Tropical Forecast Discussion for September 24, 2010

Synoptic Overview:

As has been the case of several days, there were only two tropical systems of interest in the Atlantic Basin. Tropical Storm Lisa (PGI45L) was still meandering within weak steering in the eastern Atlantic and newly-formed Tropical Storm Matthew (PGI46L/AL95) (Fig 1). Mathew was briskly moving west in the Caribbean Sea. Lisa was forecast to move slowly to the NW over the next couple of days without gaining much intensity while Mathew was slowly gaining strength in the

Synoptic features included a broad and moderately, strong ridge centered over the western Atlantic extending across the Gulf of Mexico and an upper-level low and trough over the eastern Atlantic that was shearing Lisa. The ridge in the western Atlantic was steering Mathew to the west and providing a favorable environment for strengthening. Since NASA and NSF/PREDICT were flying Mathew, the weather discussion only included this storm.

Fig. 1: Graphical Tropical Weather Outlook of the Atlantic basin UTC 24 September.

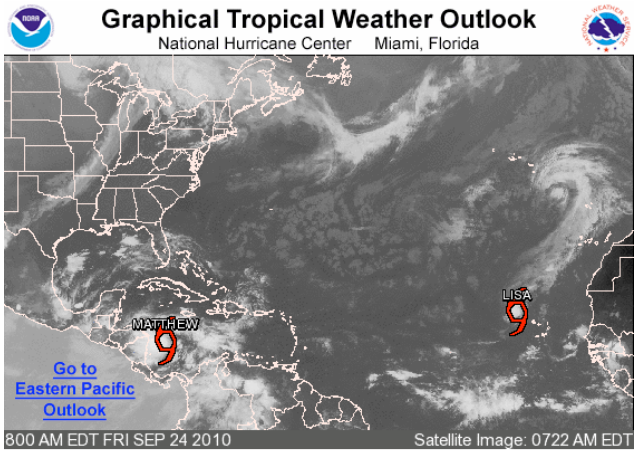
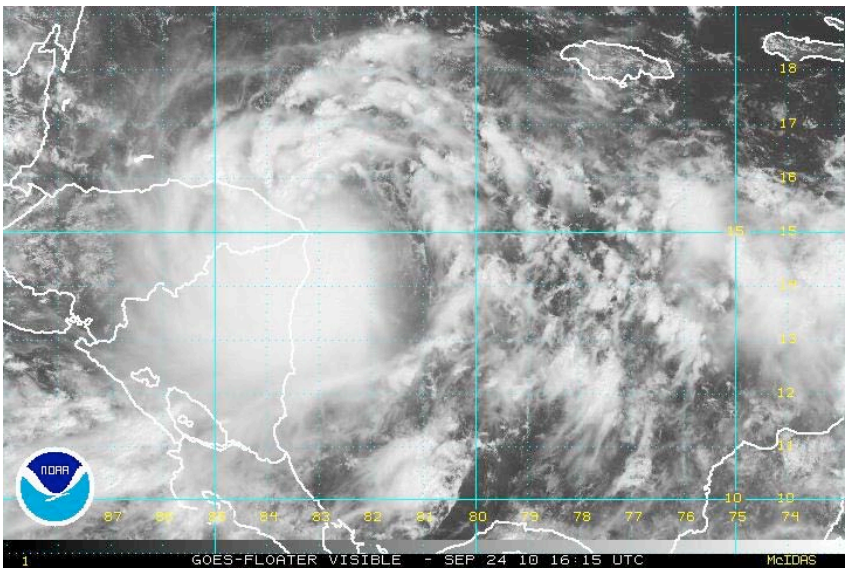


Fig. 2: Visible satellite image of TS Matthew



Tropical Storm Matthew (PGI46L/AL95):

Despite producing deep convection near the center of circulation overnight, the 12Z AF reconnaissance aircraft found that Mathew had not strengthened and the intensity was held at 45kt. A MCS formed about 2300 UTC last night, grew in size, and persisted throughout the morning hours. This MCS appeared to be co-located with the center and was producing cloud-top temperatures colder than -80°C. A series of infrared satellite images from the NRL web site is in Fig. 3 and shows the evolution of this MCS.

Fig 3a. IR Image of Mathew at 2345 UTC 23 Sep.

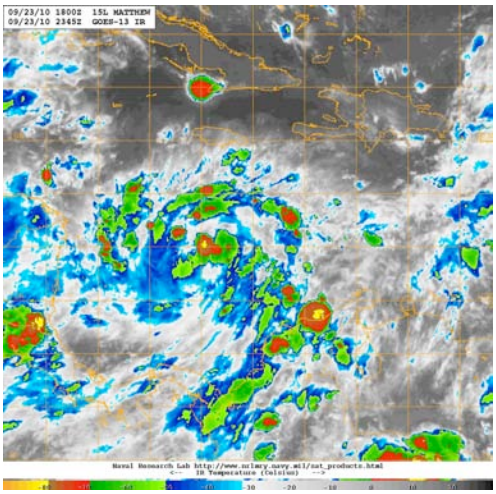


Fig 3b. IR Image of Mathew at 0300 UTC 24 Sep.

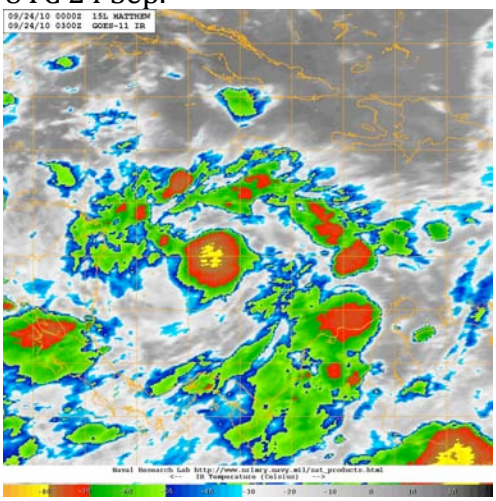


Fig 3c. IR Image of Mathew at 0430 UTC 24 Sep.

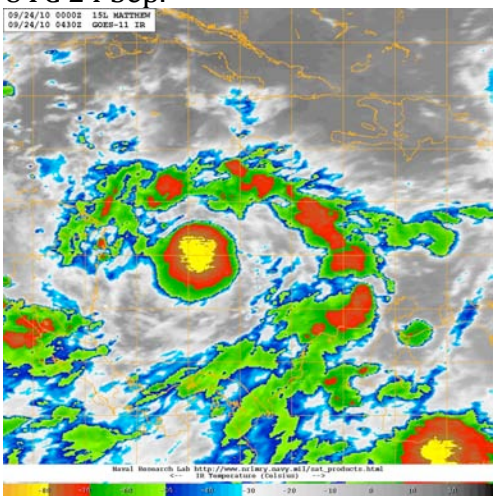


Fig 3d. IR Image of Mathew at 0715 UTC 24 Sep.

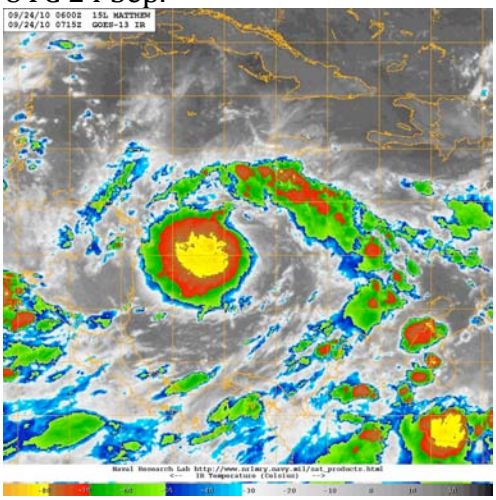


Fig 3e. IR Image of Mathew at 1045 UTC 24 Sep.

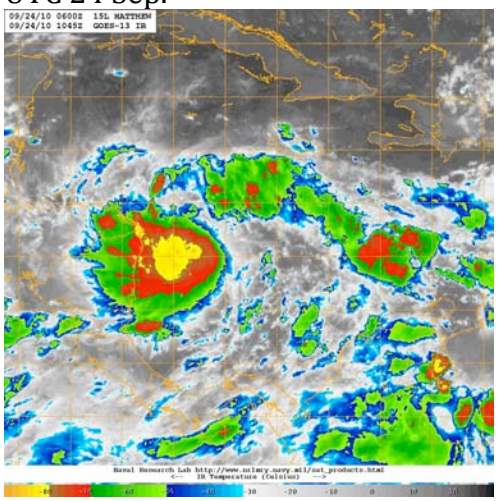
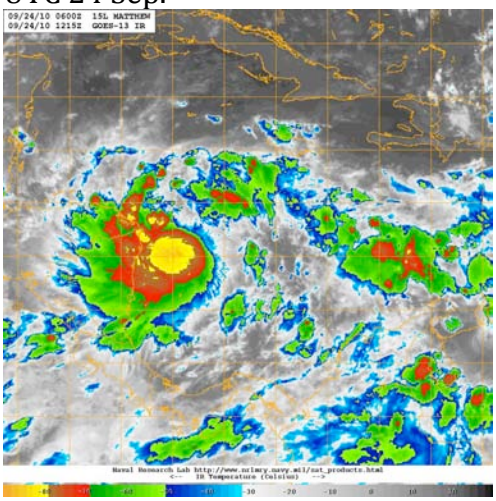


Fig 3b. IR Image of Mathew at 1215 UTC 24 Sep.



As can be seen in Fig. 3 (a-d), the MCS grew in size and the circular shape of the expanding cirrus outflow suggests that shear over Matthew's center was low. By 1045 UTC, however, the cirrus was expanding to the west, indicating that easterly shear was perhaps increasing. Microwave imagery, also from the NRL site seems to confirm the increase in shear during the morning hours on 24 September. The first one, an 85 GHz image form the Aqua satellite at 0715 UTC (Fig. 4) shows a curved rainband that could be interpreted as a developing eyewall just west of the low-level center. In fact, the NASA Global Hawk aircraft that had been flying overnight in Matthew was also tracking a possible development of an eye and eyewall with their microwave imager (HAMSR). An example of one of the images, superimposed on an IR satellite image is in Fig. 5.

Fig. 4: Microwave image of TS Matthew at 0715 UTC

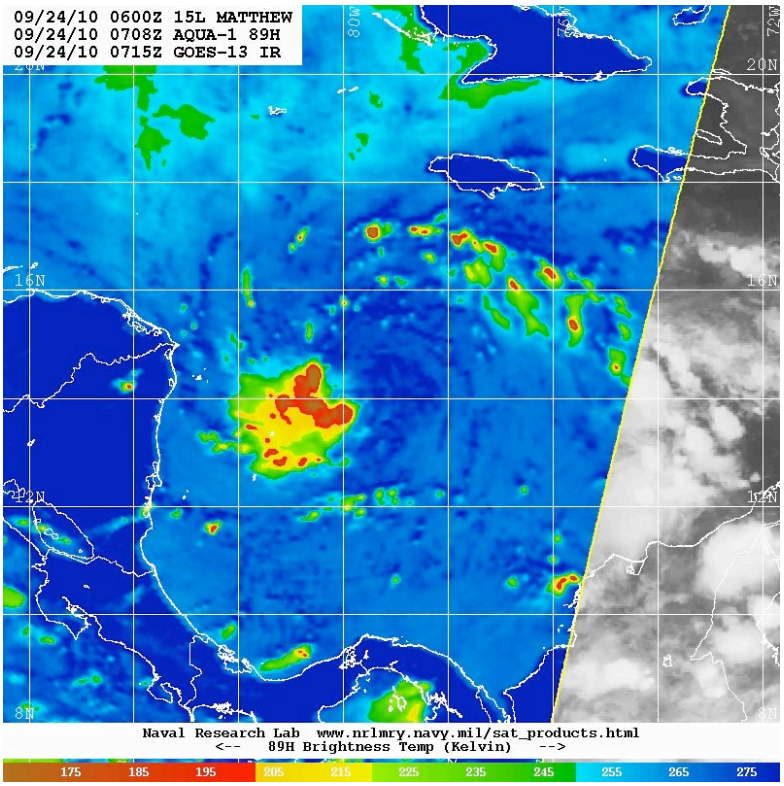
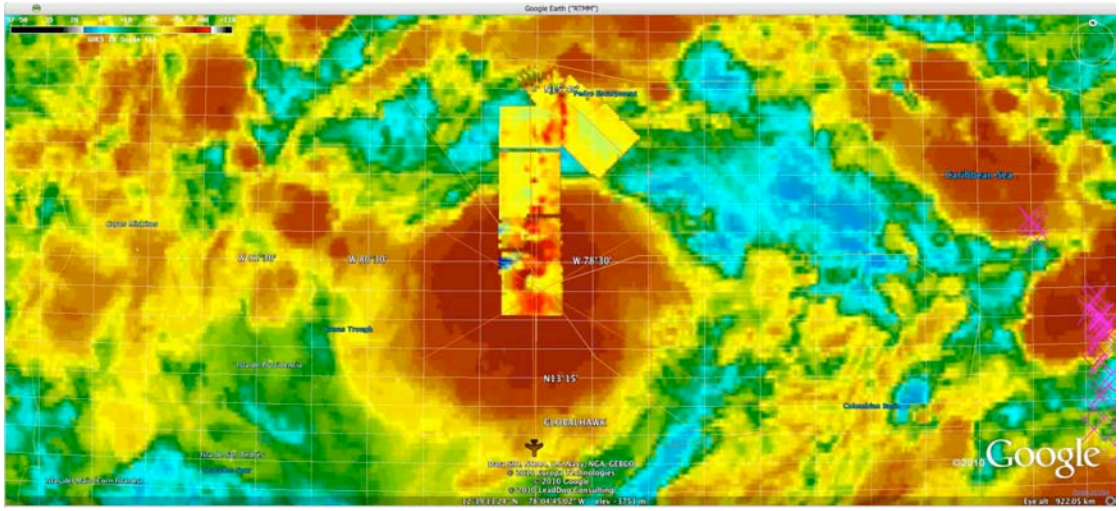
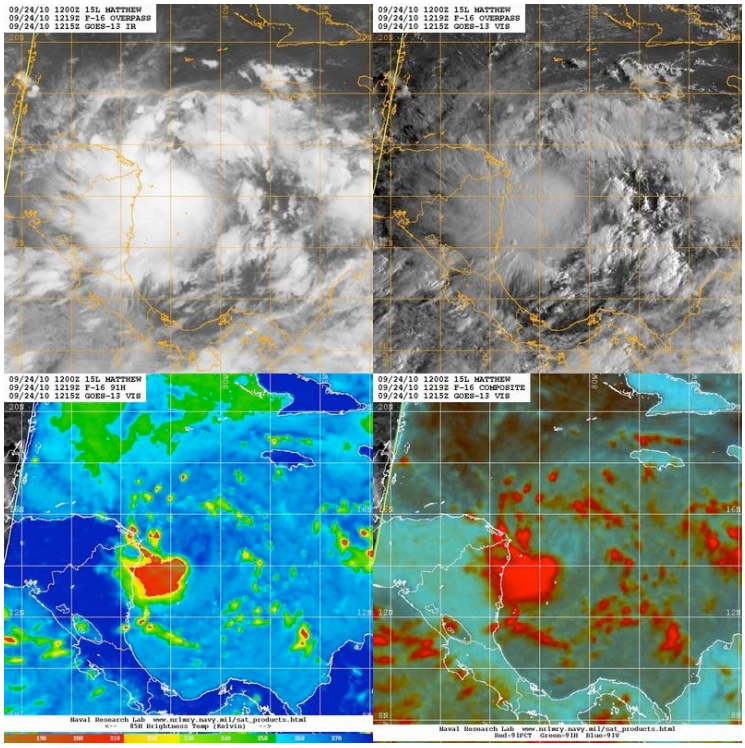


Fig. 5: Screen grab from NASA RATMM of HAMSR microwave imagery on IR satellite imagery



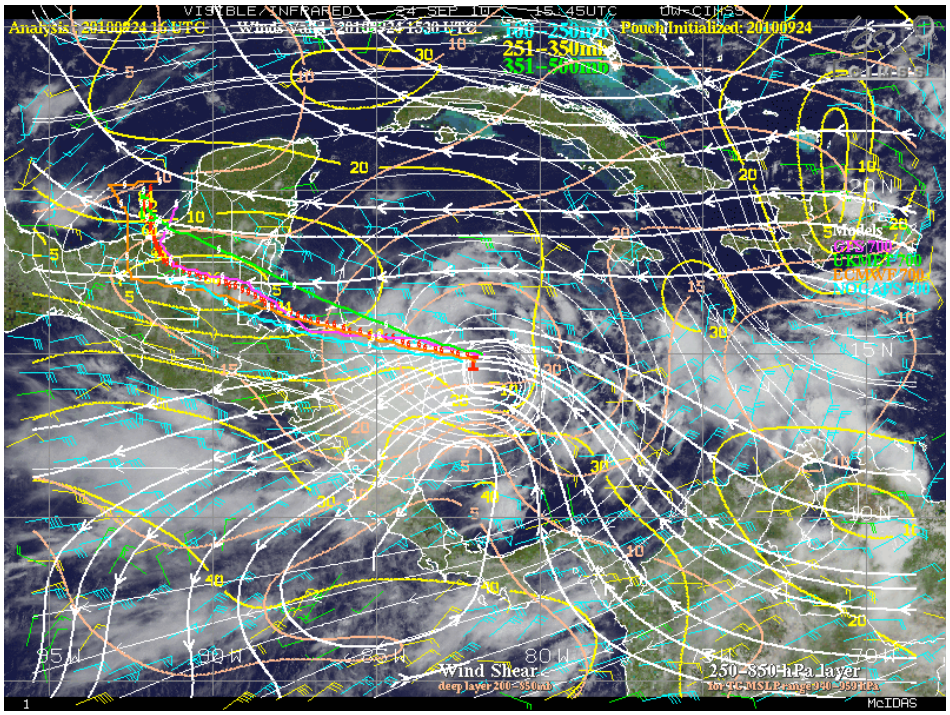
This "eyewall-like' feature quickly evolved so that by 1215 UTC, the curved rainband was displaced further to the SW of the center and no longer took on the appearance of an eyewall (Fig. 6). It is speculated that easterly shear increased in the early morning hours, halting or negating any intensification that may have been occurring overnight.

Fig. 6: Composite visible, IR, and microwave image of TS Matthew at 1215 UTC 24 Sep.



CIMMS analyses of shear at 1545 UTC (Fig. 7) confirmed that Matthew's core was undergoing about 15-20 kt of easterly shear which might prevent the storm from attaining hurricane status that was forecast by NHC 12 hours earlier. Given the current state of the cyclone and that it would be making landfall in a few hours, Matthew was not forecast to intensify and might even weaken somewhat.

Fig. 7: CIMMS analyses of shear, upper level winds, vorticity, and forecast track of Matthew.



The short-term track forecast was certain; Matthew would make landfall in NE Nicaragua, move inland, and weaken. There was a possibility that Matthew might remerge briefly over water in the Gulf of Honduras but that was becoming more unlikely given the fast westward motion. There was much more uncertainty, however, in the forecast beyond about 48 hr. The track guidance (Fig. 8) showed Matthew slowing down and either stalling over Central America while dissipating or reemerge in at days 4-5 in the NW Caribbean and possibly redeveloping. In addition, storm monsoonal flow from the EPAC was entering the Caribbean region and some of the model guidance suggested that a monsoon depression might form in the NW Caribbean or southern Gulf of Mexico.

An example of some of these possibilities is given by the GFS ensemble track guidance of Mathew in Fig. 9. Some of the global model diagnostics showed vorticity mergers from the EPAC and the remnant of Mathew redeveloping into a tropical cyclone south of western Cuba and moving to the north. There was not any consensus track among the different models and we would have to wait a day or two longer to see what solution would likely emerge.

Fig. 8: Track guidance for TS Matthew at 1200 UTC 24 Sep.

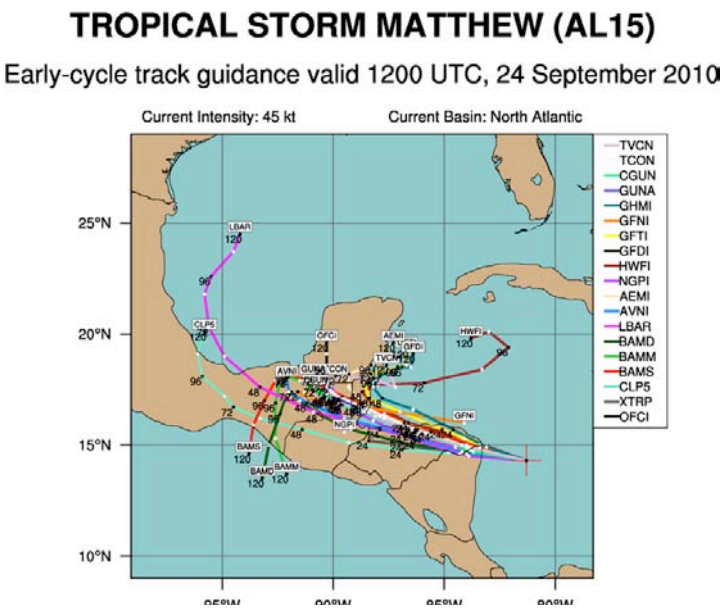
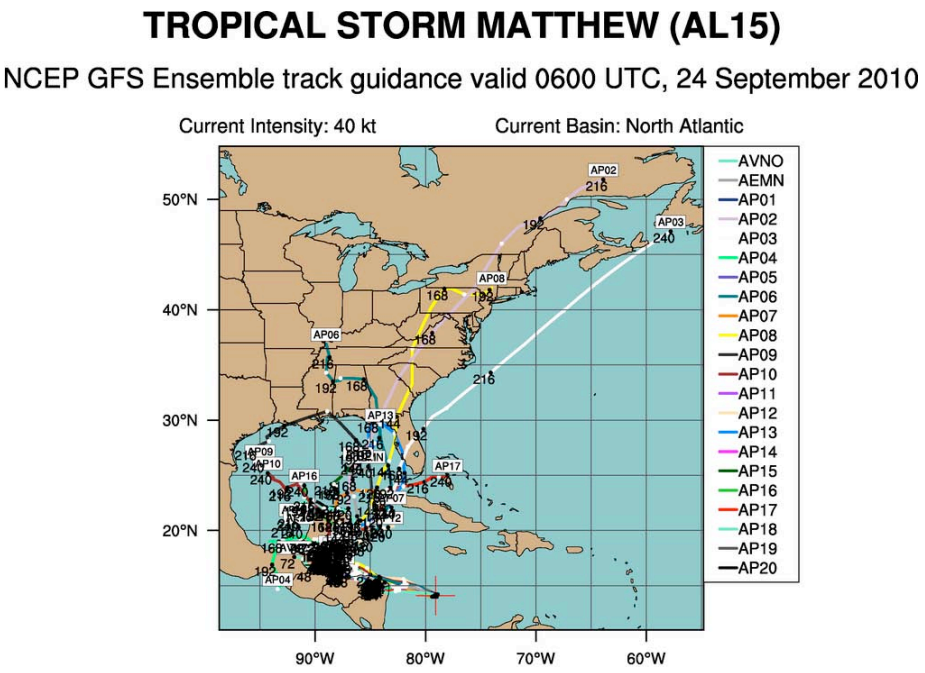


Fig. 9: GFS ensemble track guidance for TS Matthew at 1200 UTC



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