Daily Science Report
Stratus2007 Cruise
NOAA Ship Ronald H. Brown
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Report #7 October 24, 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 (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 until reaching the buoy location at 20 S 85 W when the frequency was increased to every 4 hours (beginning 0000GMT on Oct 23) for two full days. A sample rawinsonde profile taken at 1200 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. Fig. 3 is a photograph taken at 1800 GMT. 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; the cloud feature in the photograph is seen in the reduction in cloud base at 1800.

In Fig. 5 we show the cloud base heights for the three days in the vicinity of the DART buoy at 20 S 75 W. Data from the aerosol system for the same period are shown in Fig. 6. In this case we expect most of the variability to be temporal since we are essentially in the same location. Note the lower cloud bases (JD 295.5 to 296.5) correspond closely to the coincidence of low aerosols associated with the POC.

On October 24 we started a project for Alex Guenther and Barry Huebert as part of the aerosol objective of VOCALS to assess the role of volatile organics (VOCs) in the growth of aerosol populations. VOCs are usually considerably less effective as CCN than sulfate is. A recent paper by Nenes postulated that terpenoid gases in the South Pacific may be the primary source of CCN mass. This is considered to be a rather bold conclusion, given that no one has ever measured terpenes in that region. Barry plans to use aerosol mass specs during VOCALS to look for terpene-derived aerosols. The other need, obviously, is to look for the precursor terpenes in the gas phase. To get a look at this on Stratus 07, Alex Guenther has provided eight stainless canisters which can easily be filled in the field by opening a valve. Today we opened the first of the eight. At the end of the cruise they will be shipped back to Alex for analysis.

Major oceanographic activities centered on changing monitoring data from the new sensors on the DART/Tsunami buoy and preparing for the next stage of buoy operations.

The preliminary report on findings in the Ecuador/Peru coastal region is nearing completion (after a frenzy of analysis and writing activities).

The ship departed at 1200 GMT on October 24 and headed west to the WHOI buoy at 20 S 85 W (est. 1800 on 10/26/2007).

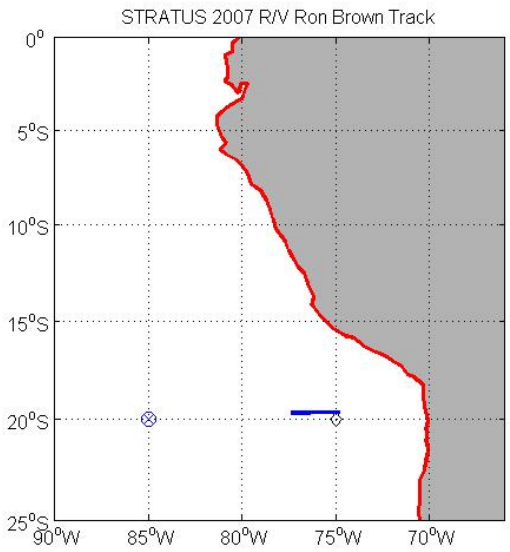

Figure 1. RHB cruise track on JD297 (Oct. 24). The diamond at 75 W is the SHOA tsunami buoy; the circle/plus at 85 W is the WHOI buoy.

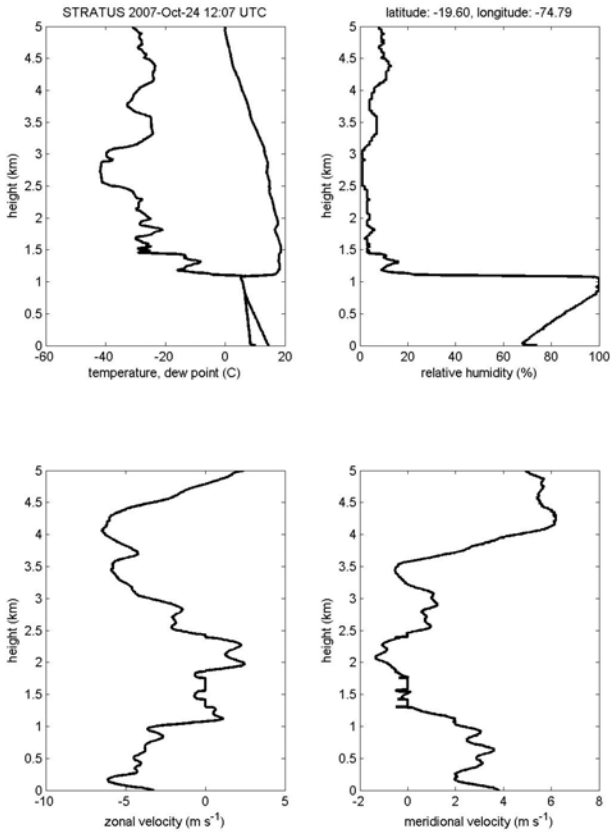

Figure 2. Rawinsonde profile 1600 GMT October 24.

Figure 3. Photograph of stratocumulus clouds 1800 GMT October 24 at 20 S 77 W.

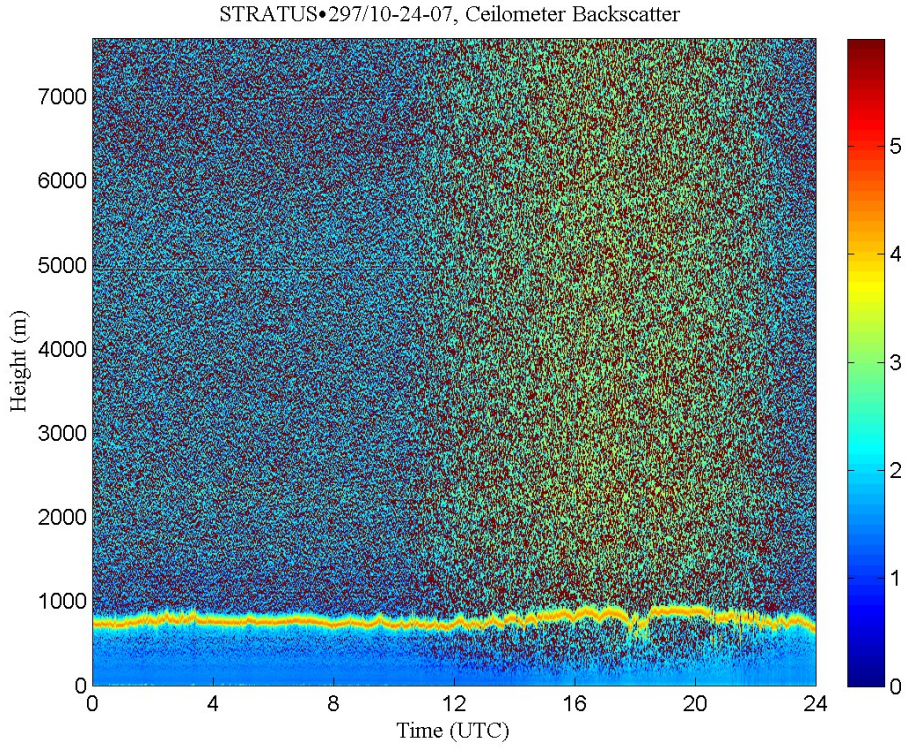

Figure 4. Time height cross section of ceilometer backscatter signal for October 24.

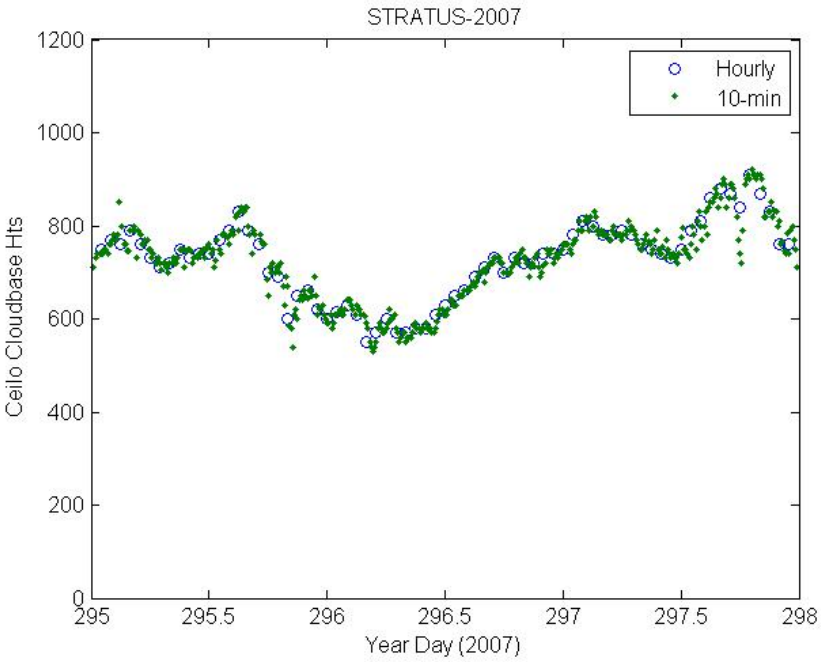

Figure 5. Time series of cloud base height from Oct 22 through October 24.

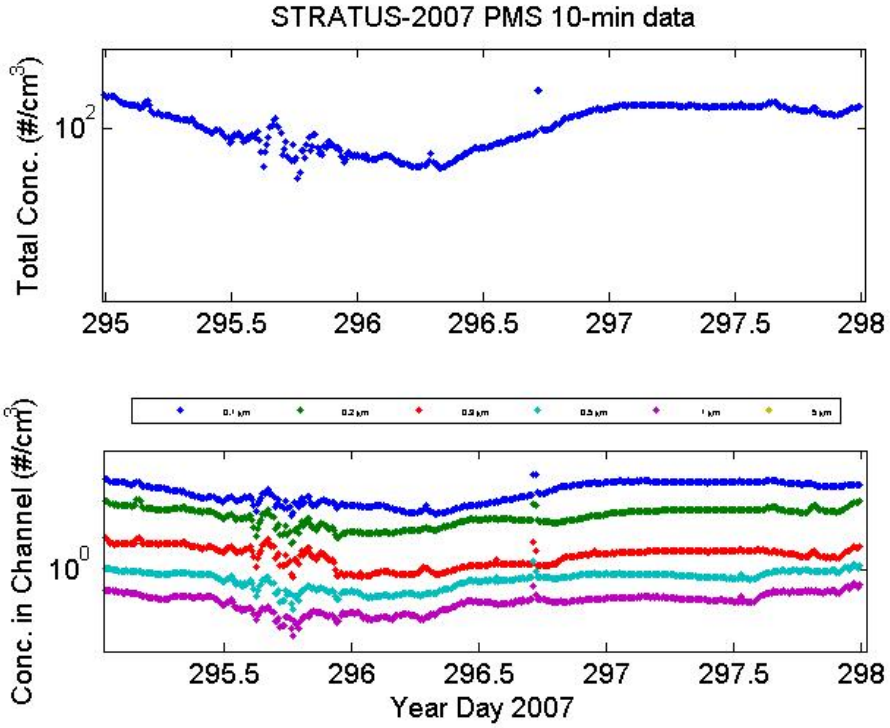

Figure 6. Time series of aerosol concentrations from Oct 22 through October 24. Upper panel: Total concentration for sizes from 0.1 to 5 micrometer. Lower panel: size resolved concentrations.

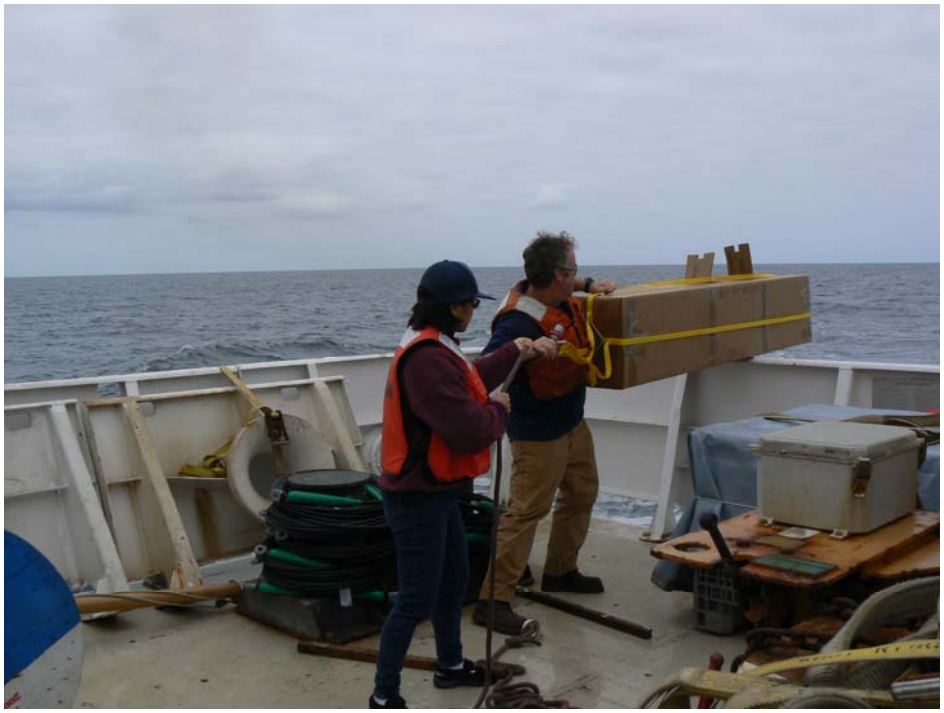

Figure 7-8. Photographs of ARGO profiling buoy deployment late on October 24.