Loss of A57 *Anna*: Weather Conditions

The following is a brief analysis of the weather conditions near the time when the A57 "Anna" was overturned by a violent squall. The event occurred near Niue Island in the South Pacific at approximately 0400Z on 1 Aug. 2010 (1500 on 31 July Niue local time).

Let's start with the sea-level pressure analysis at 0600Z (nearest analysis output in time to the event), shown in Figure 1. Low pressures are denoted with purples, higher pressures with reds and yellows. Note the tropical wave (southward bulge of lower pressure, indicated by white curve) in the area near *Anna*. The wave compressed the isobars and tightened the pressure gradient in *Anna*'s vicinity, which leads to stronger surface winds.

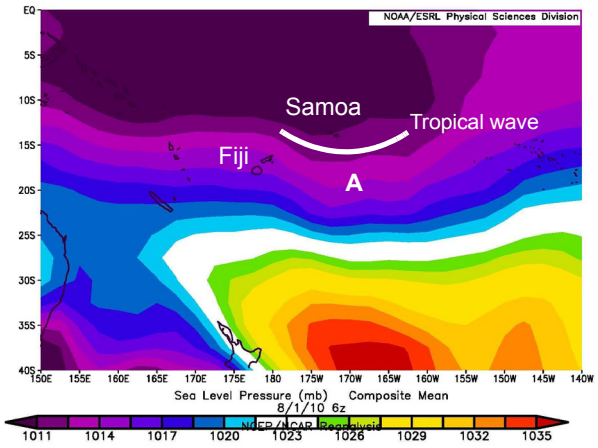

Figure 1: Sea-level pressure at 06Z on 1 Aug 2010, the approximate time that squall hit *Anna*, position indicated by white "A."

The wave also produced a well-defined area of convective showers, evident in the infrared satellite image (Fig. 2) for the same time as the pressure analysis above. *Anna*'s position is under the very white clouds. Bright white indicates that cloud-tops are cold and therefore high, associated with strong convective cells.

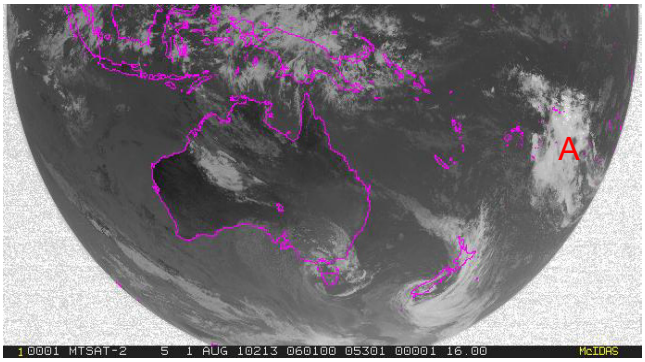

Figure 2: IR image at 06Z Aug 1 2010. Red "A" marks approximate position of Anna.

Figure 3 is the field of vertical wind (upward and downward winds) associated with the tropical wave. A large area of strong upward winds is located near *Anna*, which also suggests that squalls in the area would be intense and capable of producing microbursts, which are local, short-lived bursts of surface wind generated by strong convective cells.

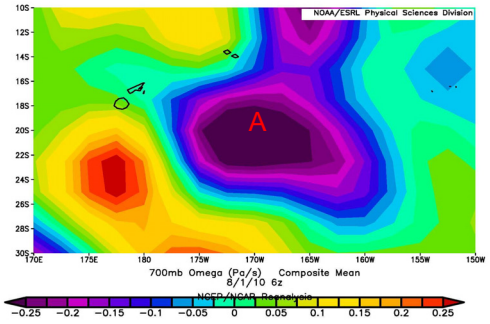

Figure 3: Vertical winds associated with tropical wave. Negative values are upward winds, indicating strong convection.

Further evidence of the potential squall intensity is shown in the field of precipitation rate (Fig. 4). Large values are associated with intense rain, which can further accelerate winds through evaporative cooling within downdrafts in

squalls. Mean surface winds in the area (Fig. 5) are only around 20 kts, but just south of *Anna*'s location is an area of 30+ kts, and intense squalls could easily produce much higher values.

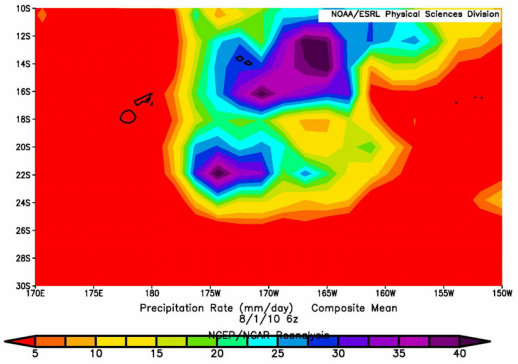

Figure 4: Precipitation rate on 1 Aug 2010 at 06Z.

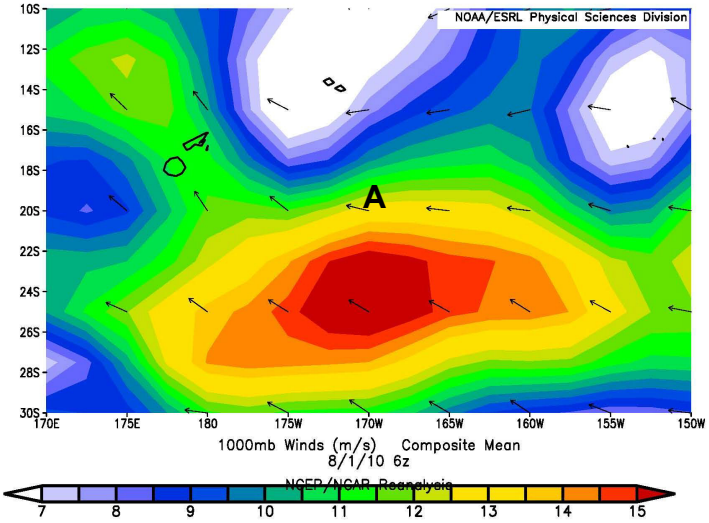

Figure 5: Near-surface wind field on 1 Aug 2010 at 06Z. Double these values for knots. Arrows indicate direction.

Summary: Tropical squalls are notoriously capricious, and predicting which of them will be intense and which are not from the deck of a vessel is difficult. Clearly, however, conditions in the area of *Anna*'s capsize were conducive to strong convection, and the likelihood of encountering severe weather was high. If the crew had possessed this knowledge, they might have been more cautious, perhaps electing to wait for more benign conditions, or at least sailing with less canvas. They may also have anticipated the need for a more immediate reaction to rapidly changing and potentially hazardous conditions. Weather information can be accessed via a variety of methods globally these days: internet via cell phone or onboard satellite systems, or via communication with a dedicated weather-routing service. Because this tropical wave was so well defined and strong, it was almost certainly forecast well in advance.

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