



The North American Carbon Program Google Earth Collection

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Summary

The central objective of the North American Carbon Program (NACP), a core element of the US Climate Change Science Program, is to quantify the sources and sinks of carbon dioxide, carbon monoxide, and methane in North America and adjacent ocean regions. The NACP consists of a wide range of investigators at universities and federal research centers. Although many of these investigators have worked together in the past, many have had few prior interactions and may not know of similar work within knowledge domains, much less across the diversity of environments and scientific approaches in the Program.

Coordinating interactions and sharing data are major challenges in conducting NACP. The Google Earth Collection on the NACP website (www.nacarbon.org) provides a geographical view of the research products contributed by each core and affiliated NACP project. Other relevant data sources (e.g. AERONET) can also be browsed in spatial context with NACP contributions. Each contribution links to project-oriented metadata, or "project profiles", that provide a greater understanding of the scientific and social context of each dataset and are an important means of communicating within the NACP and to the larger carbon cycle science community. Project profiles store information such as a project's title, leaders, participants, an abstract, keywords, funding agencies, associated intensive field campaigns, expected data products, data needs, publications, and URLs to associated data centers, datasets, and metadata. Data products are research contributions that include biometric inventories, flux tower estimates, remote sensing land cover products, tools, services, and model inputs / outputs.

Project leaders have been asked to identify these contributions to the site level whenever possible, either through simple latitude/longitude pair, or by uploading a KML, KMZ, or shape file. After post-processing, research contributions are added to the NACP Google Earth Collection to facilitate discovery and use in synthesis activities of the Program.

Process for Generating Profile KML files for Google Earth:

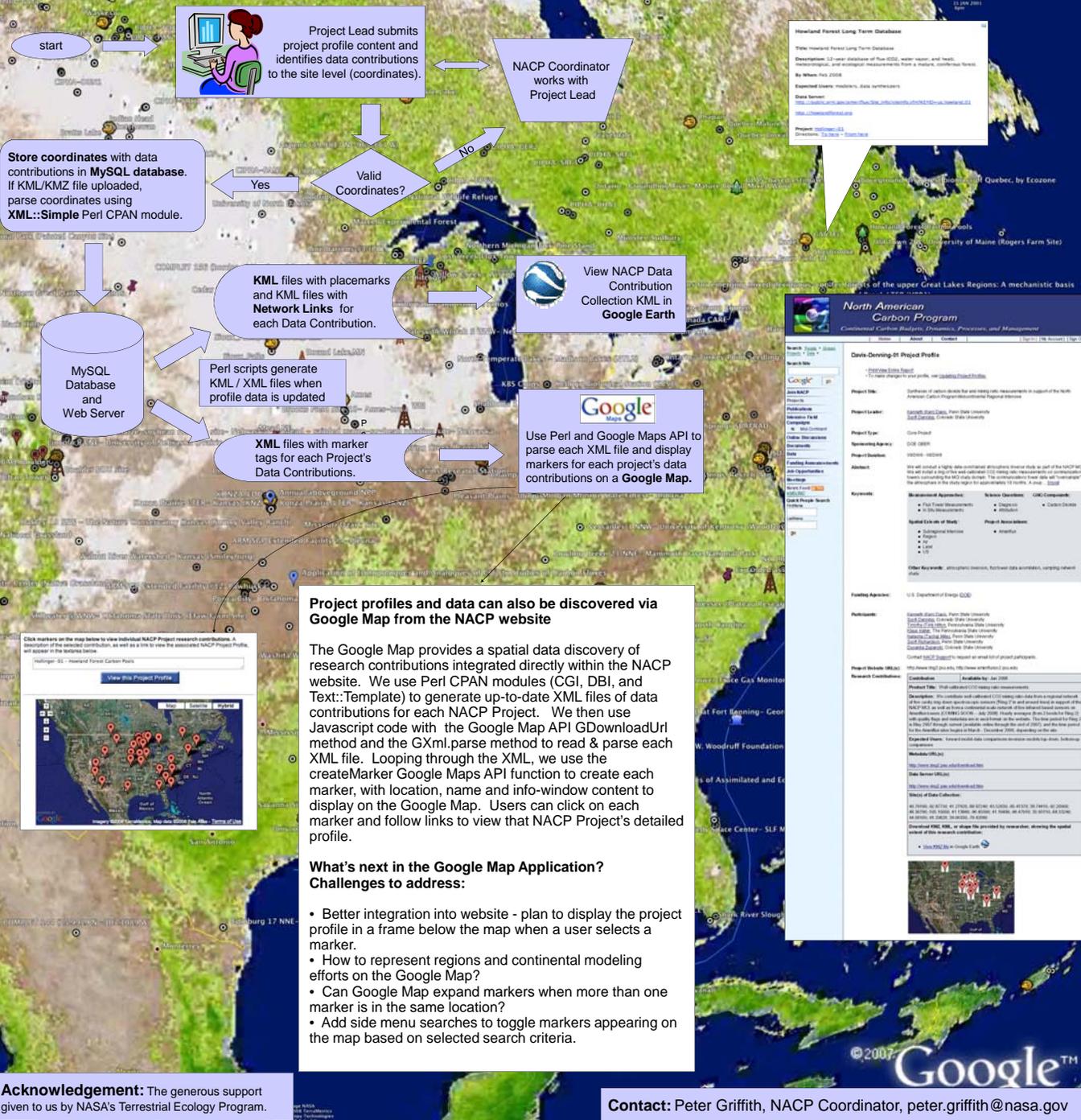
Collecting Coordinates: When NACP Project Leads update their project profiles using an online tool, they may provide site level coordinates for their data contributions by entering latitude/longitude values or by uploading their own KML, KMZ, or shape file. Coordinates are parsed from the KML or KMZ file (specifically from the <Document> <Folder> <Placemark> <Point> <coordinates> tag) using the XML::Simple Perl CPAN module. We check that the coordinates are valid for North America using a series of Perl regular expressions, and then if valid, they are stored with each data contribution in a MySQL database.

Generating KML File: When a data contribution is updated, a Perl script automatically queries the MySQL database and regenerates the KML file of <placemark> tags for that data contribution. We customize the content and layout of the Google Earth Info-Window by defining a <BalloonStyle> item in conjunction with <ExtendedData> name/value pairs.

Using Network Links to Share the KML: We generate a separate KML file containing a network link to each of the individual data contribution placemark KML files. The KML file with **network links** is hosted online. The KML includes the <atom> attribution data tags defined in the W3C Atom Syndication Format namespace so that it can be **indexed correctly** by Google and other web crawlers. The NACP Google Earth collection KML is comprised of the comprehensive list of all of the NACP network link KML files, so that once a user loads the collection KML into their local Google Earth, any new changes to the profile will be reflected in that user's Google Earth.

What's Next for the Google Earth Collection?

- use different placemark icons to represent specific data collection types/categories (what categories would be useful for NACP collection)
- display regional / continental scale data contributions / modelling products (not just site-level placemarks)
- use Google Earth API to more closely integrate Earth in to NACP website and add custom searches and user friendly interface.



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