

Flight Report: DC-8 flight 1, July 31, 2008

In preparation for the Arctic Mechanisms of Interaction between the Sea and Atmosphere (AMISA 2008) project an instrument check flight was flown on Thursday, July 31, 2008. The 2.5-hour local flight originated out of Palmdale, CA, and included instrument checkout maneuvers within the W-291 warning area over and south of San Clemente Island. The purpose of the flight was to test the three primary AMISA sensor groups, which include the radiometer array, in situ probes, dropsondes.

The radiometer array included the following instruments: PSR/A, LRAD, CRAD, NDCR, NRAD, TRAD, ZDCR, and ZRAD. The PSR/A exhibited a solid state disk failure immediately prior to takeoff, and could not be operated during flight. Also, the NDCR 21 GHz channel became stuck in an internal calibration state. Otherwise, all other radiometers behaved as expected. Land-water crossings of San Clemente Island at both high and low altitude were used to verify proper response of the nadir-staring radiometers. The problem with the PSR/A memory has been diagnosed and repaired, and a short test flight is planned on Tuesday Aug 5. The NDCR 21 GHz channel is being diagnosed, and replacement calibration switch hardware is being overnighed for a repair on Monday Aug 4. A damaged ferrite switch on the 20-24 GHz ZDCR channels is also being replaced on Monday. We expect a fully functioning radiometer array for Tuesday's short test flight.

WRT the in situ probes, the VACC system behaved normally except for a problem with the high voltage supply on the SMPS, which measures aerosol concentration in the range down to 20 nm size. However, the loss of this portion of VACC is mostly compensated for by the availability of LARGE on AMISA. Although LARGE was not tested on Tuesday, it functioned well during over twenty flights on ARCTAS, and is remaining on board the DC-8 for AMISA. LARGE also includes the CAPS cloud particle probe, which was thoroughly tested during ARCTAS. Since all other capabilities on VACC functioned well, the VACC+LARGE complement can be considered functional for AMISA science requirements.

Although there was a problem powering up one of the dropsondes, the single sonde released within W-291 functioned properly, returning data without any dropouts from release altitude of 26,000' to the surface. A capping inversion producing a marine stratus layer extending from the surface to ~950 mb was clearly observed, although the dew point spread in the marine boundary layer was slightly higher than expected. It is suspected that deconvolution of the profile data will provide more accurate results in inversion cases where strong vertical structure exists.

AMISA is a NASA-sponsored International Polar Year (IPY) project with the goal of understanding the sea ice and atmospheric radiation processes leading to Arctic sea ice freezeup. The instrument tests were critical to the project goals in providing AMISA scientists with a necessary shakedown of their newly-installed instruments. Moreover, the test flight was performed far enough in advance of transit to make necessary repairs. The flight also provided an opportunity for AMISA scientists to develop their observation

techniques in preparation for AMISA science flights. Coordination between pilots, ATC, mission manager, and AMISA scientists for the test flight was excellent.

Thanks are due to NASA DC-8 pilots Bill Brockett and Frank Batteas, mission manager Chris Jennison, and the DC-8 crew for a well-executed test flight. Thanks are also due to AMISA scientists David Kraft, Eric McIntyre, Ankita Chaturvedi, Barbara Brooks, and Miao Tian, the DC-8 technician crew headed by Mike Bereda, and Adam Webster, Rick Shetter, and David van Gilst of NSERC, for completion of the AMISA upload on a particularly tight work schedule.

More next week as we perform one additional test flight and prepare for transit to Kiruna. The R/V Oden is now steaming toward (88N,0W), and we are on track for a unique coordinated mission!

Al Gasiewski
PI, AMISA 2008

