

Are Unmanned Aerial Vehicles (UAVs) in our Lab's Future?

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NOAA and the National Aeronautics and Space Administration (NASA) Dryden have teamed together to perform one of the first atmospheric science demonstrations using the NASA Altair UAV (High Altitude Version of the Predator UAV) as shown in Figure 1. The airborne experiment is named NOAA Unmanned Air Vehicle Demonstration (NOAA UAV Demo) planned for this spring off the west coast of the United States. Both agencies are attempting to make UAVs part of their operations in the near future. The Altair UAV is capable of a maximum of 36-hour flight duration, speeds of ~120-150 kts, a payload of ~200 kg, and a maximum altitude of 15 km. The purpose of the NOAA UAV Demo is to test atmospheric research instruments and NOAA operational requirements (mapping, fisheries management, and marine sanctuary enforcement) on a UAV. CMDL scientists have built a new instrument package that includes a two-channel gas chromatograph and a modified commercial ozone photometer into a small package weighing ~20 kg. The UAV Chromatograph for Atmospheric Trace Species (UCATS) will measure nitrous oxide (N₂O), sulfur hexafluoride (SF₆), chlorofluorocarbon-11 (CFC-11, CCl₃F), CFC-12 (CCl₂F₂), and halon-1211 (CBrClF₂) every 70 seconds. Ozone (O₃) will be measured once every 10 seconds. Altair will fly near the CMDL observatory at Trinidad Head, California, to compare ground-based and other aircraft measurements of the trace gases. Validation of the new NASA Aura atmospheric chemistry satellite launched in August 2004 also will be attempted. It will measure N₂O, CFC-11, CFC-12, and O₃. Ocean color measurements (chlorophyll, i.e., carbon uptake in the ocean) near the coastlines and water vapor measurements by microwave radiometers for atmospheric rivers observations (tropical tropospheric air mass movement into midlatitudes) are planned. The payload also includes a digital camera system (false color IR and visible) and real-time infrared and visible scanning with a sky ball for photographic retrieval.



Figure 1. The NASA UAV Altair used for the NOAA UAV demonstration in spring 2005.