Daily Science Report
Stratus2007 Cruise
NOAA Ship Ronald H. Brown
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Report #8 October 25, 2007

Summary of Recent Activities

The ship departed Panama as planned the morning of October 16. Observations were officially begun on October 18. The ship reached 20 S 75 W by the end of October 22 and spent almost two days at that location before departing to the west on October 24. We were underway to the west all of October 25 (Fig. 1). The ESRL observations include air-sea fluxes/near-surface bulk meteorology, cloud ceilometers, radar wind profiler, scanning Doppler C-band precipitation radar, a microwave radiometer for column water vapor/liquid, and aerosols in the 0.1 to 6 micrometer range. Rawinsonde launches were every 6 hours on October 25. A sample rawinsonde profile taken at early morning local (0000 GMT) is shown in Fig. 2. A strong subsidence inversion typical of stratocumulus regions is visible at a height of about 1100 m; the relative humidity profile indicates a deep cloud layer (400 m). Fig. 3 is a photograph taken at 1200 GMT; if you examine the cloud closely you will see a bunny wabbit. This photograph shows evidence of a decoupled boundary layer (i.e., scud clouds below the main stratocumulus deck) and small-scale mesoscale organizations (the roll-cloud structure in the picture). The cloud ceilometer return for the day is shown in Fig. 4; drizzle events are visible as the milky-looking vertical streaks. The corresponding wind profiler backscatter profile is shown in Fig. 5. Drizzle is visible in the image as very thin orange vertical streaks. The thicker clouds, stronger winds, and warmer water have reduced the net heat flux to the ocean to 40 W/m^2 (compared to 120 W/m^2 in the more coastal location of the DART buoy).

In Fig. 6 we show the data from the aerosol system for the period from October 22 through October 25. Note the lower aerosol concentrations (JD 295.5 to 296.5) which corresponded to the POC in that period. The total aerosol count decreased at the end of this period (JD 298), but notice that the larger size particles actually increased in concentration. This is likely because of increasing sea spray salt particles associated with the increasing wind speed at the end of the period (Fig. 7). This example illustrates the complexity of aerosol production and removal mechanisms.

Major oceanographic activities centered on preparing for the next stage of buoy operations. A drifter was deployed at 1100 GMT and an ARGO float at 2000 GMT. The preliminary report on findings in the Ecuador/Peru coastal region is now complete and will be submitted soon. The ship continued westward to the WHOI buoy at 20 S 85 W (est. 1200 on 10/26/2007).

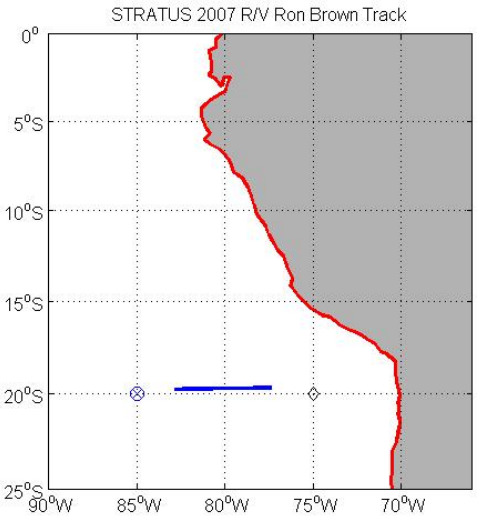

Figure 1. RHB cruise track on JD298 (Oct. 25). The diamond at 75 W is the SHOA tsunami buoy; the circle/plus at 85 W is the WHOI buoy.

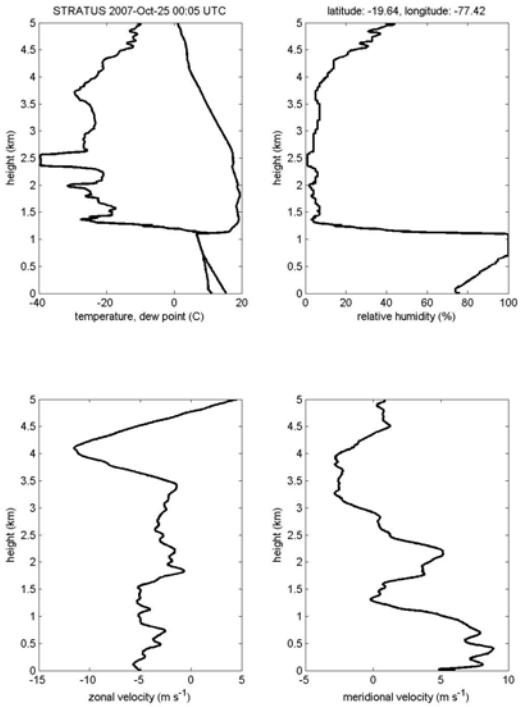

Figure 2. Rawinsonde profile 0000 GMT October 25.

Figure 3. Photograph of stratocumulus clouds 1400 GMT October 25 at 20 S 82 W.

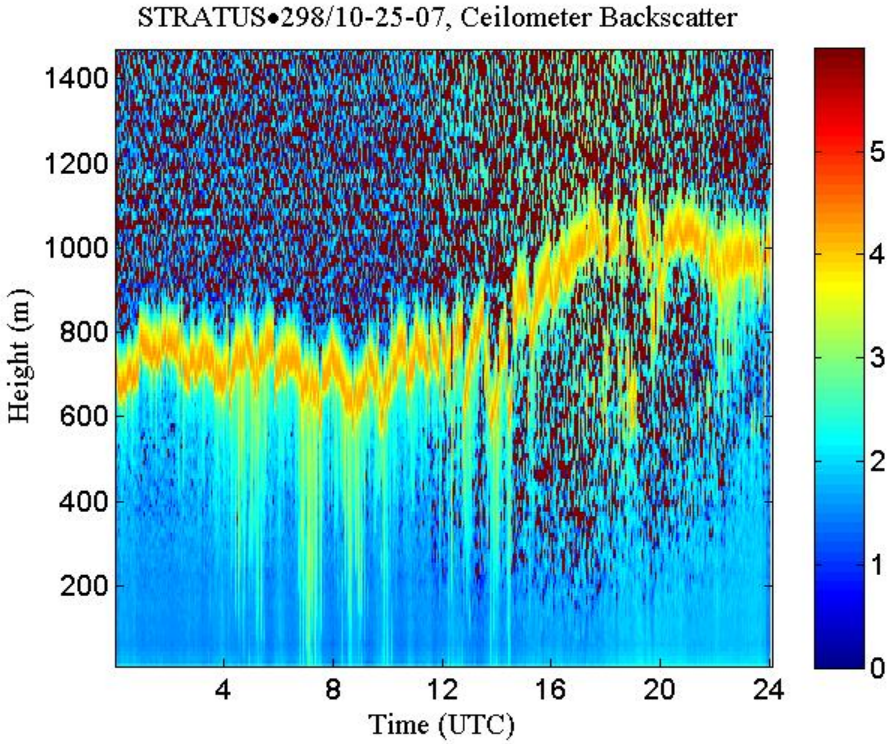

Figure 4. Time height cross section of ceilometer backscatter signal for October 25.

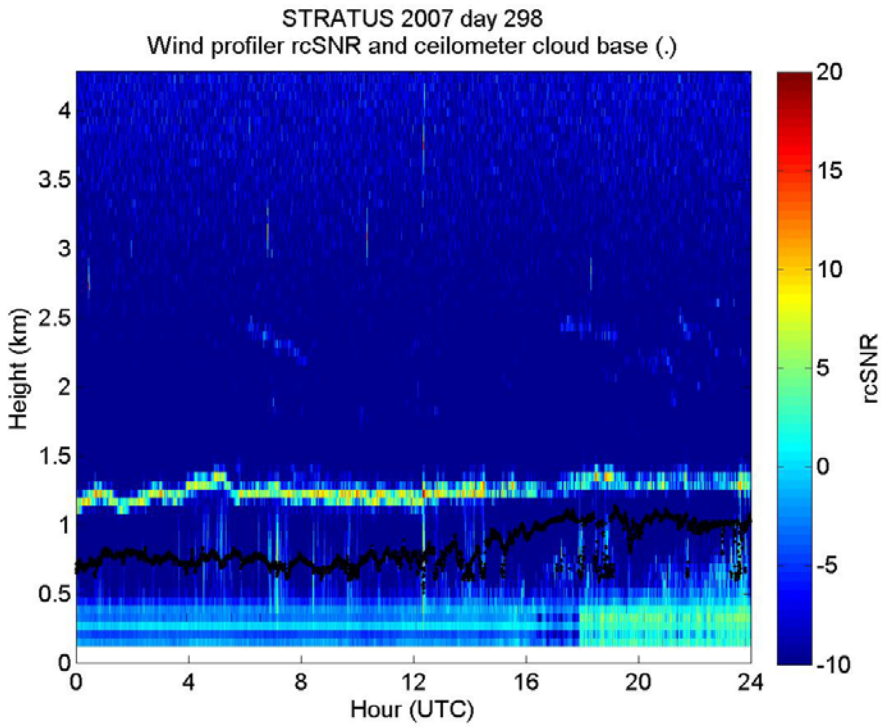

Figure 5. Time height cross section of wind profiler backscatter coefficient (color contours) with cloud base height superposed as black dots from Oct 25.

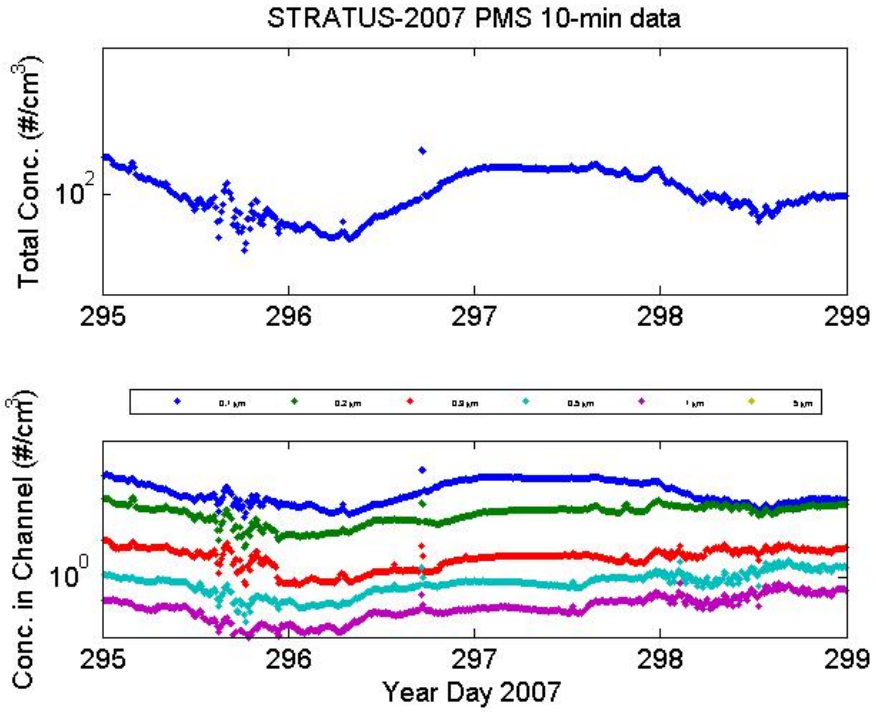

Figure 6. Time series of aerosol concentrations from October 22 through October 25. Upper panel: Total concentration for sizes from 0.1 to 5 micrometer. Lower panel: size resolved concentrations.

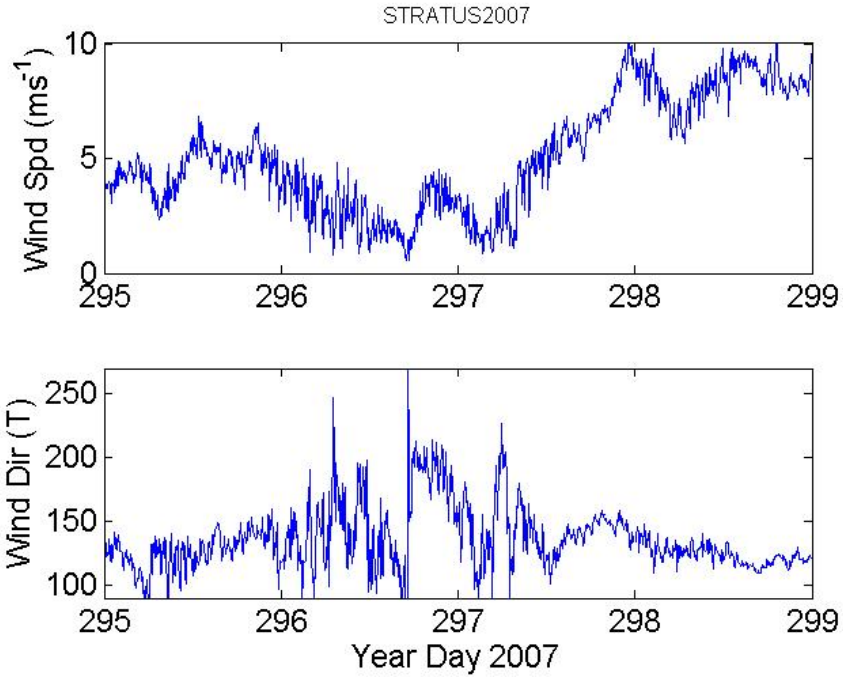

Figure 7. Time series of winds for the period October 22 through October 25. Upper panel: wind speed. Lower panel: wind direction.


Figure 8. Photograph of a rawinsonde launch on October 25.