NASA disassembles, reassembles Gert

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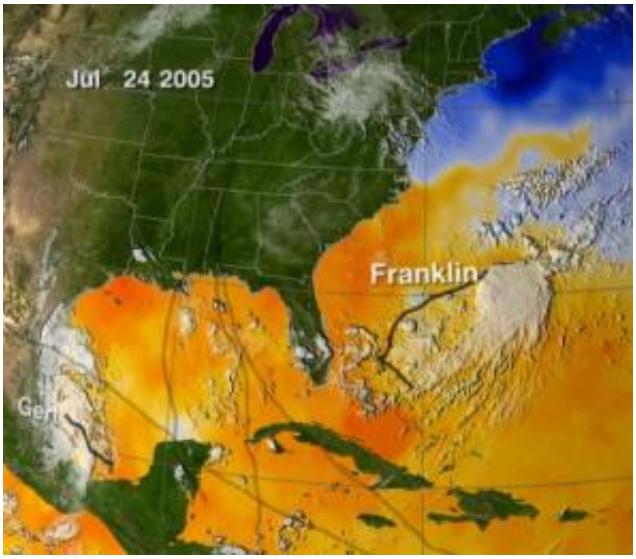

This image from July 24, 2005 shows the small track of Tropical Storm Gert in the lower left hand corner of the image. Gert was located north of the Yucatan Peninsula, in the Bay of Campeche. The yellow and orange colors on this image indicate the warm waters of the Gulf of Mexico and Atlantic Ocean. Click image to enlarge.

To figure out how something mechanical works, people take it apart and look at its components, then try and put it back together. That's what NASA researchers are doing with hurricanes, to try to figure out what makes them tick. For Tropical Storm Gert, which formed in the Gulf of Mexico in July 2005, they found that the mountainous areas of Mexico helped the storm to form.

To see how a hurricane works, scientists take readings of all its pieces: wind, rain, temperature, humidity and air pressure. They can also use computer models to try to re-create the storm's conditions. By comparing model simulations to actual observations of the storm, they can determine how good or bad the models are. If the models do poorly, scientists try to figure out what went wrong. If they do well, scientists can then use the model results to try to better understand how hurricanes form and intensify. Researchers did this after the summer of 2005, using Gert as a test case to make sure that their computer models were accurately "re-assembling" the storm as it appeared.

Scott Braun, Atmospheric scientist at NASA's Goddard Space Flight Center, Greenbelt, Md. and his co-author on the Gert study, Michael T. Montgomery, an Atmospheric scientist from Colorado State University, took data produced by the National Centers for Environmental Prediction about the state of the atmosphere during Gert, and used it in their computer model. The model produced a re-creation of Tropical Storm Gert. Their conclusions were presented at the American Meteorological Society's 27th Conference on Hurricanes and Tropical Meteorology the week of April 24, 2006, in Monterey, Calif.

If one used only actual observations to figure out what makes a storm tick, it would be much more difficult because these observations are very limited in space and time. If scientists can trust that a computer model did a good job, they can use the model's information to figure out what is happening everywhere in the storm at all times. This will help scientists learn much more than they could from the observations alone.

The Gert data was gathered by a large mission called the Tropical Cloud Systems and Processes Experiment, or TCSP, which included airplanes that dropped sensors called "dropsondes" into the storminess of Gert to get wind, temperature and humidity data. Other data used to check the accuracy of the computer model include flight-level winds from the

NOAA P-3 aircraft, NASA ER-2 Doppler radar data, and precipitation information from a direct overpass of the Tropical Rainfall Measuring Mission satellite.

Gert began as a low pressure area that formed in the Gulf of Honduras just east of Chetumal, Mexico on July 22. The low quickly moved inland over Yucatan, then into the Bay of Campeche early on the 23rd. A tropical depression formed on July 23 about 255 nautical miles east-southeast of Tuxpan, Mexico. The depression strengthened into Tropical Storm Gert on July 24th.

"We examined the role that topography in Mexico played in the development of Tropical Storm Gert," said Braun. They found that the mountains blocked the flow of air at low levels, which according to the computer model was critical in helping Gert form. As the weak disturbance that eventually became Gert moved into the Gulf of Mexico, the easterly winds associated with it ran up against the mountains of Mexico along the western side of the Gulf. When air flow like this encounters such an obstacle, it has two options.

Under the right conditions, air flow could simply go up and over the mountains. However, under other conditions (when the air is stable), the air encounters more resistance to upward movement and must go around the mountains. That is what happened in Gert's case. As the easterly winds hit the mountains, they were forced to turn to the southeast in a direction parallel to the mountains. By turning the flow partially back in the direction from which it came, the mountains increased the large-scale rotation of the winds over the Gulf, thereby providing a more favorable environment for Gert to form and intensify.

This may not necessarily apply to all storms in the Gulf. Gert was probably a borderline storm that needed help to form. While some systems like Gert may occasionally need help to develop, many other

storms do not require such help, but can develop easily on their own. Scientists don't know how often storms might need this type of help. Even if it is not often, knowing how those kinds of storms develop is still important to those people who are impacted by them.

Source: NASA

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