

## **Flight Report: DC-8 flight 2, August 8, 2008**

The NASA DC-8 aircraft completed an initial transit and data flight on August 8, 2008 as part of the Arctic Mechanisms of Interaction between the Sea and Atmosphere (AMISA 2008) project. The flight combined transit of the DC-8, scientists, and crew from Palmdale, CA to Kiruna, Sweden, along with an en route scientific overflight of the R/V Oden. The 10.5-hour flight provided rare soundings of frontal bands associated with two rapidly evolving cold polar cyclones north of Greenland, along with radiometric and in-situ cloud sampling of these events. It also provided continuous high-resolution radiometric observations over the Canadian archipelago continuing over the pack ice around the Oden at (82.9N,1.8W) and south to Spitzbergen. The flight was well managed and provided the first opportunity during AMISA to practice various in-flight communication and navigation techniques necessary for subsequent coordinated aircraft-ship operations.

The flight track over the frontal bands around the Oden revealed cloud tops in the 15,000' -23,000' range, with the westernmost of these bands having lower altitudes but much colder cloud-top temperatures. The thermodynamic and wind structure of these bands was observed using a curtain of four XDR-928 dropsondes released at ~75 nmi intervals. The westernmost band was associated with a particularly compact and evolving eyewall which was visually apparent as a tightly circulating cloud field. Four of five sondes released provided thermodynamic and GPS wind data from FL230 to the surface (a problem with the single failed sonde was traced to a correctable antenna attachment problem known to occur on some units). The dropsonde curtain revealed distinct profiles (see attachments) below the inversion layer for the two bands, and demonstrated that the current XDR-928 sonde board and package will largely be effective for use during AMISA intensive observations, and specifically within cold Arctic conditions. Radiometric observations included nadir temperature sounding, moisture, and liquid water data, long- and short-wave radiative fluxes, and multiband polarimetric sea ice imagery data. In situ observations by LARGE included data on cloud top particle distributions within convection in the band around the Oden.

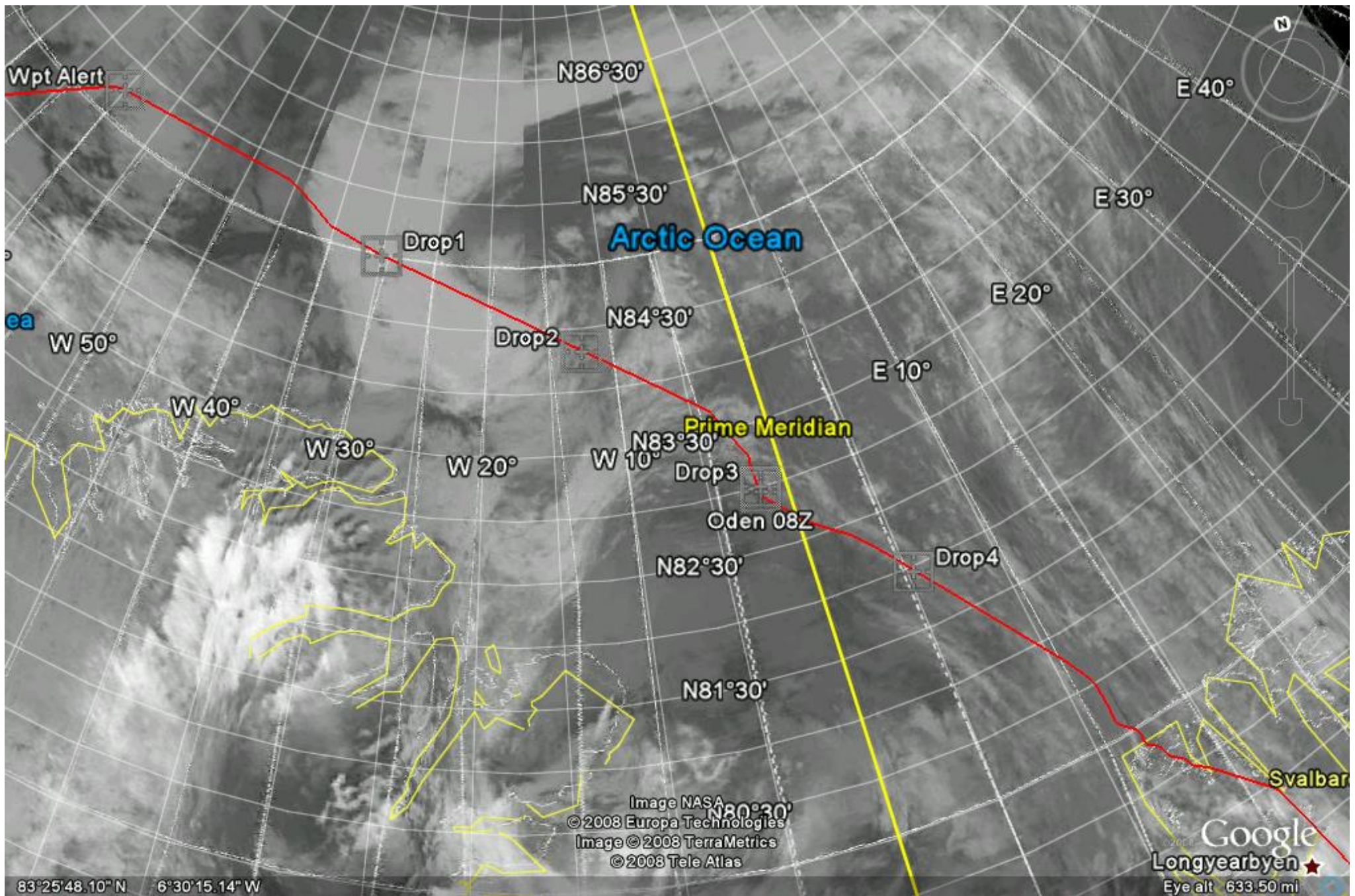
The encounter with the Oden occurred at ~0810Z, and was coordinated using both aircraft-to-ship Iridium communications along with VHF radio. In-flight updates on the ship's position and operations were essential to achieve an overflight that passed within ~5 nmi of the ship and a coordinated release of a rawinsonde from the Oden. In-flight downloading of recent MODIS satellite maps was also demonstrated. The utility of the in-flight data in identifying the location of evolving cloud features was clearly shown by the use of in-flight overlays of recent MODIS overpasses and aircraft track data. Observation of evolving cloud features associated with frontal bands, particularly those that have an impact on cloud radiation, is a major goal of AMISA.

The first dedicated AMISA science flight is being planned to occur as the Oden is able to make camp, pending suitable forecast weather conditions. Quicklook data is also being generated from the numerous on-board instruments to better facilitate in-flight decision making.

AMISA is a NASA-sponsored International Polar Year (IPY) project with the goal of understanding the surface and atmospheric radiation and dynamical processes leading to Arctic sea ice freezeup. The combined transit and science flight served to significantly increase the amount of data available for AMISA post-mission science, along with observe at close range the frontal phenomena associated with polar cyclones.

Thanks are due to NASA DC-8 pilots Bill Brockett and Dick Ewers, navigator Ryan Lubinski, mission managers Chris Jennison and Adam Webster, and the DC-8 crew for a well-executed flight. Thanks are also due to mission scientist Ola Persson for an excellent series of meteorological calls, and all of the AMISA scientists for supporting this rather long sortie. Credit is due to Ankita Chaturvedi, Eric McIntyre, and Ellen Sukovich for excellent instrument management, and David vanGilst for providing valuable in-flight networking capabilities.

Al Gasiewski  
PI, AMISA 2008



Wpt Alert

N86°30'

E 40°

N85°30'

E 30°

Arctic Ocean

Drop1

N84°30'

E 20°

W 50°

Drop2

E 10°

W 40°

Prime Meridian

W 30°

N83°30'

Drop3

Oden 08Z

W 20°

Drop4

N82°30'

N81°30'

Svalbar

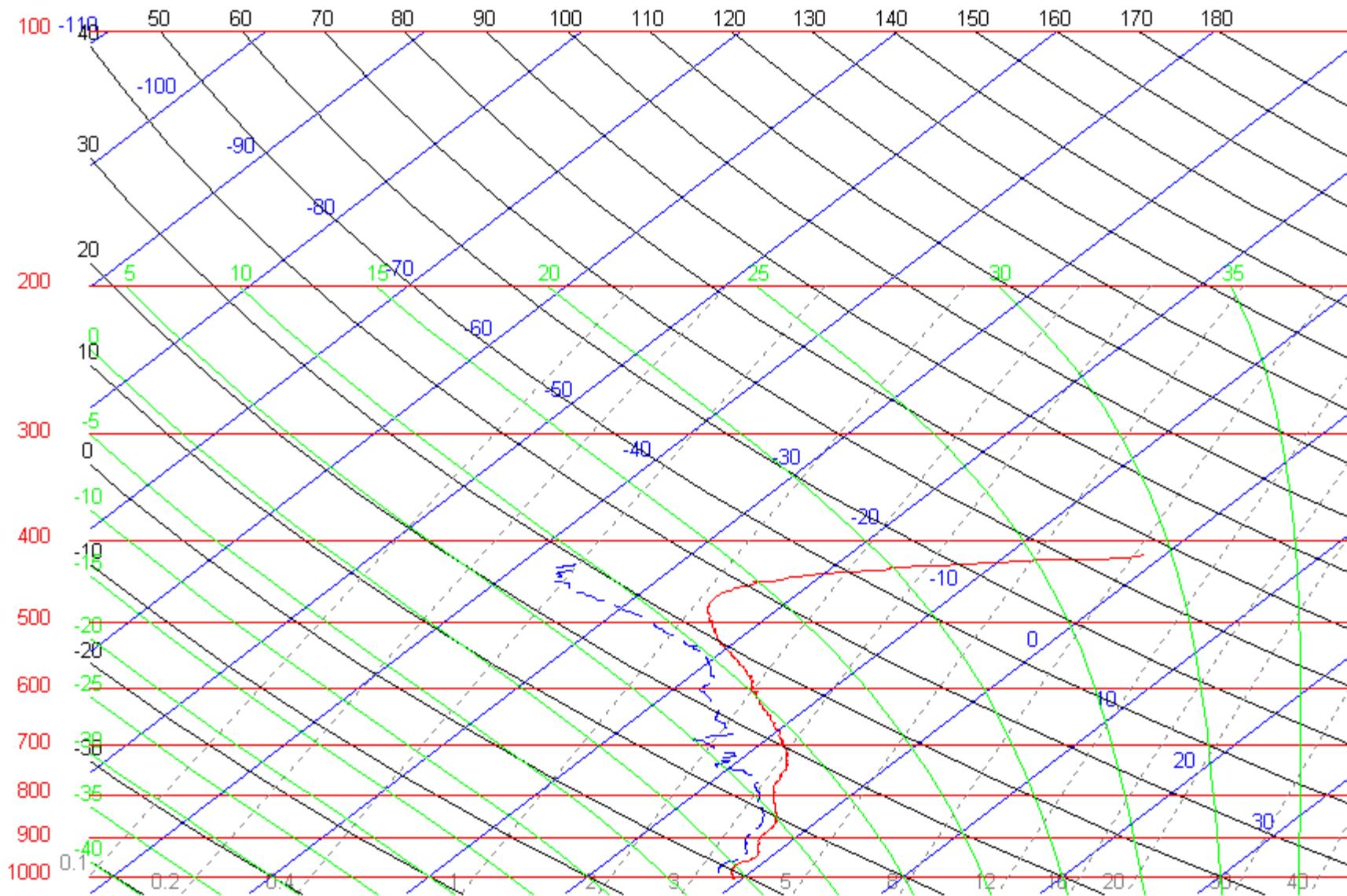
Image NASA  
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Google  
Longyearbyen

Eye alt 633.50 mi

83°25'48.10" N 6°30'15.14" W

2008\_0808\_0801\_sonde\_54\_ASPEN.csv



Aspen V2.7.4.1, 08 Aug 2008 08:49 UTC

# 2008\_0808\_0724\_sonde\_12\_ASPEN.csv

