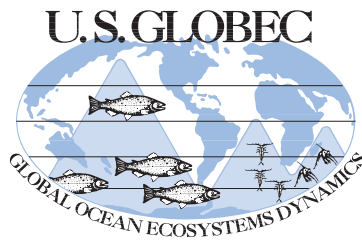


GLOBEC Northeast Pacific, Northern California Current

Cruise Report, R/V *New Horizon* (NH0005)

28 May – 13 June 2000



Chief Scientist:

Cynthia Tynan
NOAA/Northwest Fisheries Science Center
Seattle, WA 98112-2097
206-860-6793
cynthia.tynan@noaa.gov

Cruise Goals

The cruise provided mesoscale and fine-scale oceanographic and ecological data in support of numerous objectives of the GLOBEC Northeast Pacific, Northern California Current program, with specific emphasis on the following projects:

W.T. Peterson - GLOBEC: A comparison of the effects of coastal upwelling on the population dynamics and vital rates of the euphausiids *Euphausia pacifica* and *Thysanoessa spinifera* in the Northern California Current, north and south of Cape Blanco, Oregon.

M. Zhou and M.E. Huntley – U.S. GLOBEC Northeast Pacific study: Mesoscale zooplankton distribution and productivity.

H.R. Harvey – GLOBEC: The use of molecular organic tracers to determine age structure, nutritional status, and potential for trophic transfer in the euphausiids *Euphausia pacifica* and *Thysanoessa spinifera*.

C.T. Tynan and D.G. Ainley – GLOBEC target species: Interactions with top trophic levels.

Summaries of each of the GLOBEC projects may be found at the web site: <http://globec.oce.orst.edu/groups/nep/projs.html>.

Table 1. GLOBEC Cruise Participants

Cynthia Tynan	NOAA- Northwest Fisheries Science Center, Chief Scientist
William Peterson	NOAA/NWFSC & Oregon State University
David Ainley	H. T. Harvey & Associates
Mark Huntley	University of Hawaii
Rodger Harvey	University of Maryland
Dale Hubbard	Oregon State University
Julie Keister	Oregon State University
Leah Feinberg	Oregon State University
Charles Alexander	H. T. Harvey & Associates
Rob Campbell	University of British Columbia
Michael Newcomer	NOAA mammal observer
Michael Force	NOAA mammal observer
Katherine Maze-Foley	NOAA mammal observer
Tammy Baiz	SIO Resident Technician
Jim Schmitt	SIO Marine Technician

Table 2. Observations and Project Principal Investigators

Parameter	Contributing Institutions	Personnel
MOCNESS	NOAA, OSU, U. Hawaii	B. Peterson, M. Huntley
Vertical Plankton Tow	NOAA, OSU, U. Hawaii	B. Peterson, M. Huntley
1-m Live Tow	NOAA, OSU, U. Hawaii	B. Peterson, M. Huntley
Seabird Surveys	H.T. Harvey & Assoc.	D. Ainley, L. Spear
Mammal Surveys	NOAA/NWFSC	C. Tynan
Nutrients	OSU	B. Hales, D. Hubbard
Parameter	Contributing Institutions	Personnel
CTD	OSU, SIO	J. Huyer
ADCP	OSU, SIO, U. Hawaii	S. Pierce, M. Huntley
Meteorology (IMET)	SIO, NOAA/NWFSC	SIO/ C. Tynan
Salinity	SIO	SIO
Alongtrack System	SIO, NOAA/NWFSC	SIO / C. Tynan
Chlorophylls	OSU, NOAA/NWFSC	L. Feinberg
Lipofuscins	University of Maryland	R. Harvey

Daily Cruise Summary (Narrative)

The R/V *New Horizon* departed Redwood City at 0900 on May 28, 2000 with 15 scientists from seven institutions onboard (Table 1). At 1200 we passed under the Golden Gate Bridge and left behind the calmest conditions that we would encounter over the next week. By evening the ship was steaming north through rough, confused seas and winds of 30-35 kts. On the morning of May 29 we were off Pt. Arena continuing to work our way north at 5 kts to the Crescent City line to meet the R/V *Wecoma*. Several zooplankton stations were planned during the northward transit; however, rough seas precluded any sampling. Winds continued unabated from the north at speeds of 25-30 kts on May 29-30.

May 30. We arrived at the start of the mesoscale grid, the Crescent City line, at approximately 1830-1900 on May 30 and commenced station work at 1945 PST at CR2 (65 m) with a vertical plankton tow (VPT) and CTD cast. Station work continued during the night at CR3, CR4 and CR5 (645 m). Sampling conducted at each station is summarized in the event log and specific sampling logs. Conditions were considered too rough and dangerous to launch the MOCNESS; similar conditions would persist until we reached the Newport Line on June 3, when the MOCNESS would finally be deployed.

On the evening of May 30 the R/V *Wecoma* was ahead on the Crescent City line at stations CR 4,5,6, and 7. The R/V *Wecoma* reported a drastic change in the water column structure in the upper few hundred meters between stations CR3 and CR4. The ships planned to meet at 1000 on the Rogue River line, mesoscale Line 10, on the morning of May 31. The R/V *New Horizon*, therefore, skipped Line 11 and headed directly to the start of the Rogue River line after completing night station work on the Crescent City line. The R/V *Wecoma* attempted to send a fax of the SeaSoar data for the Crescent City line; however, the FAX on the R/V *New Horizon* was not working. The R/V *Wecoma* reported a strong correlation between the phytoplankton (chlorophyll maximum) at 30-35 m and an acoustic layer at this depth. Zooplankton samples at CR3 contained *E. pacifica* and very large salps.

May 31. At 0730 the R/V *New Horizon* and R/V *Wecoma* were both at the beginning of Line 10, the Rogue River line. The R/V *New Horizon* waited for the R/V *Wecoma* to complete work on the OPC and launch the SeaSoar so that the two ships could survey Line 10 in tandem. The R/V *New Horizon* began steaming west along Line 10 at 0915 with marine mammal and seabird survey effort, passing the R/V *Wecoma* at 42 29.76'N; 124 40.36'W, and moving away from upwelled water. The R/V *Wecoma* had the SeaSoar in the water at 1130, when the R/V *New Horizon* was at RR5, and steamed behind us within 2 hours. Upwelling favorable winds from the north (340 – 000 degrees) continued at 20-35 kts during the day. No station work was conducted in part because the zooplankton team had been sampling all night on the Crescent City line and needed rest; weather was also a factor. At 1409 we completed Line 10 and headed north on a deep-water (> 3000 m) transit between lines 10 and 9 in a Beaufort 7 and

sea of whitecaps. We began mesoscale Line 9 at 1612 (42 40.91'N; 125 15.04'W) and steamed east during the afternoon in 25-35 kt winds. Zooplankton station work was contemplated; however, conditions were too rough and dangerous. The R/V *Wecoma* reported a local increase in phytoplankton production along the 700 m isobath of line 9, with the phytoplankton signal increasing at approximately 30 m depth in the water column. This may have been the vicinity of the coastal jet separation.

Conditions at the end of Line 9 were too rough and dangerous for station work. After completing Line 9 at 2025 (73 m depth), we transited northwest around Cape Blanco, varying the course to avoid crab pots and fishing buoys. Weather permitting, the zooplankton team had planned station work along Line 8 during the night. Sampling here too was cancelled due to weather and the R/V *New Horizon* changed course on Line 8 to steam northwest to the outer end of Line 7 (Five Mile Line).

June 1. At 0630 the R/V *New Horizon* was steaming at 7.5 kts northwest in 30-35 kt winds to the western end of Line 7. We began the survey of the Five Mile line at 0700 (~2200 m) with the R/V *Wecoma* about 5 nm behind. The ship made a zigzag course along Line 7 due to the rough sea state. The R/V *Wecoma* passed the R/V *New Horizon* at station FM7 (192 m depth) at 0944 (43 13.71'N; 124 50.94'W) while the CTD was in the water. Despite 30 kt winds, we completed a VPT and 1m vertical net tow for live zooplankton as well. Station work continued eastward on Line 7 with the R/V *Wecoma* 5-6 nm ahead. Offshore of FM5, over depths > 150 m, the surface salinity was less than 32 psu, indicating the presence of Columbia River Plume water; a sharp boundary existed just to the east of this region. The F/V *Sea Eagle* was trawling off Heceta Head during this time. The R/V *New Horizon* completed station FM3 and finished Line 7 at 1514 hrs, then transited north, and began Line 6 at 1750 in upwelling favorable conditions, but an uncomfortable Beaufort 7 of 25-30 kt windspeeds from 350 degrees. The density of the most abundant seabird species (murre, auklets, and shearwaters) was stratified by depth and SST. The R/V *Wecoma* reported some scattered patches on the HTI in the upper 20-50 m inshore; however, no striking layers were observed until Line 6. We continued seabird and mammal surveys along Line 6, changing course to head to Line 5 (Reedsport line) for night station work. Zooplankton tows during the night at two stations (RP1, RP3) revealed an abundance of euphausiids, or swarms, that appeared to match acoustic data from the R/V *Wecoma*. The abundance of copepods in net tows was rather low thus far.

June 2. Seabird and mammal survey effort began at 0630 on mesoscale Line 4 (Heceta Head line), inshore at ~ 42 m in cold (SST 9.48 C) upwelled water. Winds had finally calmed to a Beaufort 2-3 such that the ship could make 9 kts. Between 90 – 120 m depths, SST increased by almost 2 degrees C (from 10.24 to 12.17C). As the R/V *New Horizon* passed HH2, the R/V *Wecoma* was to the south, near the inshore waypoint of Line 5. The lower salinity surface water at HH2 (31.878 psu) indicated the presence of Columbia River Plume water. Wind again picked up during the day and by 1300, at the end of Line 4 (~2200 m), wind speeds were again 20-25 kts. At 1200 the F/V *Sea Eagle* was sampling along the Newport Line (mesoscale Line 1) near NH15. The R/V *New Horizon* transited north to mesoscale Line 3, encountering sperm whales and elephant seals in deep water. Seabird and mammal surveys continued along Line 3 toward Cape Perpetua throughout the afternoon. Two groups of humpback whales were sighted on the shelf, though otherwise the mammal and seabird abundances appeared low in the warm, low salinity water, despite a high fluorescence signal at the 100 m isobath. A coastal station (3E) was conducted in the cold, low fluorescent, recently upwelled water at the end of Line 3. During the night, station work was also conducted during the diagonal transit from Line 3 to the western end of Newport Line (Line 1).

June 3. At 0600 we began the survey of the Newport Line (mesoscale Line 1), ~2278 m, in good weather (a wind speed of 8 kts, Beaufort 3). Humpback whales and beaked whales were observed in deep (> 1100 m) water. Station work commenced at NH35 at 0745 (494 m) and continued during the day with stations NH25, 20,15,10 and 5. The first MOCNESS of the cruise was deployed at NH25, due largely to the improved weather conditions. Difficulties with the tripping mechanism of the CTD were noted during the stations. At 1913 hrs the small-boat was launched to rendezvous with the R/V *Wecoma* in order to exchange data and satellite imagery, as the FAX machine had not worked properly on the R/V *New Horizon*. The small-boat was back onboard and secured at 2050 and the ship headed on to NH5 to resume sampling.

June 4. At 0600 we commenced the northern fine-scale on line 2 ahead of the R/V *Wecoma*, steaming east at 9 kts. Conditions were excellent with a windspeed of only 1 kt and a sea of glass. At 92 m depth, we were already across

the 'jet', in colder upwelled coastal water (10.48C SST, 32.363 psu). We completed Line 2 and were able to see many harbor porpoise in the calm conditions near the coast. Continuing on to Line 2a, we met up with the F/V *Sea Eagle* trawling near the waypoint and passed them at 0820 (44 22.45'N; 124 12.24'W). We surveyed Line 2a until 1340 (44 14.84'N; 125 06.08'W) and began the transit south to Line 3a. Without having rotating zooplankton teams, our survey pattern tended toward top trophic surveys during the morning and station work during afternoon and night. We resumed survey effort along the western end of Line 3a at 1454 hrs (44 06.59'N; 125 0.63'W) at 1276 m depth with warm, low salinity surface water (14.58 C SST, and 30.985 psu). While crossing Heceta Bank at 1600 (~106 m) the ship stopped due to engine problems (44 06.44'N; 124 44.92'W). The ship had been losing water and now had to steam to Newport immediately for engine repairs and to take on water. We headed to Newport on one engine and arrived at the dock at 2200.

June 5. The day was spent dockside in Newport as a diver worked to seal 12-13 holes related to the water leakage and engine problems. The ship needed to take on approximately 25,000 gallons of water. While in port we also picked up a new FAX machine and CTD trip mechanism for the R/V *New Horizon*, as well as equipment needed by the R/V *Wecoma*: additional nutrient bottles, PAR sensor ball, and an antenna for an ARGOS drifter. At 2100 the R/V *New Horizon* left Newport and steamed south during the night to Line 5 to resume fine-scale survey work with the other ships at 0600 on June 6. Winds had shifted and were now out of the south, with a weak surface current to the north. The R/V *Wecoma* reported that the surface layer was warmer than a few days ago, but still just a cap over cooler upwelled water. A subsurface chlorophyll maximum was present at 10 m depth near the coast and at 25 m depth further offshore.

June 6. At 0600 the R/V *New Horizon* was heading south to fine-scale Line 5 to join the R/V *Wecoma* and F/V *Sea Eagle*. At 0700 all three ships were in the same vicinity, at approximately the 37 m isobath. Station work at UR1 (for Umpqua River) began at 0730 on Line 5. The small-boat was launched at 0900 in order to deliver the equipment picked up in Newport to the R/V *Wecoma*. At 0940 the small-boat was back on deck (43 44.15'N; 124 15.22'W), station work at UR1 was completed, and the ship proceeded west along Line 5 to UR2. All three ships were sampling Line 5 of the Northern Fine-Scale. The F/V *Sea Eagle* was ahead trawling at UR3, while the R/V *New Horizon* sampled at UR2. At the first station the F/V *Sea Eagle* reported a catch of 3 coho and 6 chinook juvenile salmon in the surface trawl at ~ 37 m isobath. The catch of salmon decreased as they headed west, with no salmon caught at UR5 (196 m station depth). The R/V *New Horizon* continued station work at UR3, UR4 and UR5 along Line 5, with mammal and seabird surveys between stations. Station UR5 was located on the edge of what had been a euphausiid swarm sampled four days ago (during night sampling) on mesoscale Line 5. The euphausiid swarm appeared to have moved. The zooplankton team continued with station work through the evening and next morning.

June 7. At 0620 the R/V *New Horizon* was transiting southwest to Line 7 (also called the Five Mile Line) of the fine-scale; at 0645 we turned on to Line 7 at ~2288 m depth (43 13.03'N; 125 15.01'W) and headed east to conduct mammal and seabird surveys. At 0955 the R/V *Wecoma* was up ahead on Line 7; we passed the ship at 1007 (43 12.22'N; 124 42.41'W). Seabird abundances suggested that the krill swarm formerly on Line 5 was now on Line 7. At 43 12.35'N, 124 42.03'W more Rhinoceros Auklets were encountered than previously seen on the cruise. The R/V *Wecoma* reported diffuse acoustical scattering at 15-50 m depths with harder targets near the bottom. There was a large seabird signal at 43 12.94'N, 124 40.88'W, where a vertical net tow revealed many copepods (at station FM6+ at 173 m station depth). We resumed mammal and seabird survey effort on Line 7 and then turned back east for CTD and zooplankton station work. The seabird species composition changed as we headed across the shelf. An abundance of Cassin's Auklets occurred at 43 12.99'N; 124 34.90'W (108 m isobath), later followed by a zone of intense murre activity prior to station FM1 (36 m). After completing top trophic surveys on Line 7, we used the changes in the abundance and species composition of the seabirds to design the locations of zooplankton and CTD station sampling. Stations back along Line 7 corresponded with the seabird species shifts as follows: FM1 (36 m) a region of no murre; FM2 (55 m) where murre were foraging on fish; FM4 (88 m) Cassin's auklet abundance indicative of copepods; FM5 (166 m) where large rafts of sooty shearwaters occurred. A MOCNESS and CTD were conducted at an additional station, FM6a (197 m), based on the presence of large flocks of sooty shearwaters. We left the warm, low salinity Columbia River Plume water (SST 13.41 C, 31.304 psu) of station FM6a and headed southwest to fine-scale Line 7a. We began Line 7a at 1915 at 952 m depth (43 05.64'N; 124 56.98'W) heading east conducting mammal and seabird surveys. At 2020 we encountered a region of large numbers of sooty shearwaters (at

43 05.02'N; 124 42.89'W). During this time the F/V *Sea Eagle* was sampling to the south of the R/V *New Horizon*. Top trophic survey effort ended at 2030 due to darkness and the zooplankton team decided to sample at the region of abundant sooty shearwaters, station 7a1. The F/V *Sea Eagle* was trawling along line 9/9a, approximately 5 nm to the south, at 2045.

June 8. At 0600 we resumed Line 7a at about the 200 m isobath heading east in a zone of large numbers of sooty shearwaters. At 0700 common murre activity picked up (43 05.00'N; 124 31.16'W) and at 0723 (43 03.33'N; 124 29.74'W) the surface of the water was roiling with patches of baitfish. Line 7a was completed at 0713 (52 m depth) and the R/V *New Horizon* began a transit south to Line 8. During the transit south many murre were observed carrying fish in their bills. At 0830 (43 00.05'N; 124 31.95'W) we passed over a brownish-red patch of euphausiids with sooty shearwaters nearby. Again at 0844 (42 57.78'N; 124 31.95'W) along the transit between Lines 7a and 8, reddish euphausiid swarms were observed at the surface, probably *Thysanoessa*; common murre were present in the region. Our weather was relatively calm (Beaufort 3, 10 kt windspeeds) during these observations, compared to previous weather on the cruise. The R/V *Wecoma* had also reported a strong acoustic signal 10 m above the bottom, in the euphausiid size range, inshore of the 200 m isobath to approximately the 70-80 m isobaths on Line 7a. We began Line 8 (42 57.11'N 124 32.96'W) heading west and continued to observe surface patches of euphausiids that were approximately 5 m in size. The alongtrack SST ranged from 11.89 - 12.17 C in this region, inshore of the 77 m isobath, where surface patches of euphausiid were observed.

We continued our surveys west along Line 8 during the morning. Humpback whales were observed off the shelf (> 200 m) and over the slope on Line 8. At 1320 we turned south (42 56.66'N; 125 15.06'W) to transit to Line 8a of the southern fine-scale survey. Pacific white-sided dolphins were common in the warm (>14C) offshore water (> ~2800 m) of Line 8a. By afternoon we were off of Cape Blanco encountering frontal slicks (42 49.14'N; 124 48.84'W) that may have separated outer southerly flow from northern inshore flow at Cape Blanco. ADCP data from the R/V *Wecoma*'s SeaSoar showed strong northerly flow inshore of this frontal region. We completed Line 8a and transited south to Line 9 searching for euphausiid surface swarms. None were observed. Humpback whales were sighted twice on the transit south over depths of 90-113 m. Zooplankton station work began inshore on Line 9 at 1914 hrs at station HM1 (Humbog Mountain 1) and continued westward during the night at HM2, HM3 and HM4.

June 9. At 0600 we began mammal and seabird survey effort on Line 9 (2000 m depth), through patches of rain and fog, in a Beaufort 7 seastate with downwelling favorable winds of 28 kts from the south. We completed Line 9 at 0930 (42 41.09'N; 124 30.38'W) and transited south to the start of Line 10 for zooplankton station work along the Rogue River line. We continued to contend with fog, as well as high winds from the southeast. Station work commenced at RR1 and continued at RR2, RR3 and RR4. By 1500 the weather was clearing and winds had abated to a Beaufort 2. After leaving station RR4 (549 m), many humpbacks were observed during the survey transit to RR5 (1098 m). More humpbacks and unidentified large whales (on the horizon) were observed west of RR5 in deep water out to 1800 m depth. Station work continued on the Rogue River line (Line 10 southern fine-scale) during the night.

June 10. Surveys began at 0600 while the ship was transiting to the start of Line 11a. At 0630 (42 03.02'N; 124 21.68'W) we turned on to Line 11a and continued mammal and seabird surveys westward amid rainsqualls. Pacific white-sided dolphins and northern right whale dolphins were the most common mammal species. We completed Line 11a (out to 2156 m depth) and headed north to Line 11 for zooplankton station work, beginning with station 11-6 (at 842 m depth) at 1400 hrs. We continued eastward along Line 11 conducting zooplankton stations 11-5, 11-4, 11-3, 11-2 and 11-1.

June 11. We returned to the northern fine-scale region and at 0810 were along the 50 m isobath following behind the R/V *Wecoma* on Line 7, attempting to stay approximately 3 nm behind the other ship. Both ships contended with a very strong wind (Beaufort 6-7) from the southwest (240 degrees) and a sea of whitecaps. Although we tried to conduct calibrations between the HTI acoustics on the R/V *Wecoma* and net tow sampling on the R/V *New Horizon*, the winds were too strong to deploy and tow the MOCNESS. At 0825 (43 13.60'N; 124 29.63'W) we passed through a front with many shearwaters and auklets. The chlorophyll fluorescence signal on the alongtrack system jumped dramatically across this feature; the seabirds were more abundant on the lower chlorophyll side. Very rough weather and fog continued through the morning as the R/V *New Horizon* continued with seabird and mammal

surveys following behind the R/V *Wecoma*. We crossed low salinity surface water (31.427 psu) along the 235 m isobath, indicative of the Columbia River Plume at 43 13.03'N; 124 43.62' W. At 1030 PST (336 m depth) we turned south to follow the R/V *Wecoma* to Line 7a. Acoustics on the R/V *Wecoma* showed a strong deep signal to 50 m inshore of 10-15 km, between FM 4-5 on Line 7. We surveyed eastward along Line 7a in difficult Beaufort 7 (30 kt windspeed) conditions and fog. Line 7a was completed at 1350 (58 m depth) and we transited south to Line 8. We attempted to conduct a VPT and CTD cast during the transit south at station 7A-A (54 m depth), where interesting downwelling and convective cell signatures were present (43 04.14'N; 124 29.39'W). We began Line 8 at 1536 PST (42 56.99'N; 124 33.13'W) in 58 m depth, with the first station 8-1 at 86 m depth. During the rough conditions the small-boat had broken free on the deck and all hands mustered to help secure the boat at 1645. Our cruise track along Line 8 consisted of a zigzag pattern due to the severe conditions: winds gusting to 40-45 kts from 240 degrees. Although we were unable to use the MOCNESS, we conducted VPT and CTD casts at stations 8-2 and 8-3. The vertical plankton tow at station 8-2 (146 m station depth) was rich in copepods, *Pseudocalanus* sp. Due to the swell, the cruise track consisted of a series of doglegs from stations 8-2, 8-3, to 8-4 during the evening.

June 12. At 0800 we were transiting north to NH55 on Line 1, the Newport Line, to repeat station work, hopefully in calmer conditions. Windspeeds varied between 20-30 kts (Beaufort 6-7 seastate). At 1000 we began the Newport Line, heading east through fog, conducting mammal and seabird surveys between the zooplankton stations. We began station work at NH45 (586 m depth) with a VPT and CTD cast. We appeared to be over a ridge or seamount at NH 45 (44 37.59'N; 125 09.95'W). Heading east we dropped over deeper water (>1000 m) between NH45 and NH35 and encountered Columbia River water (31.531 psu). Mammals were sparse along this line. The abundance of Cassin's auklets increased inshore of NH15, followed soon after by an increase in common murres and rhinoceros auklets. Stations were conducted at NH 25, 15, 10, 5 and 2. Murres, harbor porpoise and Steller sea lions were present in the vicinity of NH5 (58 m depth), where one Steller sea lion was observed feeding on a salmon at the surface. At NH3 common murres were feeding on schools of small fish.

June 13. At 0600 the R/V *New Horizon* was headed across the southern shelf-edge of Heceta Bank toward the western end of Line 6. Conditions were much improved, with clear weather and a Beaufort 2 seastate. We passed through a region of intense seabird activity at 43 49.09'N; 124 53.79'W (366 m depth): Leach's and fork-tailed storm-petrels and black-footed albatrosses. We turned on to Line 6 at 0810 and headed east for mammal and seabird surveys. Though conditions were excellent, the zooplankton team had concluded their sampling and were packing and preparing for the arrival of the ship in Coos Bay later in the afternoon. At the eastern end of Line 6 we headed south along the 73 m isobath to continue surveys and search for coastal krill swarms, while waiting to meet the pilot outside of Coos Bay. South of Cape Arago at 1500 PST we headed north again toward Coos Bay to meet the pilot. The R/V *New Horizon* was returning to port one day early at the Captain's request to ensure a safe offload of the science party and to take advantage of the window of good weather for the ship to complete dock operations and to depart before any further bad weather occurred. Although temporary repairs were made to the R/V *New Horizon* in Newport, the ship was still considered a ship at risk.

Survey Effort, Station Plots, Event Log and Satellite Imagery

During the cruise we completed a total of 30 CTDs (Table 3), 15 MOCNESS tows (limited in number largely due to weather) (Table 4), 58 vertical plankton tows (VPT) (Table 5), and 24 one-meter ring net tows (for live zooplankton) (Table 6). The seabird survey effort covered 886 nm over 98.5 hours of observations. An example of the survey coverage for top trophic surveys is also provided in a figure showing coverage with 25X power 'Big-eye' binoculars for mammal effort during mesoscale and fine-scale surveys. Plots of the cruise track during mesoscale and fine-scale survey effort, as well as the locations of MOCNESS, CTD, vertical plankton tow (VPT), and live tow (one meter ring net) stations are provided. For reference, station locations are plotted over the 12 mesoscale track lines of the R/V *Wecoma*. Line 12 refers to the first line of the survey conducted off Crescent City and Line 1 refers to the most northern line off Newport, Oregon. Station plots are also available on the GLOBEC NEP website at http://globec.oce.orst.edu/groups/nep/reports/ccs-cruises/nh0005/nh0005_index.html.

The event log (Appendix I) contains a summary of the times and locations for all sampling activities; separate specific tables are also provided for each instrument. Top trophic mammal and seabird survey effort is summarized

in the master event log. Two satellite images of SST during or following the cruise are shown in Figures 7 and 8: June 1, during the upwelling favorable conditions; and June 16, just after the cruise. Figure 9 shows chlorophyll concentration composite for June 1-8, 2000.

Table 3: CTD Casts

Event#	Instr	Cast	Sta	Sta std	Day	Mos	Time	S/E flag	Lat	Long	Water Depth	Cast Depth	SI	Reg	Comments
NH15100.10	CTD	1	1	CR2	30	5	2006	S	41.8982	-124.4070	77	70	ZoPIs	12	Prob with bot trip
NH15100.11	CTD	1	1	CR2	30	5	2031	E	nd	nd	77	70	ZoPIs	12	
NH15100.14	CTD	2	2	CR3	30	5	2200	S	41.8907	-124.5195	176	160	ZoPIs	12	Drifted off stn
NH15100.15	CTD	2	2	CR3	30	5	2228	E	41.8865	-124.8622	278	160	ZoPIs	12	
NH15200.03	CTD	3	3	CR4	31	5	0011	S	41.8982	-124.6168	560	150	ZoPIs	12	
NH15200.04	CTD	3	3	CR4	31	5	0047	E	41.8952	-124.6307	560	nd	ZoPIs	12	
NH15200.05	CTD	4	4	CR5	31	5	0216	S	41.9042	-124.7112	596	nd	ZoPIs	12	
NH15200.06	CTD	4	4	CR5	31	5	0251	E	41.9060	-124.7183	596	160	ZoPIs	12	
NH15300.07	CTD	5	5	FM7	1	6	0931	S	43.2268	-124.8455	347	346	ZoPIs	7	
NH15300.08	CTD	5	5	FM7	1	6	1004	E	43.2317	-124.8550	354	nd	ZoPIs	7	
NH15300.11	CTD	6	6	FM5	1	6	1145	S	43.2157	-124.6703	167	158	ZoPIs	7	
NH15300.12	CTD	6	6	FM5	1	6	1208	E	43.2172	-124.6760	172	nd	ZoPIs	7	
NH15300.16	CTD	7	7	FM4	1	6	1316	S	43.2163	-124.5842	88	80	ZoPIs	7	
NH15300.17	CTD	7	7	FM4	1	6	1333	E	43.2145	-124.5875	94	nd	ZoPIs	7	
NH15300.29	CTD	8	9	RP3	1	6	2319	S	43.7515	-124.6200	320	310	ZoPIs	5	
NH15300.30	CTD	8	9	RP3	1	6	nd	E	nd	nd	nd	nd	nd	nd	
NH15400.04	CTD	9	10	RP2	2	6	0206	S	43.7552	-124.5247	167	160	ZoPIs	5	Drift NW off station
NH15400.05	CTD	9	10	RP2	2	6	0236	E	43.7595	-124.5332	175	nd	ZoPIs	5	
NH15400.28	CTD	10	13	ZIG1	2	6	nd	E	nd	nd	nd	nd	nd	nd	
NH15500.02	CTD	11	14	ZIG2	3	6	0207	E	44.4895	-124.8178	200	nd	ZoPIs	2	
NH15500.12	CTD	12	16	NH25	3	6	1030	S	44.6067	-124.4050	nd	270	ZoPIs	1	
NH15500.13	CTD	12	16	NH25	3	6	nd	E	nd	nd	nd	nd	nd	nd	
NH15500.30	CTD	13	21	NH15	3	6	2338	S	44.6557	-124.4093	100	85	ZoPIs	1	CTD not tripping properly
NH15500.31	CTD	13	21	NH15	3	6	nd	E	nd	nd	nd	nd	nd	nd	
NH15600.05	CTD	14	23	NH25b	4	6	0400	S	44.6752	-124.6705	325	315	ZoPIs	1	
NH15600.06	CTD	14	23	NH25b	4	6	nd	E	nd	nd	nd	nd	nd	nd	
NH15800.05	CTD	15	24	UR1	6	6	0750	S	43.7492	-124.2255	46	40	ZoPIs	NFS	New CTD trip mech.
NH15800.06	CTD	15	24	UR1	6	6	0805	E	43.7492	-124.2233	42	nd	ZoPIs	NFS	
NH15800.25	CTD	16	29	UR6	6	6	1430	S	43.7283	-124.4983	145	nd	ZoPIs	NFS	
NH15800.26	CTD	16	30	UR7	6	6	1450	E	43.7223	-124.5030	146	nd	ZoPIs	NFS	
NH15800.32	CTD	17	28	UR5	6	6	1700	S	43.7367	-124.6050	276	260	ZoPIs	NFS	
NH15800.33	CTD	17	28	UR5	6	6	1719	E	43.7350	-124.6083	282	nd	ZoPIs	NFS	
NH15800.40	CTD	18	29	UR7a	6	6	2120	S	43.7467	-124.8200	650	640	ZoPIs	NFS	
NH15800.41	CTD	18	29	UR7a	6	6	2206	E	43.7473	-124.8198	670	nd	ZoPIs	NFS	Drifted off station
NH15900.01	CTD	19	30	UR7	7	6	0001	S	43.7237	-124.7640	575	560	ZoPIs	NFS	
NH15900.02	CTD	19	30	UR7	7	6	nd	E	nd	nd	nd	nd	nd	nd	
NH15900.21	CTD	20	35	FM5	7	6	1525	S	43.2205	-124.6718	166	155	ZoPIs	NFS	
NH15900.22	CTD	20	35	FM5	7	6	nd	E	nd	nd	nd	nd	nd	nd	
NH15900.25	CTD	21	36	FM6a	7	6	1735	S	43.2187	-124.7035	199	180	ZoPIs	NFS	
NH15900.26	CTD	21	36	FM6a	7	6	nd	E	nd	nd	nd	nd	nd	nd	
NH16100.23	CTD	22	45	RR3	9	6	1356	S	42.4727	-124.7010	126	120	ZoPIs	SFS	
NH16100.24	CTD	22	45	RR3	9	6	1423	E	42.4623	-124.7010	125	nd	ZoPIs	SFS	
NH16100.31	CTD	23	46	RR4	9	6	1640	S	42.5033	-124.8452	790	510	ZoPIs	SFS	
NH16100.32	CTD	23	46	RR4	9	6	nd	E	nd	nd	nd	nd	nd	nd	
NH16100.42	CTD	24	48	RR7	9	6	2145	S	42.5027	-125.2032	2998	1000	ZoPIs	SFS	
NH16100.43	CTD	24	48	RR7	9	6	nd	E	nd	nd	nd	nd	nd	nd	
NH16200.02	CTD	25	50	RR6	10	6	0120	S	42.5040	-124.9892	1770	500	ZoPIs	SFS	
NH16200.03	CTD	25	50	RR6	10	6	nd	E	nd	nd	nd	nd	nd	nd	
NH16400.09	CTD	26	67	NH45	12	6	1130	S	44.6465	-125.1263	894	nd	ZoPIs	1	
NH16400.10	CTD	26	67	NH45	12	6	nd	E	nd	nd	nd	nd	nd	nd	

Table 3: CTD Casts (cont'd)

Event#	Instr	Cast	Sta	Sta std	Day	Mos	Time	S/E flag	Lat	Long	Water Depth	Cast Depth	SI	Reg	Comments
NH16400.14	CTD	27	68	NH25	12	6	1545	S	44.6510	-124.6583	281	270	ZoPIs	1	
NH16400.15	CTD	27	68	NH25	12	6	nd	E	nd	nd	nd	nd	nd	nd	

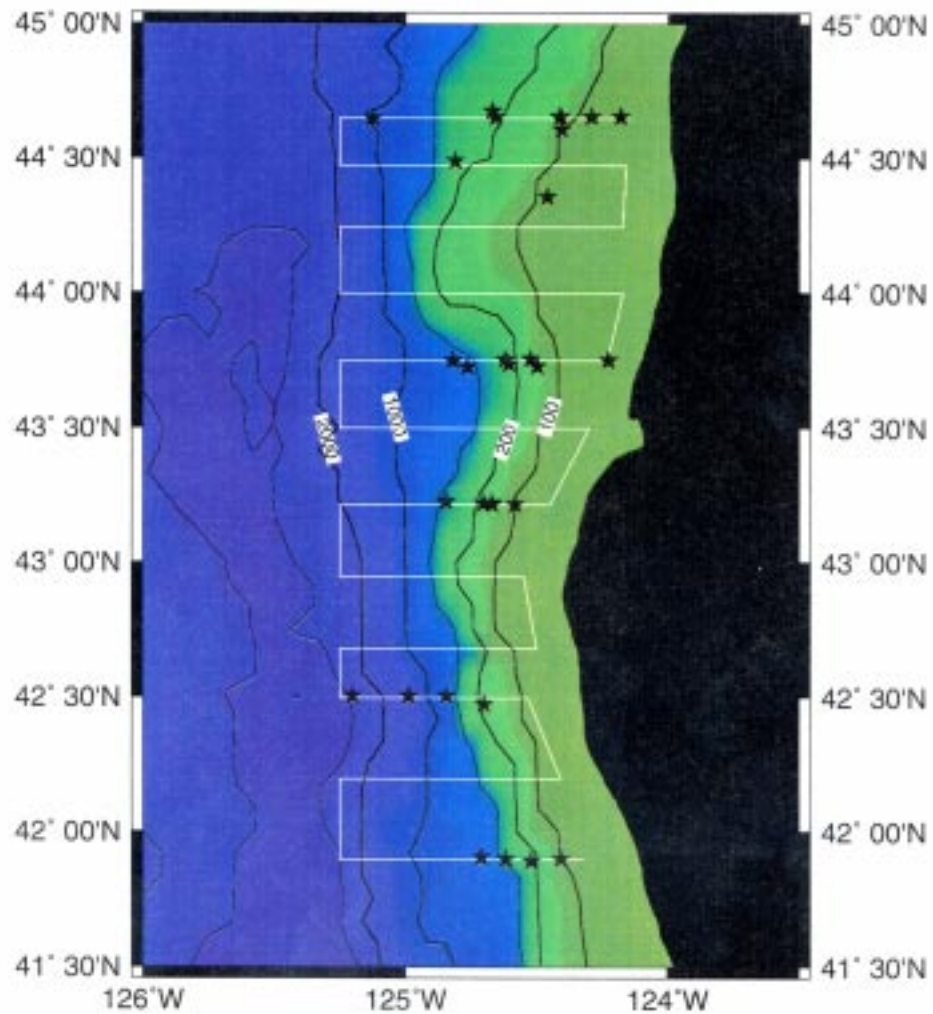


Figure 1. Locations of CTD Stations, May - June, 2000, GLOBEC Cruise, NH0005

Table 4: MOCNESS Sampling

Event#	Instr	Cast	Sta	Sta std	Day	Mos	Time	S/E flag	Lat	Long	Water Depth	Cast Depth	SI	Reg	Comments
NH15500.14	MOC	1	16	NH25	3	6	1227	S	44.6527	-124.6577	292	260	ZoPIs	1	
NH15500.15	MOC	1	16	NH25	3	6	nd	E	nd	nd	nd	nd	nd	nd	
NH15500.22	MOC	2	18	NH15	3	6	1600	S	44.6543	-124.4223	96	nd	ZoPIs	1	
NH15500.23	MOC	2	18	NH15	3	6	nd	E	nd	nd	nd	nd	nd	nd	
NH15500.25	MOC	3	19	NH10	3	6	1812	S	44.6557	-124.3043	83	65	ZoPIs	1	
NH15500.26	MOC	3	19	NH10	3	6	1840	E	44.6655	-124.3222	83	65	ZoPIs	1	
NH15600.01	MOC	4	22	NH15b	4	6	0056	S	44.6515	-124.4123	95	80	ZoPIs	1	
NH15600.02	MOC	4	22	NH15b	4	6	0121	E	44.6408	-124.4242	88	nd	ZoPIs	1	
NH15600.03	MOC	5	23	NH25b	4	6	nd	S	44.6548	-124.6543	298	282	ZoPIs	1	
NH15600.04	MOC	5	23	NH25b	4	6	nd	E	nd	nd	nd	nd	nd	nd	
NH15800.17	MOC	6	26	UR3	6	6	1120	S	43.7393	-124.3953	115	100	ZoPIs	NFS	
NH15800.18	MOC	6	26	UR3	6	6	nd	E	nd	nd	nd	nd	nd	nd	
NH15800.23	MOC	7	27	UR4	6	6	1351	S	43.7467	-124.4833	125	110	ZoPIs	NFS	
NH15800.24	MOC	7	28	UR4	6	6	1415	E	43.7300	-124.4933	130	nd	ZoPIs	NFS	
NH15800.30	MOC	8	28	UR5	6	6	1612	S	43.7483	-124.5633	225	nd	ZoPIs	NFS	
NH15800.31	MOC	8	28	UR5	6	6	nd	E	nd	nd	nd	nd	nd	nd	
NH15800.38	MOC	9	29	UR7a	6	6	2000	S	43.7487	-124.8168	715	350	ZoPIs	NFS	
NH15800.39	MOC	9	29	UR7a	6	6	2047	E	43.7285	-124.8405	725	350	ZoPIs	NFS	
NH15800.43	MOC	10	30	UR7	6	6	2312	S	43.7448	-124.7608	540	380	ZoPIs	NFS	Start long. Not logged
NH15800.44	MOC	10	30	UR7	6	6	2351	E	43.7258	-124.7608	548	nd	ZoPIs	NFS	
NH15900.23	MOC	11	36	FM6a	7	6	1623	S	43.2153	-124.7063	197	nd	ZoPIs	NFS	
NH15900.24	MOC	11	36	FM6a	7	6	1655	E	43.2042	-124.7373	270	190	ZoPIs	NFS	
NH15900.34	MOC	12	37	7a1	7	6	2325	S	43.0860	-124.6880	170	155	ZoPIs	NFS	
NH15900.35	MOC	12	37	7a1	7	6	2357	E	43.1058	-124.6830	172	160	ZoPIs	NFS	
NH16100.21	MOC	13	45	RR3	9	6	1324	S	42.4962	-124.6983	125	110	ZoPIs	SFS	
NH16100.22	MOC	13	45	RR3	9	6	1350	E	42.4765	-124.7025	125	nd	ZoPIs	SFS	
NH16100.29	MOC	14	46	RR4	9	6	1540	S	42.4980	-124.8020	587	350	ZoPIs	SFS	
NH16100.30	MOC	14	46	RR4	9	6	1630	E	42.6360	-124.8398	634	nd	ZoPIs	SFS	
NH16100.36	MOC	15	47	RR5	9	6	1830	S	42.4995	-124.9113	1168	350	ZoPIs	SFS	
NH16100.37	MOC	15	47	RR5	9	6	nd	E	nd	nd	nd	nd	nd	nd	

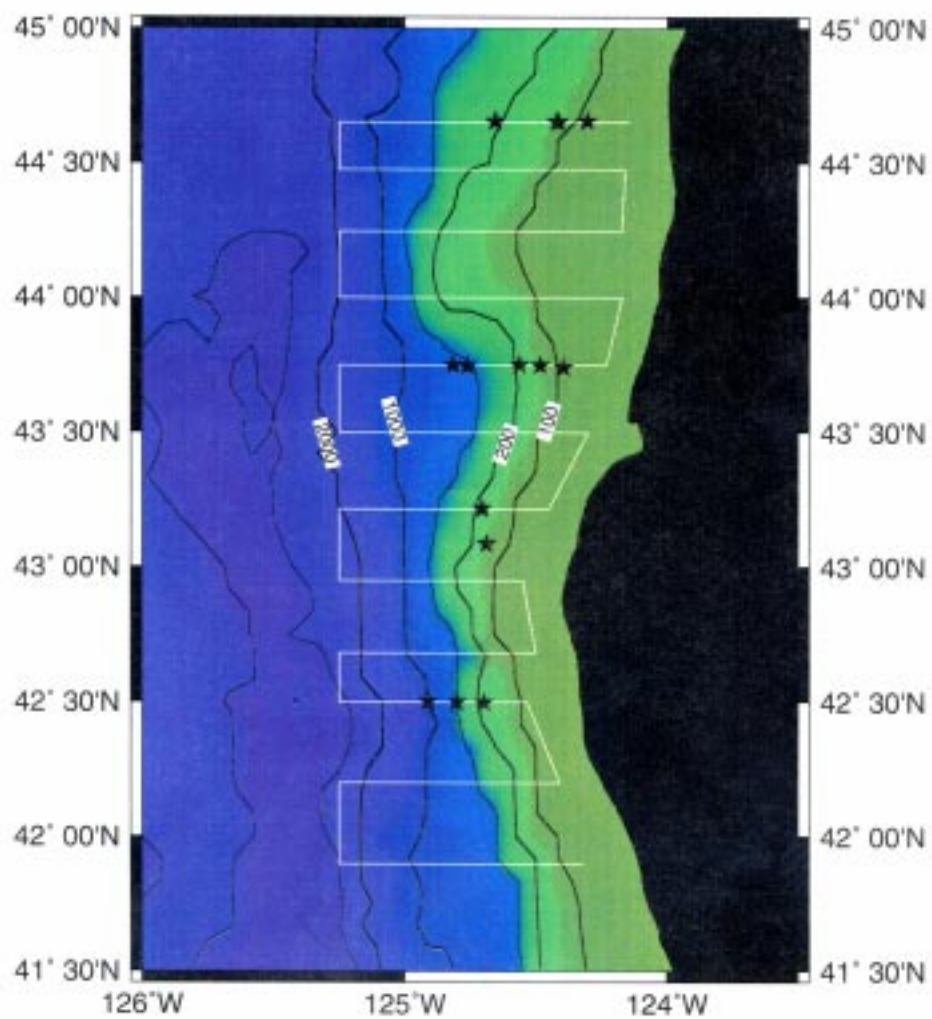


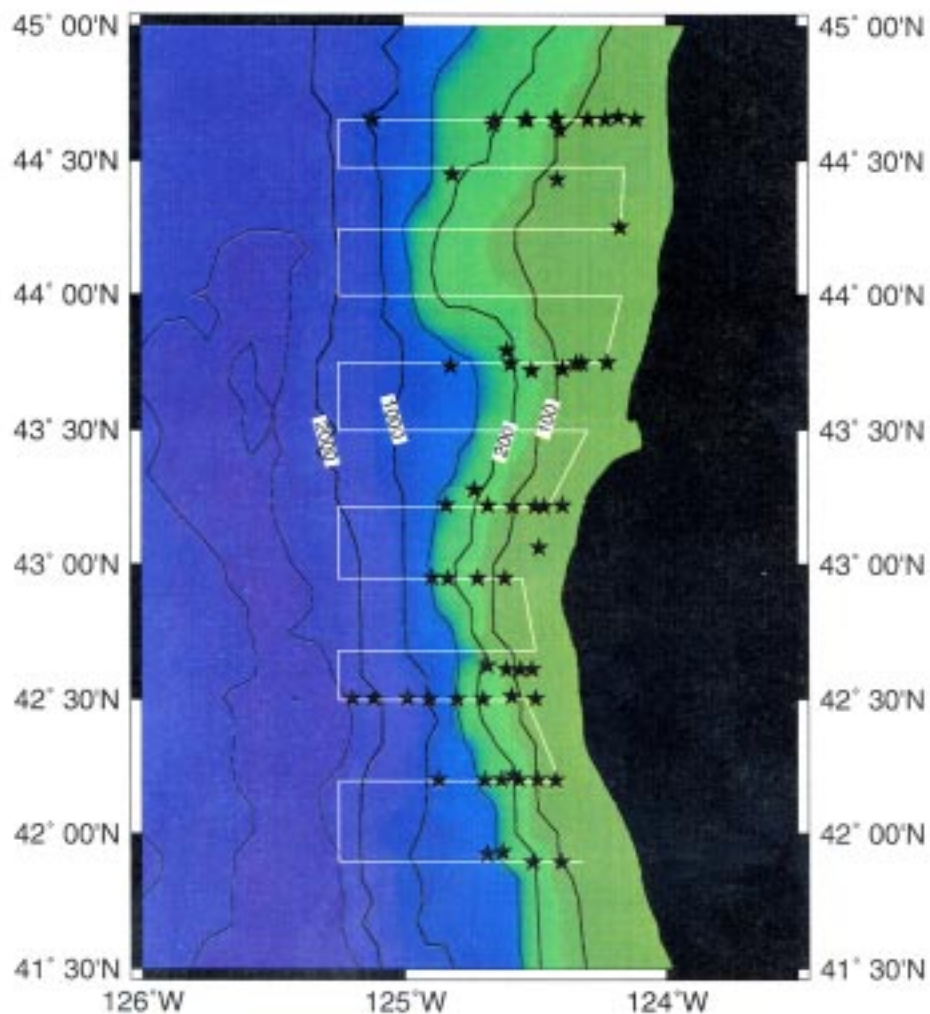
Figure 2. Locations of MOCNESS Stations, May - June, 2000, GLOBEC Cruise, NH0005

Table 5: Vertical Plankton Tows

Event#	Instr	Cast	Sta	Sta std	Day	Mos	Time	S/E flag	Lat	Long	Water Depth	Cast Depth	SI	Reg	Comments
NH15100.09	VPT	1	1	CR2	30	5	1945	S	41.8950	-124.4027	70	65	ZoPIs	12	
NH15100.13	VPT	2	2	CR3	30	5	2139	S	41.8950	-124.5117	152	100	ZoPIs	12	
NH15100.17	VPT	3	3	CR4	30	5	2354	S	41.9317	-124.6267	545	100	ZoPIs	12	
NH15200.01	VPT	4	4	CR5	31	5	0138	S	41.9233	-124.6850	596	100	ZoPIs	12	
NH15300.06	VPT	5	5	FM7	1	6	0911	S	43.2200	-124.8400	nd	100	ZoPIs	7	
NH15300.13	VPT	6	6	FM5	1	6	1222	S	43.2182	-124.6807	178	100	ZoPIs	7	
NH15300.18	VPT	7	7	FM4	1	6	1345	S	43.2145	-124.5875	94	85	ZoPIs	7	Position from CTD sta.
NH15300.21	VPT	8	8	FM3	1	6	1438	S	43.2150	-124.5017	62	50	ZoPIs	7	
NH15400.02	VPT	9	9	RP3	2	6	0025	S	43.7933	-124.6083	346	100	ZoPIs	5	
NH15400.07	VPT	10	11	RP1	2	6	0420	S	43.7470	-124.3403	108	100	ZoPIs	5	
NH15400.08	VPT	10	11	RP1	2	6	0428	E	43.7465	-124.3423	109	nd	ZoPIs	5	
NH15400.26	VPT	11	12	3E	2	6	2055	S	44.2500	-124.1733	53	48	ZoPIs	3	
NH15400.30	VPT	12	13	ZIG1	2	6	2335	S	44.4300	-124.4150	89	85	ZoPIs	2	Salps
NH15500.04	VPT	13	14	ZIG2	3	6	0235	S	44.4493	-124.8157	193	100	ZoPIs	2	
NH15500.08	VPT	14	15	NH35	3	6	0825	S	44.6348	-124.6590	nd	100	ZoPIs	1	
NH15500.11	VPT	15	16	NH25	3	6	1020	S	44.6150	-124.4050	nd	100	ZoPIs	1	
NH15500.18	VPT	16	17	NH20	3	6	1435	S	44.6525	-124.5362	150	100	ZoPIs	1	
NH15500.22	VPT	17	18	NH15	3	6	1539	S	44.6543	-124.4223	90	88	ZoPIs	1	Position from CTD sta.
NH15500.24	VPT	18	19	NH10	3	6	1755	S	44.6532	-124.2972	83	76	ZoPIs	1	
NH15500.29	VPT	18	20	NH5	3	6	2200	S	44.6617	-124.1797	63	58	ZoPIs	1	
NH15800.04	VPT	19	24	UR1	6	6	0740	S	43.7492	-124.2250	45	42	ZoPIs	NFS	
NH15800.14	VPT	20	25	UR2	6	6	1015	S	43.7480	-124.3202	102	99	ZoPIs	NFS	
NH15800.19	VPT	21	26	UR3	6	6	1205	S	43.7250	-124.3947	nd	100	ZoPIs	NFS	
NH15800.27	VPT	22	31	UR4	6	6	1455	S	43.7203	-124.5127	146	100	ZoPIs	NFS	
NH15800.34	VPT	23	28	UR5	6	6	1745	S	43.7450	-124.5930	260	100	ZoPIs	NFS	
NH15800.42	VPT	24	29	UR7a	6	6	2215	S	43.7370	-124.8223	667	100	ZoPIs	NFS	
NH15900.10	VPT	25	31	FM6+	7	6	1030	S	43.2778	-124.7340	175	100	ZoPIs	NFS	
NH15900.18	VPT	26	32	FM1	7	6	1330	S	43.2177	-124.3967	36	30	ZoPIs	NFS	
NH15900.19	VPT	27	33	FM2	7	6	1350	S	43.2143	-124.4673	55	50	ZoPIs	NFS	
NH15900.20	VPT	28	34	FM4	7	6	1440	S	43.2173	-124.5855	88	82	ZoPIs	NFS	
NH16000.28	VPT	29	39	HM1	8	6	1938	S	42.6107	-124.5128	78	72	ZoPIs	SFS	
NH16000.30	VPT	30	40	HM2	8	6	2050	S	42.6103	-124.5582	93	88	ZoPIs	SFS	
NH16000.33	VPT	31	41	HM3	8	6	2332	S	42.6113	-124.6117	115	100	ZoPIs	SFS	
NH16100.01	VPT	32	42	HM4	9	6	0045	S	42.6248	-124.6828	161	100	ZoPIs	SFS	
NH16100.12	VPT	33	43	RR1	9	6	1058	S	42.5012	-124.5003	37	32	ZoPIs	SFS	
NH16100.16	VPT	34	44	RR2	9	6	1152	S	42.5110	-124.5907	85	80	ZoPIs	SFS	
NH16100.19	VPT	35	45	RR3	9	6	1305	S	42.5000	-124.7000	124	100	ZoPIs	SFS	
NH16100.20	VPT	36	45	RR3	9	6	1313	E	42.4950	-124.6977	124	nd	ZoPIs	SFS	
NH16100.27	VPT	37	46	RR4	9	6	1525	S	42.4990	-124.7998	608	100	ZoPIs	SFS	
NH16100.28	VPT	38	46	RR4	9	6	1535	E	42.4982	-124.8007	589	nd	ZoPIs	SFS	
NH16100.35	VPT	38	47	RR5	9	6	1820	S	42.4978	-124.9048	1168	100	ZoPIs	SFS	
NH16100.41	VPT	39	48	RR7	9	6	2123	S	42.5008	-125.1995	2992	100	ZoPIs	SFS	
NH16100.44	VPT	40	49	RR6A	9	6	2345	S	42.5020	-125.1178	2169	100	ZoPIs	SFS	
NH16200.01	VPT	41	50	RR6	10	6	0100	S	42.5040	-124.9892	1770	100	ZoPIs	SFS	
NH16200.15	VPT	42	51	11-6	10	6	1435	S	42.1983	nd	000	100	ZoPIs	SFS	
NH16200.18	VPT	43	52	11-5	10	6	1550	S	42.1983	nd	500	100	ZoPIs	SFS	
NH16200.21	VPT	44	53	11-4	10	6	1630	S	42.2005	-124.6290	351	100	ZoPIs	SFS	
NH16200.24	VPT	45	54	11-3	10	6	1718	S	42.1993	-124.5627	163	100	ZoPIs	SFS	
NH16200.27	VPT	46	55	11-2	10	6	1757	S	42.2007	-124.4927	122	100	ZoPIs	SFS	
NH16200.31	VPT	47	56	11-1	10	6	1845	S	42.1978	-124.4225	72	63	ZoPIs	SFS	
NH16300.07	VPT	48	61	7A-A	11	6	1115	S	43.0617	-124.4858	54	50	ZoPIs	nd	

Table 5: Vertical Plankton Tows (cont'd)

Event#	Instr	Cast	Sta	Sta std	Day	Mos	Time	S/E flag	Lat	Long	Water Depth	Cast Depth	SI	Reg	Comments
NH16300.15	VPT	49	63	8-1	11	6	1604	S	42.9483	-124.6162	88	80	ZoPls	nd	
NH16300.20	VPT	50	64	8-2	11	6	1818	S	42.9478	-124.7210	143	100	ZoPls	nd	
NH16300.22	VPT	51	65	8-3	11	6	1900	S	42.9478	-124.8333	nd	100	ZoPls	nd	No latitude logged
NH16300.25	VPT	52	66	8-4	11	6	2055	S	42.9505	-124.8945	nd	100	ZoPls	nd	
NH16400.08	VPT	53	67	NH45	12	6	1117	S	44.6503	-125.1212	1497	100	ZoPls	1	
NH16400.13	VPT	54	68	NH25	12	6	1530	S	44.6522	-124.6518	297	100	ZoPls	1	
NH16400.18	VPT	55	69	NH20	12	6	1725	S	44.6538	-124.5275	144	100	ZoPls	1	
NH16400.21	VPT	56	70	NH15	12	6	1820	S	44.6553	-124.4145	100	92	ZoPls	1	
NH16400.24	VPT	57	71	NH10	12	6	1910	S	44.6528	-124.2305	83	78	ZoPls	1	
NH16400.30	VPT	58	72	NH2	12	6	2040	S	44.6542	-124.1150	45	nd	ZoPls	1	



**Figure 3. Locations of VPT Stations, May - June, 2000,
GLOBEC Cruise, NH0005**

Table 6: Collection of Live Animals for Shipboard Experiments

Event#	Instr	Cast	Sta	Sta std	Day	Mos	Time	S/E flag	Lat	Long	Water Depth	Cast Depth	SI	Reg	Comments
NH15100.12	LiveNet1	1	2	CR3	30	5	2122	S	41.8833	-124.5067	152	50	ZoPIs	12	For live tow work
NH15100.16	LiveNet1	2	3	CR4	30	5	2335	S	41.9003	-124.6050	530	50	ZoPIs	12	
NH15200.02	LiveNet1	3	4	CR5	31	5	0150	S	41.9250	-124.6850	596	50	ZoPIs	12	
NH15400.01	LiveNet1	4	9	RP3	2	6	0010	S	43.7575	-124.6353	336	50	ZoPIs	5	
NH15400.03	LiveNet1	5	10	RP2	2	6	0140	S	43.7520	-124.5173	168	50	ZoPIs	5	
NH15400.06	LiveNet1	6	11	RP1	2	6	0405	S	43.7470	-124.3402	109	50	ZoPIs	5	
NH15400.25	LiveNet1	7	12	3E	2	6	2035	S	44.2483	-124.1733	52	40	ZoPIs	3	
NH15400.29	LiveNet1	8	13	ZIG1	2	6	2300	S	44.3833	-124.4250	90	40	ZoPIs	2	
NH15500.03	LiveNet1	9	14	ZIG2	3	6	0212	S	44.4895	-124.8178	195	50	ZoPIs	2	
NH15800.07	LiveNet1	10	24	UR1	6	6	0830	S	43.7492	-124.2233	42	nd	ZoPIs	NFS	CTD position used
NH15800.20	LiveNet1	11	26	UR3	6	6	1220	S	43.7200	-124.3945	nd	75	ZoPIs	NFS	CTD position used
NH15900.32	LiveNet1	12	37	7a1	7	6	2200	S	43.0833	-124.6857	nd	50	ZoPIs	NFS	Salps
NH15900.33	LiveNet1	13	37	7a1	7	6	2245	S	43.0907	-124.6793	nd	15	ZoPIs	NFS	
NH16000.01	LiveNet1	14	38	7a2	8	6	0220	S	43.1032	-124.6037	111	30	ZoPIs	NFS	
NH16000.29	LiveNet1	15	39	HM1	8	6	1950	S	42.6140	-124.5163	79	50	ZoPIs	SFS	
NH16000.31	LiveNet1	16	40	HM2	8	6	2100	S	42.6103	-124.5582	93	88	ZoPIs	SFS	
NH16000.32	LiveNet1	17	40	HM2	8	6	2220	S	42.6133	-124.5728	93	88	ZoPIs	SFS	
NH16100.02	LiveNet1	18	42	HM4	9	6	0056	S	42.6242	-124.6848	161	50	ZoPIs	SFS	
NH16100.03	LiveNet1	19	42	HM4	9	6	0130	S	42.6242	-124.6848	161	50	ZoPIs	SFS	
NH16100.04	LiveNet1	20	42	HM4	9	6	0150	S	42.6242	-124.6848	162	50	ZoPIs	SFS	
NH16200.32	LiveNet1	21	57	RR-A	10	6	2121	S	42.4440	-124.6213	95	50	ZoPIs	SFS	
NH16200.33	LiveNet1	22	58	RR-B	10	6	2215	S	42.5072	-124.6362	nd	50	ZoPIs	SFS	
NH16200.34	LiveNet1	23	59	RR-C	10	6	2324	S	42.5240	-124.6070	nd	50	ZoPIs	SFS	

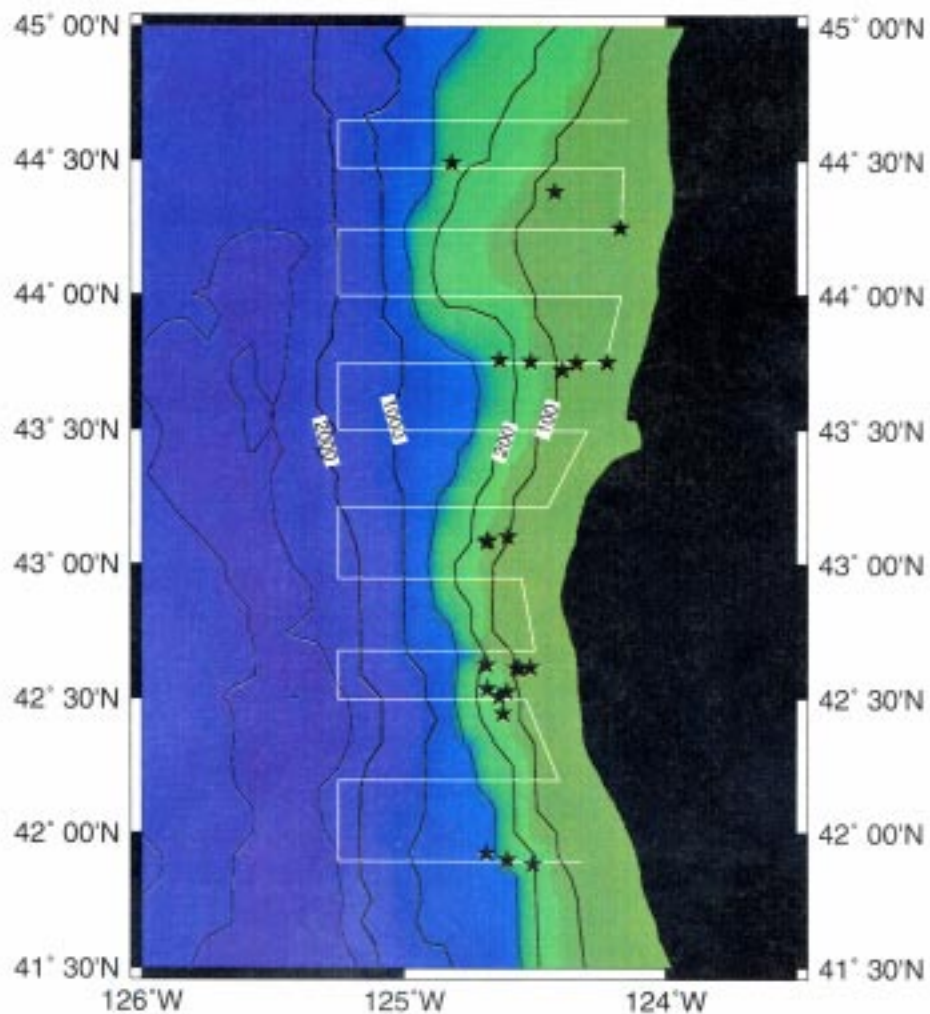


Figure 4. Locations of Live Zooplankton Tows, May - June, 2000, GLOBEC Cruise, NH0005

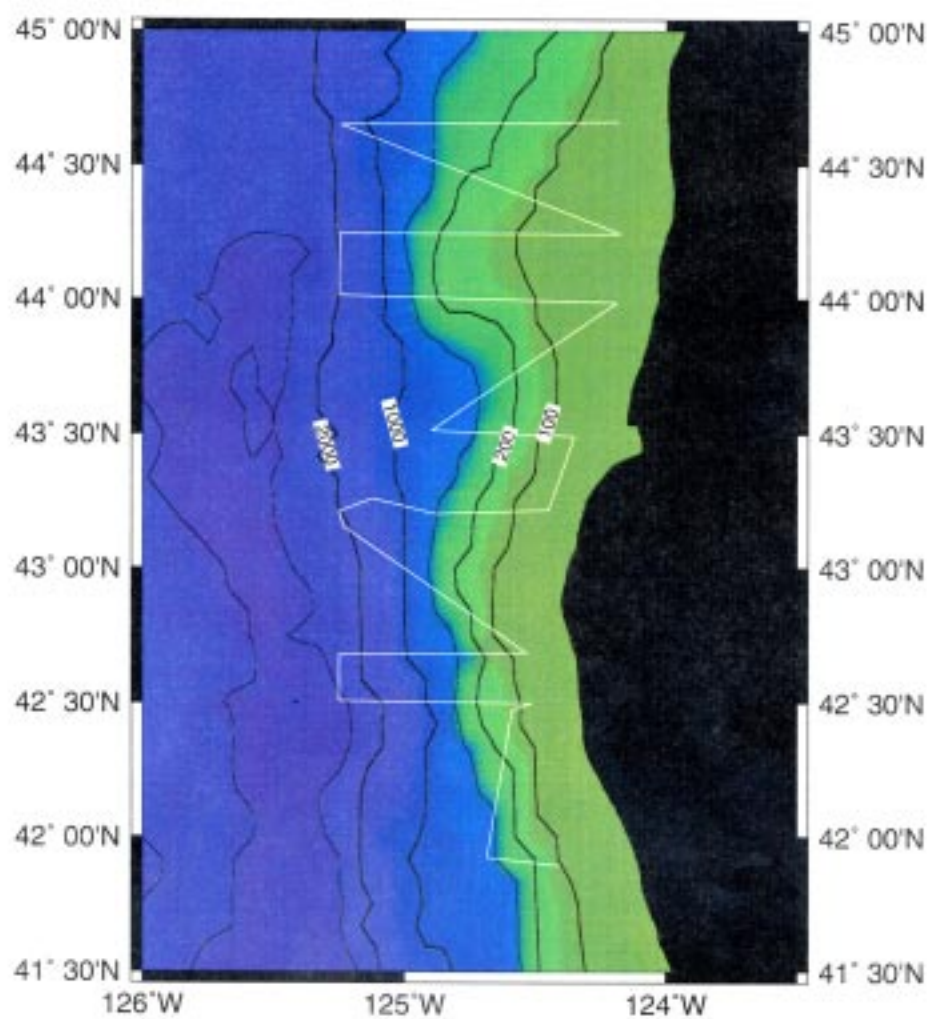
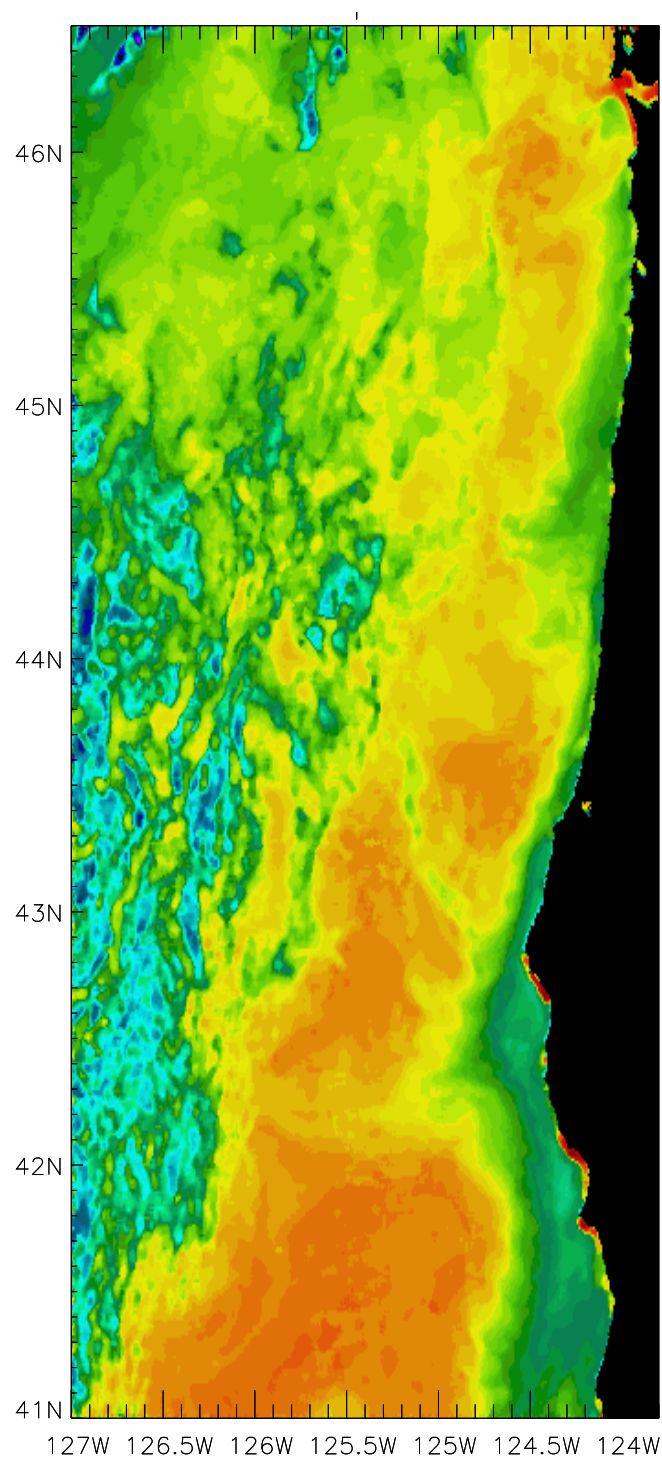



Figure 5. Locations of Mesoscale Survey, May - June, 2000, GLOBEC Cruise, NH0005





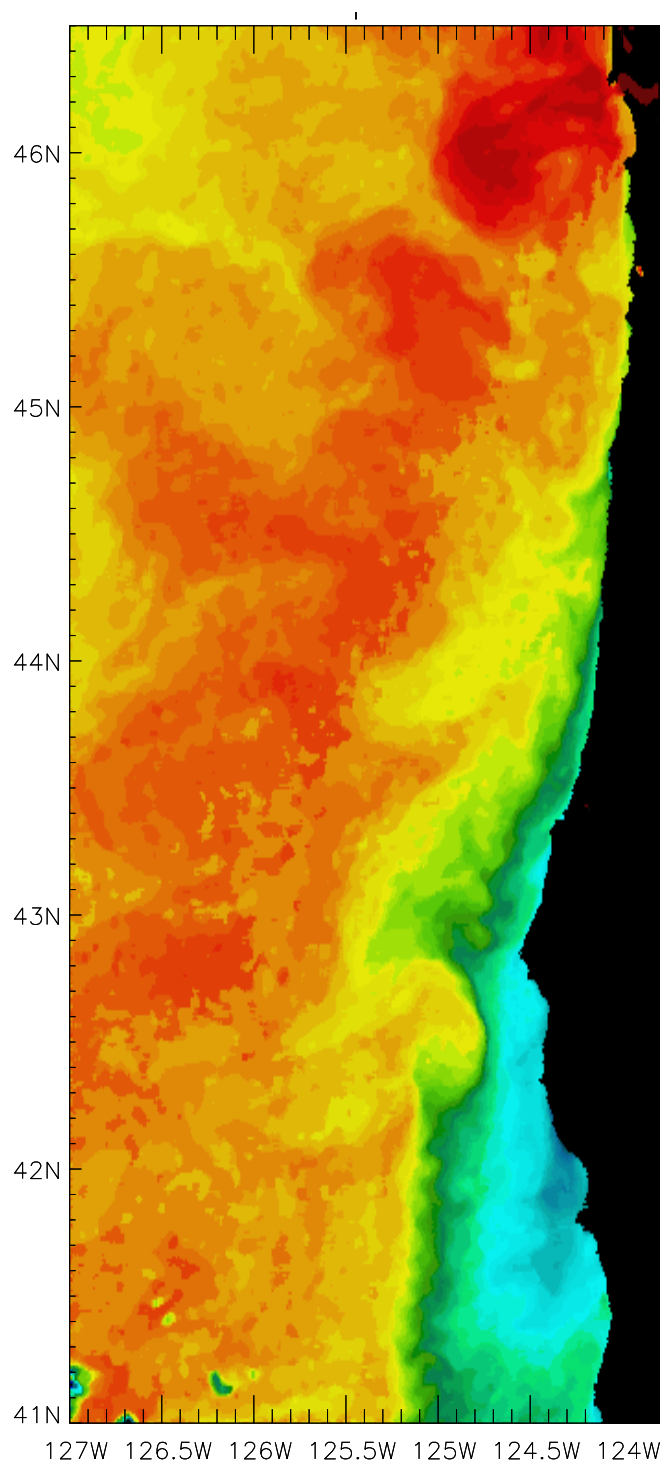
To the right of each image name is the additional correction added to the image temperatures.

N0015303_3220_N15	-1.30°C	A median filter with a width of approx 5 km was applied
N0015313_2230_N14	-0.30°C	
N0015315_1200_N15	-1.30°C	

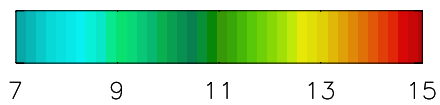


7.0 8.8 10.5 12.2 14.0

**Figure 7. Composite Sea Surface Temperature,
June 1, 2000**

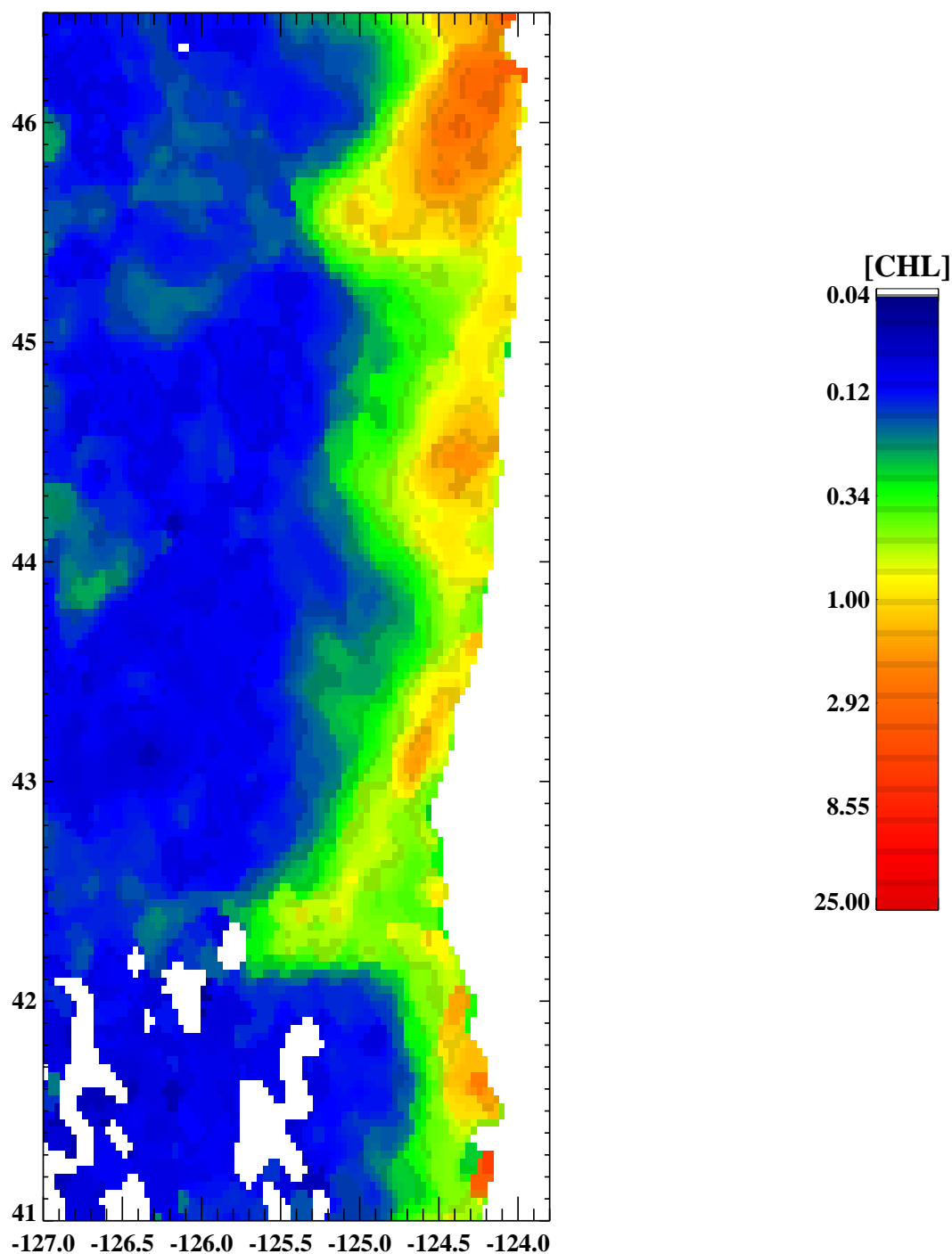


To the right of each image name is the additional correction added to the image temperatures.
 N0016823_0000_N14 -0.30°C A median filter with a width of approx 5 km was applied



**Figure 8. Sea Surface Temperature,
June 16, 2000**

California Current System
2000153-160



**Figure 9. SeaWiFS Chlorophyll Concentration
Composite for June 1-8, 2000**

APPENDIX I

NH0005 EVENT LOG

EVENT LOG CONTENTS	
Column Label	Description
Event#	Unique identifier for each line of event log
Instrument (Instr)	H. Binocs: Handheld binoculars (birds, sometimes mammals); BigEyes: Big eye binoculars (mammals); VPT: Vertical Plankton Tow; CTD: Conductivity Temperature Depth profile collected with Seabird SBE; MOC: 1m ² MOCNESS, 333 µm mesh; LiveNet1: 1m diameter net towed for live animal experiments.
Cast	Sequence # for a particular instrument
Station (Sta)	
Station Standard (Sta std)	
Day	Local time basis
Month (Mos)	Local time basis
Time	Local time
Start/End (S/E) flag	S=Start of event; E=End of event
Latitude (Lat)	Decimal degrees; north is positive
Longitude (Long)	Decimal degrees; east is positive
Water Depth	Depth of bottom
Cast Depth	Maximum depth of deployment
Scientific Investigator (SI)	
Region (Reg)	Numbers 1-12 indicate transect line numbers; NFS: Northern Fine Scale; SFS: Southern Fine Scale
Comments	

Event#	Instr	Cast	Sta	Sta std	Day	Mos	Time	S/E flag	Lat	Long	Water Depth	Cast Depth	SI	Reg	Comments
NH14900.01	Depart	nd	nd	nd	28	5	0900	S	37.5097	-122.2118	nd	nd	Tynan	nd	Depart from Redwood, City, CA
NH15100.01	H.Binocs	mams	Trans	Trans	30	5	1043	S	41.2612	-124.5772	nd	nd	Tynan	12	Bridge, Transit
NH15100.02	H.Binocs	mams	Trans	Trans	30	5	1133	E	41.3370	-124.5800	nd	nd	Tynan	12	Bridge, Transit
NH15100.03	H.Binocs	mams	Trans	Trans	30	5	1212	S	41.3957	-124.5842	nd	nd	Tynan	12	Bridge, Transit
NH15100.04	H.Binocs	mams	Trans	Trans	30	5	1633	E	41.7925	-124.6288	nd	nd	Tynan	12	Bridge, Transit
NH15100.05	H.Binocs	birds	Trans	CR	30	5	1745	S	41.9500	-124.6167	200	nd	Ainley	12	Transit
NH15100.06	H.Binocs	mams	Trans	CR	30	5	1751	S	41.9127	-124.5937	nd	nd	Tynan	12	Bridge, Transit
NH15100.07	H.Binocs	birds	Trans	CR	30	5	1840	E	41.8667	-124.4333	75	nd	Ainley	12	Transit
NH15100.08	H.Binocs	mams	Trans	CR	30	5	1845	E	41.8708	-124.4185	78	nd	Tynan	12	Bridge, Transit
NH15100.09	VPT	1	1	CR2	30	5	1945	S	41.8950	-124.4027	70	65	ZoPIs	12	
NH15100.10	CTD	1	1	CR2	30	5	2006	S	41.8982	-124.4070	77	70	ZoPIs	12	Prob with bot trip
NH15100.11	CTD	1	1	CR2	30	5	2031	E	nd	nd	77	70	ZoPIs	12	
NH15100.12	LiveNet1	1	2	CR3	30	5	2122	S	41.8833	-124.5067	152	50	ZoPIs	12	For live tow work
NH15100.13	VPT	2	2	CR3	30	5	2139	S	41.8950	-124.5117	152	100	ZoPIs	12	
NH15100.14	CTD	2	2	CR3	30	5	2200	S	41.8907	-124.5195	176	160	ZoPIs	12	Drifted off stn
NH15100.15	CTD	2	2	CR3	30	5	2228	E	41.8865	-124.8622	278	160	ZoPIs	12	
NH15100.16	LiveNet1	2	3	CR4	30	5	2335	S	41.9003	-124.6050	530	50	ZoPIs	12	
NH15100.17	VPT	3	3	CR4	30	5	2354	S	41.9317	-124.6267	545	100	ZoPIs	12	
NH15200.01	VPT	4	4	CR5	31	5	0138	S	41.9233	-124.6850	596	100	ZoPIs	12	
NH15200.02	LiveNet1	3	4	CR5	31	5	0150	S	41.9250	-124.6850	596	50	ZoPIs	12	
NH15200.03	CTD	3	3	CR4	31	5	0011	S	41.8982	-124.6168	560	150	ZoPIs	12	
NH15200.04	CTD	3	3	CR4	31	5	0047	E	41.8952	-124.6307	560	nd	ZoPIs	12	
NH15200.05	CTD	4	4	CR5	31	5	0216	S	41.9042	-124.7112	596	nd	ZoPIs	12	
NH15200.06	CTD	4	4	CR5	31	5	0251	E	41.9060	-124.7183	596	160	ZoPIs	12	
NH15200.07	H.Binocs	birds	Trans	RR	31	5	0600	S	42.3067	-124.6250	189	nd	Ainley	11	
NH15200.08	BigEyes	mams	Trans	To RR	31	5	0653	S	42.4277	-124.6027	nd	nd	Tynan	To 10	Transit to line 10
NH15200.09	BigEyes	mams	Trans	RR	31	5	0730	E	42.4830	-124.5483	nd	nd	Tynan	10	Ready to start Line 10, near R/V Wecoma
NH15200.10	BigEyes	mams	Trans	RR	31	5	0917	S	42.4995	-124.5143	37	nd	Tynan	10	West on line 10, will pass Wecoma at 1011
NH15200.11	BigEyes	mams	Trans	RR	31	5	1130	E	42.4970	-124.8927	nd	nd	Tynan	10	
NH15200.12	BigEyes	mams	Trans	RR	31	5	1214	S	42.5042	-124.9150	1006	nd	Tynan	10	
NH15200.13	H.Binocs	birds	Trans	RR	31	5	1350	E	42.5000	-125.2067	2745	nd	Ainley	11	
NH15200.14	BigEyes	mams	Trans	RR	31	5	1409	E	42.5092	-125.2495	nd	nd	Tynan	10	End of line 10, Beaufort 7
NH15200.15	BigEyes	mams	Transit	To LN9	31	5	1507	S	42.5742	-125.2503	3005	nd	Tynan	10	Transit to line 9, Beaufort 7
NH15200.16	H.Binocs	birds	Trans	RR	31	5	1525	S	42.5983	-125.2500	3040	nd	Ainley	10	
NH15200.17	BigEyes	mams	Trans	To LN9	31	5	1533	E	42.6173	-125.2462	nd	nd	Tynan	10	Switch to hand-held, ESW 400m
NH15200.18	H.Binocs	mams	Trans	To LN9	31	5	1533	S	42.6173	-125.2462	nd	nd	Tynan	To 9	
NH15200.19	H.Binocs	mams	Trans	LN9	31	5	1703	E	42.6798	-125.0903	nd	nd	Tynan	9	Line 9 heading east
NH15200.20	H.Binocs	mams	Trans	LN9	31	5	1736	S	42.6777	-124.9885	1244	nd	Tynan	9	Beaufort 7-8, ESW 400m
NH15200.21	H.Binocs	mams	Trans	LN9	31	5	1948	E	42.6897	-124.6210	110	nd	Tynan	9	Too rough for zoopl. Stations
NH15200.22	H.Binocs	mams	Trans	LN9	31	5	1958	S	42.6912	-124.6075	110	nd	Tynan	9	
NH15200.23	H.Binocs	birds	Trans	LN9	31	5	2010	E	42.6867	-124.5317	82	nd	Ainley	10	
NH15200.24	H.Binocs	mams	Trans	LN9	31	5	2024	E	42.6872	-124.5307	77	nd	Tynan	9	End of line 9, head NW around Cape Blanco
NH15300.01	H.Binocs	mams	Trans	To LN7	1	6	0625	S	43.1562	-125.2353	nd	nd	Tynan	To 7	Transit to Line 7, Beaufort 7-8
NH15300.02	H.Binocs	birds	Trans	FM	1	6	0700	S	43.2167	-124.2500	2196	nd	Ainley	7	
NH15300.03	H.Binocs	mams	Trans	LN7	1	6	0733	E	43.2542	-125.1418	1432	nd	Tynan	7	Line 7, zig-zag course due to weather
NH15300.04	H.Binocs	mams	Trans	LN7	1	6	0756	S	43.2500	-125.0648	nd	nd	Tynan	7	
NH15300.05	H.Binocs	mams	Trans	LN7	1	6	0903	E	43.2160	-124.8412	192	nd	Tynan	7	On station FM7 - R/V Wecoma passes at 0944
NH15300.06	VPT	5	5	FM7	1	6	0911	S	43.2200	-124.8400	nd	100	ZoPIs	7	
NH15300.07	CTD	5	5	FM7	1	6	0931	S	43.2268	-124.8455	347	346	ZoPIs	7	
NH15300.08	CTD	5	5	FM7	1	6	1004	E	43.2317	-124.8550	354	nd	ZoPIs	7	

Event#	Instr	Cast	Sta	Sta std	Day	Mos	Time	S/E flag	Lat	Long	Water Depth	Cast Depth	SI	Reg	Comments
NH15300.09	H.Binocs	mams	Trans	LN7	1	6	1022	S	43.2392	-124.8535	nd	nd	Tynan	7	
NH15300.10	H.Binocs	mams	Trans	LN7	1	6	1128	E	43.2143	-124.6693	146	nd	Tynan	7	On station FM5
NH15300.11	CTD	6	6	FM5	1	6	1145	S	43.2157	-124.6703	167	158	ZoPIs	7	
NH15300.12	CTD	6	6	FM5	1	6	1208	E	43.2172	-124.6760	172	nd	ZoPIs	7	
NH15300.13	VPT	6	6	FM5	1	6	1222	S	43.2182	-124.6807	178	100	ZoPIs	7	
NH15300.14	H.Binocs	mams	Trans	LN7	1	6	1234	S	43.2180	-124.6743	150	nd	Tynan	7	
NH15300.15	H.Binocs	mams	Trans	LN7	1	6	1308	E	43.2138	-124.5830	117	nd	Tynan	7	On station FM4, Beaufort 6
NH15300.16	CTD	7	7	FM4	1	6	1316	S	43.2163	-124.5842	88	80	ZoPIs	7	
NH15300.17	CTD	7	7	FM4	1	6	1333	E	43.2145	-124.5875	94	nd	ZoPIs	7	
NH15300.18	VPT	7	7	FM4	1	6	1345	S	43.2145	-124.5875	94	85	ZoPIs	7	Position from CTD sta.
NH15300.19	H.Binocs	mams	Trans	LN7	1	6	1400	S	43.2128	-124.5845	86	nd	Tynan	7	
NH15300.20	H.Binocs	mams	Trans	LN7	1	6	1435	E	43.2162	-124.4993	nd	nd	Tynan	7	On station FM3
NH15300.21	VPT	8	8	FM3	1	6	1438	S	43.2150	-124.5017	62	50	ZoPIs	7	
NH15300.22	H.Binocs	mams	Trans	LN7	1	6	1456	S	43.2192	-124.5077	57	nd	Tynan	7	
NH15300.23	H.Binocs	birds	Trans	FM	1	6	1555	E	43.2983	-124.4817	77	nd	Ainley	7	
NH15300.24	H.Binocs	mams	Trans	to LN6	1	6	1610	E	43.3233	-124.4793	nd	nd	Tynan	To 6	Transit to line 6
NH15300.25	H.Binocs	birds	Trans	LN6	1	6	1730	S	43.4667	-124.3917	97	nd	Ainley	6	
NH15300.26	H.Binocs	mams	Trans	LN6	1	6	1748	S	43.4912	-124.3538	94	nd	Tynan	6	Line 6, Beaufort 6-7
NH15300.27	H.Binocs	mams	Trans	LN6	1	6	2015	E	43.5132	-124.8832	732	nd	Tynan	6	Line 6
NH15300.28	H.Binocs	birds	Trans	LN6	1	6	2025	E	43.5167	-124.9283	785	nd	Ainley	6	
NH15300.29	CTD	8	9	RP3	1	6	2319	S	43.7515	-124.6200	320	310	ZoPIs	5	
NH15300.30	CTD	8	9	RP3	1	6	nd	E	nd	nd	nd	nd	nd	nd	
NH15400.01	LiveNet1	4	9	RP3	2	6	0010	S	43.7575	-124.6353	336	50	ZoPIs	5	
NH15400.02	VPT	9	9	RP3	2	6	0025	S	43.7933	-124.6083	346	100	ZoPIs	5	
NH15400.03	LiveNet1	5	10	RP2	2	6	0140	S	43.7520	-124.5173	168	50	ZoPIs	5	
NH15400.04	CTD	9	10	RP2	2	6	0206	S	43.7552	-124.5247	167	160	ZoPIs	5	Drift NW off station
NH15400.05	CTD	9	10	RP2	2	6	0236	E	43.7595	-124.5332	175	nd	ZoPIs	5	
NH15400.06	LiveNet1	6	11	RP1	2	6	0405	S	43.7470	-124.3402	109	50	ZoPIs	5	
NH15400.07	VPT	10	11	RP1	2	6	0420	S	43.7470	-124.3403	108	100	ZoPIs	5	
NH15400.08	VPT	10	11	RP1	2	6	0428	E	43.7465	-124.3423	109	nd	ZoPIs	5	
NH15400.09	H.Binocs	birds	Trans	HH	2	6	0635	S	44.0000	-124.1667	42	nd	Ainley	4	
NH15400.10	BigEyes	mams	Trans	HH	2	6	0637	S	43.9987	-124.1965	42	nd	Tynan	4	Begin Line 4, Heceta Head Line, Beaufort 2-3
NH15400.11	BigEyes	mams	Trans	HH	2	6	0726	E	43.9953	-124.3837	nd	nd	Tynan	4	
NH15400.12	BigEyes	mams	Trans	HH	2	6	0804	S	44.0065	-124.3938	117	nd	Tynan	4	Beaufort 5, 20-23 kt wind
NH15400.13	BigEyes	mams	Trans	HH	2	6	1000	E	44.0013	-124.8090	101	nd	Tynan	4	On station HH4
NH15400.14	BigEyes	mams	Trans	HH	2	6	1026	S	44.0053	-124.8382	nd	nd	Tynan	4	To Heceta Bank
NH15400.15	BigEyes	mams	Trans	HH	2	6	1132	E	43.9980	-125.0905	nd	nd	Tynan	4	
NH15400.16	BigEyes	mams	Trans	HH	2	6	1214	S	44.0050	-125.1013	1460	nd	Tynan	4	Line 4, will finish Heceta Head line
NH15400.17	H.Binocs	birds	Trans	To LN3	2	6	1315	E	44.0333	-125.2500	2196	nd	Ainley	To 3	
NH15400.18	BigEyes	mams	Trans	To LN3	2	6	1322	E	44.0552	-125.2497	nd	nd	Tynan	To 3	Transit to line 3
NH15400.19	H.Binocs	birds	Trans	To LN3	2	6	1430	S	44.2150	-125.2500	2287	nd	Ainley	To 3	
NH15400.20	BigEyes	mams	Trans	To LN3	2	6	1436	S	44.2328	-125.2495	nd	nd	Tynan	To 3	Transit to line 3, sperm whales
NH15400.21	BigEyes	mams	Trans	LN3	2	6	1710	E	44.2502	-124.7138	92	nd	Tynan	3	Humpback whales
NH15400.22	BigEyes	mams	Trans	LN3	2	6	1810	S	44.2497	-124.6917	92	nd	Tynan	3	Line 3, Beaufort 5
NH15400.23	H.Binocs	birds	Trans	LN3	2	6	2026	E	44.2450	-124.1700	52	nd	Ainley	3	
NH15400.24	BigEyes	mams	Trans	LN3	2	6	2026	E	44.2443	-124.1732	nd	nd	Tynan	3	Line 3, recently upwelled water nearshore
NH15400.25	LiveNet1	7	12	3E	2	6	2035	S	44.2483	-124.1733	52	40	ZoPIs	3	
NH15400.26	VPT	11	12	3E	2	6	2055	S	44.2500	-124.1733	53	48	ZoPIs	3	
NH15400.28	CTD	10	13	ZIG1	2	6	nd	E	nd	nd	nd	nd	nd	nd	
NH15400.29	LiveNet1	8	13	ZIG1	2	6	2300	S	44.3833	-124.4250	90	40	ZoPIs	2	

Event#	Instr	Cast	Sta	Sta std	Day	Mos	Time	S/E flag	Lat	Long	Water Depth	Cast Depth	SI	Reg	Comments
NH15400.30	VPT	12	13	ZIG1	2	6	2335	S	44.4300	-124.4150	89	85	ZoPIs	2	Salps
NH15500.02	CTD	11	14	ZIG2	3	6	0207	E	44.4895	-124.8178	200	nd	ZoPIs	2	
NH15500.03	LiveNet1	9	14	ZIG2	3	6	0212	S	44.4895	-124.8178	195	50	ZoPIs	2	CTD position used
NH15500.04	VPT	13	14	ZIG2	3	6	0235	S	44.4493	-124.8157	193	100	ZoPIs	2	
NH15500.05	H.Binocs	birds	Trans	NH	3	6	0600	S	44.6500	-125.2500	2287	nd	Ainley	1	Begin line 1, Newport Line, Beaufort 3
NH15500.06	BigEyes	mams	Trans	NH	3	6	0603	S	44.6515	-125.2417	2278	nd	Tynan	1	Begin line 1, Newport Line, Beaufort 3
NH15500.07	BigEyes	mams	Trans	NH	3	6	0745	E	44.6297	-124.8870	475	nd	Tynan	1	On station NH35
NH15500.08	VPT	14	15	NH35	3	6	0825	S	44.6348	-124.6590	nd	100	ZoPIs	1	
NH15500.09	BigEyes	mams	Trans	NH	3	6	0849	S	44.6520	-124.8778	494	nd	Tynan	1	Line 1, Beaufort 2
NH15500.10	BigEyes	mams	Trans	NH	3	6	1002	E	44.6477	-124.6490	256	nd	Tynan	1	On station NH25, first MOCNESS
NH15500.11	VPT	15	16	NH25	3	6	1020	S	44.6150	-124.4050	nd	100	ZoPIs	1	
NH15500.12	CTD	12	16	NH25	3	6	1030	S	44.6067	-124.4050	nd	270	ZoPIs	1	
NH15500.13	CTD	12	16	NH25	3	6	nd	E	nd	nd	nd	nd	nd	nd	
NH15500.14	MOC	1	16	NH25	3	6	1227	S	44.6527	-124.6577	292	260	ZoPIs	1	
NH15500.15	MOC	1	16	NH25	3	6	nd	E	nd	nd	nd	nd	nd	nd	
NH15500.16	BigEyes	mams	Trans	NH	3	6	1351	S	44.6518	-124.6517	256	nd	Tynan	1	Line 1, Beaufort 1
NH15500.17	BigEyes	mams	Trans	NH	3	6	1426	E	44.6523	-124.5287	nd	nd	Tynan	1	On station NH20
NH15500.18	VPT	16	17	NH20	3	6	1435	S	44.6525	-124.5362	150	100	ZoPIs	1	
NH15500.19	H.Binocs	birds	Trans	NH	3	6	1445	E	44.6517	-124.5333	197	nd	Ainley	1	
NH15500.20	BigEyes	mams	Trans	NH	3	6	1447	S	44.6538	-124.5355	128	nd	Tynan	1	
NH15500.21	BigEyes	mams	Trans	NH	3	6	1454	E	44.6525	-124.5107	nd	nd	Tynan	1	Dense fog – signal on
NH15500.22	VPT	17	18	NH15	3	6	1539	S	44.6543	-124.4223	90	88	ZoPIs	1	Position from CTD sta.
NH15500.22	MOC	2	18	NH15	3	6	1600	S	44.6543	-124.4223	96	nd	ZoPIs	1	
NH15500.23	MOC	2	18	NH15	3	6	nd	E	nd	nd	nd	nd	nd	nd	
NH15500.24	VPT	18	19	NH10	3	6	1755	S	44.6532	-124.2972	83	76	ZoPIs	1	
NH15500.25	MOC	3	19	NH10	3	6	1812	S	44.6557	-124.3043	83	65	ZoPIs	1	
NH15500.26	MOC	3	19	NH10	3	6	1840	E	44.6655	-124.3222	83	65	ZoPIs	1	
NH15500.27	Small-boat	nd	1	NH	3	6	1913	S	44.6488	-124.3657	nd	nd	nd	1	Small-boat heads to R/V Wecoma
NH15500.28	Small-boat	nd	1	NH	3	6	2048	E	44.6612	-124.3978	nd	nd	nd	1	Small-boat secured, head to NH5
NH15500.29	VPT	18	20	NH5	3	6	2200	S	44.6617	-124.1797	63	58	ZoPIs	1	
NH15500.30	CTD	13	21	NH15	3	6	2338	S	44.6557	-124.4093	100	85	ZoPIs	1	CTD not tripping properly
NH15500.31	CTD	13	21	NH15	3	6	nd	E	nd	nd	nd	nd	nd	nd	
NH15600.01	MOC	4	22	NH15b	4	6	0056	S	44.6515	-124.4123	95	80	ZoPIs	1	
NH15600.02	MOC	4	22	NH15b	4	6	0121	E	44.6408	-124.4242	88	nd	ZoPIs	1	
NH15600.03	MOC	5	23	NH25b	4	6	nd	S	44.6548	-124.6543	298	282	ZoPIs	1	
NH15600.04	MOC	5	23	NH25b	4	6	nd	E	nd	nd	nd	nd	nd	nd	
NH15600.05	CTD	14	23	NH25b	4	6	0400	S	44.6752	-124.6705	325	315	ZoPIs	1	
NH15600.06	CTD	14	23	NH25b	4	6	nd	E	nd	nd	nd	nd	nd	nd	
NH15600.07	H.Binocs	birds	Trans	LN2	4	6	0600	S	44.4750	-124.8833	95	nd	Ainley	NFS	
NH15600.08	BigEyes	mams	Trans	LN2	4	6	0600	S	44.4742	-124.5382	92	nd	Tynan	NFS	Line 2 fine-scale, Beaufort 0
NH15600.09	H.Binocs	birds	Trans	LN2	4	6	0730	E	44.4717	-124.1917	54	nd	Ainley	NFS	
NH15600.10	BigEyes	mams	Trans	LN2	4	6	0737	E	44.4715	-124.1702	54	nd	Tynan	NFS	
NH15600.11	H.Binocs	birds	Trans	LN2a	4	6	0810	S	44.3817	-124.1717	45	nd	Ainley	NFS	
NH15600.12	BigEyes	mams	Trans	LN2a	4	6	0818	S	44.3743	-124.2003	45	nd	Tynan	NFS	Begin line 2a heading west
NH15600.13	BigEyes	mams	Trans	LN2a	4	6	0957	E	44.3833	-124.5670	100	nd	Tynan	NFS	
NH15600.14	BigEyes	mams	Trans	LN2a	4	6	1020	S	44.3888	-124.5853	94	nd	Tynan	NFS	Line 2a
NH15600.15	BigEyes	mams	Trans	LN2a	4	6	1137	E	44.3772	-124.8728	500	nd	Tynan	NFS	Line 2a
NH15600.16	BigEyes	mams	Trans	LN2a	4	6	1212	S	44.3770	-124.8738	640	nd	Tynan	NFS	
NH15600.17	H.Binocs	birds	Trans	LN2a	4	6	1240	E	44.3733	-124.9833	640	nd	Ainley	NFS	
NH15600.18	BigEyes	mams	Trans	Trans	4	6	1353	E	44.2090	-125.0998	1281	nd	Tynan	NFS	Transit to line 3a
NH15600.19	H.Binocs	birds	Trans	LN3a	4	6	1355	S	44.1833	-125.0967	1281	nd	Ainley	NFS	

Event#	Instr	Cast	Sta	Sta std	Day	Mos	Time	S/E flag	Lat	Long	Water Depth	Cast Depth	SI	Reg	Comments
NH15600.20	BigEyes	mams	Trans	LN3a	4	6	1454	S	44.1098	-125.0105	1281	nd	Tynan	NFS	Line 3a heading east to cross Heceta Bank
NH15600.21	BigEyes	mams	Trans	LN3a	4	6	1603	E	44.1073	-124.7487	120	nd	Tynan	NFS	Engine failures; to Newport for water/repairs
NH15600.22	BigEyes	mams	Trans	Trans	4	6	1630	S	44.1283	-124.6988	114	nd	Tynan	NFS	Transit to Newport for repairs
NH15600.23	H.Binocs	birds	Trans	LN3a	4	6	1655	E	44.1700	-124.6483	120	nd	Ainley	NFS	
NH15600.24	BigEyes	mams	Trans	Trans	4	6	1900	E	44.1740	-124.6440	100	nd	Tynan	NFS	Transit to Newport for repairs
NH15600.25	BigEyes	mams	Trans	Trans	4	6	1754	S	44.2557	-124.5398	100	nd	Tynan	NFS	Transit to Newport for repairs
NH15600.26	H.Binocs	birds	Trans	Trans	4	6	1800	S	44.2650	-124.5267	100	nd	Ainley	NFS	
NH15600.27	BigEyes	mams	Trans	Trans	4	6	1929	E	44.3978	-124.3525	nd	nd	Tynan	NFS	Transit to Newport for repairs
NH15600.28	BigEyes	mams	Trans	Trans	4	6	1948	S	44.4298	-124.3218	nd	nd	Tynan	NFS	
NH15600.29	BigEyes	mams	Trans	Trans	4	6	2030	E	44.4962	-124.2478	68	nd	Tynan	NFS	
NH15600.30	H.Binocs	birds	Trans	Trans	4	6	2030	E	44.5000	-124.2433	68	nd	Ainley	NFS	
NH15600.31	Ship	nd	nd	dock	4	6	2215	nd	44.6333	-124.0667	nd	nd	nd	nd	Ship arrives at dock, Newport
NH15700.01	Depart	nd	nd	dock	5	6	2100	nd	44.6333	-124.0667	nd	nd	nd	nd	Ship departs dock, Newport
NH15800.01	BigEyes	mams	Trans	Trans	6	6	0604	S	43.8675	-124.2788	86	nd	Tynan	5	To line 5 fine-scale
NH15800.02	H.Binocs	birds	Trans	Trans	6	6	0700	S	43.5367	-124.2783	98	nd	Ainley	6	
NH15800.03	BigEyes	mams	Trans	Trans	6	6	0710	E	43.7518	-124.2370	37	nd	Tynan	5	On station UR1 line 5
NH15800.04	VPT	19	24	UR1	6	6	0740	S	43.7492	-124.2250	45	42	ZoPIs	NFS	
NH15800.05	CTD	15	24	UR1	6	6	0750	S	43.7492	-124.2255	46	40	ZoPIs	NFS	New CTD trip mech.
NH15800.06	CTD	15	24	UR1	6	6	0805	E	43.7492	-124.2233	42	nd	ZoPIs	NFS	
NH15800.07	LiveNet1	10	24	UR1	6	6	0830	S	43.7492	-124.2233	42	nd	ZoPIs	NFS	CTD position used
NH15800.08	H.Binocs	birds	Trans	Trans	6	6	0856	E	43.7617	-124.2567	80	nd	Ainley	6	
NH15800.09	Small-boat	nd	2	LN5	6	6	0903	S	43.7458	-124.2353	nd	nd	nd	5	Deliver gear to R/V Wecoma
NH15800.10	Small-boat	nd	2	LN5	6	6	0940	E	43.7358	-124.2537	63	nd	nd	5	
NH15800.11	H.Binocs	birds	Trans	LN5	6	6	0945	S	43.7033	-124.2633	81	nd	Ainley	5	Line 5, after small-boat op.
NH15800.12	BigEyes	mams	Trans	LN5	6	6	0947	S	43.7357	-124.2610	63	nd	Tynan	5	Line 5, after small-boat op. to R/V Wecoma
NH15800.13	BigEyes	mams	Trans	LN5	6	6	0959	E	43.7457	-124.2963	104	nd	Tynan	5	Line 5; rain and fog
NH15800.14	VPT	20	25	UR2	6	6	1015	S	43.7480	-124.3202	102	99	ZoPIs	NFS	
NH15800.15	BigEyes	mams	Trans	LN5	6	6	1026	S	43.7480	-124.3222	nd	nd	Tynan	5	Line 5, leaving station UR2 heading west
NH15800.16	BigEyes	mams	Trans	LN5	6	6	1052	E	43.7495	-124.3985	nd	nd	Tynan	5	
NH15800.17	MOC	6	26	UR3	6	6	1120	S	43.7393	-124.3953	115	100	ZoPIs	NFS	
NH15800.18	MOC	6	26	UR3	6	6	nd	E	nd	nd	nd	nd	nd	nd	
NH15800.19	VPT	21	26	UR3	6	6	1205	S	43.7250	-124.3947	nd	100	ZoPIs	NFS	
NH15800.20	LiveNet1	11	26	UR3	6	6	1220	S	43.7200	-124.3945	nd	75	ZoPIs	NFS	
NH15800.21	H.Binocs	mams	Trans	LN5	6	6	1304	S	43.7503	-124.3998	115	nd	Tynan	5	Line 5, leaving station UR3
NH15800.22	H.Binocs	mams	Trans	LN5	6	6	1328	E	43.7502	-124.4825	121	nd	Tynan	5	Line 5, on station UR4
NH15800.23	MOC	7	27	UR4	6	6	1351	S	43.7467	-124.4833	125	110	ZoPIs	NFS	
NH15800.24	MOC	7	28	UR4	6	6	1415	E	43.7300	-124.4933	130	nd	ZoPIs	NFS	
NH15800.25	CTD	16	29	UR6	6	6	1430	S	43.7283	-124.4983	145	nd	ZoPIs	NFS	
NH15800.26	CTD	16	30	UR7	6	6	1450	E	43.7223	-124.5030	146	nd	ZoPIs	NFS	
NH15800.27	VPT	22	31	UR4	6	6	1455	S	43.7203	-124.5127	146	100	ZoPIs	NFS	
NH15800.28	BigEyes	mams	Trans	LN5	6	6	1530	S	43.7458	-124.4857	117	nd	Tynan	5	Line 5, leave station UR4
NH15800.29	H.Binocs	mams	Trans	LN5	6	6	1557	E	43.7493	-124.5615	196	nd	Tynan	5	Line 5, on station UR5
NH15800.30	MOC	8	28	UR5	6	6	1612	S	43.7483	-124.5633	225	nd	ZoPIs	NFS	
NH15800.31	MOC	8	28	UR5	6	6	nd	E	nd	nd	nd	nd	nd	nd	
NH15800.32	CTD	17	28	UR5	6	6	1700	S	43.7367	-124.6050	276	260	ZoPIs	NFS	
NH15800.33	CTD	17	28	UR5	6	6	1719	E	43.7350	-124.6083	282	nd	ZoPIs	NFS	
NH15800.34	VPT	23	28	UR5	6	6	1745	S	43.7450	-124.5930	260	100	ZoPIs	NFS	
NH15800.35	H.Binocs	mams	Trans	LN5	6	6	1804	S	43.7500	-124.5975	238	nd	Tynan	5	Line 5, leave station UR5
NH15800.36	H.Binocs	birds	Trans	LN5	6	6	1915	E	43.7517	-124.8533	732	nd	Ainley	5	
NH15800.37	H.Binocs	mams	Trans	LN5	6	6	1918	E	43.7523	-124.8488	nd	nd	Tynan	5	Line 5
NH15800.38	MOC	9	29	UR7a	6	6	2000	S	43.7487	-124.8168	715	350	ZoPIs	NFS	

Event#	Instr	Cast	Sta	Sta std	Day	Mos	Time	S/E flag	Lat	Long	Water Depth	Cast Depth	SI	Reg	Comments
NH15800.39	MOC	9	29	UR7a	6	6	2047	E	43.7285	-124.8405	725	350	ZoPIs	NFS	
NH15800.40	CTD	18	29	UR7a	6	6	2120	S	43.7467	-124.8200	650	640	ZoPIs	NFS	
NH15800.41	CTD	18	29	UR7a	6	6	2206	E	43.7473	-124.8198	670	nd	ZoPIs	NFS	Drifted off station
NH15800.42	VPT	24	29	UR7a	6	6	2215	S	43.7370	-124.8223	667	100	ZoPIs	NFS	
NH15800.43	MOC	10	30	UR7	6	6	2312	S	43.7448	-124.7608	540	380	ZoPIs	NFS	Start long. Not logged
NH15800.44	MOC	10	30	UR7	6	6	2351	E	43.7258	-124.7608	548	nd	ZoPIs	NFS	
NH15900.01	CTD	19	30	UR7	7	6	0001	S	43.7237	-124.7640	575	560	ZoPIs	NFS	
NH15900.02	CTD	19	30	UR7	7	6	nd	E	nd	nd	nd	nd	nd	nd	
NH15900.03	BigEyes	mams	Trans	Trans	7	6	0620	S	43.2765	-125.2222	1800	nd	Tynan	NFS	Transit to start line 7
NH15900.04	H.Binocs	birds	Trans	LN7	7	6	0625	S	43.2567	-125.0650	1820	nd	Ainley	7	
NH15900.05	BigEyes	mams	Trans	Trans	7	6	0732	E	43.2153	-125.0685	nd	nd	Tynan	NFS	
NH15900.06	BigEyes	mams	Trans	LN7	7	6	0818	S	43.2148	-125.0880	1032	nd	Tynan	NFS	Line 7
NH15900.07	BigEyes	mams	Trans	LN7	7	6	0910	E	43.2192	-124.9033	nd	nd	nd	nd	Line 7 switch to hand-held binocs., radar on
NH15900.08	H.Binocs	mams	Trans	LN7	7	6	0910	S	43.2192	-124.9033	nd	nd	nd	nd	Getting radar fix on R/V Wecoma
NH15900.09	H.Binocs	mams	Trans	LN7	7	6	1016	E	43.2145	-124.6803	nd	nd	Tynan	NFS	Line 7, pass R/V Wecoma 1007, FM6
NH15900.10	VPT	25	31	FM6+	7	6	1030	S	43.2778	-124.7340	175	100	ZoPIs	NFS	
NH15900.11	BigEyes	mams	Trans	LN7	7	6	1059	S	43.2118	-124.7013	202	nd	Tynan	NFS	Line 7, leave FM6 after VPT
NH15900.12	BigEyes	mams	Trans	LN7	7	6	1131	E	43.2142	-124.5930	nd	nd	Tynan	NFS	
NH15900.13	BigEyes	mams	Trans	LN7	7	6	1214	S	43.2108	-124.6273	110	nd	Tynan	NFS	Line 7
NH15900.14	BigEyes	mams	Trans	LN7	7	6	1300	E	43.2158	-124.4803	nd	nd	nd	nd	
NH15900.15	H.Binocs	birds	Trans	LN7	7	6	1305	E	43.2150	-124.4567	46	nd	Ainley	7	
NH15900.16	H.Binocs	mams	Trans	LN7	7	6	1300	S	43.2158	-124.4803	nd	nd	nd	nd	
NH15900.17	H.Binocs	mams	Trans	LN7	7	6	1318	E	43.2177	-124.4342	36	nd	nd	nd	Line 7, on station FM1
NH15900.18	VPT	26	32	FM1	7	6	1330	S	43.2177	-124.3967	36	30	ZoPIs	NFS	
NH15900.19	VPT	27	33	FM2	7	6	1350	S	43.2143	-124.4673	55	50	ZoPIs	NFS	
NH15900.20	VPT	28	34	FM4	7	6	1440	S	43.2173	-124.5855	88	82	ZoPIs	NFS	
NH15900.21	CTD	20	35	FM5	7	6	1525	S	43.2205	-124.6718	166	155	ZoPIs	NFS	
NH15900.22	CTD	20	35	FM5	7	6	nd	E	nd	nd	nd	nd	nd	nd	
NH15900.23	MOC	11	36	FM6a	7	6	1623	S	43.2153	-124.7063	197	nd	ZoPIs	NFS	
NH15900.24	MOC	11	36	FM6a	7	6	1655	E	43.2042	-124.7373	270	190	ZoPIs	NFS	
NH15900.25	CTD	21	36	FM6a	7	6	1735	S	43.2187	-124.7035	199	180	ZoPIs	NFS	
NH15900.26	CTD	21	36	FM6a	7	6	nd	E	nd	nd	nd	nd	nd	nd	
NH15900.27	H.Binocs	birds	Trans	Trans	7	6	1810	S	43.2033	-124.7467	286	nd	Ainley	NFS	Transit line 7 to 7a, after station FM6a
NH15900.28	BigEyes	mams	Trans	Trans	7	6	1813	S	43.2027	-124.7498	220	nd	Tynan	NFS	Transit line 7 to 7a, after station FM6a
NH15900.29	BigEyes	Ship	c/c	LN7a	7	6	1916	nd	43.0940	-124.9497	952	nd	Tynan	nd	c/c on to Line 7a
NH15900.30	H.Binocs	birds	Trans	LN7a	7	6	2030	E	43.0817	-124.7350	366	nd	Ainley	NFS	
NH15900.31	BigEyes	mams	Trans	LN7a	7	6	2031	E	43.0847	-124.6860	nd	nd	Tynan	NFS	Line 7a, return to Line 7 night zoopl. Stas.
NH15900.32	LiveNet1	12	37	7a1	7	6	2200	S	43.0833	-124.6857	nd	50	ZoPIs	NFS	
NH15900.33	LiveNet1	13	37	7a1	7	6	2245	S	43.0907	-124.6793	nd	15	ZoPIs	NFS	
NH15900.34	MOC	12	37	7a1	7	6	2325	S	43.0860	-124.6880	170	155	ZoPIs	NFS	
NH15900.35	MOC	12	37	7a1	7	6	2357	E	43.1058	-124.6830	172	160	ZoPIs	NFS	
NH16000.01	LiveNet1	14	38	7a2	8	6	0220	S	43.1032	-124.6037	111	30	ZoPIs	NFS	
NH16000.02	H.Binocs	birds	Trans	LN7a	8	6	0600	S	43.0783	-124.7183	181	nd	Ainley	NFS	Line 7a, heading east
NH16000.03	BigEyes	mams	Trans	LN7a	8	6	0605	S	43.0803	-124.7167	200	nd	Tynan	NFS	Line 7a, heading east
NH16000.04	H.Binocs	birds	Trans	LN7a	8	6	0700	E	43.0833	-124.5117	69	nd	Ainley	NFS	
NH16000.05	H.Binocs	birds	Trans	LN7a	8	6	0710	S	43.0833	-124.4833	52	nd	Ainley	NFS	
NH16000.06	BigEyes	mams	Trans	Trans	8	6	0727	E	43.0465	-124.5022	nd	nd	Tynan	SFS	Transit to Line 8
NH16000.07	BigEyes	mams	Trans	Trans	8	6	0812	S	43.0478	-124.5153	nd	nd	Tynan	SFS	Transit to Line 8, surface euphausiid patches
NH16000.08	H.Binocs	birds	Trans	Trans	8	6	0847	E	42.9633	-124.5450	64	nd	Ainley	SFS	
NH16000.09	H.Binocs	birds	Trans	LN8	8	6	0900	S	42.9500	-124.6017	77	nd	Ainley	SFS	
NH16000.10	BigEyes	mams	Trans	LN8	8	6	0926	E	42.9487	-124.6913	nd	nd	Tynan	SFS	Line 8

Event#	Instr	Cast	Sta	Sta std	Day	Mos	Time	S/E flag	Lat	Long	Water Depth	Cast Depth	SI	Reg	Comments
NH16000.11	BigEyes	mams	Trans	LN8	8	6	0930	S	42.9490	-124.7070	130	nd	Tynan	SFS	Line 8
NH16000.12	BigEyes	mams	Trans	LN8	8	6	1010	E	42.9482	-124.8573	150	nd	Tynan	SFS	Line 8
NH16000.13	BigEyes	mams	Trans	LN8	8	6	1040	S	42.9453	-124.8658	166	nd	Tynan	SFS	Line 8
NH16000.14	BigEyes	mams	Trans	LN8	8	6	1100	E	42.9462	-124.9418	nd	nd	Tynan	SFS	Line 8, off effort for id. - humpbacks
NH16000.15	BigEyes	mams	Trans	LN8	8	6	1117	S	42.9478	-124.9655	nd	nd	Tynan	SFS	Line 8, humpbacks
NH16000.16	BigEyes	mams	Trans	LN8	8	6	1145	E	42.9497	-125.0710	1464	nd	Tynan	SFS	Line 8, humpbacks
NH16000.17	BigEyes	mams	Trans	LN8	8	6	1235	S	42.9503	-125.0757	1363	nd	Tynan	SFS	Line 8, beaked whales, humpbacks
NH16000.18	H.Binocs	birds	Trans	LN8	8	6	1300	E	42.9500	-125.1900	2379	nd	Ainley	SFS	
NH16000.19	BigEyes	mams	Trans	LN8	8	6	1332	E	42.9185	-125.2502	2300	nd	Tynan	SFS	
NH16000.20	BigEyes	mams	Trans	Trans	8	6	1411	S	42.8160	-125.2395	2836	nd	Tynan	SFS	Line 8a, PWS dolphins, humpbacks
NH16000.21	H.Binocs	birds	Trans	LN8a	8	6	1420	S	42.8167	-125.2133	2421	nd	Ainley	SFS	
NH16000.22	H.Binocs	birds	Trans	LN8a	8	6	1650	E	42.8167	-124.6833	58	nd	Ainley	SFS	
NH16000.23	BigEyes	mams	Trans	LN8a	8	6	1650	E	42.8188	-124.6755	nd	nd	Tynan	SFS	Line 8a, off Cape Blanco
NH16000.24	H.Binocs	birds	Trans	Trans	8	6	1740	S	42.7833	-124.6833	129	nd	Ainley	SFS	
NH16000.25	BigEyes	mams	Trans	Trans	8	6	1754	S	42.7592	-124.6865	nd	nd	Tynan	SFS	Transit to Line 9
NH16000.26	H.Binocs	birds	Trans	Trans	8	6	1900	E	42.6333	-124.5483	90	nd	Ainley	SFS	
NH16000.27	BigEyes	mams	Trans	LN9	8	6	1914	E	42.6087	-124.5440	nd	nd	Tynan	SFS	On Line 9, begin stations
NH16000.28	VPT	29	39	HM1	8	6	1938	S	42.6107	-124.5128	78	72	ZoPIs	SFS	
NH16000.29	LiveNet1	15	39	HM1	8	6	1950	S	42.6140	-124.5163	79	50	ZoPIs	SFS	
NH16000.30	VPT	30	40	HM2	8	6	2050	S	42.6103	-124.5582	93	88	ZoPIs	SFS	
NH16000.31	LiveNet1	16	40	HM2	8	6	2100	S	42.6103	-124.5582	93	88	ZoPIs	SFS	
NH16000.32	LiveNet1	17	40	HM2	8	6	2220	S	42.6133	-124.5728	93	88	ZoPIs	SFS	Salps
NH16000.33	VPT	31	41	HM3	8	6	2332	S	42.6113	-124.6117	115	100	ZoPIs	SFS	
NH16100.01	VPT	32	42	HM4	9	6	0045	S	42.6248	-124.6828	161	100	ZoPIs	SFS	
NH16100.02	LiveNet1	18	42	HM4	9	6	0056	S	42.6242	-124.6848	161	50	ZoPIs	SFS	
NH16100.03	LiveNet1	19	42	HM4	9	6	0130	S	42.6242	-124.6848	161	50	ZoPIs	SFS	
NH16100.04	LiveNet1	20	42	HM4	9	6	0150	S	42.6242	-124.6848	162	50	ZoPIs	SFS	
NH16100.05	BigEyes	mams	Trans	LN9	9	6	0609	S	42.6855	-125.1058	nd	nd	Tynan	SFS	Line 9, Beaufort 7
NH16100.06	H.Binocs	mams	Trans	LN9	9	6	0645	E	42.6862	-124.9748	nd	nd	Tynan	SFS	Line 9, high wind and seas
NH16100.07	H.Binocs	birds	Trans	LN9	9	6	0700	S	42.6867	-125.1100	2000	nd	Ainley	SFS	
NH16100.08	H.Binocs	mams	Trans	LN9	9	6	0730	E	42.6872	-124.8255	nd	nd	Tynan	SFS	Line 9
NH16100.09	H.Binocs	mams	Trans	LN9	9	6	0807	S	42.6857	-124.7860	585	nd	Tynan	SFS	
NH16100.10	H.Binocs	birds	Trans	LN9	9	6	0920	E	42.6867	-124.5000	46	nd	Ainley	SFS	
NH16100.11	H.Binocs	mams	Trans	LN9	9	6	0927	E	42.6793	-124.5067	nd	nd	Tynan	SFS	End of Line 9, c/c south to Line 10
NH16100.12	VPT	33	43	RR1	9	6	1058	S	42.5012	-124.5003	37	32	ZoPIs	SFS	
NH16100.13	H.Binocs	birds	Trans	LN10	9	6	1110	S	42.5000	-124.5200	38	nd	Ainley	SFS	
NH16100.14	H.Binocs	mams	Trans	Trans	9	6	1114	S	42.5008	-124.5143	56	nd	Tynan	SFS	Transit to Line 10
NH16100.15	H.Binocs	mams	Trans	LN10	9	6	1145	E	42.5143	-124.5952	nd	nd	Tynan	SFS	Line 10, at station RR2
NH16100.16	VPT	34	44	RR2	9	6	1152	S	42.5110	-124.5907	85	80	ZoPIs	SFS	
NH16100.17	H.Binocs	mams	Trans	LN10	9	6	1215	S	42.4977	-124.5838	nd	nd	Tynan	SFS	Line 10
NH16100.18	H.Binocs	mams	Trans	LN10	9	6	1256	E	42.5000	-124.6987	nd	nd	Tynan	SFS	Line 10, at station RR3
NH16100.19	VPT	35	45	RR3	9	6	1305	S	42.5000	-124.7000	124	100	ZoPIs	SFS	
NH16100.20	VPT	36	45	RR3	9	6	1313	E	42.4950	-124.6977	124	nd	ZoPIs	SFS	
NH16100.21	MOC	13	45	RR3	9	6	1324	S	42.4962	-124.6983	125	110	ZoPIs	SFS	
NH16100.22	MOC	13	45	RR3	9	6	1350	E	42.4765	-124.7025	125	nd	ZoPIs	SFS	
NH16100.23	CTD	22	45	RR3	9	6	1356	S	42.4727	-124.7010	126	120	ZoPIs	SFS	
NH16100.24	CTD	22	45	RR3	9	6	1423	E	42.4623	-124.7010	125	nd	ZoPIs	SFS	
NH16100.25	H.Binocs	mams	Trans	LN10	9	6	1446	S	42.4998	-124.7018	119	nd	Tynan	SFS	Line 10, leave station RR3
NH16100.26	H.Binocs	mams	Trans	LN10	9	6	1521	E	42.4998	-124.7997	nd	nd	Tynan	SFS	Line 10, at station RR4
NH16100.27	VPT	37	46	RR4	9	6	1525	S	42.4990	-124.7998	608	100	ZoPIs	SFS	
NH16100.28	VPT	38	46	RR4	9	6	1535	E	42.4982	-124.8007	589	nd	ZoPIs	SFS	

Event#	Instr	Cast	Sta	Sta std	Day	Mos	Time	S/E flag	Lat	Long	Water Depth	Cast Depth	SI	Reg	Comments
NH16100.29	MOC	14	46	RR4	9	6	1540	S	42.4980	-124.8020	587	350	ZoPIs	SFS	
NH16100.30	MOC	14	46	RR4	9	6	1630	E	42.6360	-124.8398	634	nd	ZoPIs	SFS	
NH16100.31	CTD	23	46	RR4	9	6	1640	S	42.5033	-124.8452	790	510	ZoPIs	SFS	
NH16100.32	CTD	23	46	RR4	9	6	nd	E	nd	nd	nd	nd	nd	nd	
NH16100.33	H.Binocs	mams	Trans	LN10	9	6	1741	S	42.4980	-124.7997	549	nd	Tynan	SFS	Line 10, leave station RR4, humpbacks
NH16100.34	H.Binocs	mams	Trans	LN10	9	6	1813	E	42.4977	-124.9015	1098	nd	Tynan	SFS	Line 10, on station RR5
NH16100.35	VPT	38	47	RR5	9	6	1820	S	42.4978	-124.9048	1168	100	ZoPIs	SFS	
NH16100.36	MOC	15	47	RR5	9	6	1830	S	42.4995	-124.9113	1168	350	ZoPIs	SFS	
NH16100.37	MOC	15	47	RR5	9	6	nd	E	nd	nd	nd	nd	nd	nd	
NH16100.38	BigEyes	mams	Trans	LN10	9	6	1945	S	42.5122	-124.9460	nd	nd	Tynan	SFS	Line 10, leave station RR5, humpbacks
NH16100.39	H.Binocs	mams	Trans	LN10	9	6	2049	E	42.5017	-125.0933	nd	nd	Tynan	SFS	Line 10
NH16100.40	H.Binocs	birds	Trans	LN10	9	6	2050	E	42.5000	-125.0500	1830	nd	Ainley	SFS	Line 10
NH16100.41	VPT	39	48	RR7	9	6	2123	S	42.5008	-125.1995	2992	100	ZoPIs	SFS	
NH16100.42	CTD	24	48	RR7	9	6	2145	S	42.5027	-125.2032	2998	1000	ZoPIs	SFS	
NH16100.43	CTD	24	48	RR7	9	6	nd	E	nd	nd	nd	nd	nd	nd	
NH16100.44	VPT	40	49	RR6A	9	6	2345	S	42.5020	-125.1178	2169	100	ZoPIs	SFS	
NH16200.01	VPT	41	50	RR6	10	6	0100	S	42.5040	-124.9892	1770	100	ZoPIs	SFS	
NH16200.02	CTD	25	50	RR6	10	6	0120	S	42.5040	-124.9892	1770	500	ZoPIs	SFS	
NH16200.03	CTD	25	50	RR6	10	6	nd	E	nd	nd	nd	nd	nd	nd	
NH16200.04	BigEyes	mams	Trans	Trans	10	6	0603	S	42.0923	-124.4413	99	nd	Tynan	SFS	Transit and start Line 11a, humpbacks
NH16200.05	H.Binocs	birds	Trans	LN11a	10	6	0630	S	42.0500	-124.3583	52	nd	Ainley	SFS	c/c begin Line 11a
NH16200.06	BigEyes	mams	Trans	LN11a	10	6	0730	E	42.0468	-124.5610	nd	nd	Tynan	SFS	Line 11a
NH16200.07	BigEyes	mams	Trans	LN11a	10	6	0809	S	42.0507	-124.5597	154	nd	Tynan	SFS	Line 11a
NH16200.08	BigEyes	mams	Trans	LN11a	10	6	0951	E	42.0510	-124.8853	nd	nd	Tynan	SFS	Line 11a, PWS-dolphins, Lissodelphis
NH16200.09	BigEyes	mams	Trans	LN11a	10	6	1022	S	42.0513	-124.8983	915	nd	Tynan	SFS	Line 11a, beaked whales, Lag., Lissodelphis
NH16200.10	BigEyes	mams	Trans	LN11a	10	6	1137	E	42.0507	-125.1555	nd	nd	Tynan	SFS	
NH16200.11	H.Binocs	birds	Trans	LN11a	10	6	1140	E	42.0500	-125.1433	1830	nd	Ainley	SFS	
NH16200.12	H.Binocs	birds	Trans	LN11	10	6	1245	S	42.2000	-125.1333	2156	nd	Ainley	SFS	Line 11
NH16200.13	BigEyes	mams	Trans	LN11	10	6	1253	S	42.2002	-125.1017	2156	nd	Tynan	SFS	Line 11, PWS-dolphins
NH16200.14	BigEyes	mams	Trans	LN11	10	6	1400	E	42.1998	-124.8673	842	nd	Tynan	SFS	Line 11, on station 11-6
NH16200.15	VPT	42	51	11-6	10	6	1435	S	42.1983	nd	000	100	ZoPIs	SFS	
NH16200.16	BigEyes	mams	Trans	LN11	10	6	1456	S	42.1993	-124.8638	878	nd	Tynan	SFS	Line 11, PWS-dolphins
NH16200.17	BigEyes	mams	Trans	LN11	10	6	1546	E	42.1972	-124.6912	529	nd	Tynan	SFS	Line 11, on station 11-5
NH16200.18	VPT	43	52	11-5	10	6	1550	S	42.1983	nd	500	100	ZoPIs	SFS	
NH16200.19	BigEyes	mams	Trans	LN11	10	6	1606	S	42.2003	-124.6970	nd	nd	Tynan	SFS	Line 11, leave station 11-5
NH16200.20	BigEyes	mams	Trans	LN11	10	6	1629	E	42.2002	-124.6265	nd	nd	Tynan	SFS	Line 11, on station 11-4
NH16200.21	VPT	44	53	11-4	10	6	1630	S	42.2005	-124.6290	351	100	ZoPIs	SFS	
NH16200.22	BigEyes	mams	Trans	LN11	10	6	1649	S	42.2015	-124.6262	nd	nd	Tynan	SFS	Line 11, leave station 11-4
NH16200.23	BigEyes	mams	Trans	LN11	10	6	1708	E	42.1995	-124.5578	nd	nd	Tynan	SFS	Line 11, on station 11-3, VPT
NH16200.24	VPT	45	54	11-3	10	6	1718	S	42.1993	-124.5627	163	100	ZoPIs	SFS	
NH16200.25	BigEyes	mams	Trans	LN11	10	6	1735	S	42.1995	-124.5550	158	nd	Tynan	SFS	Line 11
NH16200.26	BigEyes	mams	Trans	LN11	10	6	1753	E	42.1985	-124.4915	nd	nd	Tynan	SFS	Line 11, on station 11-2
NH16200.27	VPT	46	55	11-2	10	6	1757	S	42.2007	-124.4927	122	100	ZoPIs	SFS	
NH16200.28	BigEyes	mams	Trans	LN11	10	6	1812	S	42.2022	-124.4958	115	nd	Tynan	SFS	Line 11, leave 11-2
NH16200.29	BigEyes	mams	Trans	LN11	10	6	1828	E	42.2002	-124.4447	nd	nd	Tynan	SFS	Line 11, just before 11-1
NH16200.30	H.Binocs	birds	Trans	LN11	10	6	1840	E	42.2000	-124.4400	70	nd	Ainley	SFS	
NH16200.31	VPT	47	56	11-1	10	6	1845	S	42.1978	-124.4225	72	63	ZoPIs	SFS	
NH16200.32	LiveNet1	21	57	RR-A	10	6	2121	S	42.4440	-124.6213	95	50	ZoPIs	SFS	
NH16200.33	LiveNet1	22	58	RR-B	10	6	2215	S	42.5072	-124.6362	nd	50	ZoPIs	SFS	
NH16200.34	LiveNet1	23	59	RR-C	10	6	2324	S	42.5240	-124.6070	nd	50	ZoPIs	SFS	

Event#	Instr	Cast	Sta	Sta std	Day	Mos	Time	S/E flag	Lat	Long	Water Depth	Cast Depth	SI	Reg	Comments
NH16300.01	LiveNet1	24	60	RR-D	11	6	0020	S	42.5355	-124.6808	nd	50	ZoPIs	SFS	
NH16300.02	H.Binocs	birds	Trans	LN7	11	6	0813	S	43.2225	-124.4617	50	nd	Ainley	nd	Line 7
NH16300.03	BigEyes	mams	Trans	LN7	11	6	0813	S	43.2185	-124.4567	50	nd	Tynan	NFS	Line 7, 3nm behind R/V Wecoma
NH16300.04	H.Binocs	mams	Trans	LN7	11	6	0910	nd	43.2210	-124.6255	130	nd	Tynan	NFS	Line 7, Beaufort 6-7
NH16300.05	H.Binocs	mams	Trans	LN7	11	6	1024	E	43.2158	-124.8330	336	nd	Tynan	NFS	Line 7 at FM7, c/c south to follow Wecoma
NH16300.06	H.Binocs	birds	Trans	LN7	11	6	1024	E	43.2157	-124.8330	336	nd	Ainley	nd	
NH16300.07	VPT	48	61	7A-A	11	6	1115	S	43.0617	-124.4858	54	50	ZoPIs	nd	
NH16300.08	H.Binocs	birds	Trans	LN7a	11	6	1157	S	43.0797	-124.8313	206	nd	Ainley	nd	Line 7a
NH16300.09	H.Binocs	mams	Trans	LN7a	11	6	1157	S	43.0810	-124.8315	206	nd	Tynan	NFS	Line 7a, behind R/V Wecoma, Beaufort 7
NH16300.10	H.Binocs	birds	Trans	LN7a	11	6	1400	E	43.0693	-124.4898	55	nd	Ainley	nd	
NH16300.11	H.Binocs	mams	Trans	Trans	11	6	1400	E	43.0693	-124.4898	55	nd	Tynan	NFS	Transit from Lines 7a to 8; try station work
NH16300.12	H.Binocs	birds	Trans	LN8	11	6	1536	S	42.9497	-124.5535	58	nd	Ainley	nd	
NH16300.13	H.Binocs	mams	Trans	LN8	11	6	1536	S	42.9497	-124.5535	58	nd	Tynan	NFS	Line 8
NH16300.14	H.Binocs	mams	Trans	LN8	11	6	1600	E	42.9500	-124.6178	86	nd	Tynan	NFS	Line 8, on station 8-1
NH16300.15	VPT	49	63	8-1	11	6	1604	S	42.9483	-124.6162	88	80	ZoPIs	nd	
NH16300.16	H.Binocs	mams	Trans	LN8	11	6	1621	S	42.9437	-124.6107	nd	nd	Tynan	NFS	Line 8
NH16300.17	H.Binocs	mams	Trans	LN8	11	6	1645	E	42.9452	-124.6675	110	nd	Tynan	NFS	Line 8, small-boat becomes loose on deck
NH16300.18	H.Binocs	mams	Trans	LN8	11	6	1745	S	42.9482	-124.6648	112	nd	Tynan	NFS	Line 8, small-boat secured again
NH16300.19	H.Binocs	mams	Trans	LN8	11	6	1814	E	42.9512	-124.7247	143	nd	Tynan	NFS	Line 8, on station 8-2
NH16300.20	VPT	50	64	8-2	11	6	1818	S	42.9478	-124.7210	143	100	ZoPIs	nd	
NH16300.21	H.Binocs	mams	Trans	LN8	11	6	1845	S	42.9520	-124.7325	146	nd	Tynan	NFS	Line 8, leave station 8-2
NH16300.22	VPT	51	65	8-3	11	6	1900	S	42.9478	-124.8333	nd	100	ZoPIs	nd	No latitude logged
NH16300.23	H.Binocs	birds	Trans	LN8	11	6	1940	E	42.9537	-124.8258	118	nd	Ainley	nd	
NH16300.24	H.Binocs	mams	Trans	LN8	11	6	1940	E	42.9537	-124.8260	nd	nd	Tynan	NFS	Line 8, station 8-3, humpbacks
NH16300.25	VPT	52	66	8-4	11	6	2055	S	42.9505	-124.8945	nd	100	ZoPIs	nd	
NH16400.01	H.Binocs	mams	Trans	Trans	12	6	0757	S	44.4263	-125.1655	1335	nd	Tynan	1	Transit to Line 1, Newport Line NH55, fog
NH16400.02	H.Binocs	birds	Trans	Trans	12	6	0800	S	44.4267	-125.1600	1335	nd	Ainley	1	
NH16400.03	H.Binocs	birds	Trans	Trans	12	6	1000	E	44.6317	-125.3567	2298	nd	Ainley	1	
NH16400.04	H.Binocs	mams	Trans	LN-NH	12	6	1000	E	44.6500	-125.3697	nd	nd	Tynan	1	c/c on to Line 1, Newport Line
NH16400.05	H.Binocs	birds	Trans	LN-NH	12	6	1015	S	44.6500	-125.2983	2502	nd	Ainley	1	
NH16400.06	H.Binocs	mams	Trans	LN-NH	12	6	1016	S	44.6493	-125.3100	nd	nd	Tynan	1	
NH16400.07	H.Binocs	mams	Trans	LN-NH	12	6	1108	E	44.6537	-125.1207	586	nd	Tynan	1	Line 1, on station NH45, VPT & CTD
NH16400.08	VPT	53	67	NH45	12	6	1117	S	44.6503	-125.1212	1497	100	ZoPIs	1	
NH16400.09	CTD	26	67	NH45	12	6	1130	S	44.6465	-125.1263	894	nd	ZoPIs	1	
NH16400.10	CTD	26	67	NH45	12	6	nd	E	nd	nd	nd	nd	nd	nd	
NH16400.11	BigEyes	mams	Trans	LN-NH	12	6	1254	S	44.6267	-125.1632	549	nd	Tynan	1	Line 1, leave station NH45, few mammals
NH16400.12	BigEyes	mams	Trans	LN-NH	12	6	1527	E	44.6515	-124.6510	nd	nd	Tynan	1	Line 1, on station NH25
NH16400.13	VPT	54	68	NH25	12	6	1530	S	44.6522	-124.6518	297	100	ZoPIs	1	
NH16400.14	CTD	27	68	NH25	12	6	1545	S	44.6510	-124.6583	281	270	ZoPIs	1	
NH16400.15	CTD	27	68	NH25	12	6	nd	E	nd	nd	nd	nd	nd	nd	
NH16400.16	BigEyes	mams	Trans	LN-NH	12	6	1636	S	44.6530	-124.6547	117	nd	Tynan	1	Line 1, leave station NH25, no mammals
NH16400.17	BigEyes	mams	Trans	LN-NH	12	6	1712	E	44.6520	-124.5275	nd	nd	Tynan	1	Line 1, on station NH20
NH16400.18	VPT	55	69	NH20	12	6	1725	S	44.6538	-124.5275	144	100	ZoPIs	1	
NH16400.19	BigEyes	mams	Trans	LN-NH	12	6	1749	S	44.6545	-124.4978	136	nd	Tynan	1	Line 1, leave station NH20
NH16400.20	BigEyes	mams	Trans	LN-NH	12	6	1813	E	44.6530	-124.4107	nd	nd	Tynan	1	Line 1, on station NH15
NH16400.21	VPT	56	70	NH15	12	6	1820	S	44.6553	-124.4145	100	92	ZoPIs	1	
NH16400.22	BigEyes	mams	Trans	LN-NH	12	6	1835	S	44.6573	-124.3987	92	nd	Tynan	1	Line 1, leave station NH15
NH16400.23	BigEyes	mams	Trans	LN-NH	12	6	1904	E	44.6528	-124.2943	nd	nd	Tynan	1	Line 1, on station NH10, very few mammals
NH16400.24	VPT	57	71	NH10	12	6	1910	S	44.6528	-124.2305	83	78	ZoPIs	1	
NH16400.25	BigEyes	mams	Trans	LN-NH	12	6	1926	S	44.6547	-124.2772	80	nd	Tynan	1	Line 1, leave station NH10
NH16400.26	BigEyes	mams	Trans	LN-NH	12	6	1952	E	44.6525	-124.1785	58	nd	Tynan	1	Line 1, on station NH5, Steller sea lion

Event#	Instr	Cast	Sta	Sta std	Day	Mos	Time	S/E flag	Lat	Long	Water Depth	Cast Depth	SI	Reg	Comments
NH16400.27	BigEyes	mams	Trans	LN-NH	12	6	2011	S	44.6530	-124.1773	nd	nd	Tynan	1	Line 1, leave NH5, harbor porpoise
NH16400.28	H.Binocs	mams	Trans	LN-NH	12	6	2035	E	44.6537	-124.1122	nd	nd	Tynan	1	Line 1, on station NH3, murres feeding
NH16400.29	H.Binocs	birds	Trans	LN-NH	12	6	2035	E	44.6500	-124.1283	45	35	Ainley	1	
NH16400.30	VPT	58	72	NH2	12	6	2040	S	44.6542	-124.1150	45	nd	ZoPIs	1	
NH16400.31	CTD	28	73	NH5	12	6	2204	S	44.6543	-124.1792	63	50	ZoPIs	1	
NH16400.32	CTD	28	73	NH5	12	6	nd	E	nd	nd	nd	nd	nd	nd	
NH16400.33	CTD	29	71	NH10	12	6	2300	S	44.6530	-124.2903	83	75	ZoPIs	1	No bottles
NH16400.34	CTD	29	71	NH10	12	6	nd	E	nd	nd	nd	nd	nd	nd	
NH16500.01	CTD	30	70	NH15	13	6	0002	S	44.6512	-124.4130	92	80	ZoPIs	1	
NH16500.02	CTD	30	70	NH15	13	6	nd	E	nd	nd	nd	nd	nd	nd	
NH16500.03	H.Binocs	birds	Trans	Trans	13	6	0600	S	44.8317	-124.8900	366	nd	Ainley	5	
NH16500.04	BigEyes	mams	Trans	Trans	13	6	0604	S	43.8295	-124.8908	366	nd	Tynan	5	Transit to west end Line 6
NH16500.05	H.Binocs	birds	Trans	nd	13	6	0730	E	43.6283	-125.0117	787	nd	Ainley	5	
NH16500.06	BigEyes	mams	Trans	Trans	13	6	0734	E	43.5923	-125.0358	1061	nd	Tynan	5	Transit to west end Line 6
NH16500.07	H.Binocs	birds	Trans	LN6	13	6	0800	S	43.5200	-125.0867	1262	nd	Ainley	6	
NH16500.08	BigEyes	mams	Trans	LN6	13	6	0810	S	43.5065	-125.0943	1262	nd	Tynan	6	c/c on to Line 6 heading east
NH16500.09	BigEyes	mams	Trans	LN6	13	6	0955	E	43.5017	-124.7327	549	nd	Tynan	6	Line 6
NH16500.10	BigEyes	mams	Trans	LN6	13	6	1015	S	43.4987	-124.7353	549	nd	Tynan	6	Line 6
NH16500.11	BigEyes	mams	Trans	LN6	13	6	1038	E	43.5010	-124.6672	nd	nd	Tynan	6	c/c for dead pinniped - Cal. Sea lion
NH16500.12	BigEyes	mams	Trans	LN6	13	6	1043	S	43.5058	-124.6558	nd	nd	Tynan	6	
NH16500.13	BigEyes	mams	Trans	LN6	13	6	1126	E	43.5008	-124.5018	nd	nd	Tynan	6	Line 6
NH16500.14	BigEyes	mams	Trans	LN6	13	6	1212	S	43.5007	-124.5067	239	nd	Tynan	6	Line 6, in low sal. Plume water
NH16500.15	H.Binocs	birds	Trans	nd	13	6	1255	E	43.5000	-124.3317	88	nd	Ainley	6	
NH16500.16	BigEyes	mams	Trans	LN6	13	6	1309	E	43.4987	-124.3062	60	nd	Tynan	6	Line 6 end
NH16500.17	H.Binocs	birds	Trans	Trans	13	6	1315	S	43.4933	-124.3167	74	nd	Ainley	7	
NH16500.18	BigEyes	mams	Trans	Trans	13	6	1318	S	43.4908	-124.3180	73	nd	Tynan	7	Transit south, gray whale, humpbacks
NH16500.19	BigEyes	mams	Trans	Trans	13	6	1458	E	43.2592	-124.4957	73	nd	Tynan	7	End transit, south of Cape Arago
NH16500.20	H.Binocs	birds	Trans	nd	13	6	1500	E	43.2833	-124.4833	73	nd	Ainley	7	

APPENDIX II

PLOTS OF IMET DATA FROM NH0005

Plots of Along-Track IMET Data - NH0005 - 28 May - 14 June 2000

(Data for each Day of the Cruise (GMT) are plotted individually)

Page 1 for each day has six plots per page in the following format:

Panel 1: True Wind Speed (m/s)

Panel 2: True Wind Direction (compass degrees, relative to true North); convention is oceanographic (e.g., winds blowing TO; 180 = winds blowing FROM North TO South)

Panel 3: Latitude (degrees)

Panel 4: Longitude (degrees; East is positive; West is Negative)

Panel 5: Atmospheric Pressure (mb)

Panel 6: Air Temperature (deg Celsius)

Page 2 for each day has six plots per page in the following format:

Panel 1: Long Wave Radiation (W/m²)

Panel 2: Short Wave Radiation (W/m²)

Panel 3: Relative Humidity (%)

Panel 4: Sea Surface Temperature (deg Celsius) from two independent sensors

Panel 5: Surface Salinity (psu)

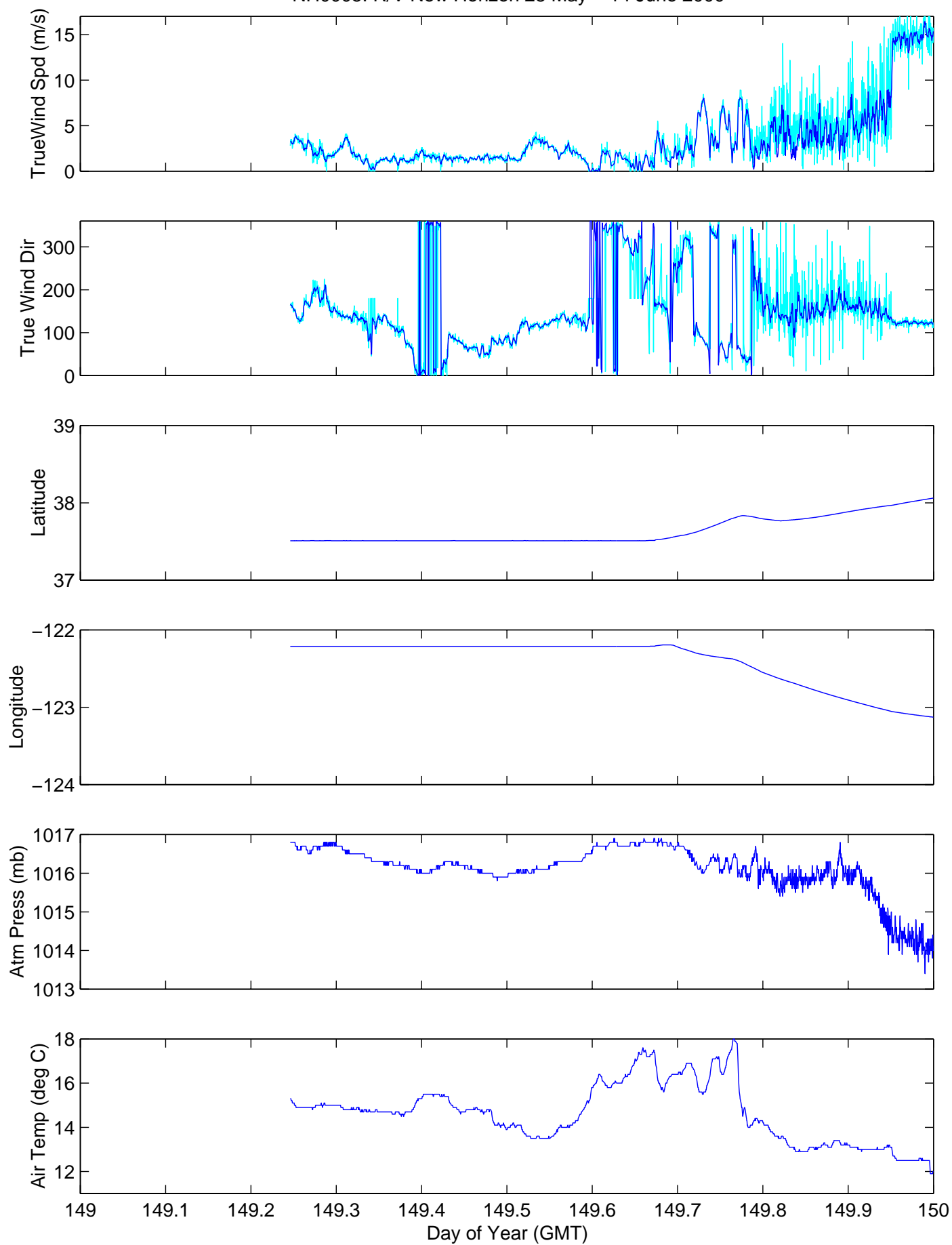
Panel 6: Fluorescence (volts)

Notes:

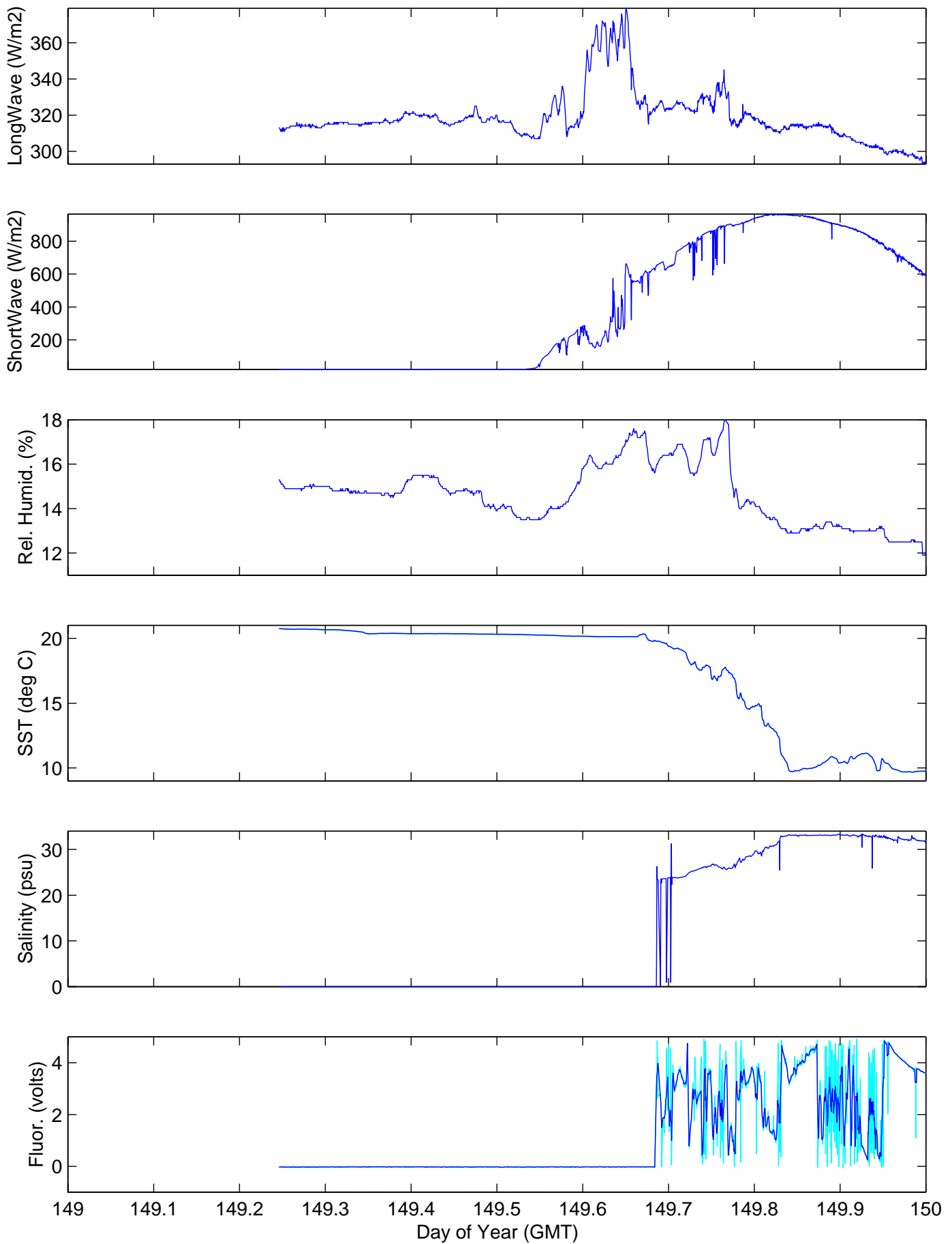
- a) Sample logging onboard done at 15 second intervals
- b) Data are plotted at 15 second intervals
- c) True Wind Speed and Direction and Fluorescence also have overplotted a 3-minute average. Because there was significant loss of data (particularly, position information) in the data stream, the averaging was done for a 3-minute interval centered on the observed data point. Thus, the number of points in the average (dark blue lines) may range from 1 (no averaging) to 12 (all observations from a 3-minute window good). Fluorescence sensor was extremely noisy. Averaging of Wind data done to minimize effects of high frequency ship motion from record.
- d) Plots are available as Encapsulated Postscript Files (eps) on the U.S. GLOBEC NEP website at http://globec.oce.orst.edu/groups/nep/reports/ccs_cruises/.

Alongtrack Sensor Descriptions		
Location	Unit	Sensors
Flying Bridge	Coastal Environmental WeatherPak	Air temp; barometric pressure; wind speed and direction; short wave radiation; long wave radiation; humidity.
Aft Lab	Seabird SBE21 Thermosalinograph Wetlabs Wetstar	Temperature, conductivity, fluorescence.
Engine Room	Dual temperature unit	Sea surface temperature.
Chart Room	Trimble Differential GPS Pcode GPS receiver	Latitude, longitude.
Bridge	Gyroscope compass	Ship's heading.

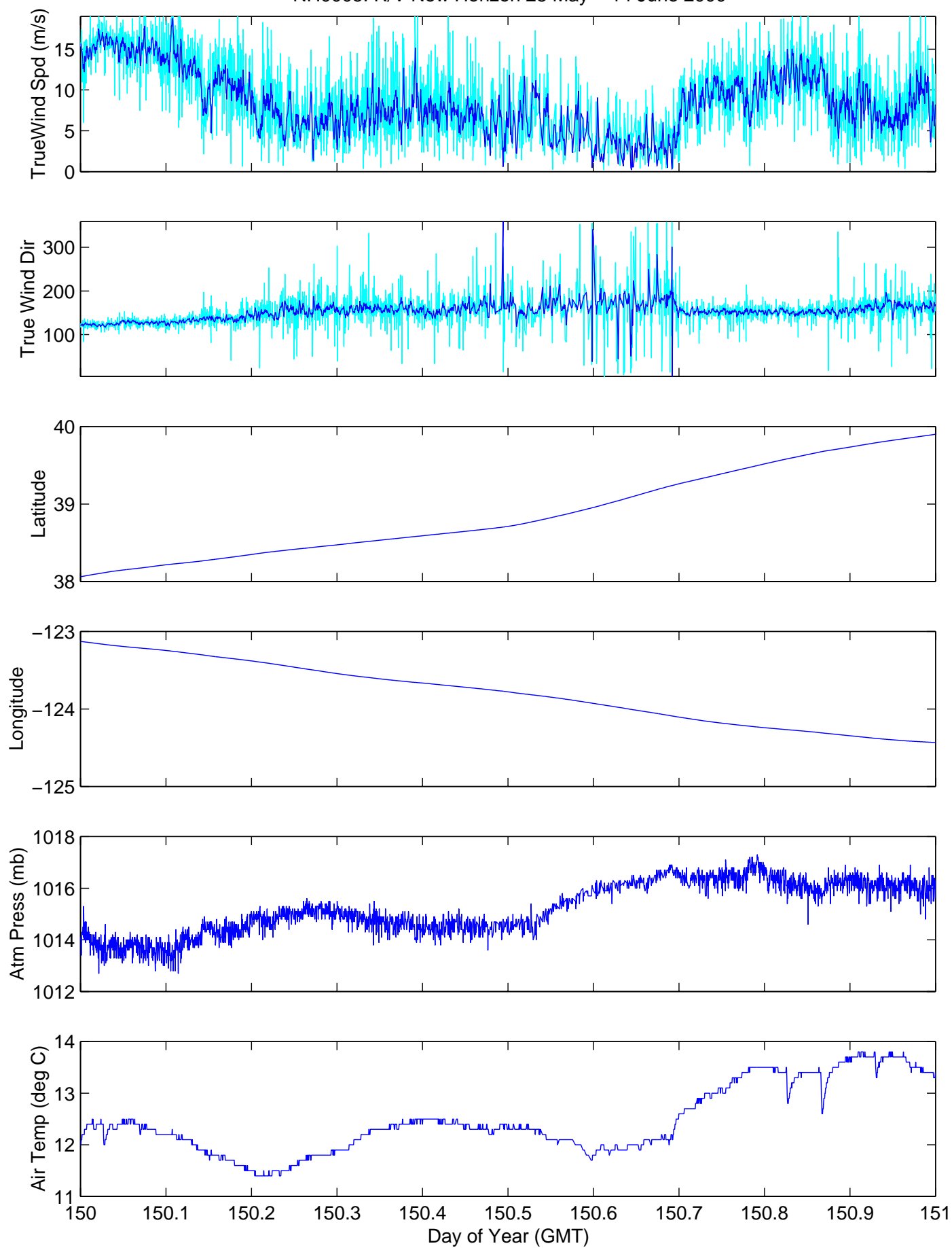
NH0005: R/V New Horizon 28 May – 14 June 2000



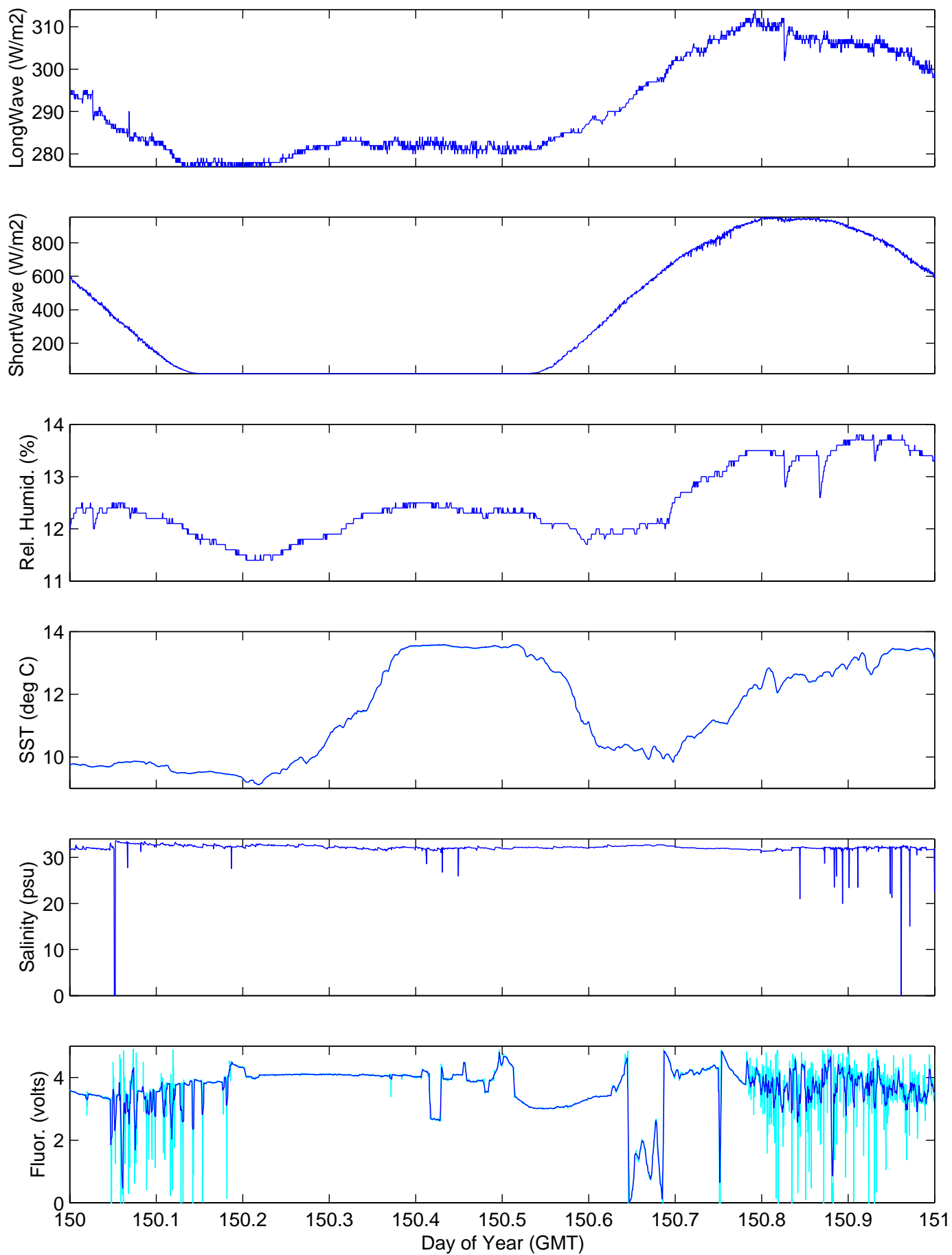
NH0005: R/V New Horizon 28 May – 14 June 2000



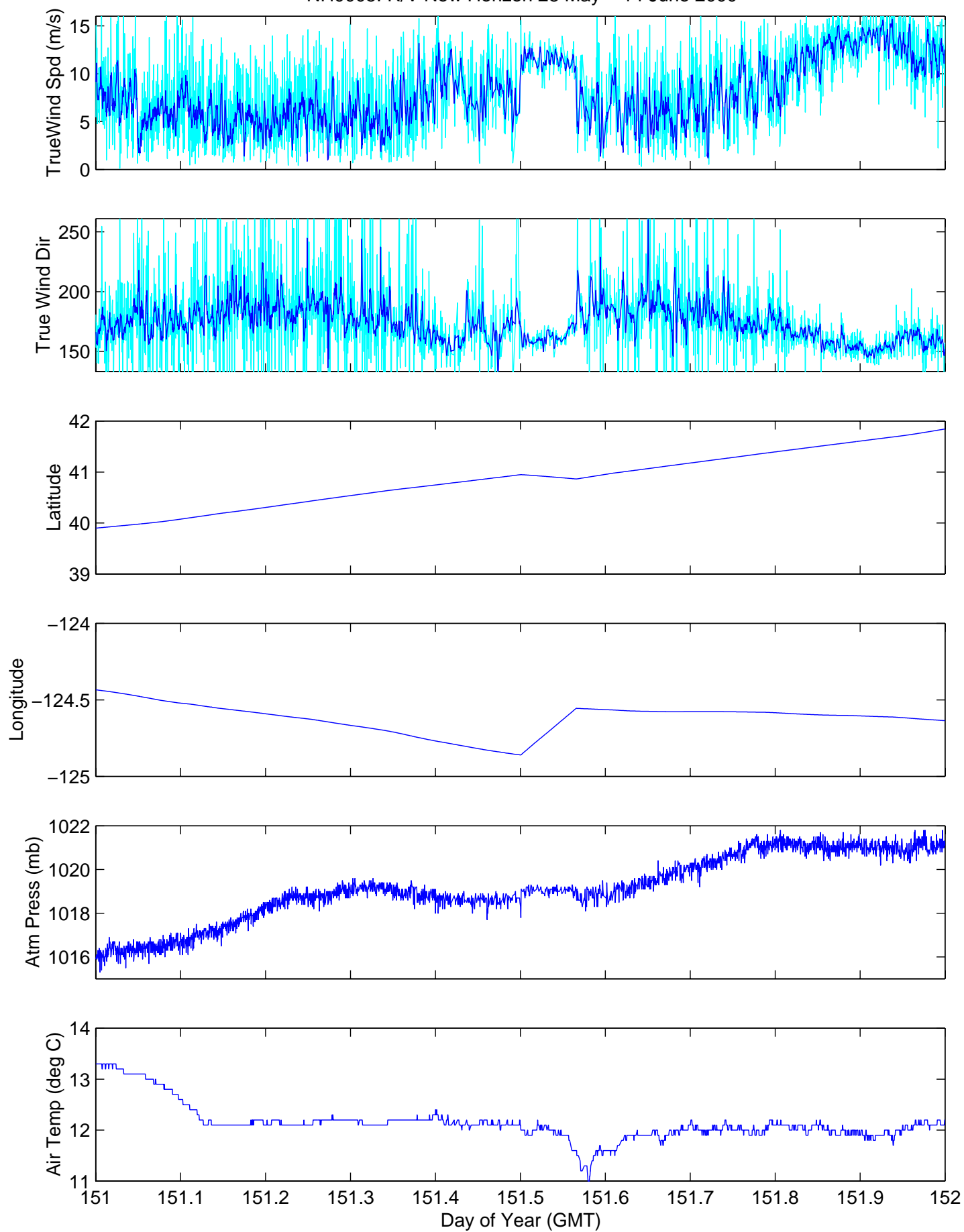
NH0005: R/V New Horizon 28 May – 14 June 2000



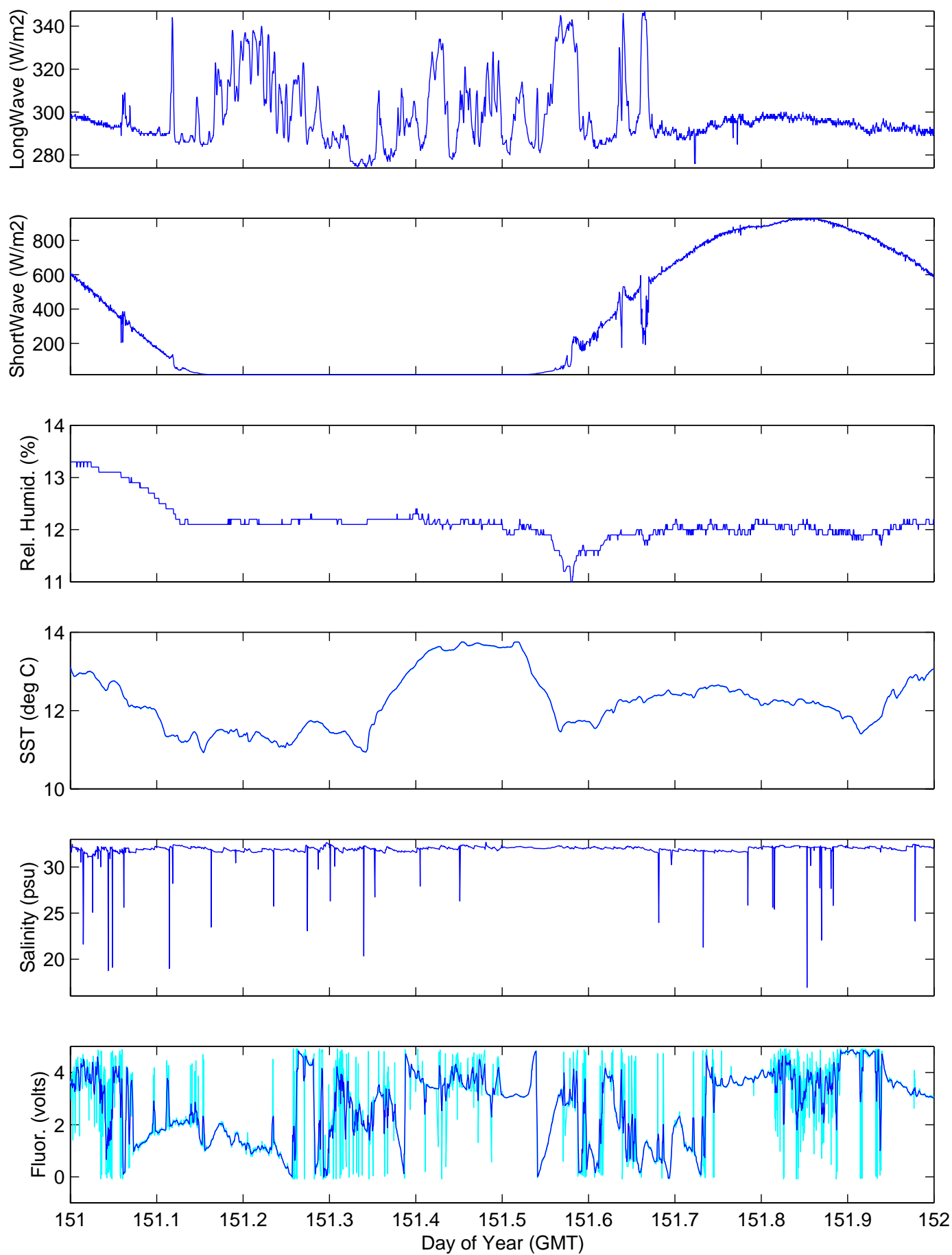
NH0005: R/V New Horizon 28 May – 14 June 2000



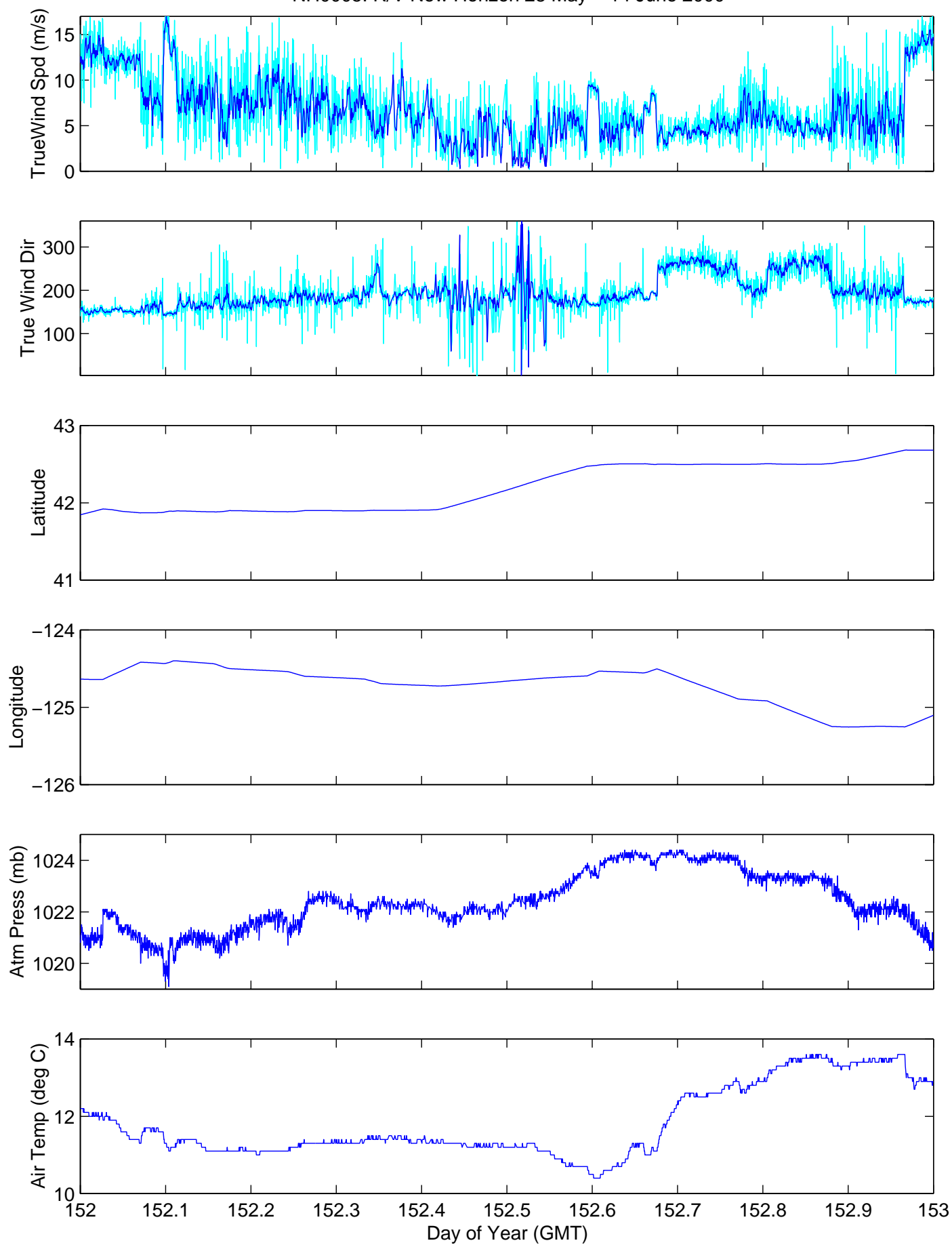
NH0005: R/V New Horizon 28 May – 14 June 2000



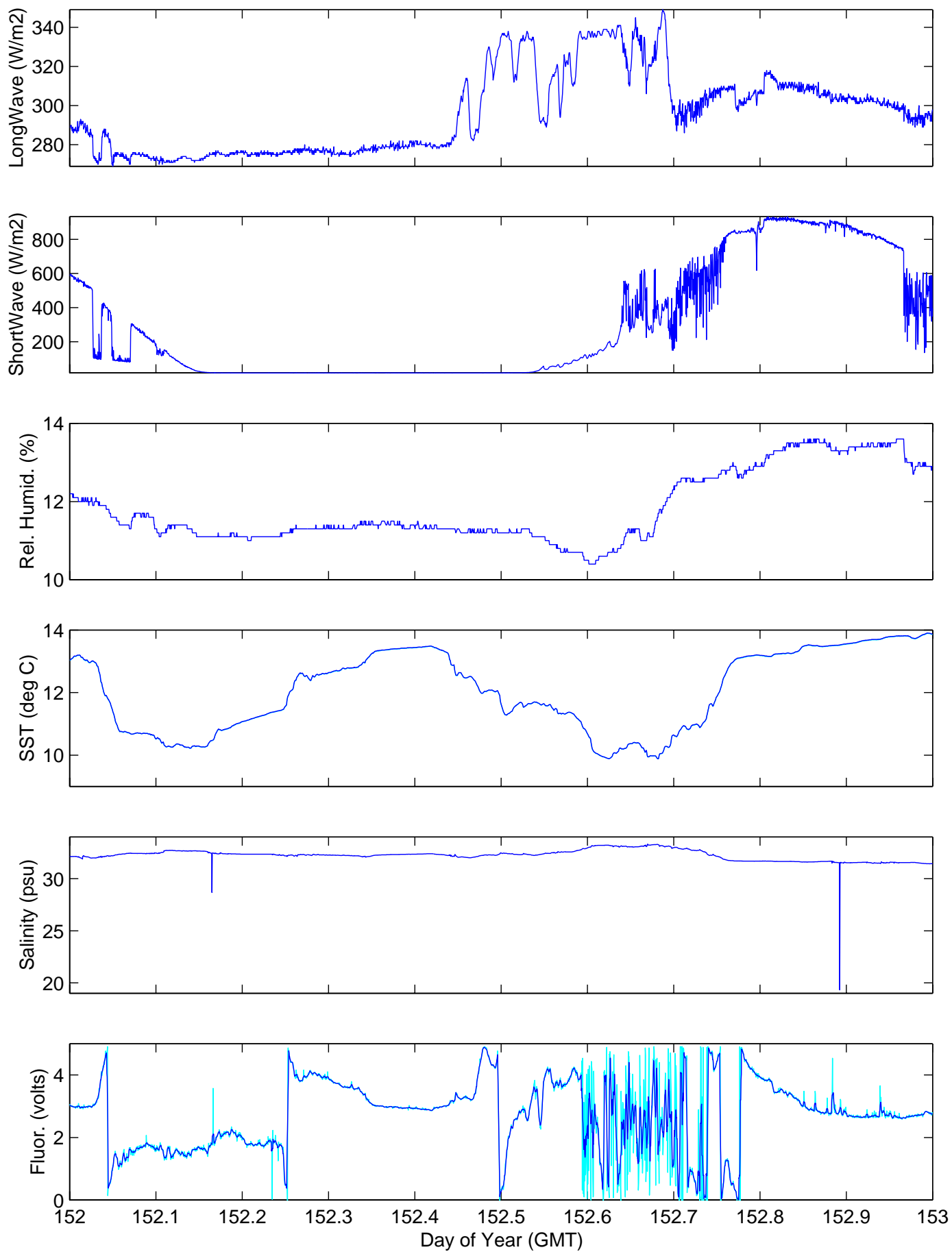
NH0005: R/V New Horizon 28 May – 14 June 2000



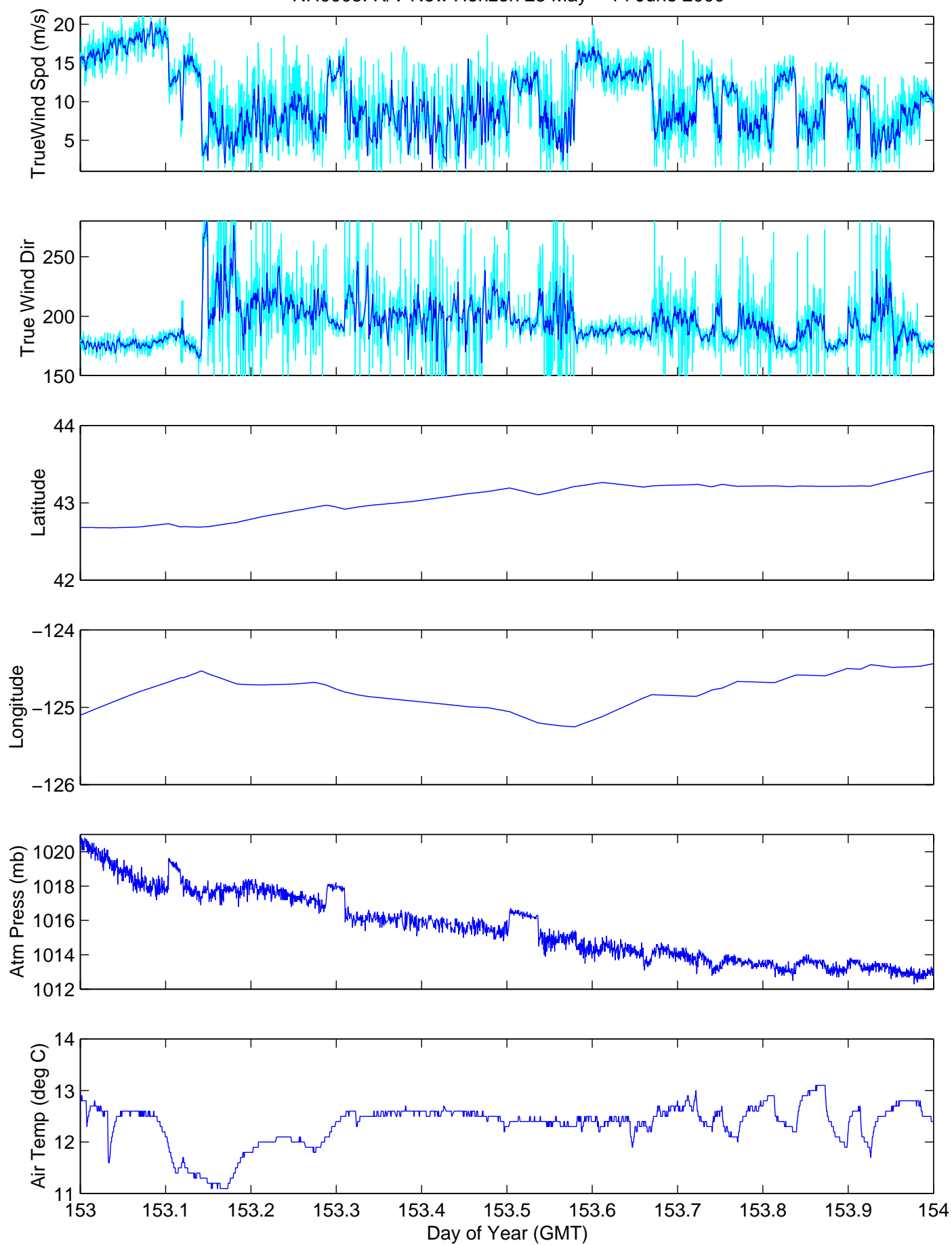
NH0005: R/V New Horizon 28 May – 14 June 2000



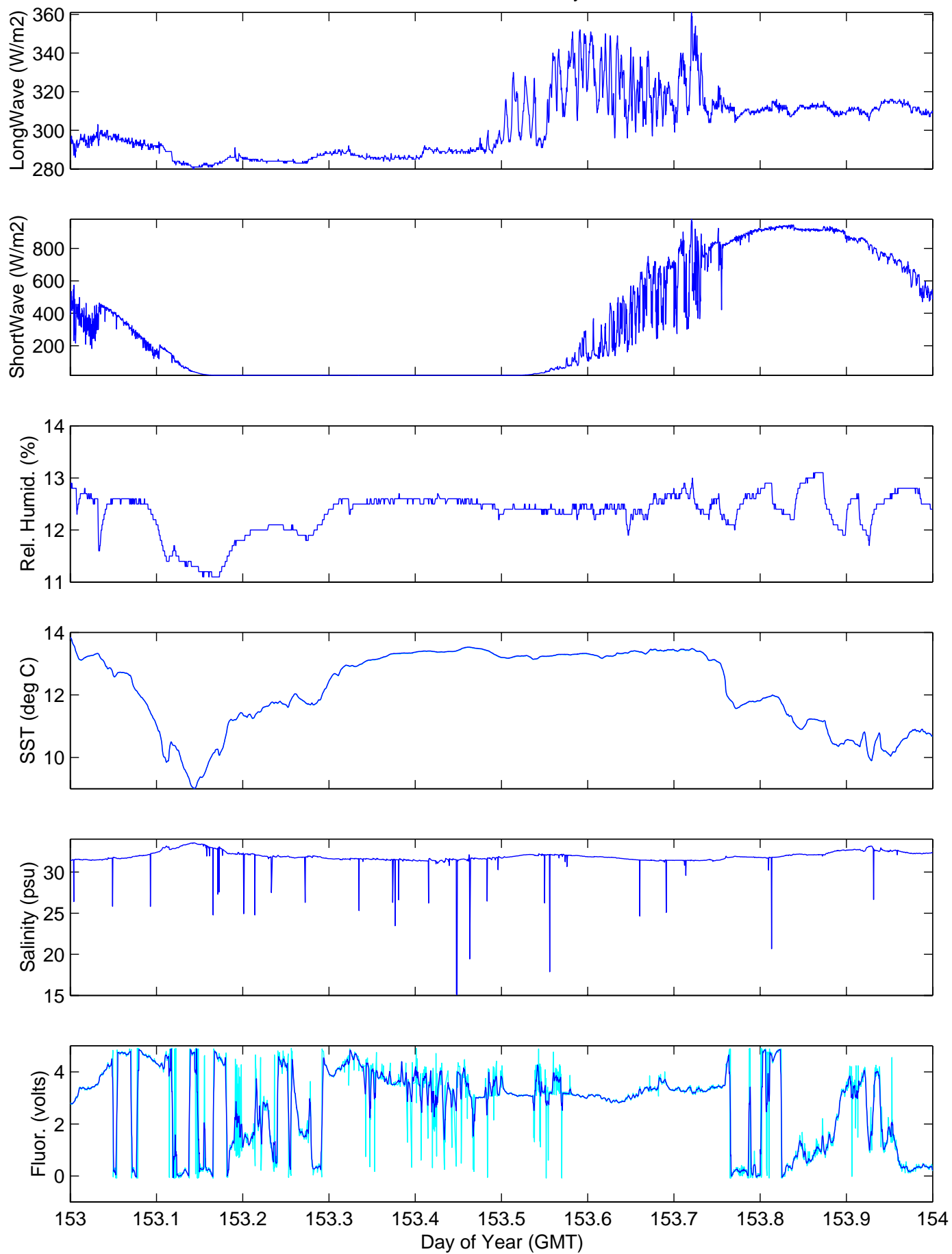
NH0005: R/V New Horizon 28 May – 14 June 2000



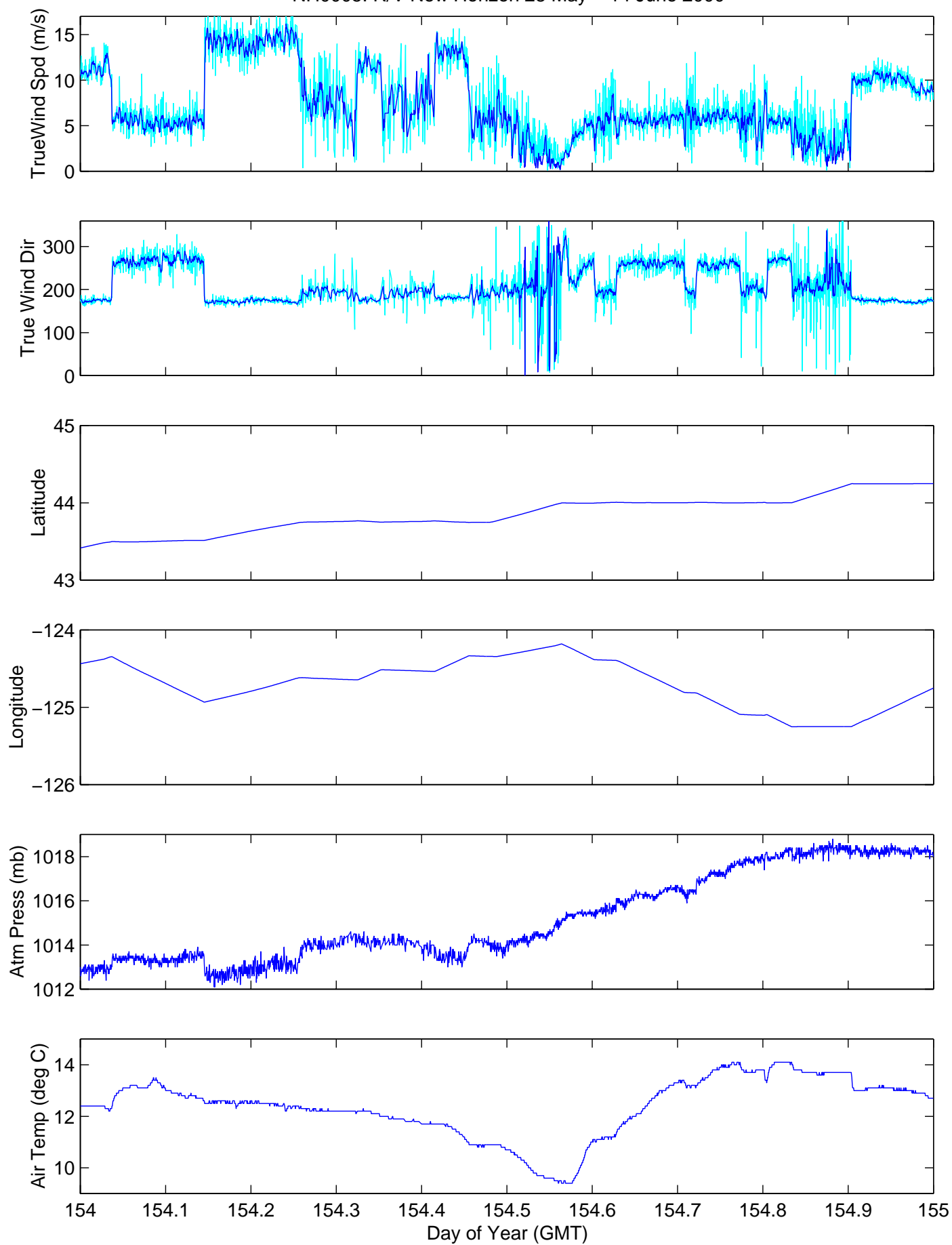
NH0005: R/V New Horizon 28 May – 14 June 2000



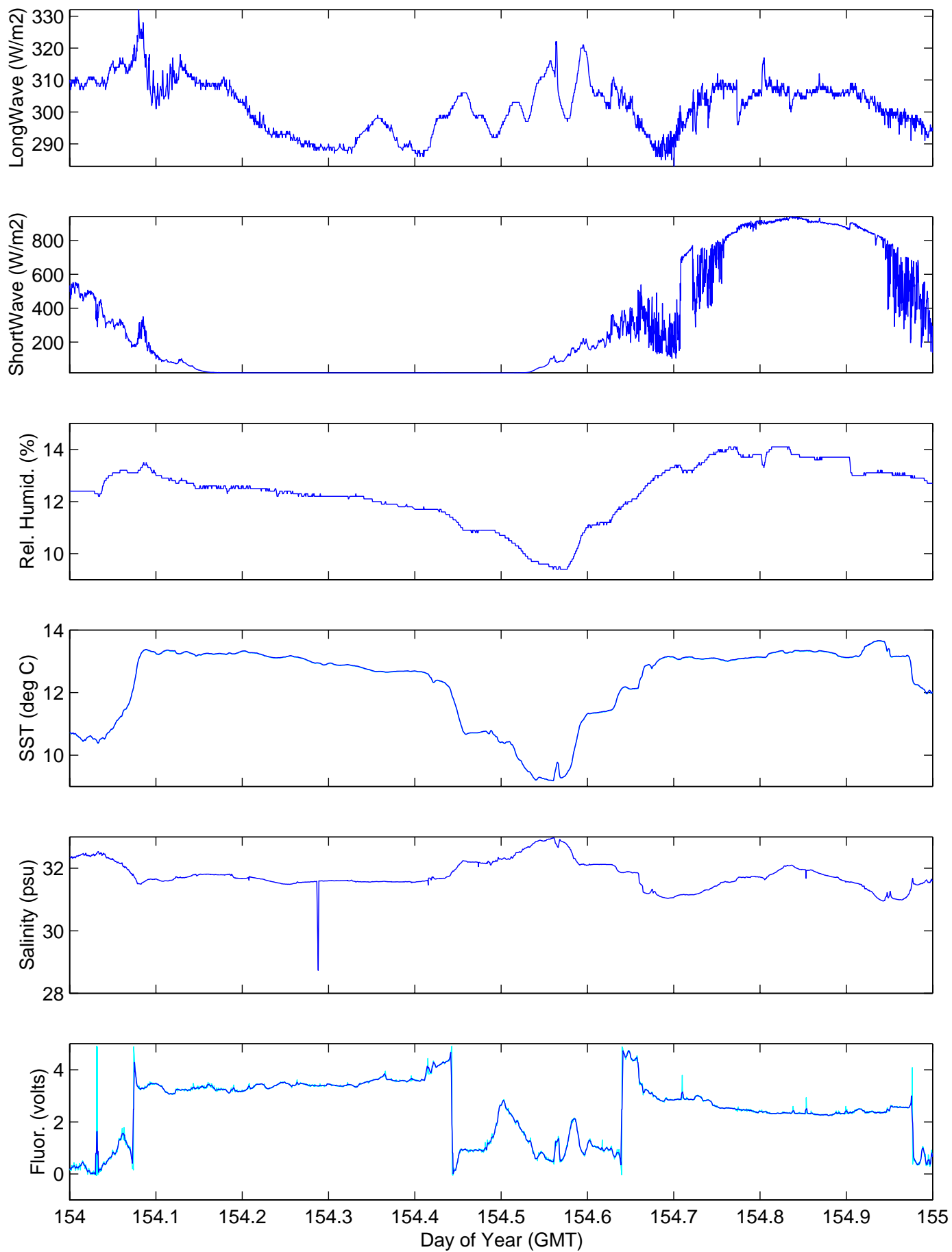
NH0005: R/V New Horizon 28 May – 14 June 2000



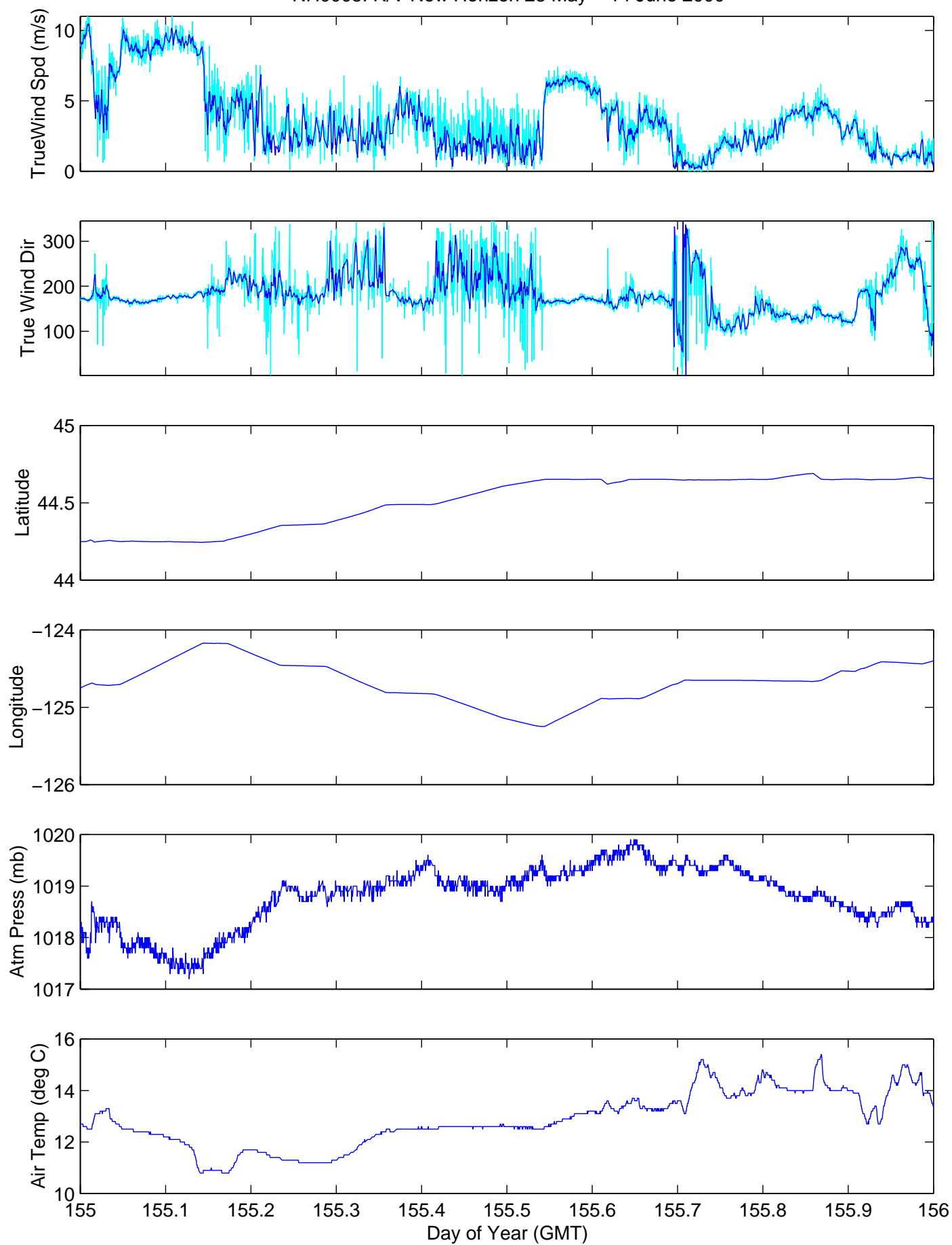
NH0005: R/V New Horizon 28 May – 14 June 2000



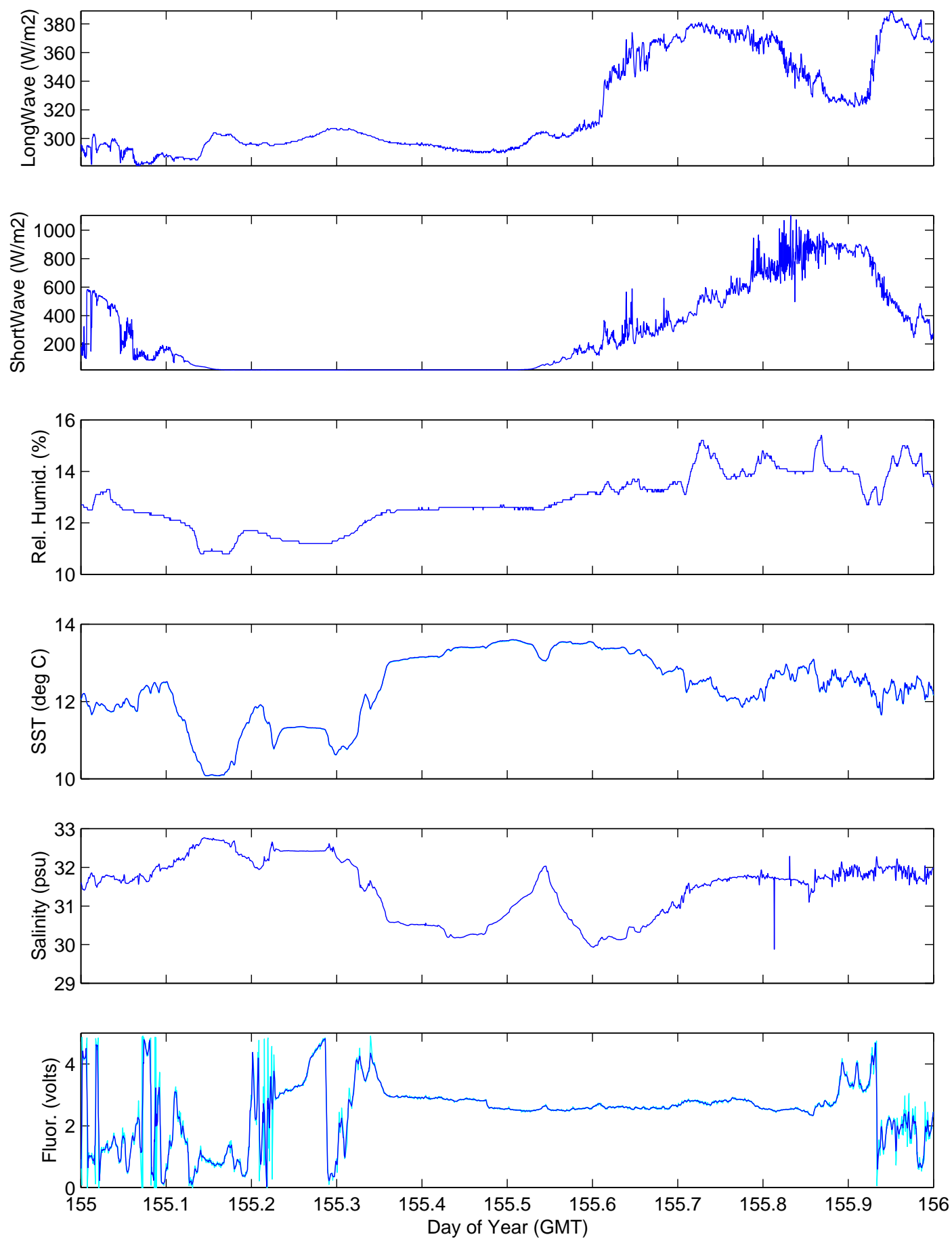
NH0005: R/V New Horizon 28 May – 14 June 2000



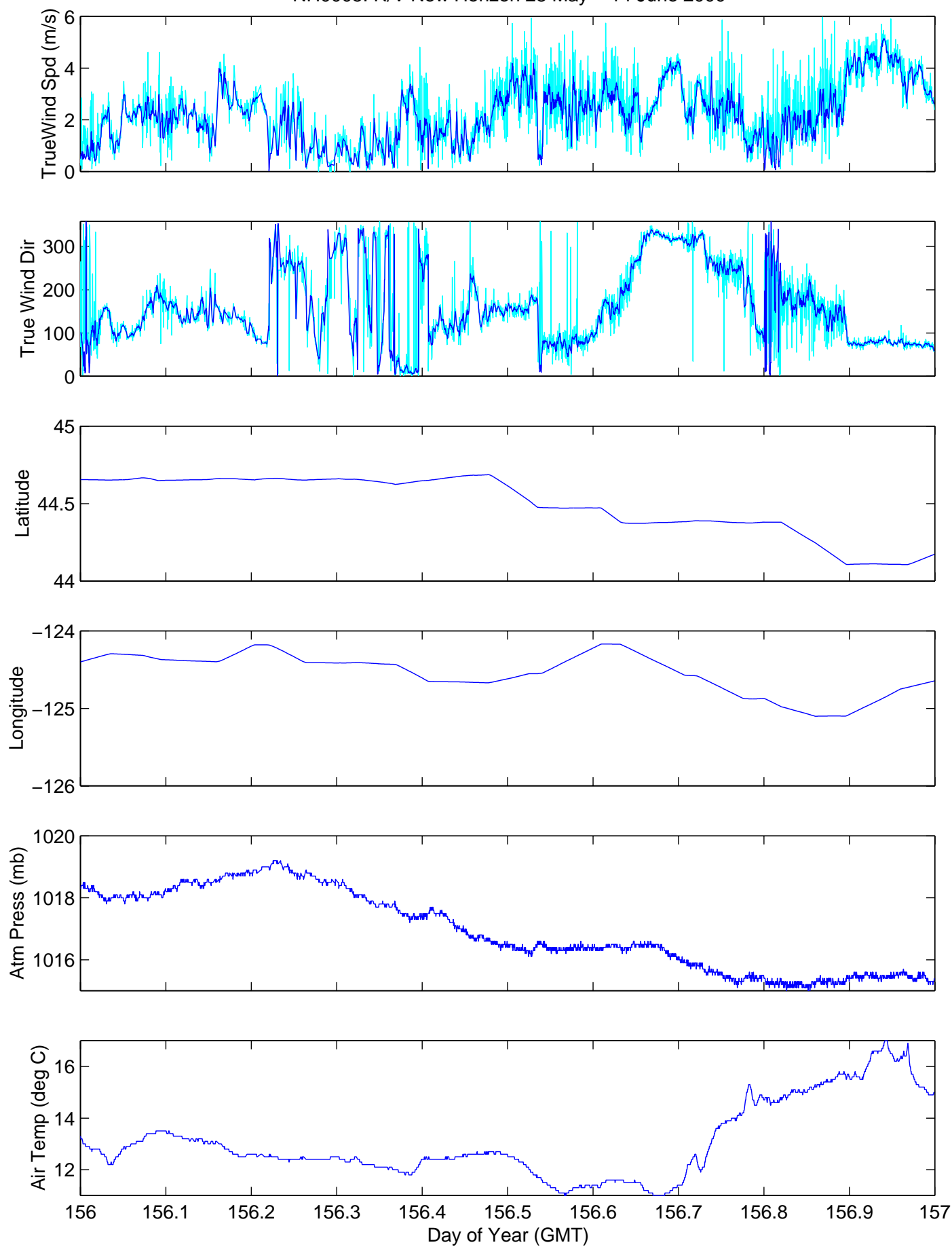
NH0005: R/V New Horizon 28 May – 14 June 2000



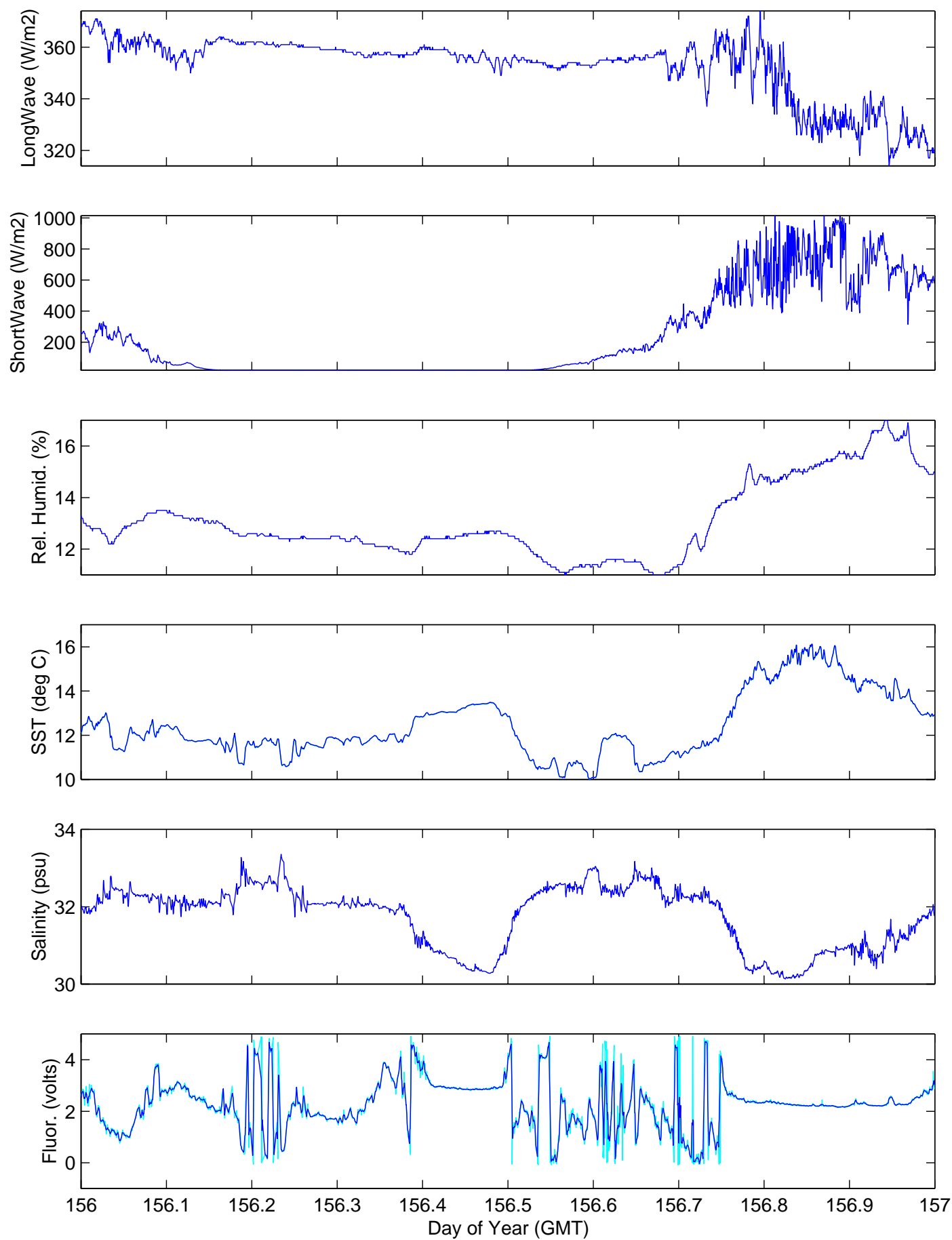
NH0005: R/V New Horizon 28 May – 14 June 2000



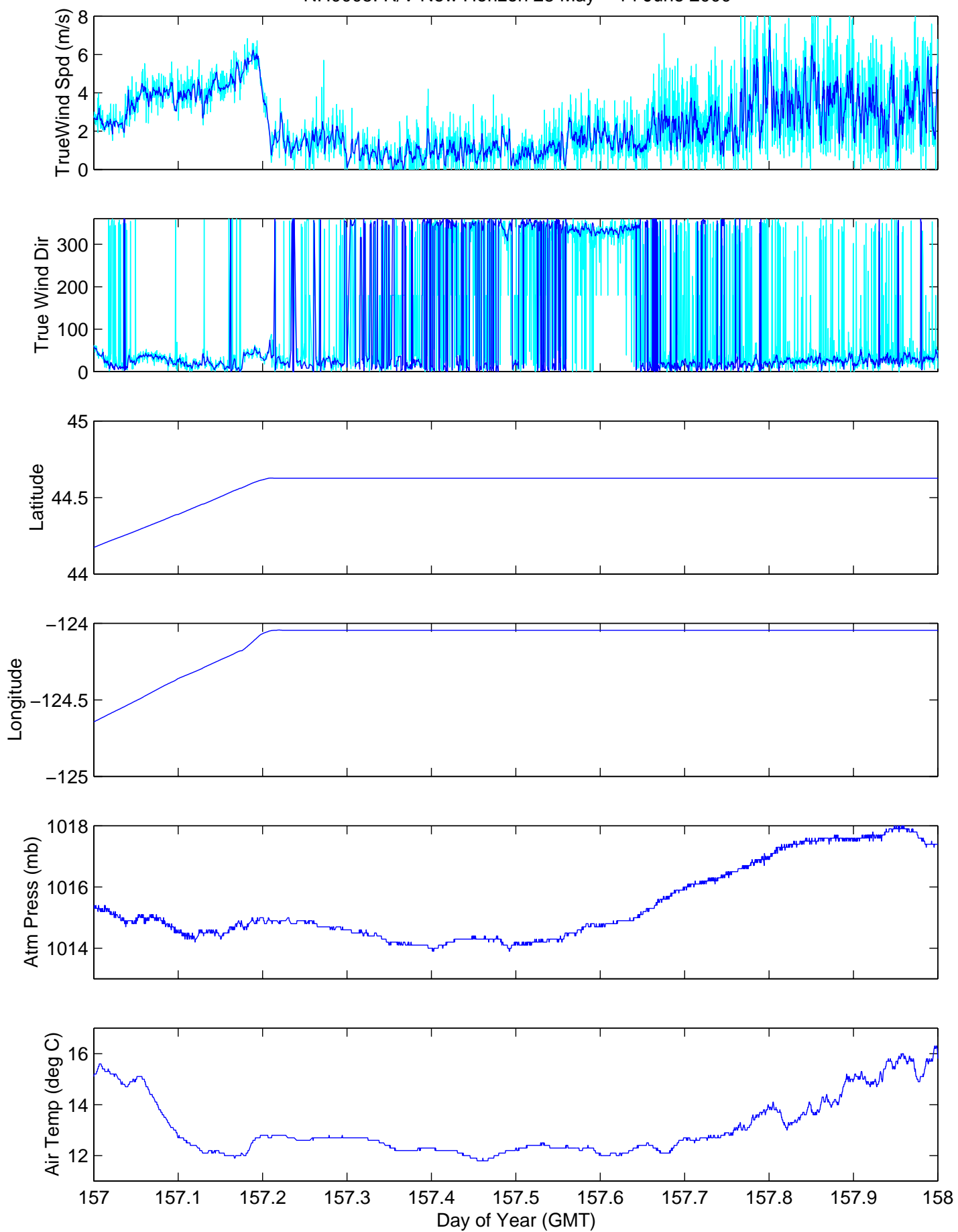
NH0005: R/V New Horizon 28 May – 14 June 2000



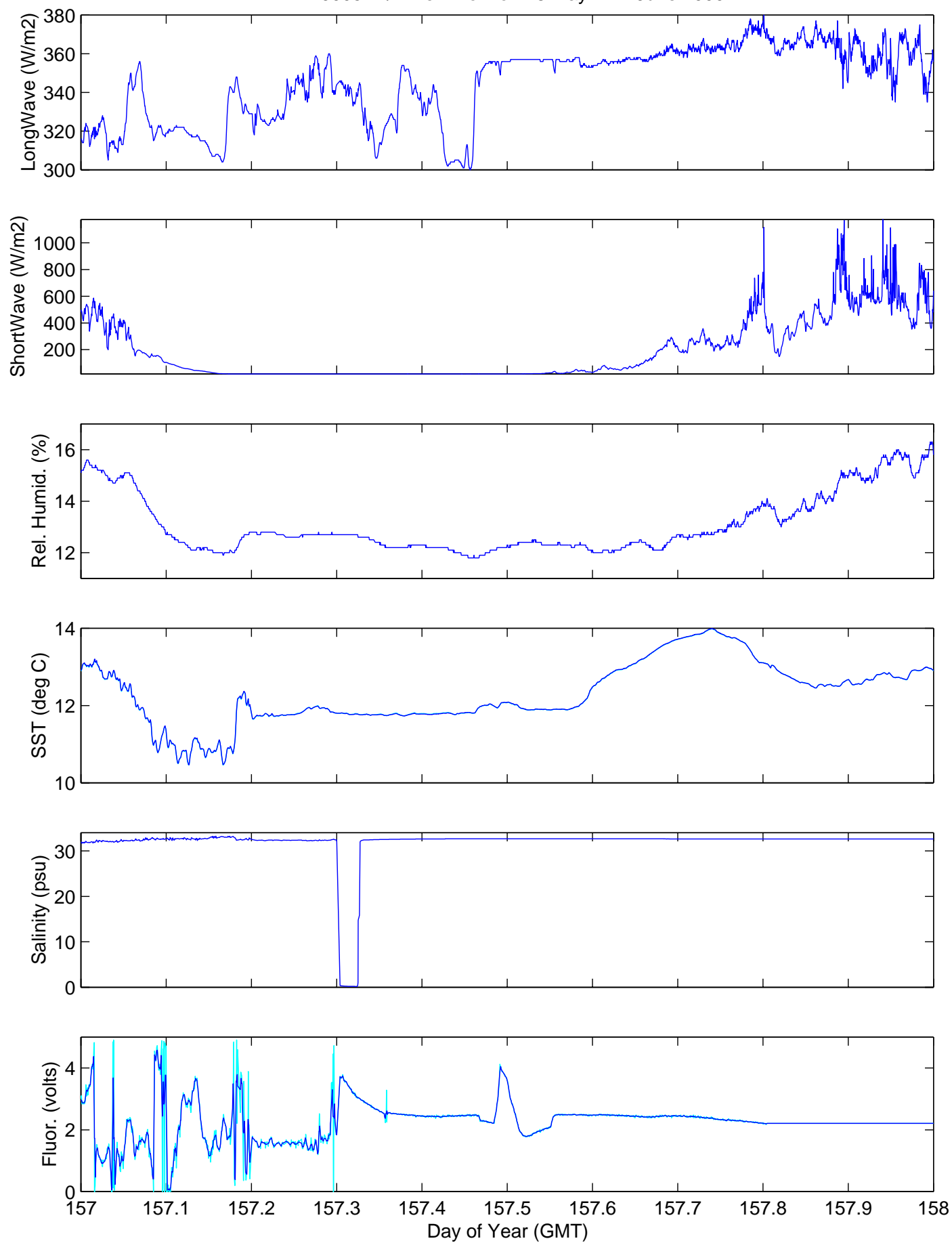
NH0005: R/V New Horizon 28 May – 14 June 2000



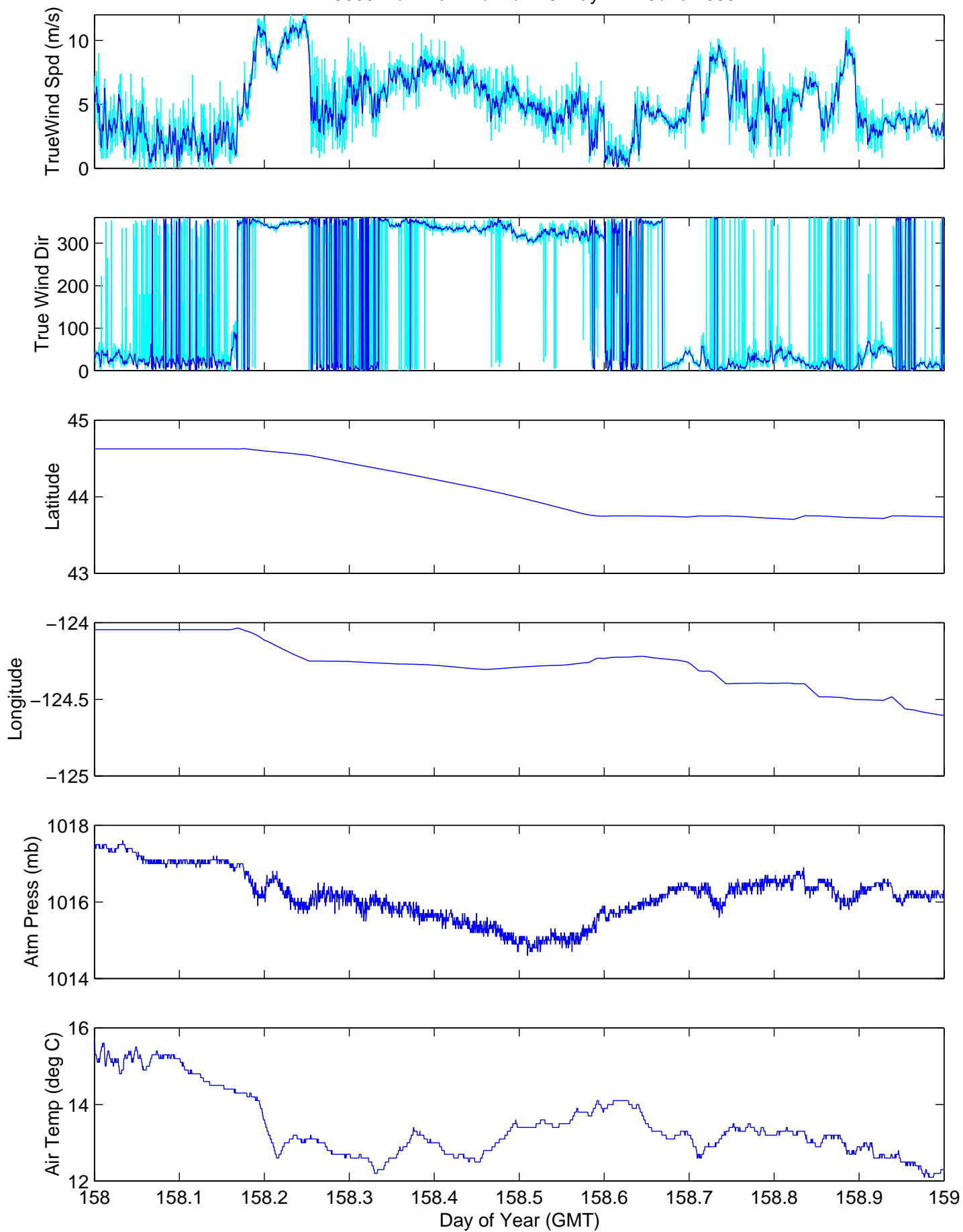
NH0005: R/V New Horizon 28 May – 14 June 2000



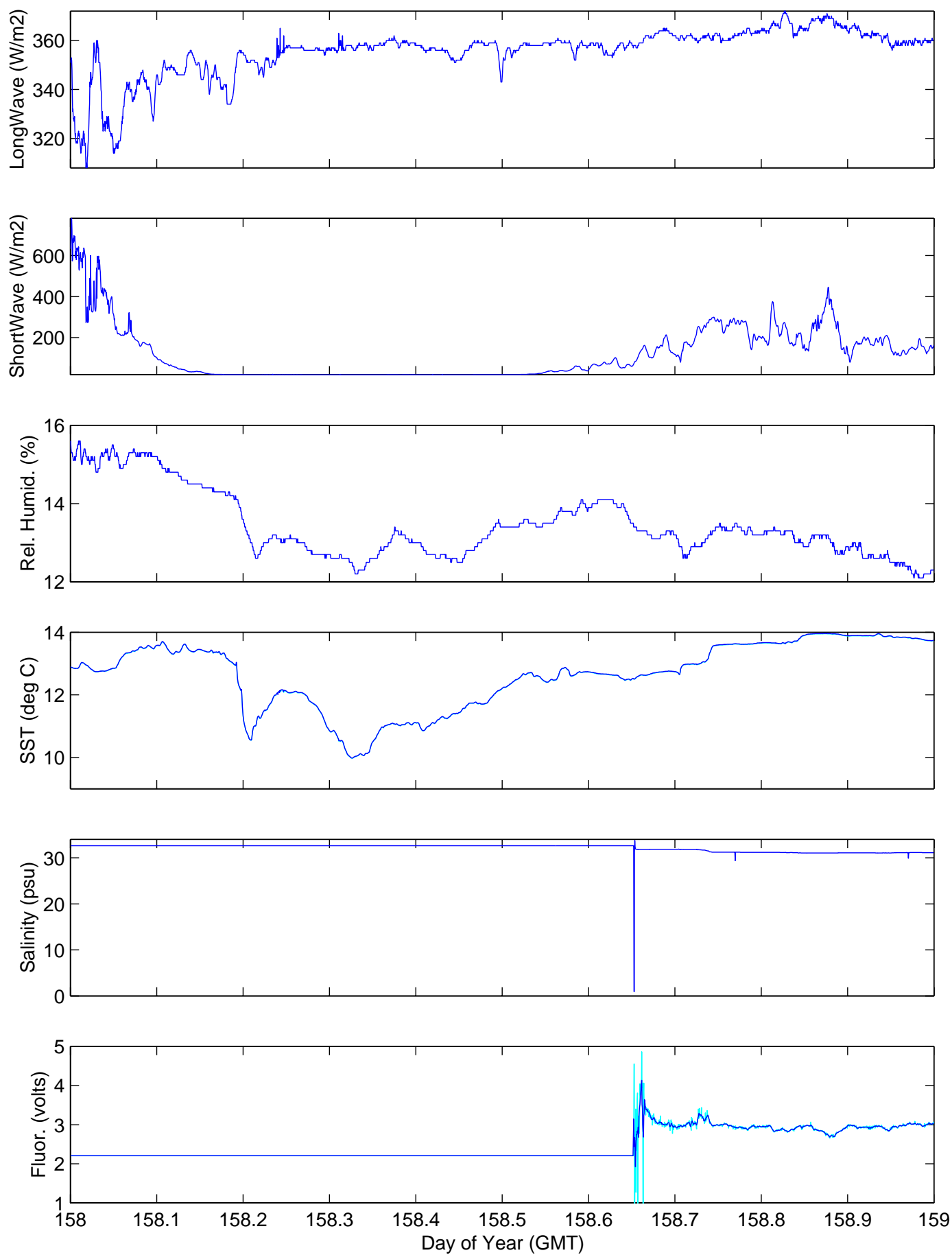
NH0005: R/V New Horizon 28 May – 14 June 2000



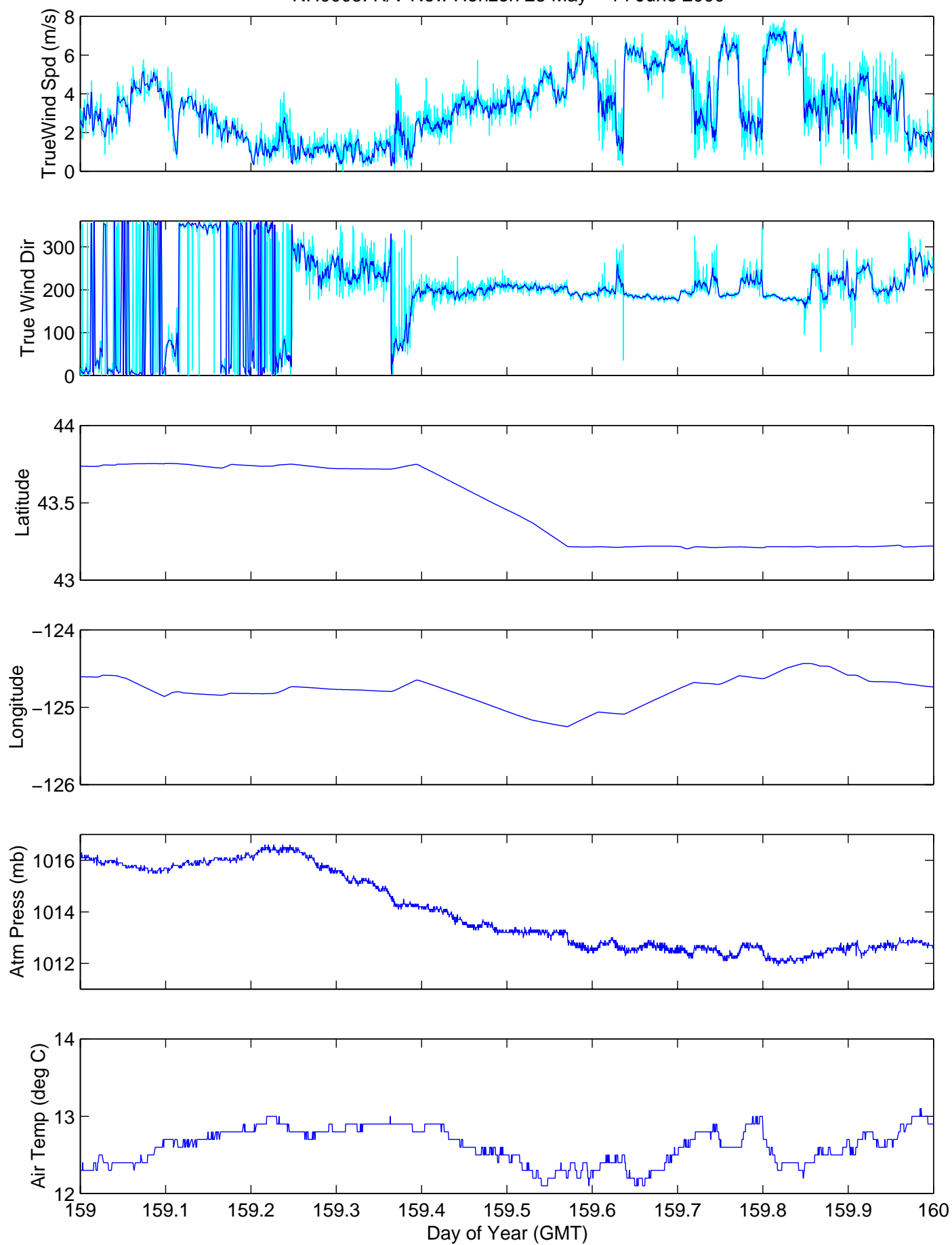
NH0005: R/V New Horizon 28 May – 14 June 2000



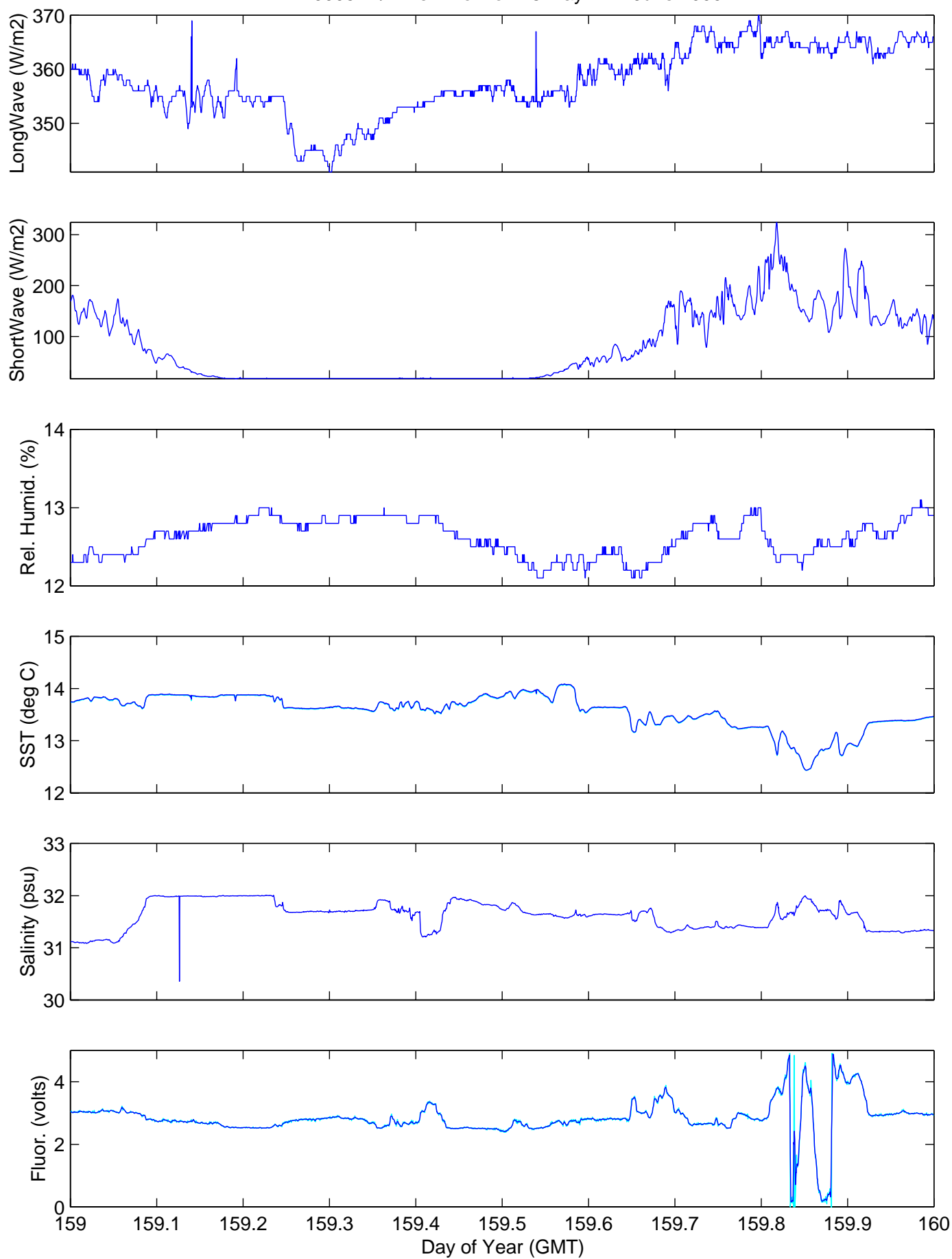
NH0005: R/V New Horizon 28 May – 14 June 2000



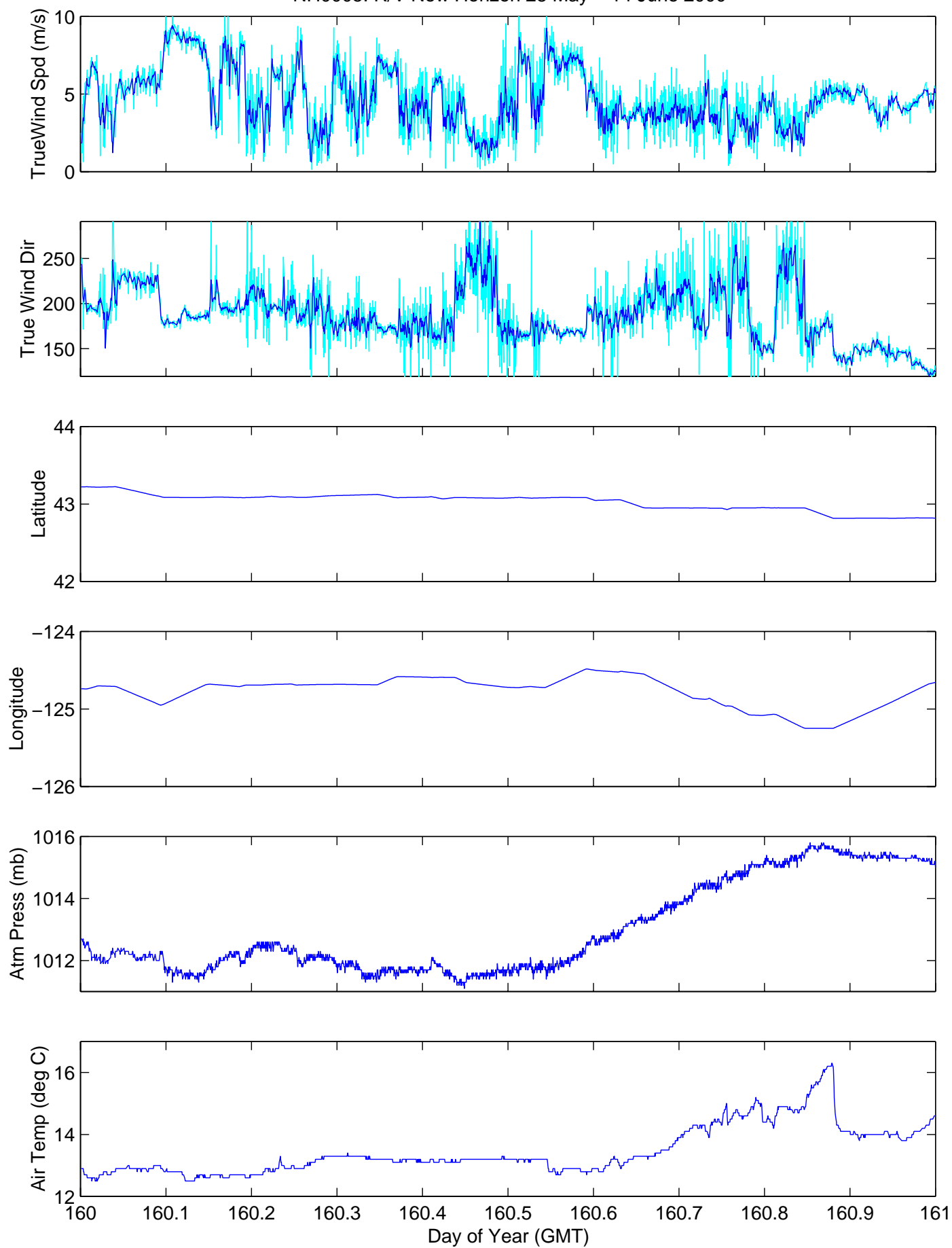
NH0005: R/V New Horizon 28 May – 14 June 2000



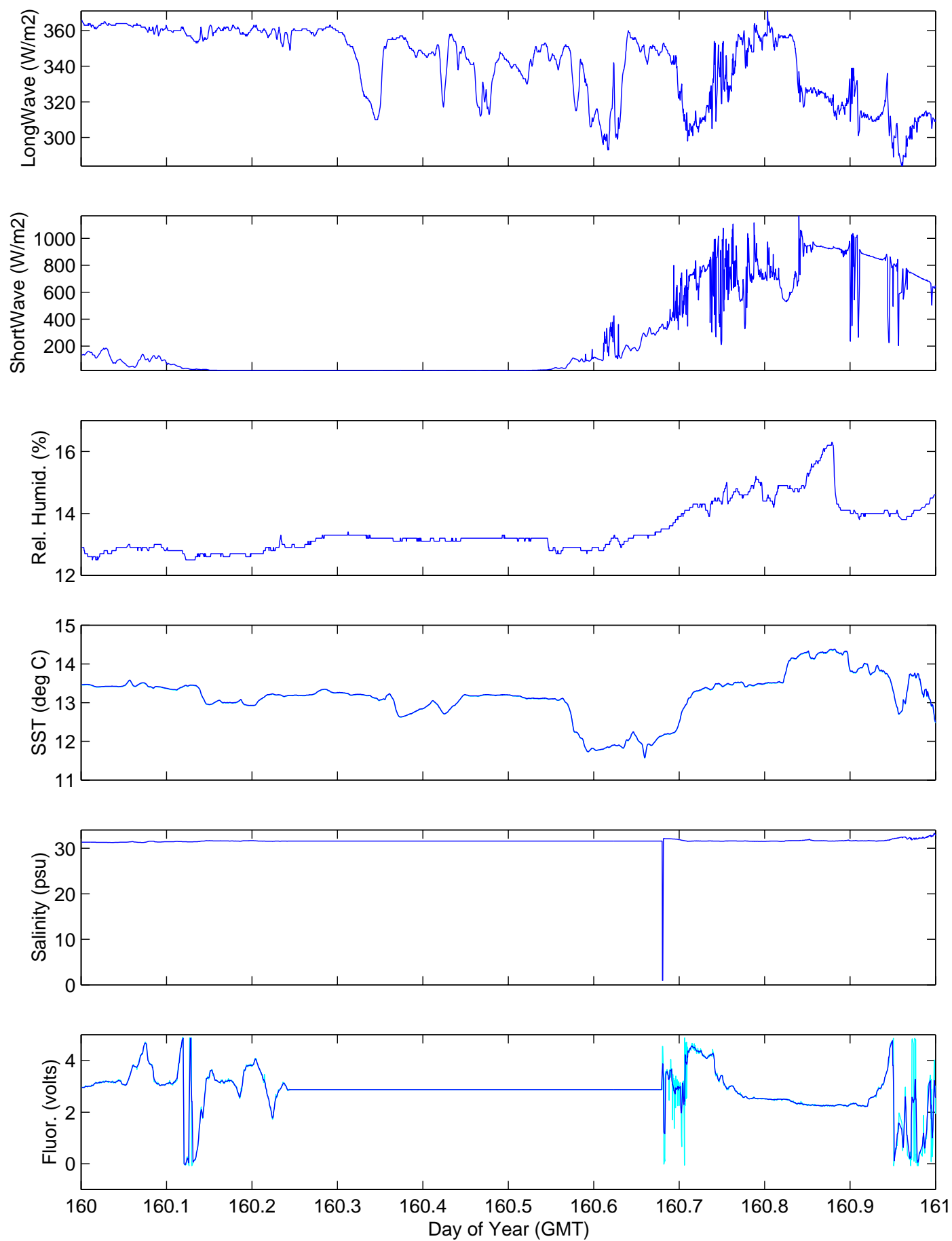
NH0005: R/V New Horizon 28 May – 14 June 2000



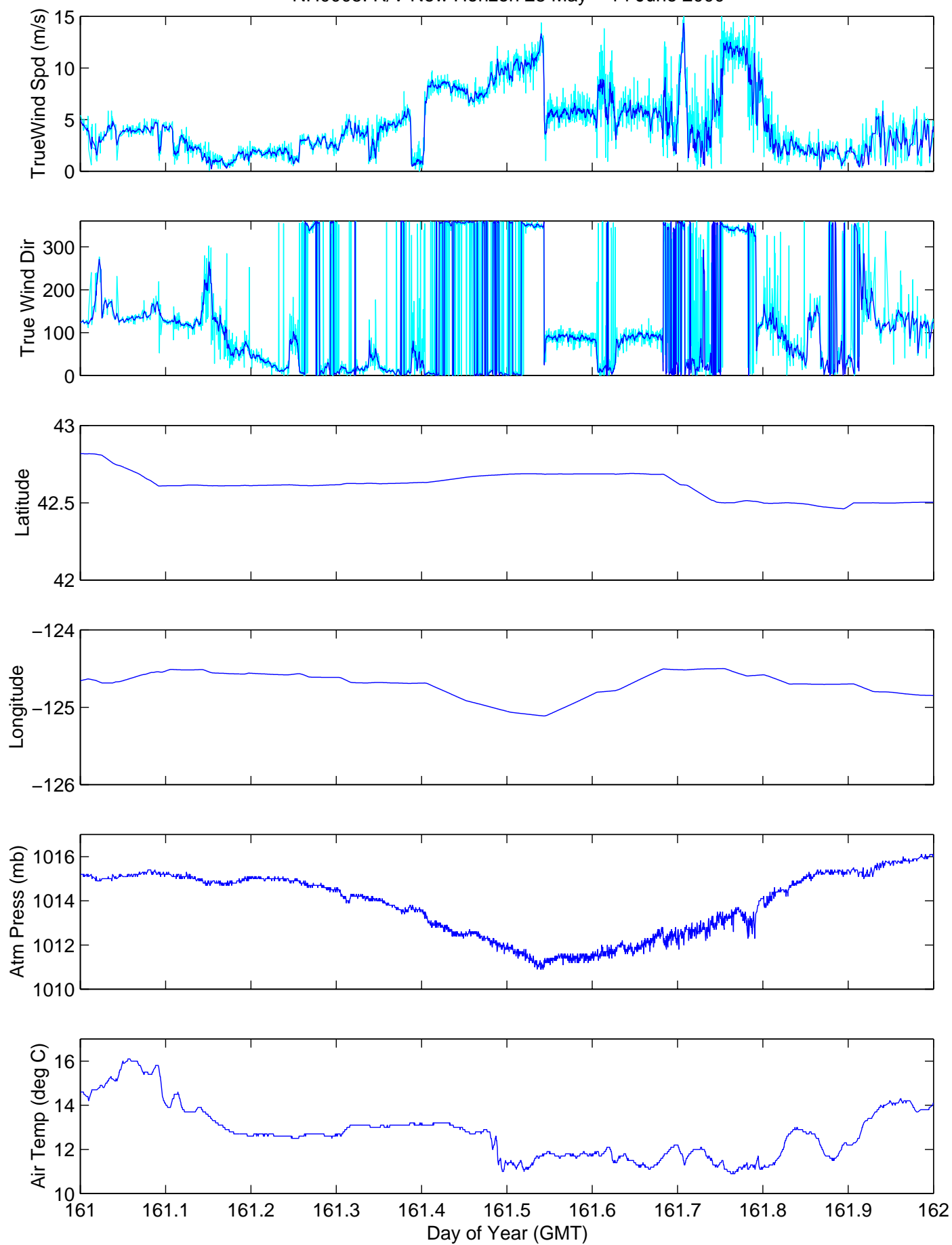
NH0005: R/V New Horizon 28 May – 14 June 2000



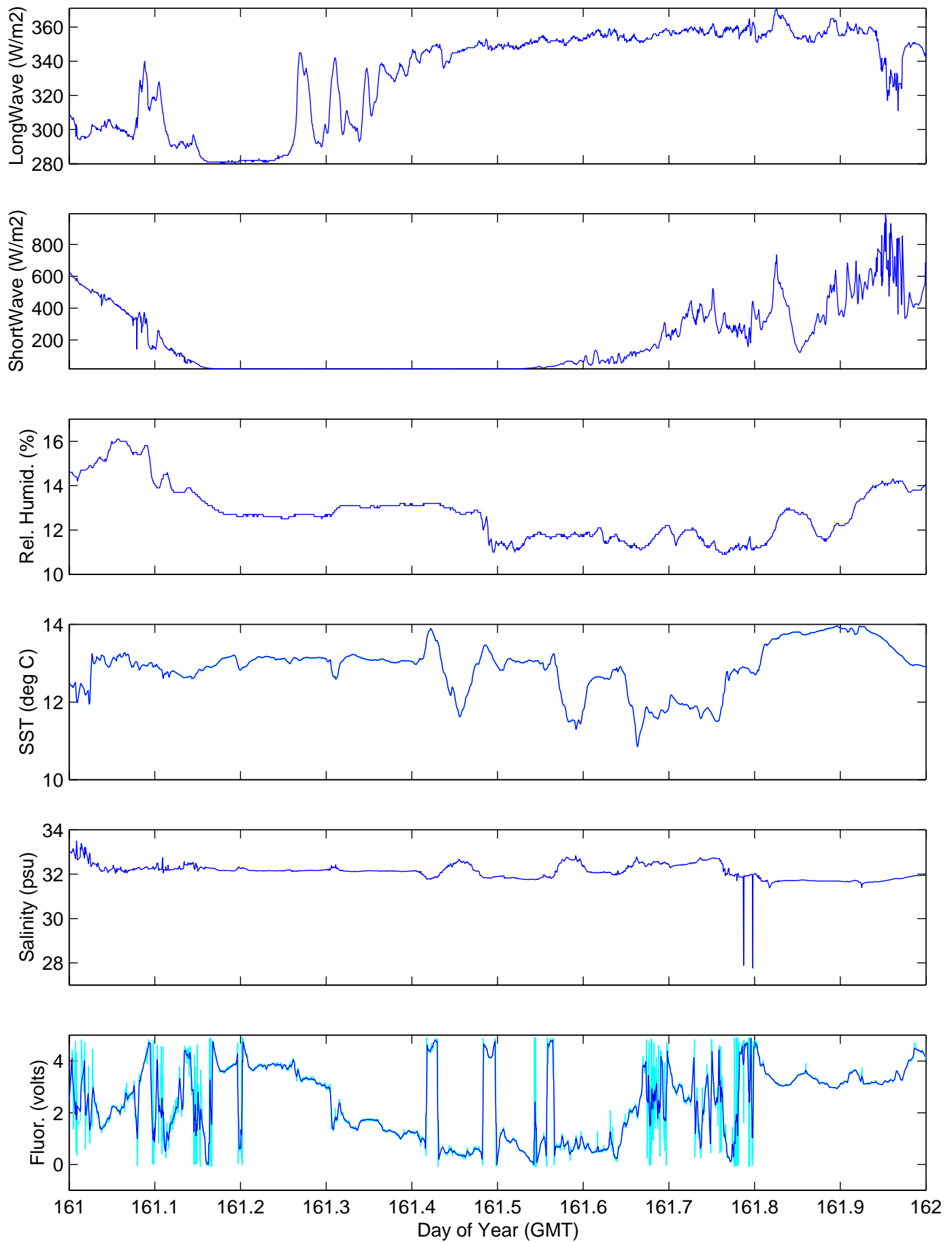
NH0005: R/V New Horizon 28 May – 14 June 2000



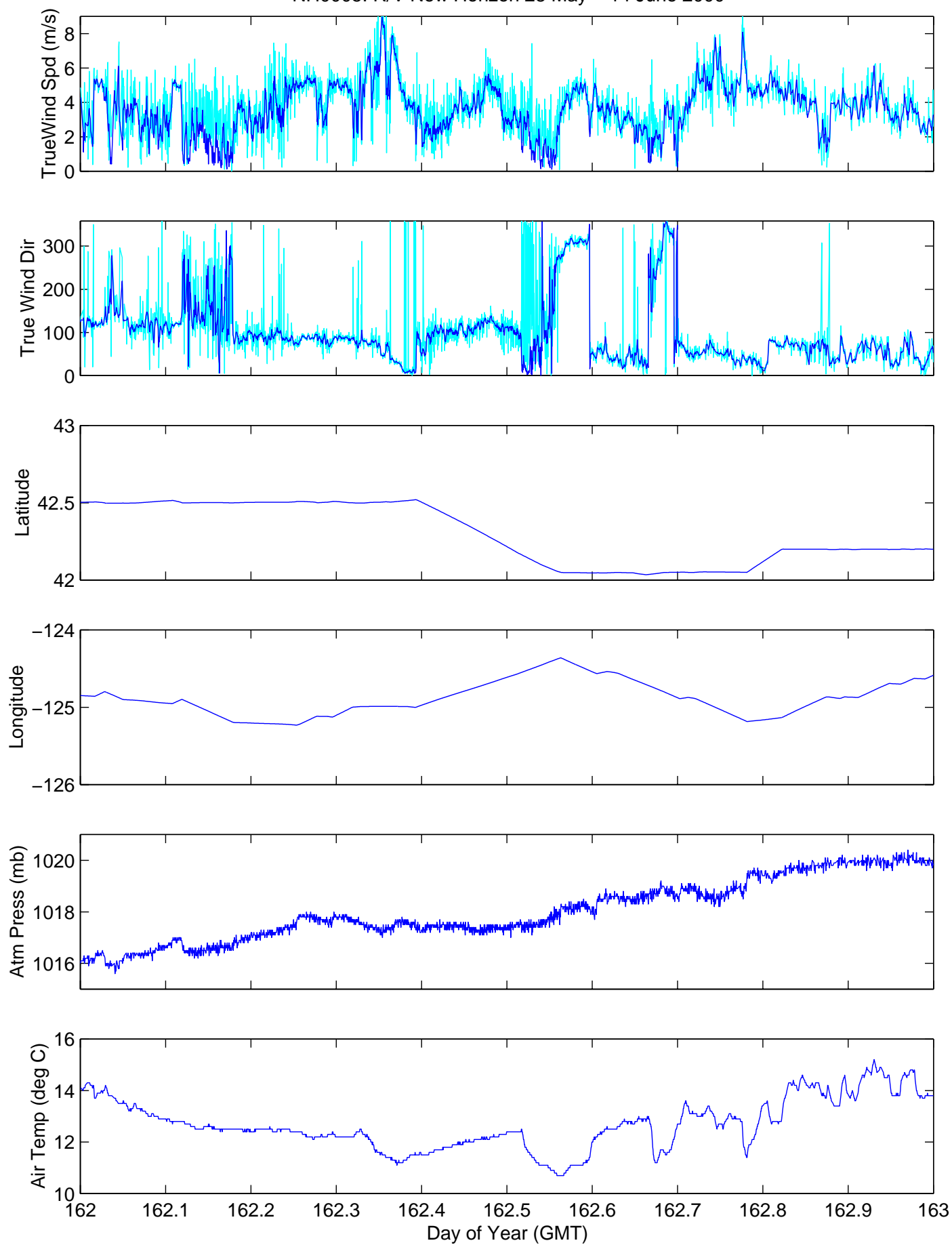
NH0005: R/V New Horizon 28 May – 14 June 2000



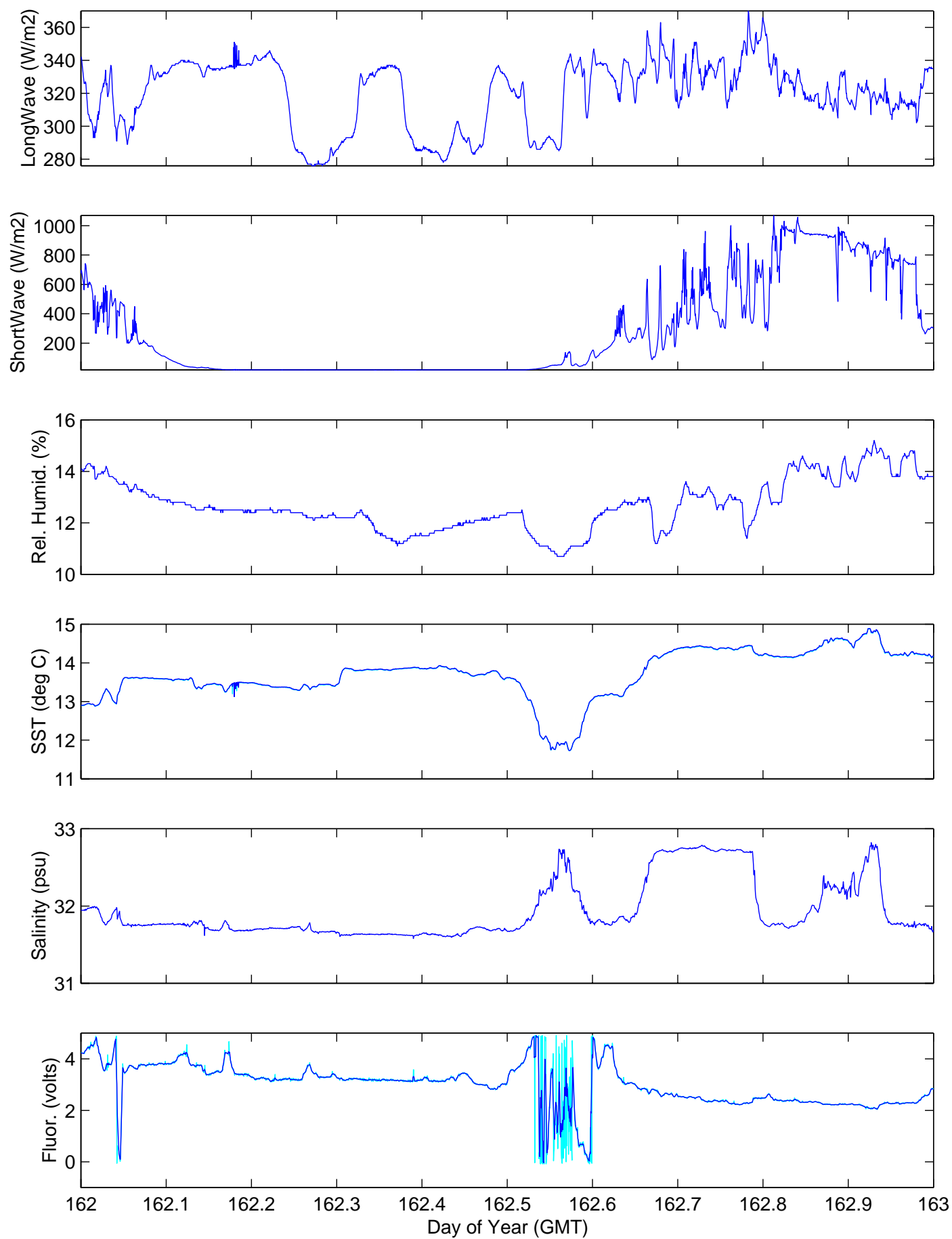
NH0005: R/V New Horizon 28 May – 14 June 2000



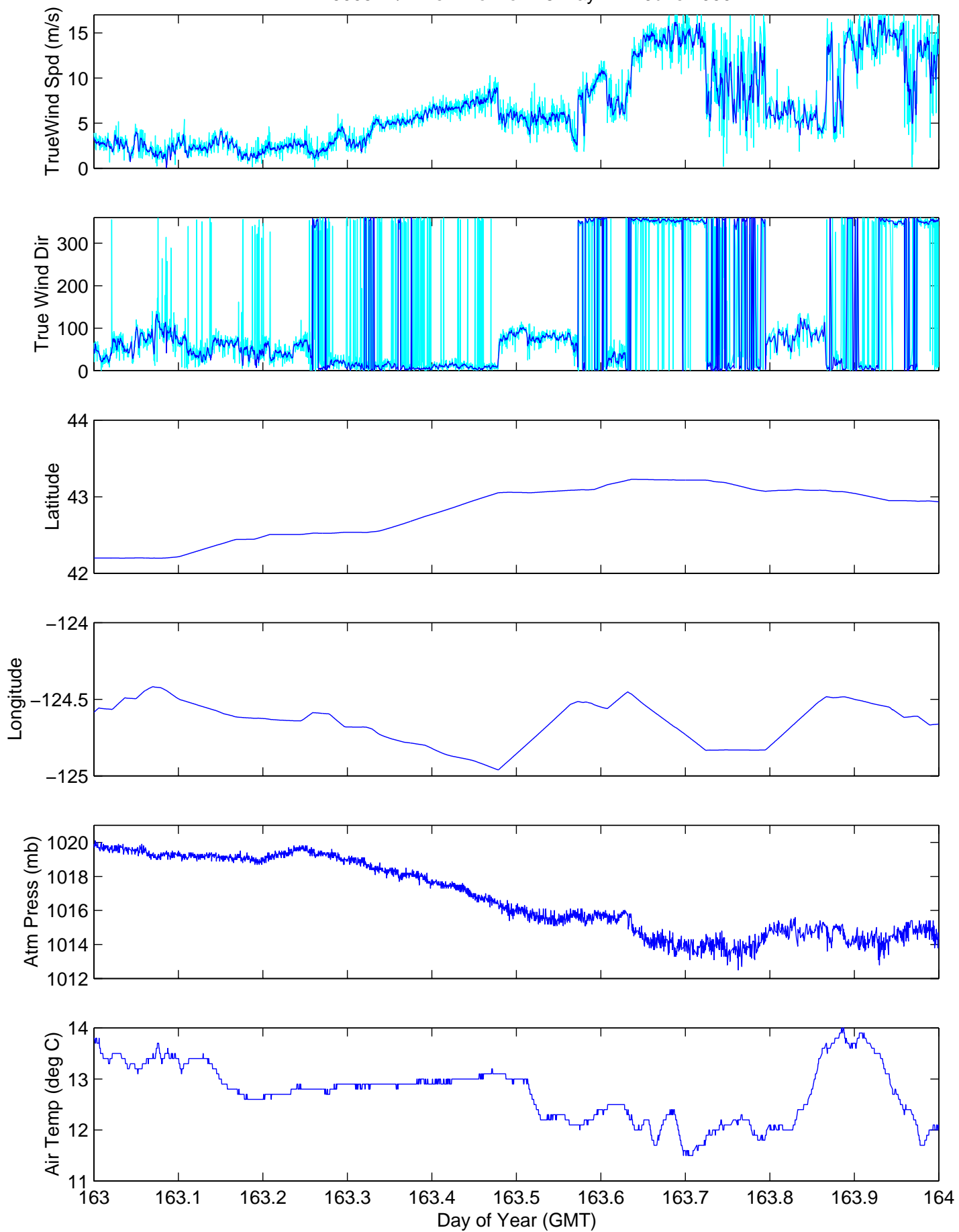
NH0005: R/V New Horizon 28 May – 14 June 2000



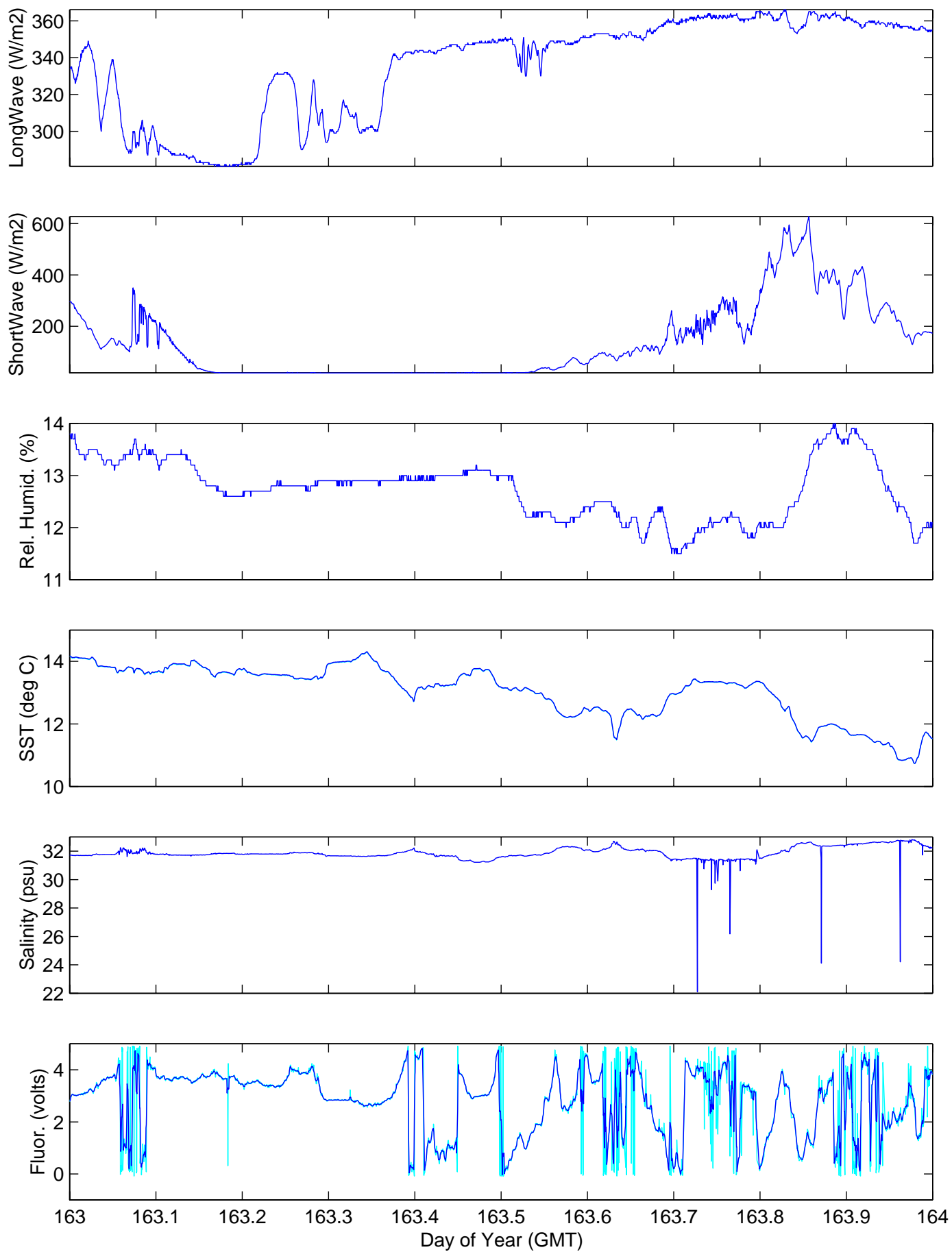
NH0005: R/V New Horizon 28 May – 14 June 2000



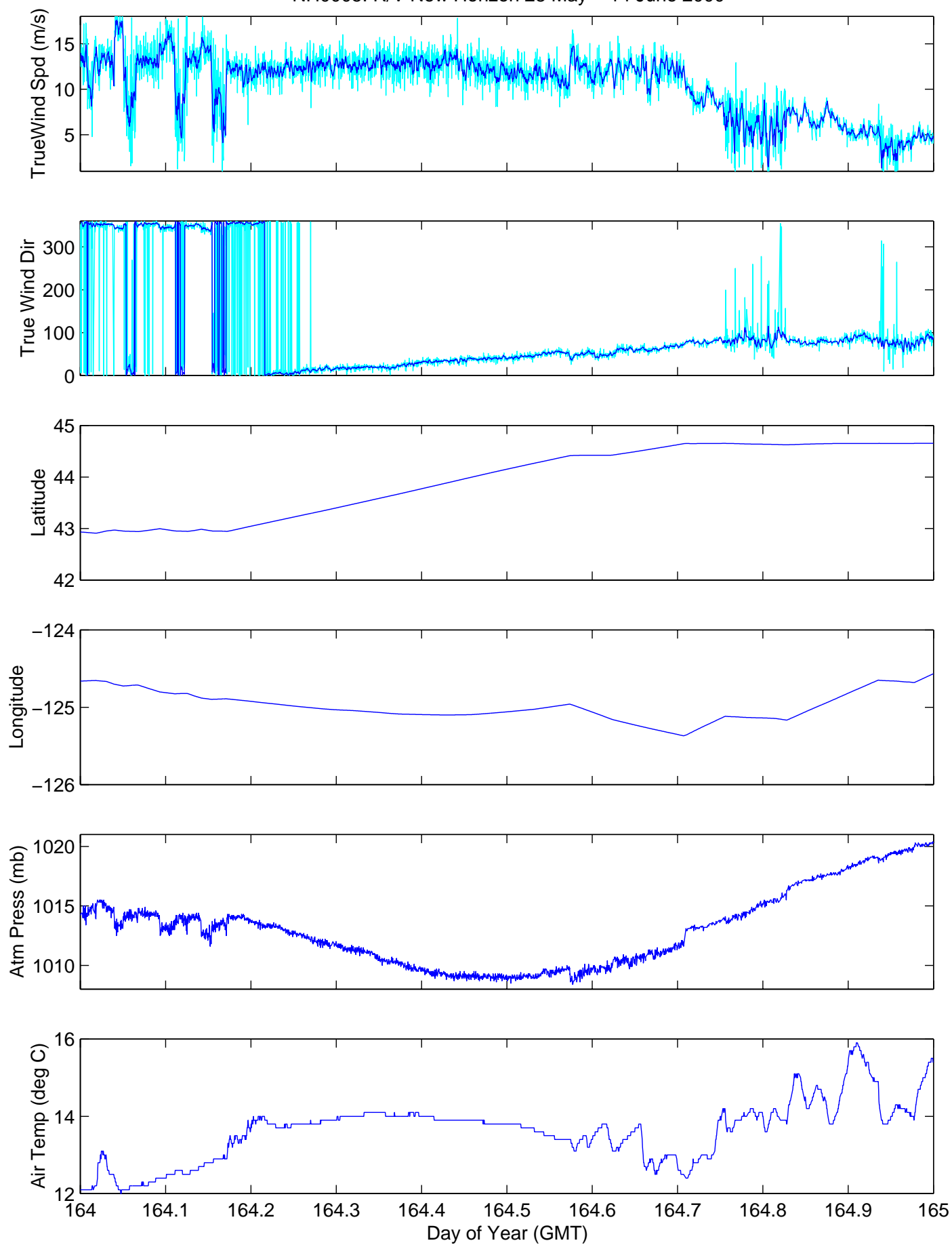
NH0005: R/V New Horizon 28 May – 14 June 2000



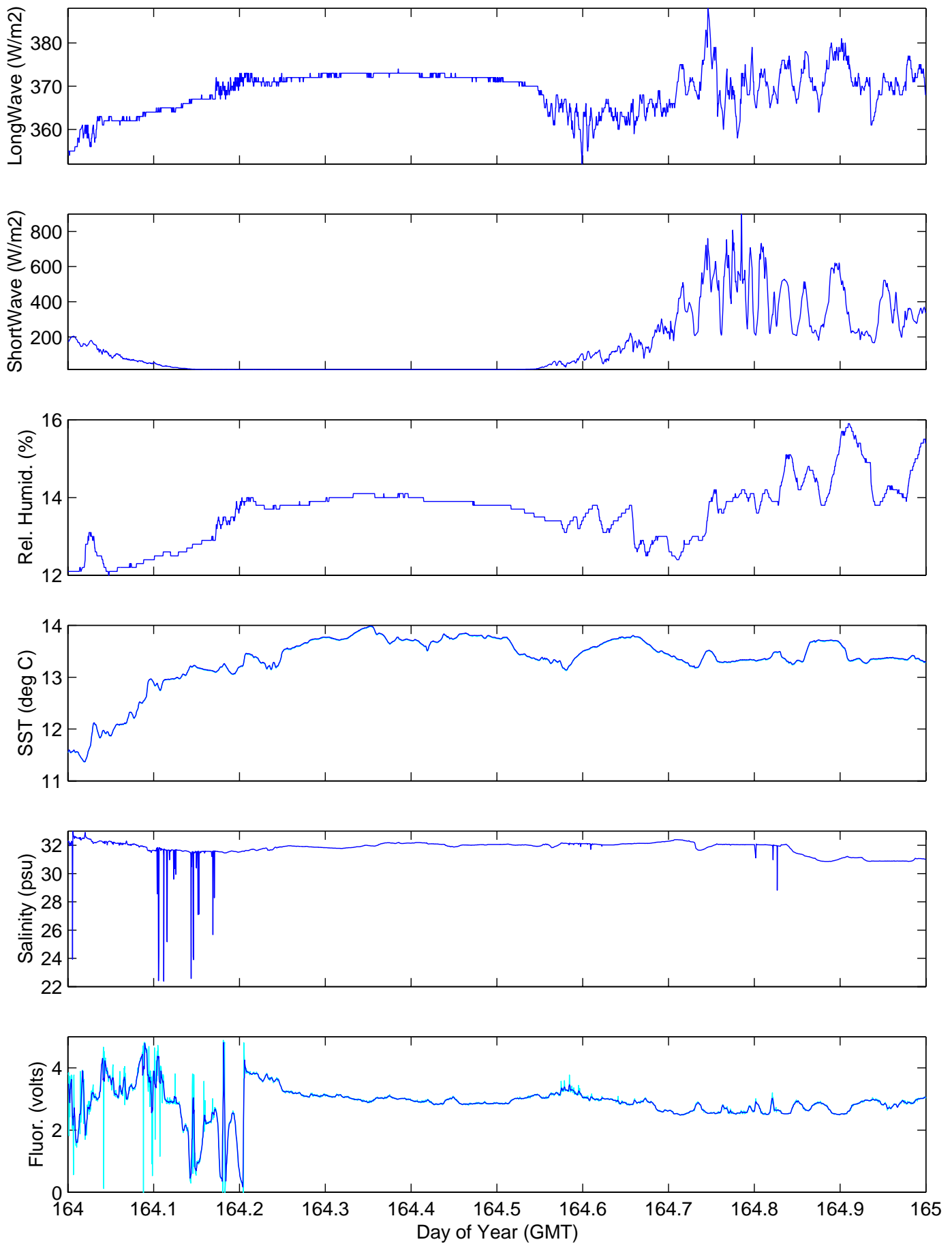
NH0005: R/V New Horizon 28 May – 14 June 2000



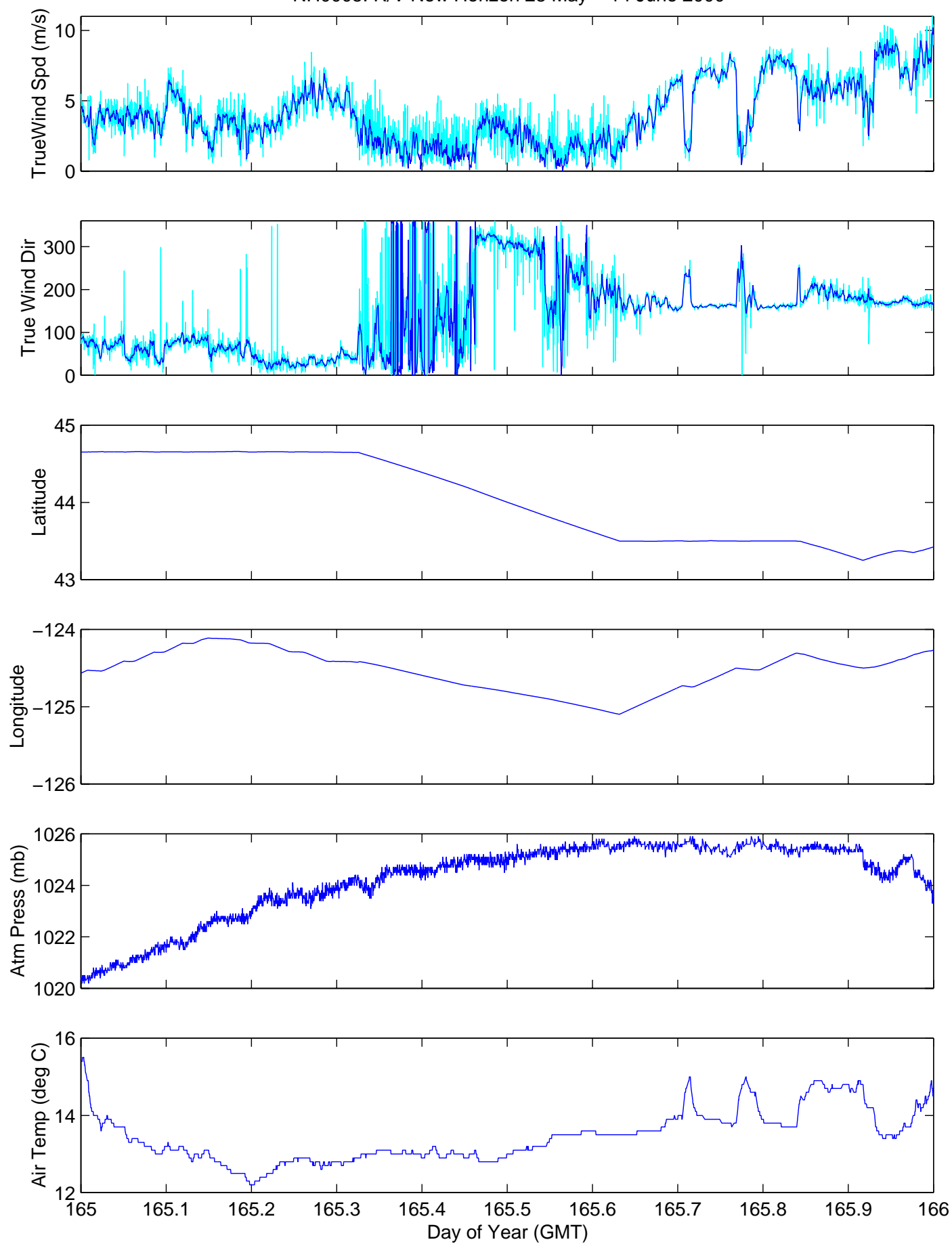
NH0005: R/V New Horizon 28 May – 14 June 2000



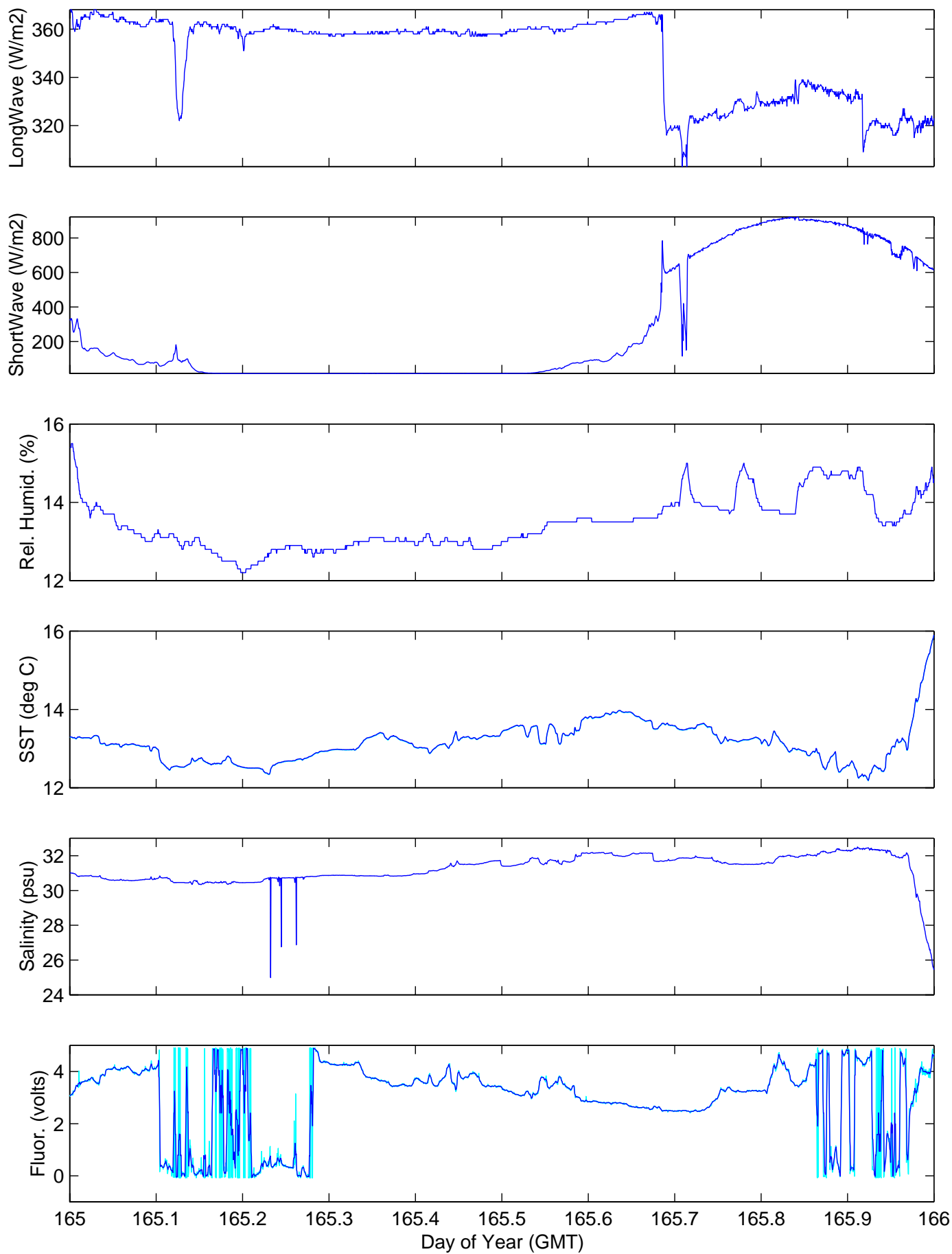
NH0005: R/V New Horizon 28 May – 14 June 2000



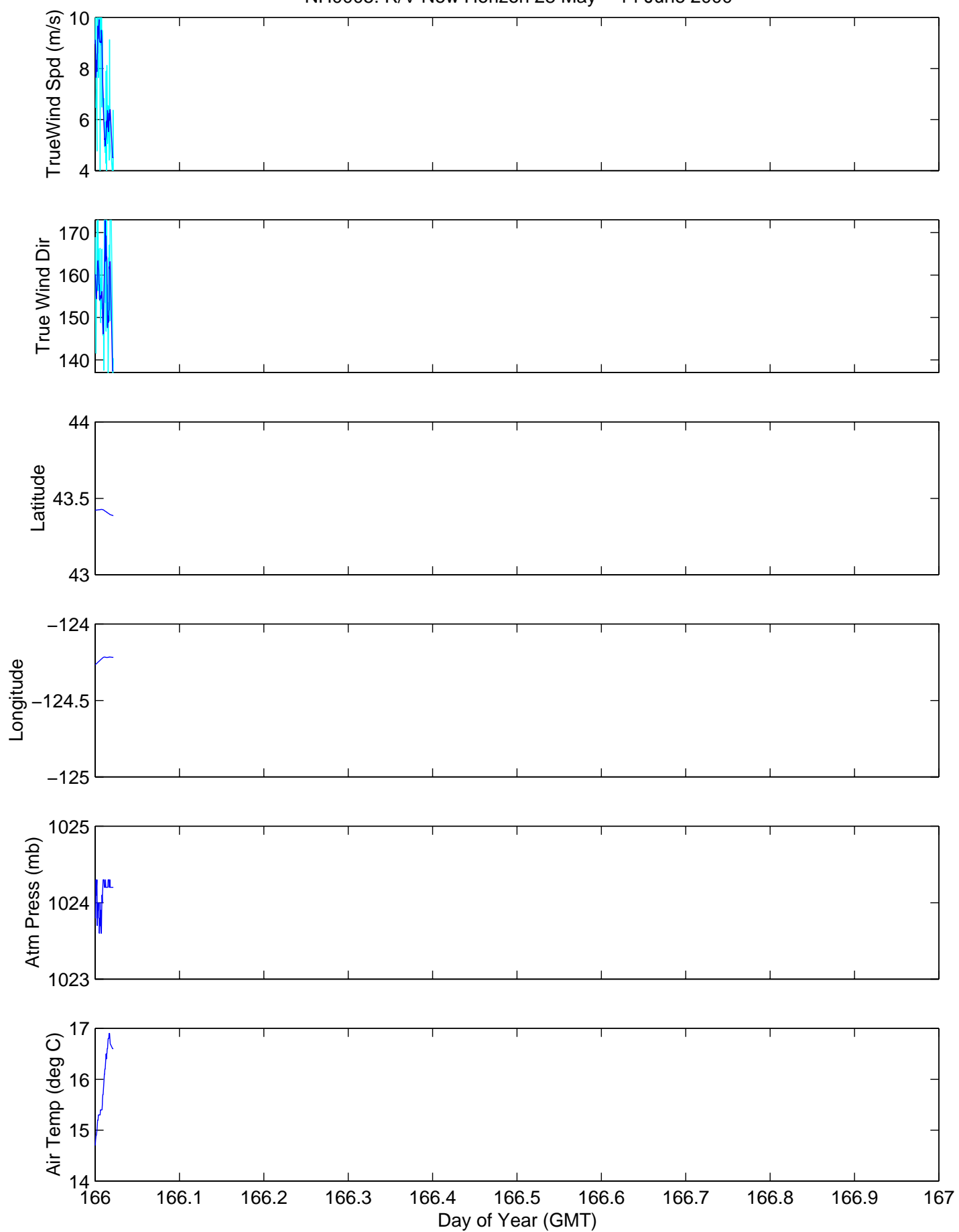
NH0005: R/V New Horizon 28 May – 14 June 2000



NH0005: R/V New Horizon 28 May – 14 June 2000



NH0005: R/V New Horizon 28 May – 14 June 2000



NH0005: R/V New Horizon 28 May – 14 June 2000

