CARVE: Daily Flight Reports, 2012-2015

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Documentation Revision Date: 2017-09-18

Data Set Version: 1

Summary

This dataset includes detailed daily flight reports from each of the airborne campaigns over the Alaskan and Canadian Arctic for the Carbon in Arctic Reservoirs Vulnerability Experiment (CARVE). The reports include plots of the flight path, altitude, wind and weather conditions, IR and visible light images, and initial analysis of the atmospheric gas concentrations encountered along the flight. Flight campaigns took place from 2012 to 2015 between the months of March and November to enable investigation of both seasonal and inter-annual variability in atmospheric gas content. The CARVE measurements are crucial for understanding changes in Arctic carbon cycling and the potential threats posed by thawing of Arctic permafrost.

There are 134 files in .pdf format with this dataset. Each file is a set of approximately 30 slides (saved as .pdf) with detailed information and imagery from each CARVE flight.

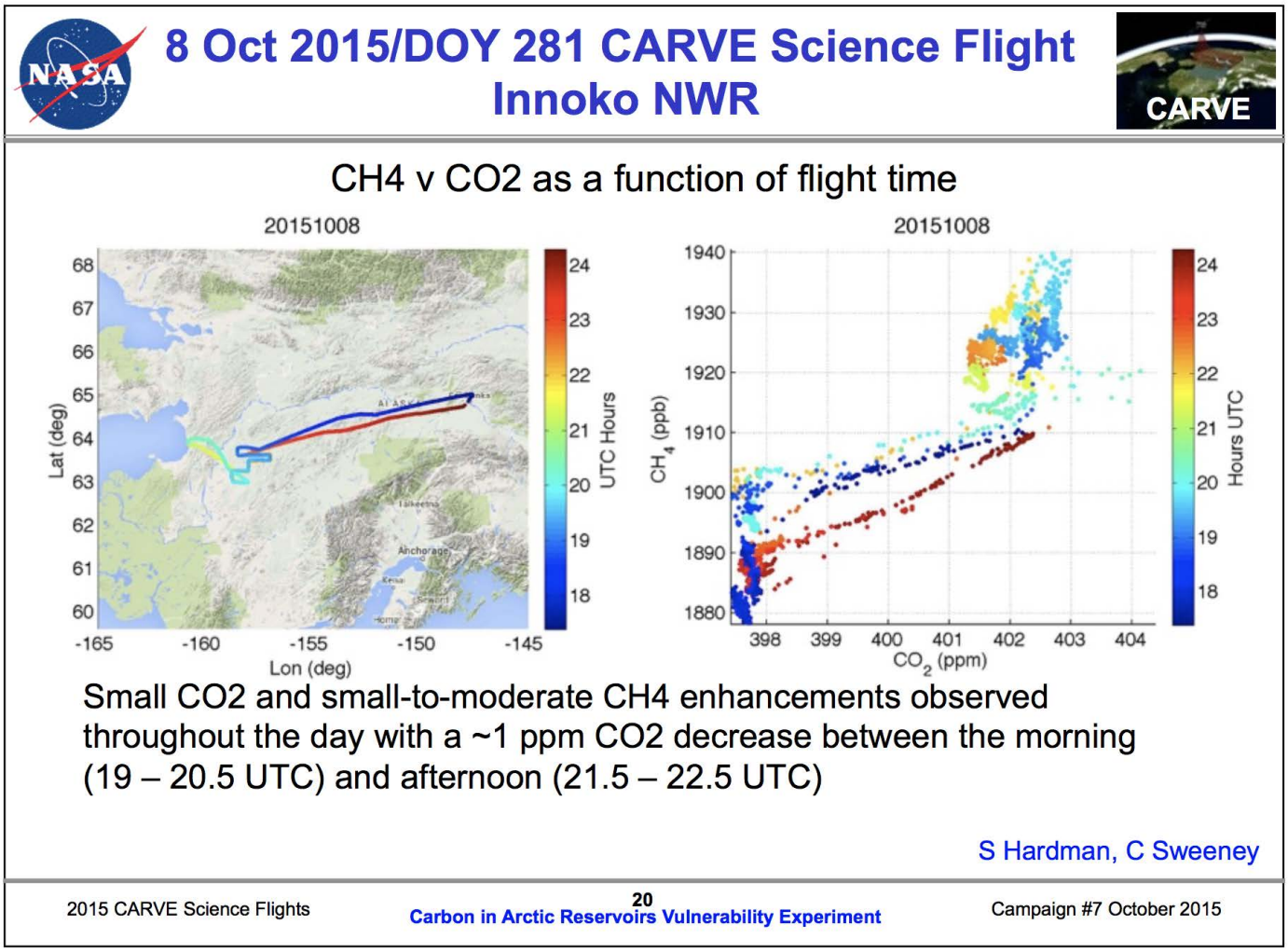

Figure 1: Excerpt from the flight report describing the CARVE flight on 8 October 2015 over the Innoko National Wildlife Refuge (page 20 from CARVE-FlightReport-20151008.pdf).

Citation

Miller, C.E. 2017. CARVE: Daily Flight Reports, 2012-2015. ORNL DAAC, Oak Ridge, Tennessee, USA. https://doi.org/10.3334/ORNLDAAC/1434

Table of Contents

1. Data Set Overview

Project: Carbon in Arctic Reservoirs Vulnerability Experiment (CARVE)

The Carbon in Arctic Reservoirs Vulnerability Experiment (CARVE) is a NASA Earth Ventures (EV-1) investigation designed to quantify correlations between atmospheric and surface state variables for Alaskan terrestrial ecosystems through intensive seasonal aircraft campaigns, ground-based observations, and analysis sustained over a 5-year mission. CARVE collected detailed measurements of greenhouse gases on local to regional scales in the Alaskan Arctic and demonstrated new remote sensing and improved modeling capabilities to quantify Arctic carbon fluxes and carbon cycle-climate processes. CARVE science fills a critical gap in Earth science knowledge and satisfies high priority objectives across NASA's Carbon Cycle and Ecosystems, Atmospheric Composition, and Climate Variability & Change focus areas as well as the Air Quality and Ecosystems elements of the Applied

Sciences program. CARVE data also complements and enhances the science return from current NASA and non-NASA sensors.

Related Data:

A full list of CARVE data products is available at: https://carve.ornl.gov/dataproducts.html

2. Data Characteristics

Spatial Coverage: CARVE flights over the Alaskan and Canadian Arctic

Spatial Resolution: Point measurements

Temporal Coverage: 20120523 - 20151112

Temporal Resolution: Periodic flights during the growing season (approx. March - November) of each year

Study Area (coordinates in decimal degrees)

Site	Westernmost Longitude	Easternmost Longitude	Northernmost Latitude	Southernmost Latitude
Alaska and Canadian Arctic	-168.111	-131.754	71.562	58.843

Data File Information

There are 134 files in .pdf format with this dataset. Each file is a set of approximately 30 slides (saved as .pdf) with detailed information and imagery from each CARVE flight. Note: not all CARVE flights may be represented by a report.

File naming convention:

Files are named by the date (beginning of flight) in UTC.

Example file names: CARVE-FlightReport-20120530.pdf, CARVE-FlightReport-20140609.pdf

3. Application and Derivation

The CARVE project was designed to collect detailed measurements of important greenhouse gases on local to regional scales in the Alaskan Arctic and demonstrate new remote sensing and improved modeling capabilities to quantify Arctic carbon fluxes and carbon cycle-climate processes. The CARVE data provide insights into Arctic carbon cycling that may be useful in numerous applications.

4. Quality Assessment

Not applicable.

5. Data Acquisition, Materials, and Methods

CARVE Flights

These data represent one part of the data collected by the Carbon in Arctic Reservoirs Vulnerability Experiment (Miller et al. 2012). A C-23 Sherpa aircraft made frequent flights out of Fairbanks, Alaska between March and November over multiple years, observing the spring thaw, summer draw-down, and fall refreeze of the Arctic growing season. Flights concentrate observations on three study domains: the North Slope, the interior, and the Yukon River valley. North Slope flights cover regions of tundra and continuous permafrost and were anchored by flux towers in Barrow, Atqasuk, and Ivotuk. Flights to Prudhoe Bay characterize the CO2 and CH4 emissions from oil and natural gas processing plants. Flights over interior Alaska sample discontinuous permafrost, boreal forests, and wetlands. A complete list of CARVE flights can be found at: https://carve.ornl.gov/flights.html. Flight paths and atmospheric gas concentrations for CARVE surveys can be visualized through the CARVE Flight Data Visualization Tool (http://carve.ornl.gov/visualize).

The CARVE aircraft carried a remote sensing and atmospheric sampling payload consisting of the following instruments: a Fourier transform spectrometer (FTS), and an in situ gas analyzer suite (ISGA) with a gas analyzer and flask sampling system (see https://carve.ornl.gov/documentation.html). All

instruments were controlled by a master computer system and UTC time stamped at 1 second intervals.

6. Data Access

These data are available through the Oak Ridge National Laboratory (ORNL) Distributed Active Archive Center (DAAC).

CARVE: Daily Flight Reports, 2012-2015

Contact for Data Center Access Information:

- E-mail: uso@daac.ornl.gov
- Telephone: +1 (865) 241-3952

7. References

Miller, C.E., Dinardo, S.J. et al. (2012). CARVE: The Carbon in Arctic Reservoirs Vulnerability Experiment., *2012 IEEE Aerospace Conference*. http://dx.doi.org/10.1109/AERO.2012.6187026