

NAAMES Mission C-130 Flight Report

From: CYYT

To: CYYT

Start: 11/14/15 10:20Z

Finish: 11/14/15 20:00Z

Flight Time: 9.7 hours

Log Number: 161006

PI: Mike Behrenfeld

Funding Source: Paula Bontempi - NASA - SMD - ESD Ocean Biology and Biogeochemistry

Official Report Logged At:

[https://airbornescience.nasa.gov/science_reports/NAAMES - C-130H Hercules 439 11 14 15 Science Report](https://airbornescience.nasa.gov/science_reports/NAAMES_-_C-130H_Hercules_439_11_14_15_Science_Report)

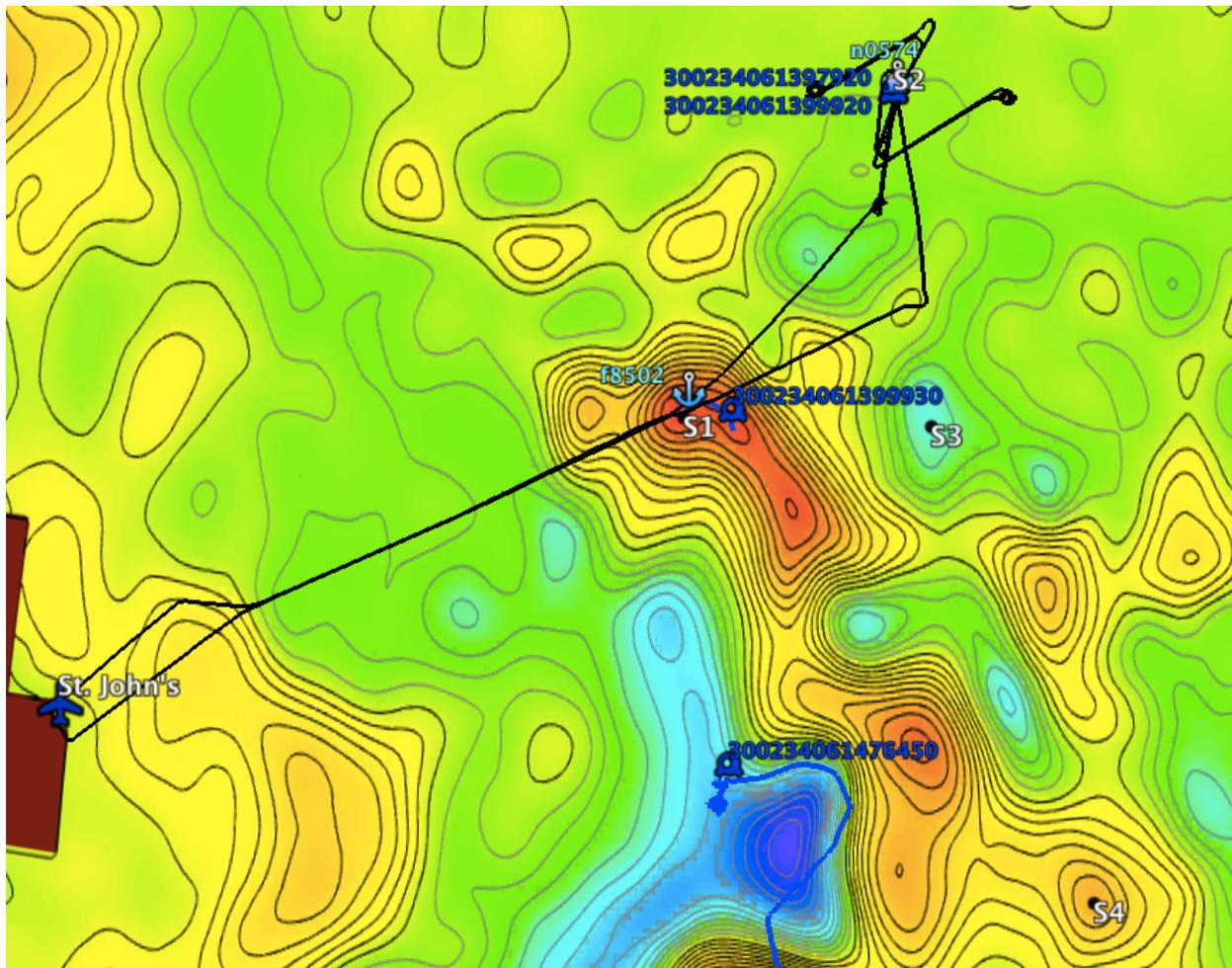
[https://airbornescience.nasa.gov/flight_reports/C-130H Hercules 439 11 14 15](https://airbornescience.nasa.gov/flight_reports/C-130H_Hercules_439_11_14_15)

Flight Hour Summary:

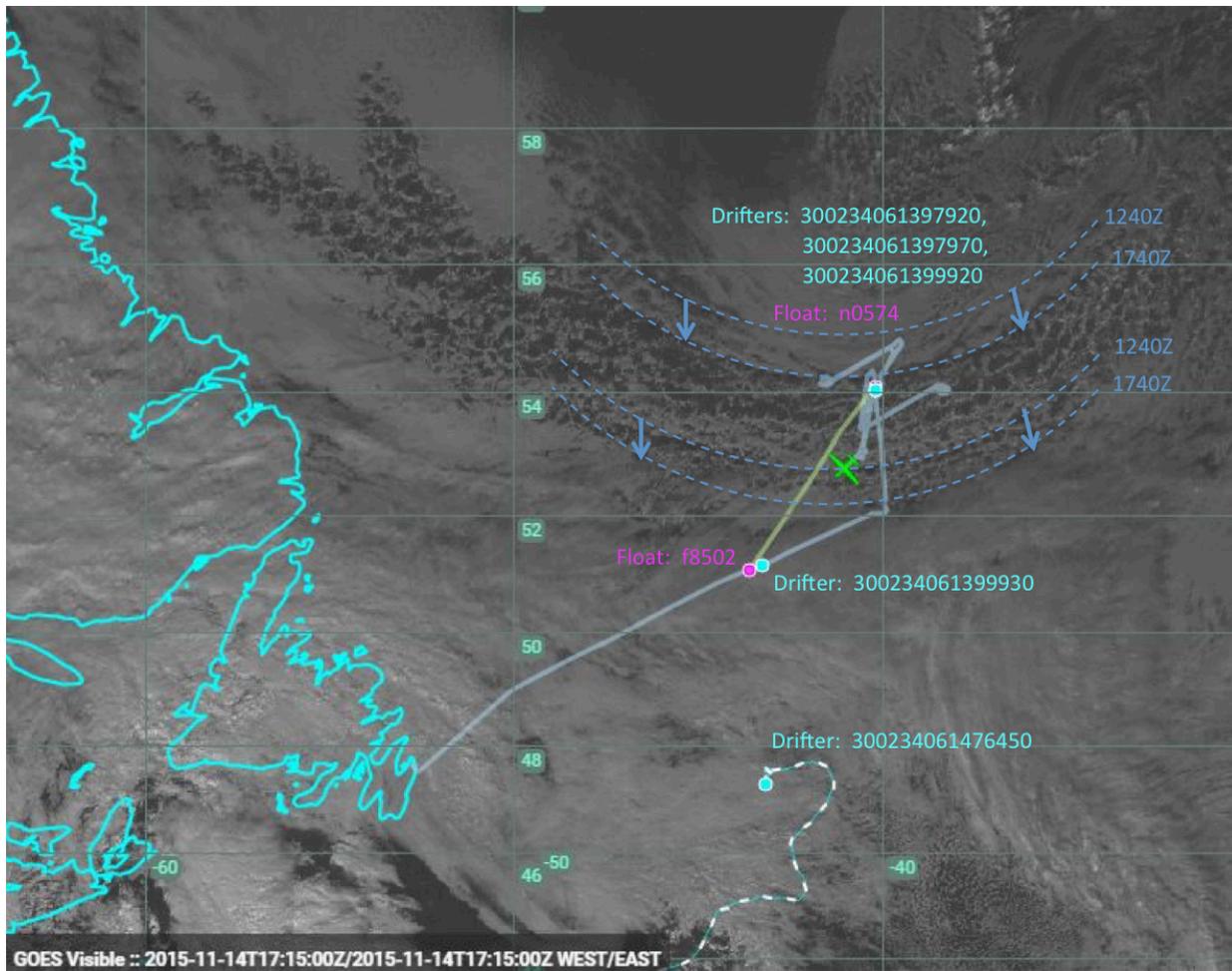
| 161006 Flight Reports | | | | | |
|-------------------------------------|--------------------------------|-------------------|----------|---------------|-----------------|
| Date | Flt # | Purpose of Flight | Duration | Running Total | Hours Remaining |
| 10/31/15 | Airworthiness Test Flight | Check | 1 | 1 | 99 |
| 11/04/15 | Project Test Flight | Check | 5.5 | 6.5 | 93.5 |
| 11/09/15 - 11/10/15 | NAAMES Nov-2015 Transit | Transit | 4.6 | 11.1 | 88.9 |
| 11/12/15 | NAAMES Nov-2015 Data Flight #1 | Science | 9.9 | 21 | 79 |
| 11/14/15 | NAAMES Nov-2015 Data Flight #2 | Science | 9.7 | 30.7 | 69.3 |

Comments: This was the second science flight for NAAMES. Ship operations commenced in the early morning with a station at Point S2 (54.1077°N, 40.018°W) under scattered stratocumulus and cumulus clouds at around 1 km altitude. The aircraft transited to the previous ship station (Point S1: 51.01167°N, 43.635°W) and then proceeded at high altitude over Point S3 (52.1147°N, 39.913°W) before turning northward to the ship position at Point S2. These high-level legs were mostly over complete low-cloud coverage; although, as the aircraft moved northward from S3 to S2, the low cloud began to open up, which allowed ocean remote sensing measurements. Arriving at the ship, the aircraft executed the downwind and upwind bowtie module of coincident sampling lines at 23 kft. and in the boundary layer (300 ft., 2000 ft., and porpoising through the clouds). Due to the LARGE aerosol inlet icing issues encountered during Science Flight #1 (11/12/15), the order of the flight plan was adjusted so that an upward spiral was executed in-between the upwind and downwind legs, and the cloud module was executed after completing the bowtie module. Cloud conditions around the ship were very different than the previous flight, with much more scattered sampling for the cloud module stacked legs. To mitigate LARGE aerosol inlet icing, the cloud top leg was completed after all of the in situ sampling legs (min. altitude, just below cloud, cloud base, and just above cloud). No inlet issues were detected; although, it is unclear if this is due to the change in flight maneuvers or because of differences in the

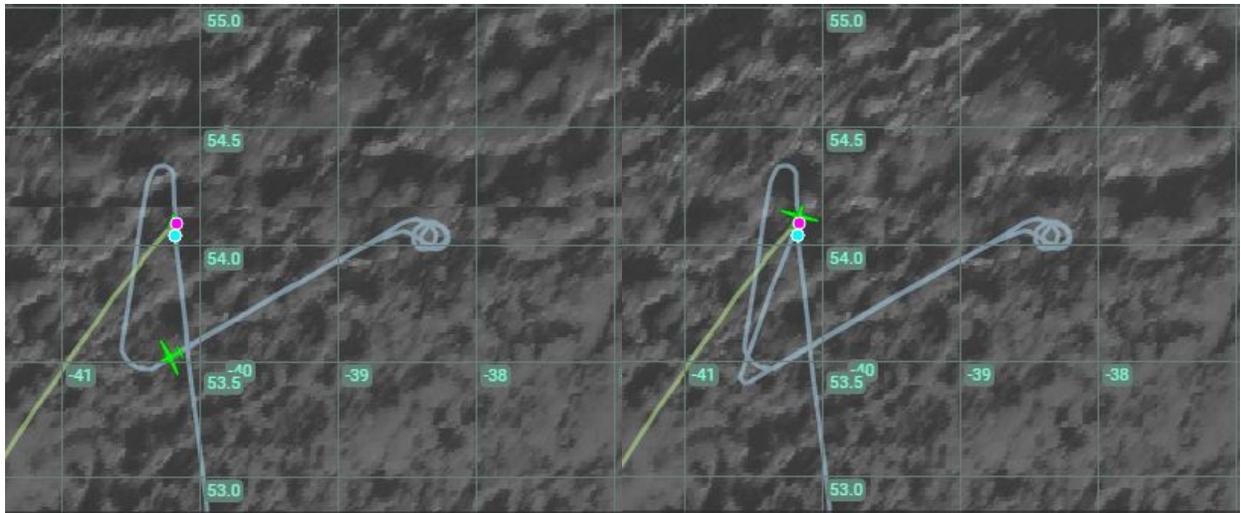
clouds encountered. After completing these stacked cloud legs, the aircraft performed an inline ascent over the ship and overflow the cloud module at 23 kft. before returning to St. John's airport. In situ instruments reported some of the cleanest conditions observed so far during NAAMES (particle concentrations $\sim 10\text{-}30\text{ cm}^{-3}$) in the boundary layer. While in situ aerosol number was greater above the boundary layer than at low altitude, HSRL atmospheric profiling showed highest aerosol extinction in the boundary layer, which decreased with increasing altitude. Ocean remote sensing showed the surface waters to be relatively uniform. All instruments operated well and are ready for the next flight.



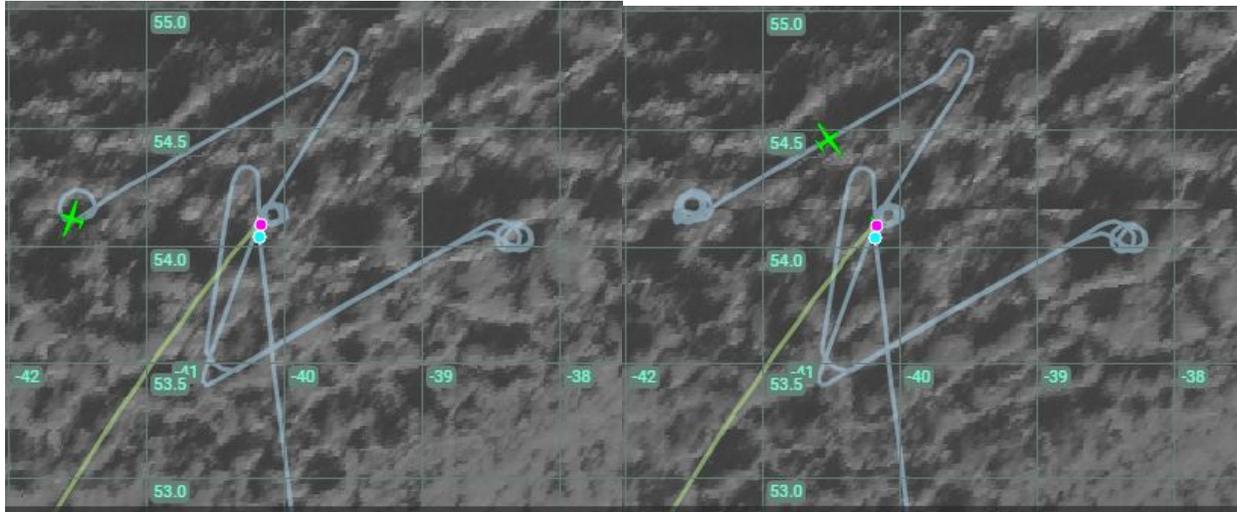
C-130 flight track (black) overlaid on the sea level anomaly (SLA) eddy map. Float (light blue anchors) and drifter (dark blue circles) positions and IDs are also shown. The drifter and float positions are very close to Point S1 (previous ship station) and Point S2 (current ship station). An additional non-NAAMES drifter is shown to the south. Eddy map courtesy of Peter Gaube.



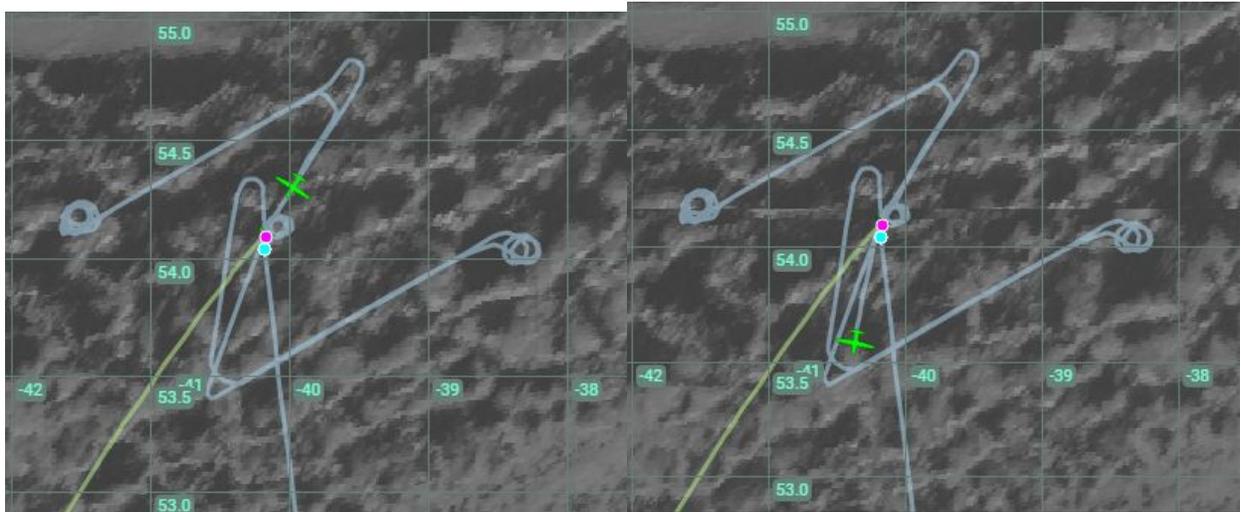
C-130 flight track (gray) overlaid on the GOES satellite visible imagery from 17:15Z. Float (magenta) and drifter (cyan) positions and IDs are also shown. The drifter and float positions are very close to Point S1 (previous ship station) and Point S2 (current ship station). The yellow line connecting the two stations is the ship track from Friday (11/13/15). While cloud conditions over Points S1 and S3 prevented ocean and boundary layer aerosol remote sensing, the open cloud structure in a narrow band around the ship provided excellent conditions for coincident sampling of ocean and atmosphere. The band shifted southward during the roughly 5-hr. period that the aircraft was carrying out science maneuvers, but the entirety of the bowtie pattern and cloud module were carried out under scattered rather than continuous cloud conditions as shown in the following zoomed in graphics.



GOES Visible :: 2015-11-14T13:45:00Z/2015-11-14T13:45:00Z WEST/EAST GOES Visible :: 2015-11-14T14:00:00Z/2015-11-14T14:00:00Z WEST/EAST



GOES Visible :: 2015-11-14T14:45:00Z/2015-11-14T14:45:00Z WEST/EAST GOES Visible :: 2015-11-14T15:00:00Z/2015-11-14T15:00:00Z WEST/EAST



GOES Visible :: 2015-11-14T15:30:00Z/2015-11-14T15:15:00Z WEST/EAST GOES Visible :: 2015-11-14T15:45:00Z/2015-11-14T15:45:00Z WEST/EAST

