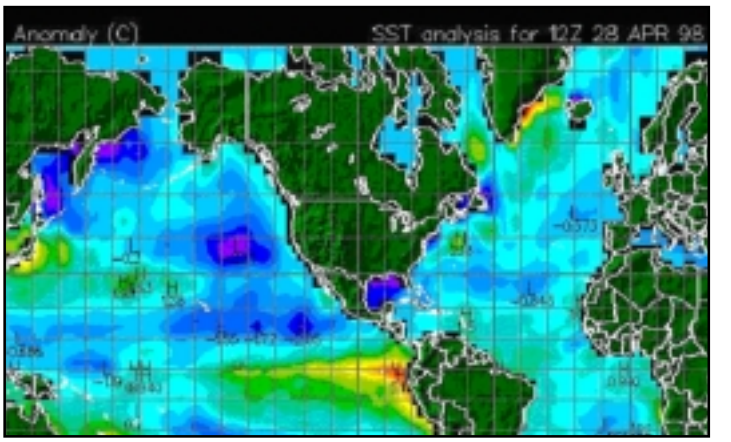

Figure 2. Sea surface temperature anomaly chart from 1200UTC 28 April 1998; courtesy of Unisys. Shades of green, yellow, orange and red represent warmer than normal water; shades of blue and purple are cooler than normal water.

The influence on this year's El Niño on the summer time high level wind pattern across the North Atlantic Ocean basin is forecast to be in the form of upper level high pressure areas that move slowly from west to east across the subtropical latitudes (20-35 degrees north latitude) separated by low pressure troughs. These troughs of weak upper air low pressure should drop into the tropical latitudes (0-20 north latitude) at various times and disrupt the development of some tropical disturbances. Additionally, it is quite likely that a few of the named storms will develop out of mid-latitude cyclones located east of Bermuda that form tropical characteristics but remain inconsequential due to their tracks staying well away from land and out of major shipping lanes.

As a result, we expect an above normal number of named storms this year. Near or slightly less than the normal number of storms are forecast to reach hurricane strength. Of those, 3 are expected to become intense. Most of these storms should form in the western North Atlantic region with fewer forming farther to the east in the general vicinity of the Cape Verde Islands. Further weakening of El Niño during the remainder of the year would cause the latter half of this year's hurricane season to be more active than the earlier half.

2003 Hurricane Season Forecast

	Normal	Forecast
Total number of named storms	10	12-14
Named storms becoming hurricanes	6	6
Hurricanes becoming intense	3	3

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Wilkens Weather Technologies: improving the way you receive your weather. (cont.)

Graphical interpretation of your weather forecasts enhances the written reports, giving you a quick visual of the upcoming weather impacting your location. Satellite images graphically depict weather headed your direction and in areas you are considering for future operations.

Satellite Maps

Enhanced Satellite Images (see Figure 1 at right)

- **A graphical display of your locations is overlaid with satellite imagery**
  Click on your location, plotted in pink, and your text forecast for that location appears.

- **Temperatures are displayed in red**

- **Wind speeds and direction are indicated using wind barbs**
  Think of a wind barb as an arrow. The "tail" of the barb is the direction the wind is coming from, just as the feathers on an arrow are the direction an arrow travels from.

  The barbs on the tail depict wind speed. Short barbs are 5 knots (kts), long barbs are 10 kts, and flags are 50 kts. Totaling the value of each barb on a tail gives you the wind speed for that location. One knot is a nautical mile per hour and is equivalent to 1.15 miles per hour or 1.9 kilometers per hour.

- **Ship and buoy locations and data**
  Stationary buoys and some traveling ships are equipped to transmit real-time wind and sea data. By clicking on one of the blue ship or buoy locations on your enhanced satellite map, you can see actual conditions at that location. Buoy observations less than 3 hours old are accompanied by wind barbs plotted in white. Observations that are 3-6 hours old are signified by wind barbs plotted in yellow. Visit http://seaboard.ndbc.noaa.gov/acq.shtml to gain more information on how buoy data is gathered.

Analyzed Satellite Data (see Figure 2 on page 5)
The Analyzed Satellite View shows just what the name suggests, data that has been analyzed by Wilkens Weather meteorologists. This image displays:

- **Isobar contour lines** (defining sea level pressure)
- **Wind barbs**
- **The locations and movements of fronts** that affect the bigger weather picture.

Like the enhanced satellite view, the analyzed satellite data provides visual interpretation of the information contained in your text forecast.

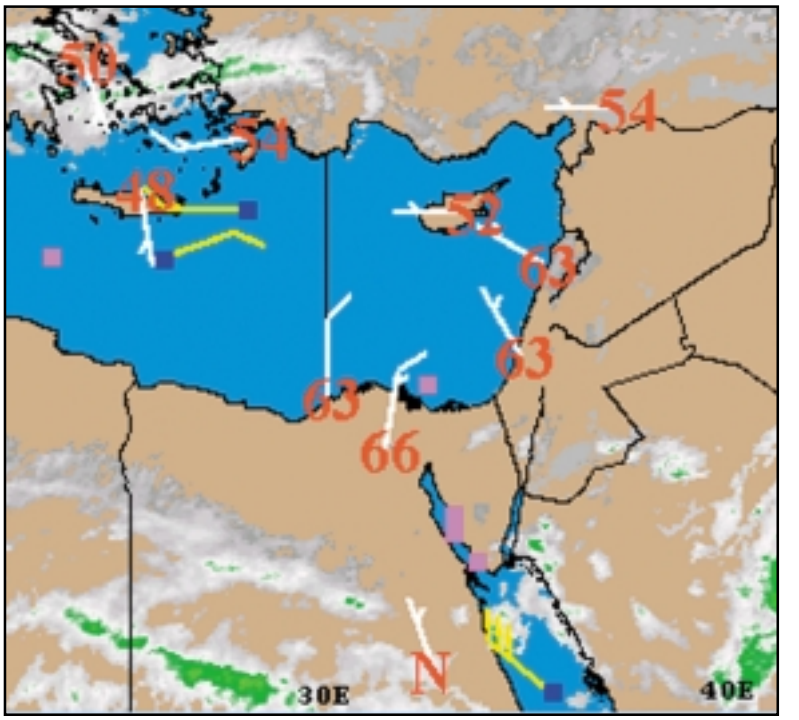


Figure 1 - Enhanced Satellite Image

Severe Weather Alerts

No matter where in the world you are operating, you need to know about severe weather right away. All current severe weather warnings are available from a link on your weather Web page.

- **Severe Weather Warning Pop-up**
  In addition to point-and-click access to severe weather information affecting your projects, your connection to your Web page allows you to receive instant pop-up messages on your screen immediately as the information becomes available. When you are logged onto your site, even if it is in the background while you work on something else, a pop-up window will alert you to real-time severe weather reports that help you make important project planning decisions.

Hurricane Season

Each year, we are challenged to develop better ways to help you prepare for hurricane season. Our job is to provide you the information required so you can minimize the impact to schedule while protecting your equipment and your personnel. During last year's Hurricane Lili, Wilkens Weather hurricane customers checked their customized Web sites at a record rate of 500 hits per minute!

- **Hurricane Tracking Tools**
  Internet hurricane tracking tools have made your planning stages much simpler, which greatly increased the popularity of our Web site. The graphic hurricane tracking maps offer some of the same benefits as the interactive satellite maps. If you click on your location, your Wilkens Weather forecast

Continued on page 6

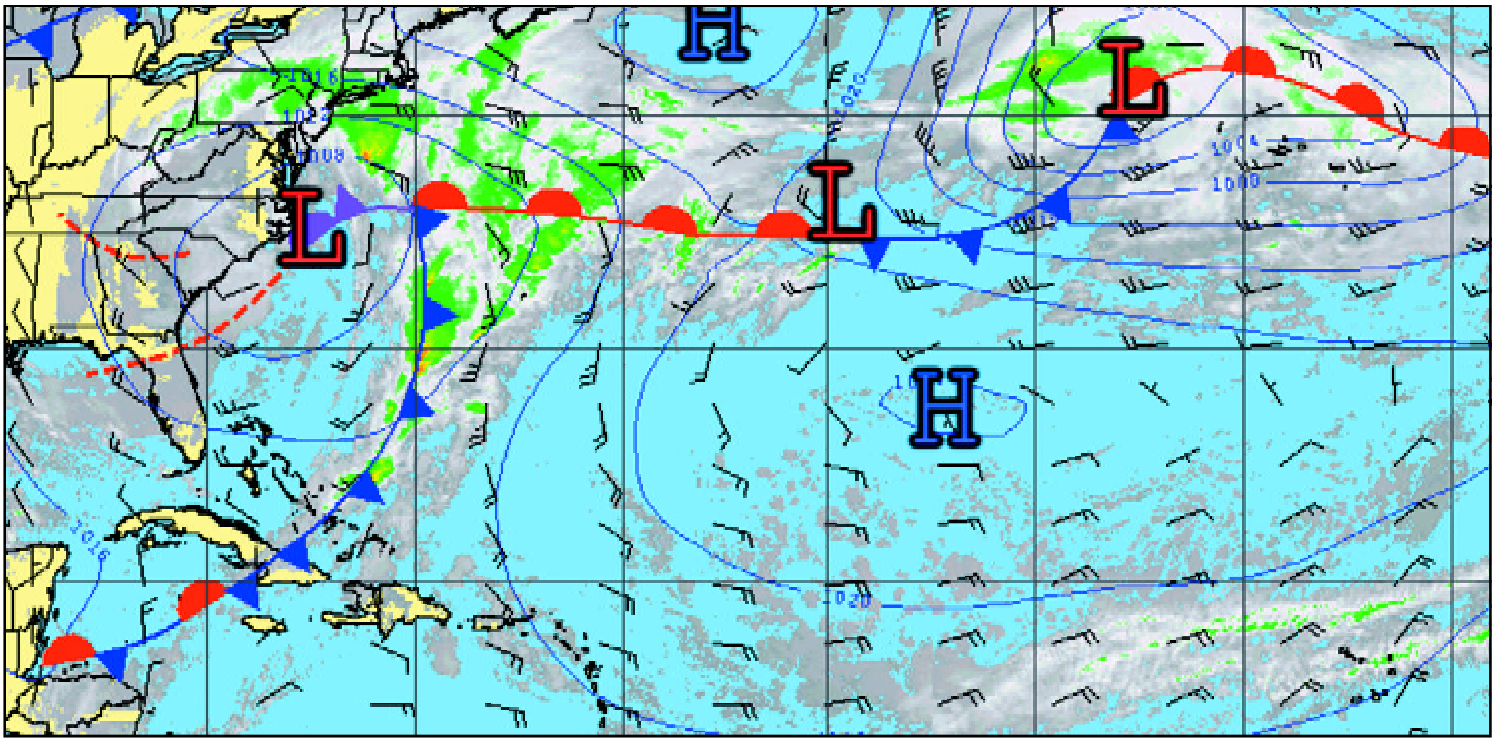


Figure 2 - Analyzed Satellite Data

How to read the map:

Isobar Contour Lines
As isobar contour lines come closer together wind speeds tend to increase.

Cold Front
A cold front is the boundary between warm and cool air when the cool air is moving in to replace the warm air. In the northern hemisphere, winds ahead of the front will be southwest and shift into the northwest with frontal passage. A cold front is displayed as a blue line with triangles pointing in the direction the cold air is moving.

Frontogenesis
This is a developing front. Frontogenesis is any atmospheric process which leads to frontal formation, or to an existing weak frontal zone becoming enhanced. On charts issued by some national meteorological services, such fronts are shown with the normally solid line defining the front broken by spaces and large dots.

Frontolysis
This is a dissipating front. The weakening or dissipation of a front occurs when two adjacent air masses lose contrasting properties such as the density and temperature. It is the opposite of frontogenesis.

Occluded Front
Occluded fronts can signal the weakening of a storm. A cold occlusion, which occurs when the air behind the front is colder than the air ahead of the front, acts similarly to a cold front. A warm occlusion occurs when the air behind the front is warmer than the air ahead of the front and acts similarly to a warm front.

Stationary Front
A stationary front is the boundary between cool and warm air when the pushing is at a standoff. Stationary fronts often bring several days of cloudy, wet weather that can last a week or more. A stationary front is depicted as alternating blue triangles pointing away from the cold air and red half circles pointing away from the warm air.

Trough or Trof
Precipitation tends to fall to the east of the trough axis while colder, drier air tends to prevail to the west of the trough. A trough is an elongated area of relatively low pressure typically associated with a cyclonic wind shift.

Warm Front
A warm front is the boundary between warm and cool, or cold, air when the warm air is replacing the cold air. The warm front symbol on a weather map marks the boundary between warm and cold air at the earth's surface. The circles on the red line point in the direction the warm air is moving. A slow-moving warm front can mean hours or days of cloudy, wet weather before the warm air finally arrives.

High Pressure
High pressure systems bring sunny days with little or no precipitation. Air tends to sink near high pressure centers, which inhibits precipitation and cloud formation. Air in a high pressure area compresses and warms as it descends. The warming inhibits the formation of clouds, meaning the sky is normally sunny in high pressure areas.

H High Pressure

Low Pressure
Air rises near low pressure areas. As air rises, it cools and often condenses into clouds and precipitation. Low pressure systems have different intensities with some producing a gentle rain while others produce hurricane force winds and a massive deluge.

L Low Pressure

Improving the way you receive your weather. (cont.)

Distances to Current Storm Position - Microsoft Internet Explorer

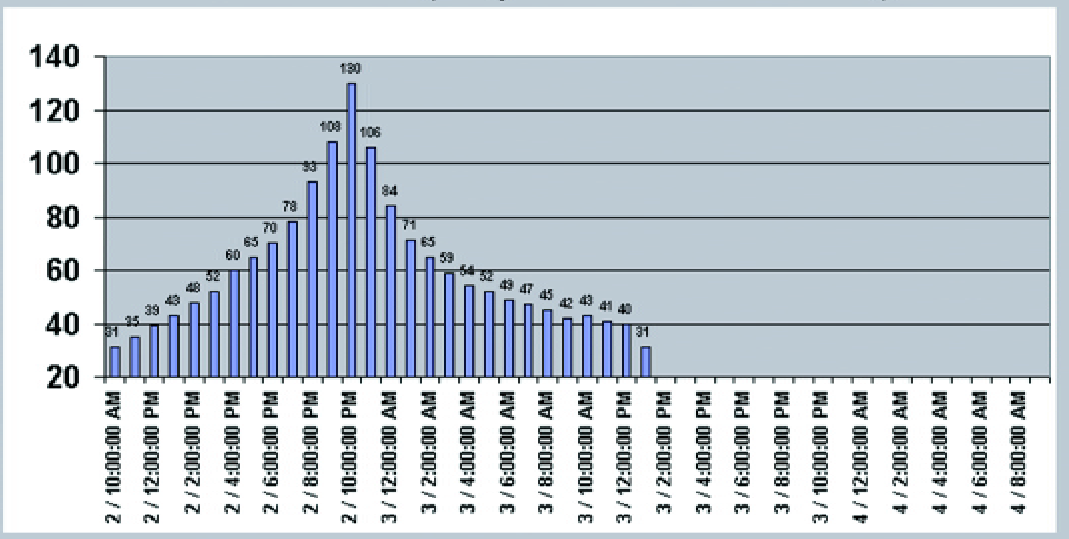
Selected Position: Lat = 26.8 N, Lon = 90.4 W

LILI Current Storm Position: Lat = 24.8 N, Lon = 88.9 W / Current Distance from Storm Center = 167 statute miles.

Time (CDT)*	Lat	Lon	Distance (Miles)	Winds (MPH)	Gusts (MPH)	Gale Radius NE / SE / SW / NW	Hurricane Radius NE / SE / SW / NW
10/2/2002 10:00:00 AM	24.8 N	88.9 W	167	120	150	160 / 125 / 75 / 140	50 / 30 / 20 / 40
10/2/2002 10:00:00 PM	26.8 N	90.4 W	0	130	160	180 / 160 / 120 / 150	60 / 40 / 30 / 50
10/3/2002 10:00:00 AM	29 N	91.9 W	178	130	160	200 / 200 / 150 / 175	60 / 50 / 35 / 55
10/3/2002 10:00:00 PM	30.7 N	92.3 W	293	90	110	120 / 150 / 150 / 125	30 / 25 / 20 / 35
10/4/2002 10:00:00 AM	32.5 N	91.9 W	405	50	65	35 / 45 / 45 / 35	0 / 0 / 0 / 0

The closest approach of the storm from this position will be toward the SouthWest near Latitude 26.8 N and Longitude 90.4 W at a distance of 0 statue miles, around 10/2/2002 10:00:00 PM CDT. This should put you within the storm's hurricane radius. Expect hurricane force winds with storm passage.

Wind Profile for this Location (Wind Speed in MPH vs. Date/Time as Central Time)



*CDT = Central Daylight Time = Eastern Daylight Time - 1 hour and Atlantic Daylight Time - 2 hours.

Figure 3 - Wind Profile

pops up. Click anywhere on the map, land or water, to get a pop-up graph displaying how strong the winds are expected to become at that location, on what day, and at what time. (See Figure 3 above)

If you simply hold the cursor over any location on the map, site-specific or otherwise, without clicking the mouse, you will see the latitude, longitude and distance from the eye of the hurricane in that location. When tracking the course of an active tropical storm or hurricane, storm track information is updated every six hours. Severe weather alerts are updated every three hours for locations immediately affected.

- **Interactive Hurricane Preparedness**
  As you plan for the approach of a hurricane toward your rig or platform, it is important to determine the distance of critical wind speeds and the eye of the storm from your location. Many hurricane preparedness plans require evacuation at a certain proximity from the storm regardless of its course. This proximity is different for different managers and companies, but all of you need to know where your location falls in relationship to your company's evacuation requirements. That is why Wilkens Weather's technical experts have developed a Web based tool to allow you to visually display your evacuation range on the hurricane tracking map.

Working with our clients to develop hurricane preparedness plans has allowed us to adapt our services to meet industry specific preparedness procedures. To make your hurricane planning more accurate and less labor intensive, we have added graphic features to help you determine if the location of the storm requires you to implement the next step in your contingency plan. This will save you hours of time and work so you can concentrate on what is really important – securing your equipment and preparing your staff for a possible evacuation.

- **Wind Radii**
  When first accessing the map, the storm track appears with rings around the eye of the hurricane. These rings represent wind radii. The legend to the right of the map indicates the color-coded wind speed for each ring. The ring closest to the center of the storm represents the strongest winds and each ring out from the hurricane represents a lower wind speed.

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2003 Summer U.S. Weather Outlook

It is significant that the latest El Niño is forecast to slowly wane this year. This raises the likelihood that, as the summer wears on, the weather pattern for North America in general, and the U.S. in particular, will return to some semblance of normal. No one area of North America is expected to be stuck in an anomalous weather pattern for the entire season. Rather, summertime cool fronts should make regular passage across the northern and central tier states. Also, summertime high pressure areas are forecast to come and go over the southern tier of the states and a weak summer cool front or two is not out of the question.

This should have a tendency to support slightly cooler than usual temperatures in and near the Upper Great Lakes region. Slightly hotter than normal temperatures are expected in the Tennessee Valley and the Middle Mississippi Valley, as well as out west from the Colorado Rockies to the Great Basin of Nevada. We expect precipitation anomalies to occur in two general areas. Somewhat more than the normal amount of rain is forecast for an area extending from Oklahoma to Illinois and eastward to Pennsylvania. Drier than normal conditions are forecast for an area from western Colorado and the Sierra Nevada Mountains.

The southern tier states can expect near normal occurrences of rain events, whether the result of tropical weather systems or the seasonal monsoon. Since high pressure systems are not expected to sit in any one spot all season, no one area should be blocked from getting summer time rain systems throughout the warm half of the year. Any dry spells are expected to be limited and will likely be followed by a return to normal summer activity.

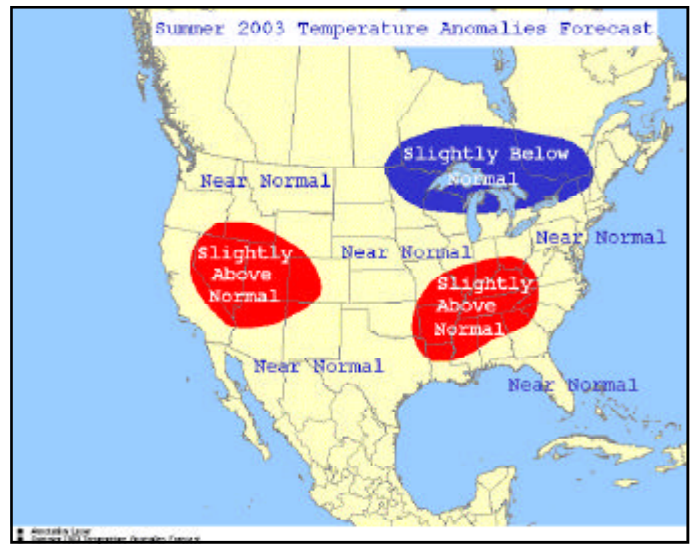

Figure 1 - Summer 2003 Temperatures

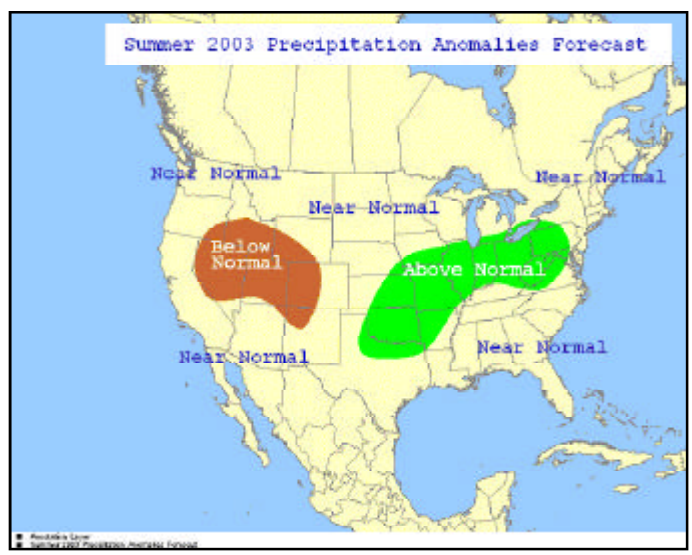

Figure 2 - Summer 2003 Precipitation

2003 Mid-Year Global Weather Outlook

World-wide effects of this year's El Niño will wane as the sea surface temperatures in the equatorial Pacific Ocean return to near normal levels during the remainder of this year. Large portions of Australia have been having drought conditions for the past 2 years, though some relief arrived in February. As the El Niño event slowly weakens and dissipates, the rainfall activity in and around Australia should return to normal.

There are likely to be fewer low pressure systems moving across the Mediterranean Sea. This means more summer time high pressure and more favorable conditions. Europe, western Russia and the Middle East could see a few unseasonably strong cold fronts into early summer and then a more normal pattern is expected to become established with more consistent weather in the subtropical latitudes of the Eastern Hemisphere.

El Niño typically suppresses the development of tropical cyclones in the Western North Pacific (WNP) Ocean region. In past El Niño years, 24-28 tropical cyclones have been noted versus the normal 32. This year between 28 and 32 tropical cyclones are forecast for the WNP region.

Above normal rains in tropical South America should ease off to near normal levels for the second half of the year. Wintertime precipitation is expected to be near normal across Chili, Argentina, southern Brazil and other nearby countries, with temperatures averaging near or slightly cooler than normal. A cool pattern with a mixture of dry and wet weather is forecast for South Africa, though the northern and eastern parts of South Africa will be warmer than usual at times.

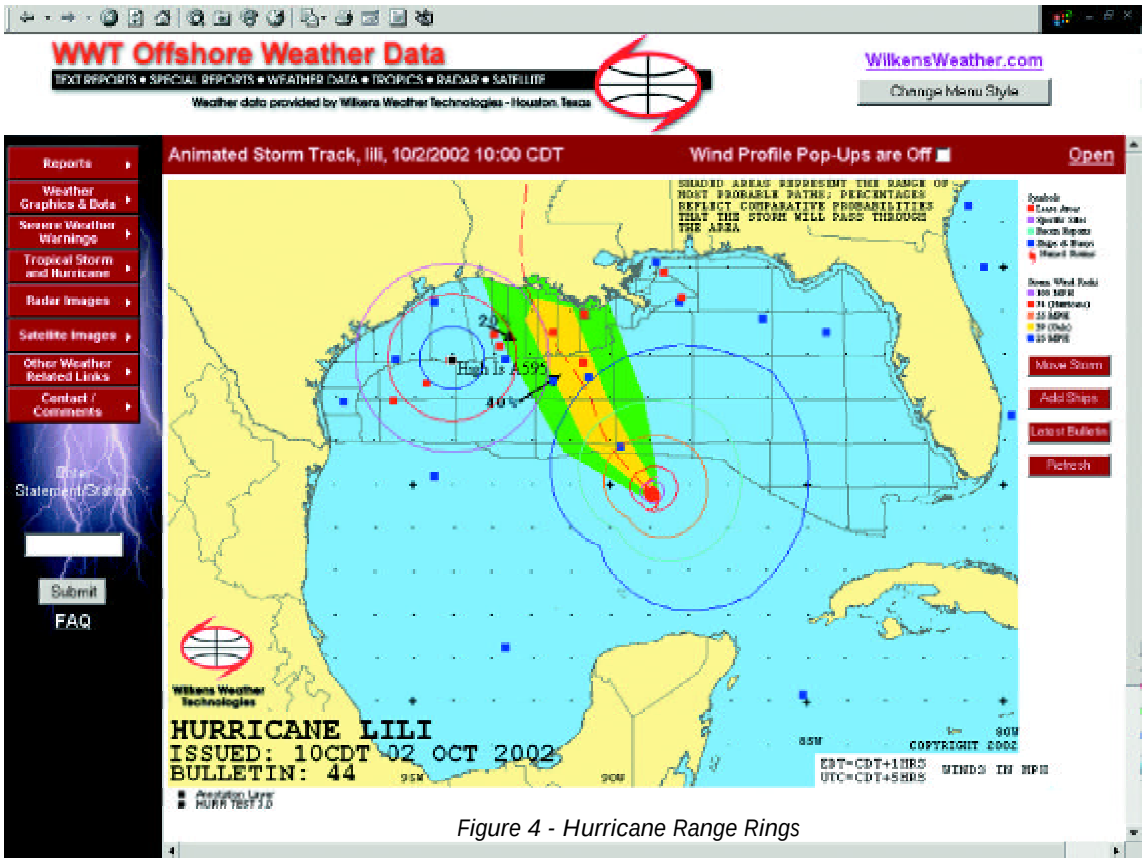

Figure 4 - Hurricane Range Rings

Click on the button to the right labeled "move storm" to progress the storm through its projected path and see the effect of wind speeds at your location.

- **Range Rings**
  To evaluate the urgency of evacuation, you can "draw" your own range rings around your site at distances that you select. Click on the "add ships" button to the right of the map. This will display a table where you can select your location from a drop down list, or enter the name of your rig, platform or vessel and your current latitude and longitude. Simply enter up to three distances from your location. Click on "save and display" and range rings will be displayed at those distances from the location you selected. Once you have drawn your range rings, you can click the "move storm" button and watch the storm follow its projected track. The hurricane's wind rings interact with the range rings for your site, graphically depicting the projected wind speeds at the crucial ranges you defined. (See Figure 4 at left)

Wilkens Weather Technologies is very excited to provide these new services to our customers. Remember, these innovations were developed based on your comments. The more feedback you share with us, the better we can incorporate your specific needs into our continuing innovations. We hope these tools will serve you well and we look forward to your feedback.

If you are a current customer and would like your staff fully aware of all the features available to them on WWT's cutomized client Web sites or if you do not subscribe to the Web service and would like a personal demonstration, please call us at 713-430-7100 or email us at wwt@wilkensweather.com. We look forward to hearing from you!

Hurricane Season 2003 (cont.)

Dr. William Gray of Colorado State University issued his forecast for the 2003 Hurricane Season early in April. His assessment of the future of the present El Niño event agrees with ours in that it is expected to weaken to a neutral state during the summer months. Our forecast differs from his very little this year. The threshold between tropical storm and hurricane status is between 70-75 mph and it is possible for a few more of the tropical storms to cross the line to minimal hurricane status for a brief period of time.

The forecast for the probability of where we expect these to form and their likely movement from those areas is indicated in Figure 3.

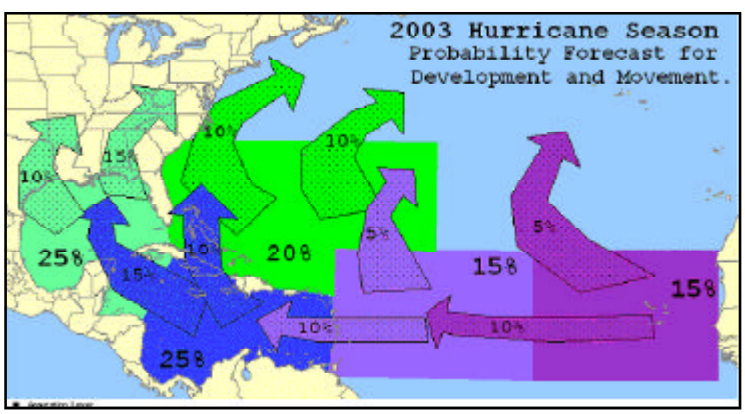

Figure 3. Probability of Development and Movement of Tropical Cyclones (depressions, storms and hurricanes) – WWT Forecast for the 2003 hurricane season.