



CARVE: The Carbon in Arctic Reservoirs Vulnerability Experiment

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The carbon budget of Arctic ecosystems is not known with confidence since fundamental elements of the complex Arctic biological-climatologic-hydrologic system are poorly quantified. CARVE will collect detailed measurements of carbon dioxide and methane on local to regional scales in the Alaskan Arctic and demonstrate new remote sensing capabilities to quantify Arctic carbon fluxes and characterize coupled carbon-hydrologic-climate system processes. Ultimately, CARVE will provide an integrated data set with unprecedented experimental insights into Arctic carbon cycling.

CARVE is a 5-year mission of intensive aircraft campaigns in the Alaskan Arctic recently selected as part of NASA's Earth Ventures program (EV-1). Starting in 2012, deployments will occur during the spring, summer and early fall when Arctic carbon fluxes are large and change rapidly. Further, at these times, the sensitivities of ecosystems to external forces such as fire and anomalous variability of temperature and precipitation are maximized.

CARVE will fly an innovative airborne in situ/remote sensing payload aboard a De Havilland DHC-6 Twin Otter aircraft. The payload includes the Passive/Active L-band System (PALS) and a nadir-viewing Fourier transform spectrometer to deliver the first simultaneous measurements of surface parameters that control gas emissions (i.e. soil moisture, freeze/thaw state, surface temperature) and total atmospheric columns of carbon dioxide, methane, and carbon monoxide. The aircraft payload also includes continuous in situ measurements of carbon dioxide, methane and carbon monoxide as well as whole air flask samples that link CARVE greenhouse gas measurements directly to World Meteorological Organization standards. Ground-based measurements provide temporal and regional context as well as calibration for CARVE airborne measurements.