

# CDI FY18 Request for Proposals

## Facilitating USGS data integration into Google Earth Engine for geospatial analysis

**Submission Title:** Facilitating USGS data integration into Google Earth Engine for geospatial analysis

**Lead PI:** Jessica Walker

**Mission Area:** Climate and Land-Use Change

**Region:** Pacific Region

**Organization:** Western Geographic Science Center

**Orcid:** 0000-0002-3225-0317

**Phone:** 5206705019

**Email:** jjwalker@usgs.gov

**City:** Tucson

**State:** AZ

**Co-PIs and Collaborators:**

**Type:** Collaborator

**Name:** Christopher Soulard

**Mission Area:** Climate and Land-Use Change

**Region:** Pacific Region

**Organization:** Western Geographic Science Center

**Orcid:** 0000-0002-5777-9516

**Phone:** 6503294317

**Email:** csoulard@usgs.gov

**City:** Menlo Park

**State:** CA

**Type:** Collaborator

**Name:** Itiya Aneece

**Mission Area:** Climate and Land-Use Change

**Region:** Pacific Region

**Organization:** USGS

**Orcid:** 0000-0002-1201-5459

**Phone:** 928-556-7313

**Email:** ianeece@usgs.gov

**City:** Flagstaff

**State:** AZ

**Science Support Framework Element 1:** Information

**Science Support Framework Element 2:** Science Data Lifecycle - Publishing/Sharing

**Science Support Framework Element 3:** Data Management

**In-Kind Match:** \$11,000.00

**List of anticipated deliverables from the project:** (1) White paper that details USGS policy towards GEE use and outlines the best practices for USGS employees' registration for and implementation of GEE; (2) White paper that provides guidance for USGS data integration into GEE; (3) Demonstration suite of The National Map vector-based files in fusion or Earth Engine table format available for upload into GEE.

**Lead Cost Center:** Western Geographic Science Center

**Project Description:** We propose to facilitate the ingestion of existing USGS data into the free, publicly accessible cloud-computing platform Google Earth Engine, and resolve internet security issues specific to USGS employees' use of the platform.

**Total Budget:** \$29,114.00

## **Facilitating USGS data integration into Google Earth Engine for geospatial analysis**

**PI: Jessica Walker**

**Background:** The USGS is continually challenged to improve the visibility, ease of access, and integration potential of the geospatial information it publicly disseminates through online data portals such as The National Map and Earth Explorer. Facilitating the ingestion of USGS geospatial data into Google Earth Engine (GEE) may help address these goals by making key USGS datasets readily accessible to the user base of this increasingly popular geospatial analysis system, and by removing one of the current roadblocks to GEE adoption within the USGS. GEE is a cloud-computing platform that has transformed the ability of researchers to access, manipulate, and analyze planetary-scale geospatial data collections. The platform makes available satellite-image archives from a variety of governmental organizations (e.g., USGS, NASA, European Space Agency) as well as multiple other public remote sensing, climatic, environmental, geophysical, and land-cover datasets. Off-loading the burden of managing data collections reduces storage and processing demands on local computer systems, while leveraging Google's vast computing resources enables users to broaden the spatial and temporal scope of analysis objectives. Since GEE is free for non-commercial use, it is a cost-effective alternative to expensive high-performance desktop systems and image processing packages (e.g., ESRI ArcMap, ENVI, ERDAS Imagine) often required in scientific research. The platform thus represents a potential avenue for reducing future USGS hardware and software licensing expenditures. Currently, USGS employees who register for and access GEE through their usgs.gov email accounts are prevented from exploiting the full functionality of the platform by USGS internet security measures. These measures also complicate the provisioning of USGS data in GEE-ready formats. Both the straightforward integration of USGS data in GEE as well as the broader USGS adoption of GEE for geospatial analysis hinge on the clarification and resolution of technical details and security points of concern. Given the potential for GEE to serve as a showcase for USGS datasets and a geospatial processing system for USGS employees, these issues need to be expeditiously explored, addressed, and documented.

**Technical solution:** Funding will allow us to formalize and enhance both the integration of USGS resources into the GEE platform and USGS use of GEE technology. We propose to investigate the feasibility of seamless ingestion of USGS data into GEE by converting a selected set of vector datasets to a format that can be natively referenced and used in GEE (i.e., fusion or Earth Engine tables). We will initially target key geospatial datasets available online through The National Map. We will coordinate with USGS IT and GEE personnel to identify possible solutions for streamlining large-dataset conversions, as well as providing public and internal access to the pilot set of data in accordance with established USGS internet protocols. We will additionally work with USGS IT personnel to formulate an application-use strategy that simultaneously complies with USGS security regulations and resolves the issues that uniquely constrain USGS users of GEE. Contingent upon an unsatisfactory conclusion to that attempt, we will document the work-around procedures that are sanctioned by the USGS for permitting access to the GEE platform.

**Deliverables:** (1) White paper that details USGS policy towards GEE use and outlines the best practices for USGS employees' registration for and implementation of GEE; (2) White paper that provides guidance for USGS data integration into GEE; (3) Demonstration suite of The National Map vector-based files in fusion or Earth Engine table format available for upload into GEE.

**Project experience and collaboration:** Our project members are among the early USGS adopters of GEE for research investigations and are experienced GEE programmers and practitioners. The PI created and oversees the USGS GEE online forum.

Budget Category	Federal Funding "Requested"	Matching Funds "Proposed"
<b>1. PERSONNEL (SALARIES including benefits):</b>		
Jessica Walker	\$11,000	\$0
Itiya Aneece	\$11,000	\$0
Federal Personnel Total:	\$22,000	\$11,000
<b>Total Salaries:</b>	\$22,000	\$11,000
<b>2. TRAVEL EXPENSES:</b>		
Travel total (Per Diem, airfare, Mileage/Shuttle) <i>1 trip:</i> <i>ESIP Summer Mtg (Tucson, AZ)</i>	\$300	\$0
Other Expenses (Registration fee):	\$650	\$0
<b>Total Travel Expenses:</b>	\$950	\$0
<b>3. OTHER DIRECT COSTS (itemize):</b>		
Equipment (including software, hardware, purchases/rentals):	\$120	\$0
Publication costs:	\$0	\$0
Office supplies, Training, Other Expenses:	\$0	\$0
<b>Total Other Direct Costs:</b>	\$120	\$0
<b>Total Direct Costs:</b>	\$23,070	\$0
<b>Indirect costs (26.2%):</b>	\$6,044	\$0
<b>GRAND TOTAL:</b>	<b>\$29,114</b>	<b>\$11,000</b>