# Appendix

Time series of measurements and derived variables at 10-minute and hourly resolution are available from the Tropical Eastern Pacific Stratus Synthesis Data Set. Measurements comprising the data set were made on ship cruises in the southeastern tropical Pacific ocean to the Stratus Woods Hole Ocean Reference Station at 85ºW, 20ºS (hereafter Stratus cruises). This appendix documents the instrument(s), sampling frequency, analysis techniques, units, estimates of accuracy and resolution, and particular configurations on different cruises used for each of the variables in the Stratus Synthesis Data Set.

## Independent variables

1. *Gregorian year.* (year) Year for the time stamp.
2. *Yearday.* Days (UTC) since December 31 of prior year of the start of the time stamp. This time stamp corresponds beginning of a 10 minute interval.

## Dependent variables

1. *Latitude.* Decimal degrees, positive north latitude, from NOAA ESRL Physical Sciences Division (PSD) global positioning system (GPS).
2. *Longitude.* Decimal degrees, positive east longitude, from PSD GPS.
3. *Thermosalinograph sea chest water temperature.* (º C) Temperature measured by a SeaBird thermosalinograph in the ship’s sea chest. Sea water is pumped through the sea chest from an intake in hull approximately 5 m below the sea surface.
4. *Sea snake water temperature.* (º C) Sea surface temperature (SST) from the PSD sea snake floating thermistor. The thermistor floats at 0.05 m depth when the ship is stationary. At this depth, the sea snake samples the solar warm layer, but not the cool skin effect.
5. *Air temperature.* (º C) Air temperature measured by a Vaisala HMP-300 series probe maintained by PSD on the forward mast, 18 m above sea level. The temperature sensor is housed in a radiation shield and aspirated by an electric fan.
6. *Westerly wind component.* (m s-1) Earth-relative mean zonal wind from a Gill sonic anemometer on the forward mast. Relative heading and motion of the ship is computed from the GPS and subtracted from the ship-relative wind. Height????
7. *Southerly wind component.* (m s-1) Earth-relative mean meridional wind from a Gill sonic anemometer on the forward mast. Relative heading and motion of the ship is subtracted from the ship-relative wind.
8. *Scalar wind speed.* (m s-1) Earth-relative average scalar wind speed from the Gill sonic anemometer, sampled at 10 Hz, averaged to 1 minute???
9. *Sensible heat flux.* (W m-2) Positive-upward sensible heat flux computed from the COARE 3.0 bulk flux algorithm. Bulk (5 or 10-minute averaged) wind speed, skin sea surface temperature, and air temperature are the primary inputs to the bulk flux computation.
10. *Latent heat flux.* (W m-2) Positive-upward latent heat flux (evaporative heat flux) computed from the COARE 3.0 bulk flux algorithm. Bulk wind speed, skin sea surface temperature, and air humidity are the primary inputs to the bulk flux computation.
11. *Bulk wind stress.* (Pa) Wind stress magnitude on the ocean computed from the COARE 3.0 bulk flux algorithm. Ocean currents are assumed to be zero, and bulk stress is assumed to be in the direction of the mean wind.
12. *Rain rate.* (mm hour-1) Rain rate from an Optical Scientific, Inc. optical scintillation rain gauge mounted on forward mast.
13. *Thermal infrared radiative flux.* (W m-2) Positive downward longwave (thermal infrared) radiative flux measured as the average of two Eppley Precision Pyrgeometers.
14. *Clear-sky thermal infrared radiative flux.* (W m-2) Positive downward longwave radiation computed from the clear-sky model of Iqbal. When available, water vapor path retrieved from the microwave radiometers is used by the radiative transfer model.
15. *Downward solar radiative flux.* (W m-2) Positive downward solar radiative flux measured as the average of two Eppley Precision Pyranometers.
16. *Clear-sky solar radiative flux.* (W m-2) Positive downward solar radiative flux computed from the model of Iqbal. Water vapor retrievals are used, when available.
17. *15th percentile of cloud base height.* (m) Cloud base height from a Vaisala lidar ceilometer, sampled every 15 or 30 seconds. 15% of cloud bases in the 10-minute interval are below the 15th percentile cloud height.
18. *Median cloud base height.* (m) Cloud base height median from a Vaisala lidar ceilometers.
19. *85th percentile of cloud base height.* (m) Cloud base height from a Vaisala lidar ceilometer, sampled every 15 or 30 seconds. 15% of cloud bases in the 10-minute interval are *above* the 85th percentile cloud height.
20. *Cloud top height.* (m) From cloud radar or rawinsondes. Cloud top is determined from a threshold below the noise of the cloud radar. When cloud radar is not available, cloud base is interpolated from the 4-8 hourly rawinsonde profiles. Cloud height from the soundings is chosen as the height of the temperature minimum at the base of the inversion layer. 2006-profiler PBL top
21. *Cloud thickness.* (m) Difference between cloud top height and median???? cloud base height.
22. *Cloud optical thickness.* (unitless)
23. *Cloud liquid water path.* (g m-2) from the microwave radiometer. Cloud liquid water path is determined from a physical retrieval by Zuidema (JGR???).
24. *Cloud fraction.* (unitless) Fraction of time in the interval when the lidar ceilometer detected a cloud directly overhead.
25. *Cloud drop number.* (number) Number of cloud drops deduced from the optical thickness by the model of ????.
26. *Aerosol number with diameter* 0*.*1 < D < 0.3 x 10-6 m. (number) Aerosol measured at the surface with diameter greater than 0.1x10-6 m and less than 0.3x10-6 m. In years ???? a Particle Measurement Systems Lasair II 110 particle counter was used. The Lasair II 110 particle counter measures scattering from particles pumped through an optical aperture. It counts the number of particles whose diameters exceed 6 thresholds: 0.1, 0.2, 0.3, 0.5 1.0, and 5.0 x 10-6 m.
27. *Aerosol number with diameter* 0*.*3 < D < 1.0 x 10-6 m. (number) Aerosol measured at the surface by the Lasair II 110 particle counter with diameter greater than 0.3x10-6 m and less than 1.0x10-6 m.
28. *Aerosol number with diameter >* 1.0 x 10-6 m. (number) Aerosol measured at the surface with diameter greater than 1.0x10-6 m.
29. *Water vapor path.* (cm liquid equivalent) Integrated water vapor from 2-channel upward looking microwave radiometers. A statistical retrieval is used to convert brightness temperature to integrated water vapor for the tropical atmosphere.
30. *Specific humidity.* (g kg-1) Surface specific humidity computed from the relative humidity and temperature from Vaisala HMP-300 series temperature/humidity sensor maintained by PSD on the forward mast, at a height of 18 m above sea level. The sensor is housed in an aspirated radiation shield.
31. *Lifting condensation level temperature.* (K) Temperature of water condensation for an adiabatically lifted surface air parcel. Temperature and humidity of the surface parcel are measured by the sensors on the forward mast.
32. *Lifting condensation level height.* (km) Height of condensation level for an adiabatically lifted surface air parcel.
33. *Total number of accumulation mode aerosols.* (number) Number of aerosols with diameter greater than 0.1 x 10-6 m. This number may be measured by the Lasair II