NASA data see Alex's core aligned, growing toward hurricane strength

June 29 2010

The GOES-13 satellite captured this visible image of Tropical Storm Alex on June 29 at 1732 UTC (1:32 p.m. EDT). Although Alex's center in the southwestern Gulf of Mexico, his cloud cover extends over a large area of the Gulf. Credit: NASA GOES Project

Two instruments aboard NASA's Aqua satellite have provided some critical information to hurricane forecasters about tropical storm Alex as it threatens the northern Mexico and southern Texas coasts. Data from those two instruments were used in the National Hurricane Center's forecast at 8 a.m. EDT today, June 29 as they provided information on Alex's structure, direction, cloud top temperatures and convection.

As Alex nears hurricane strength at 8 a.m. EDT on June 29, a Hurricane

Warning is in effect for the coast of Texas south of Baffin Bay to the mouth of the Rio Grande and the coast of Mexico from the mouth of the Rio Grande to La Cruz. A tropical storm warning in effect for the coast of Texas From Baffin Bay to Port O'Connor. The weather is already deteriorating today in the northern Mexico/southern Texas coast. Alex's clouds are already visible from the southern Texas coast this morning.

A hurricane warning means that hurricane conditions are expected somewhere within the warning area. A warning is typically issued 36 hours before the anticipated first occurrence of Tropical-storm-force winds. A tropical storm warning means that tropical storm conditions are expected somewhere within the warning area within 36 hours.

At 2 p.m. EDT the center of Tropical Storm Alex was located near latitude 22.9 north and longitude 93.6 west. That's about 270 miles (435 km) east-southeast of La Pesca, Mexico, and 320 miles (515 km) southeast of Brownsville, Texas. Alex is now moving toward the northwest near 13 mph (21 km/hr). Maximum sustained winds are near 70 mph (110 km/hr) with higher gusts. The National Hurricane Center notes that "Additional strengthening is forecast during the next 48 hours and Alex is likely to become a hurricane later today."

A turn toward the northwest is expected later today, followed by a gradual turn toward the west-northwest on Wednesday. The minimum central pressure just reported by the hurricane hunter is 981 millibars, a drop of 2 millibars from three hours before. That drop in pressure indicates a strengthening storm.

Tropical storm force winds extend outward up to 140 miles (220 km), that's 35 miles per hour greater than at 11 a.m. EDT today, so the storm is growing. An automated weather station managed by the Mexican Navy at Cayo Arenas reported a wind gust of 68 mph (109 km/hr) in mid-morning hours of June 29.

The Atmospheric Infrared Sounder (AIRS) instrument reads the temperature of thunderstorm cloud tops in tropical cyclones and the sea surface temperatures around them. The colder temperatures of cloud tops, the higher they are in the atmosphere, and the stronger they are. Very high, cold cloud tops can be colder than -63 Fahrenheit, and likely dump heavy rainfall.

AIRS data noticed increasing deep convection (rapidly rising air that form clouds and thunderstorms that power the tropical cyclone)in the eastern semicircle of Alex's small developing eye indicating a strengthening storm.

The AIRS instrument works with another instrument on NASA's Aqua satellite to provide more insight on the workings of tropical cyclones. AIRS data combined with data from the Advanced Microwave Sounding Unit (AMSU) helps pinpoint the motion of tropical cyclones. AIRS/AMSU data confirmed that Alex's initial motion in the last 8 hours is 340 or north-northwest.

Microwave data from AMSU at 0243 UTC (June 28 at 10:43 p.m. EDT) and imagery captured at 0114 UTC (9:14 p.m. EDT, June 28) from the Special Sensor Microwave/Imager (SSM/I) instrument that flies on the U.S. Air Force Defense Meteorological Satellite Program (DMSP) indicated a small mid-level eye feature very near the low-level recon center position. The AMSU data indicated that Alex's center of circulation has aligned vertically, which favors steady intensification because there is low wind shear and warm ocean surface temperatures.

So, what is AMSU and what does it do? The Advanced Microwave Sounding Unit is a multi-channel microwave radiometer installed on NASA's Aqua satellite and meteorological satellites such as the on several NOAA low-Earth satellites. The instrument examines several bands of microwave radiation from the atmosphere to perform

atmospheric sounding (reading) of temperature and moisture levels. AMSU data is used extensively in weather prediction. Temperature data are processed as quickly as possible and sent to numerical weather prediction (NWP) centers around the world. This data helps keep the assessment of the current state of the atmosphere correct, which in turn helps make forecasts more accurate.

What are the hazards that Alex will bring to Northeastern Mexico and southeastern Texas? Heavy rainfall, gusty winds and storm surge. Accumulations of 6 to 12 inches of rainfall over portions of northeastern Mexico and southern Texas are possible, with isolated amounts to as much as 20 inches. This extreme rainfall can cause flash-flooding and life-threatening mud slides. Additional rainfall accumulations of 2 to 4 inches are possible over portions of southern Mexico through today.

Alex is expected to strengthen into hurricane, and tropical storms conditions are expected to reach coastal areas on Wednesday. In addition, the National Hurricane Center warns "a dangerous storm surge will raise water levels by as much as 3 to 5 feet above ground level along the immediate coast near and to the north of where the center makes landfall. The surge could penetrate inland as far as several miles from the shore with depth generally decreasing as the water moves inland. Near the coast...the surge will be accompanied by large and destructive waves."

What is expected to turn Alex to the west-northwest? A building sub-tropical ridge (that's an area of high pressure) to the north and east of Alex over the next 3 days which is expected to gradually steer the cyclone on a west-northwestward or westward track with time. The National Hurricane Center noted that Alex is now moving northwestward and shift west-northwest on Wednesday. Alex is expected to make landfall in northern Mexico or southern Texas late Wednesday night.

Provided by NASA's Goddard Space Flight Center