GeoDash: Assisting Visual Image Interpretation in Collect Earth Online by Leveraging Big Data on Google Earth Engine

Kel Markert[1,2], William Ashmall[1,3], Gary Johnson[4], David Saah[4,5], Danilo Mollicone[6], Alfonso Sánchez-Paus Díaz[6], Eric Anderson[1,2], Africa Flores[1,2], Robert Griffin[7]

[1]NASA-SERVIR, Science Coordination Office; [2]Earth System Science Center, University of Alabama in Huntsville; [3]Science and Technology Institute, University Space Research Association; [4]Spatial Informatics Group; [5]Geospatial Analysis Lab, University of San Francisco; [6]Food and Agriculture Organization of the United Nations; [7]Department of Atmospheric Science, University of Alabama in Huntsville
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Abstract

Collect Earth Online (CEO) is a free and open online implementation of the FAO Collect Earth system for collaboratively collecting environmental data through the visual interpretation of Earth observation imagery. The primary collection mechanism in CEO is human interpretation of land surface characteristics in imagery served via Web Map Services (WMS). However, interpreters may not have enough contextual information to classify samples by only viewing the imagery served via WMS, be they high resolution or otherwise. To assist in the interpretation and collection processes in CEO, SERVIR, a joint NASA-USAID initiative that brings Earth observations to improve environmental decision making in developing countries, developed the GeoDash system, an embedded and critical component of CEO. GeoDash leverages Google Earth Engine (GEE) by allowing users to set up custom browser-based widgets that pull from GEE's massive public data catalog. These widgets can be quick looks of other satellite imagery, time series graphs of environmental variables, and statistics panels of the same. Users can customize widgets with any of GEE's image collections, such as the historical Landsat collection with data available since the 1970s, select date ranges, image stretch parameters, graph characteristics, and create custom layouts, all on-the-fly to support plot interpretation in CEO. This presentation focuses on the implementation and potential applications, including the back-end links to GEE and the user interface with custom widget building. GeoDash takes large data volumes and condenses them into meaningful, relevant information for interpreters. While designed initially with national and global forest resource assessments in mind, the system will complement disaster assessments, agriculture management, project monitoring and evaluation, and more.
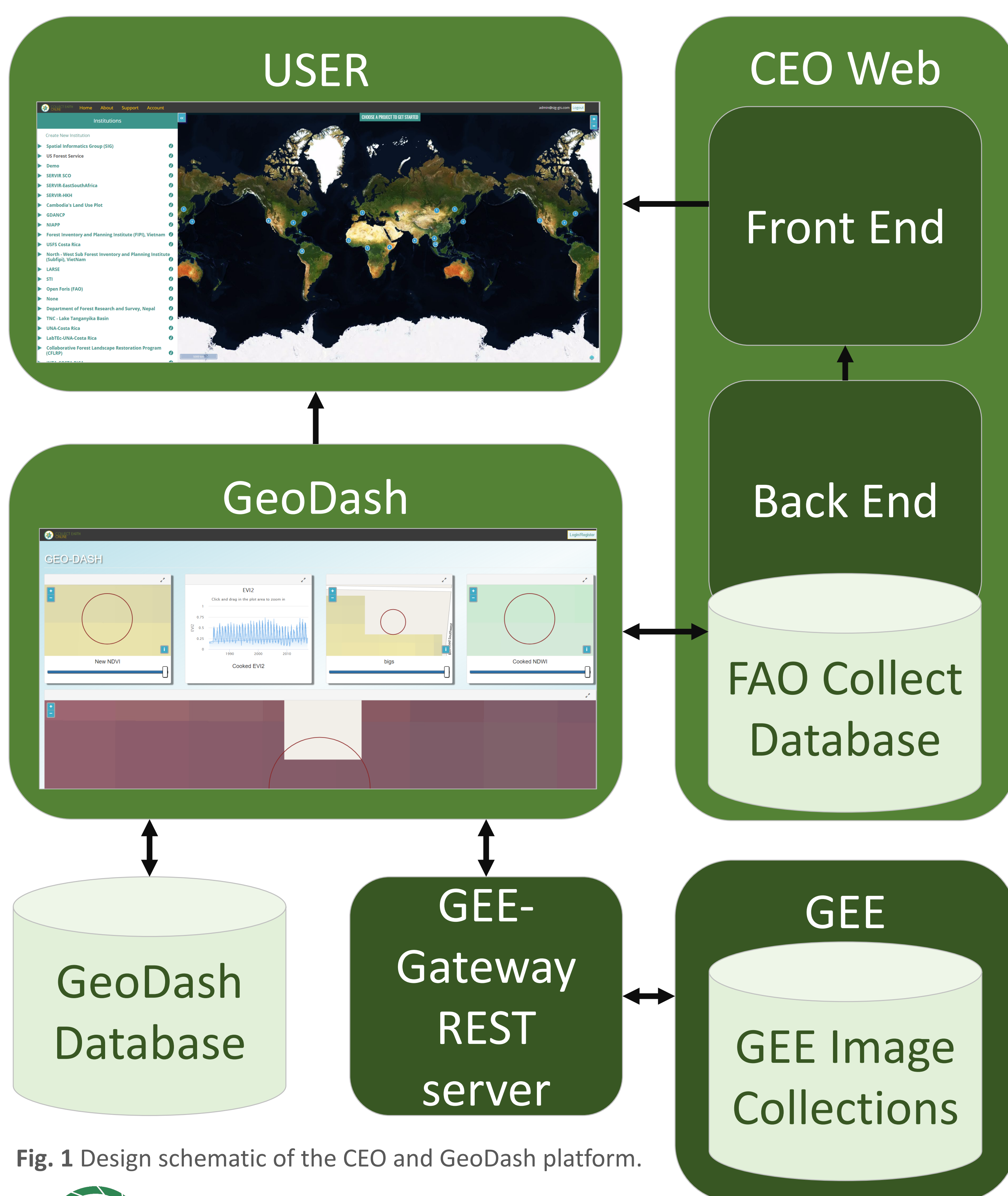
Methodology

Collect Earth Online promotes consistency in locating, interpreting, and labeling reference data plots for use in classifying and monitoring land cover / land use change. The full functionality of Collect Earth Online including collaborative compilation of reference point databases, using the FAO collect system, is implemented online so there is no need for desktop installation. The GeoDash system is integrated into CEO where collection plots are inputs into the GEE queries for display. The GeoDash system being separate allows for building custom widgets the leverage Earth Engine for additional applications such as forest monitoring.

Fig. 1 Design schematic of the CEO and GeoDash platform.

Results
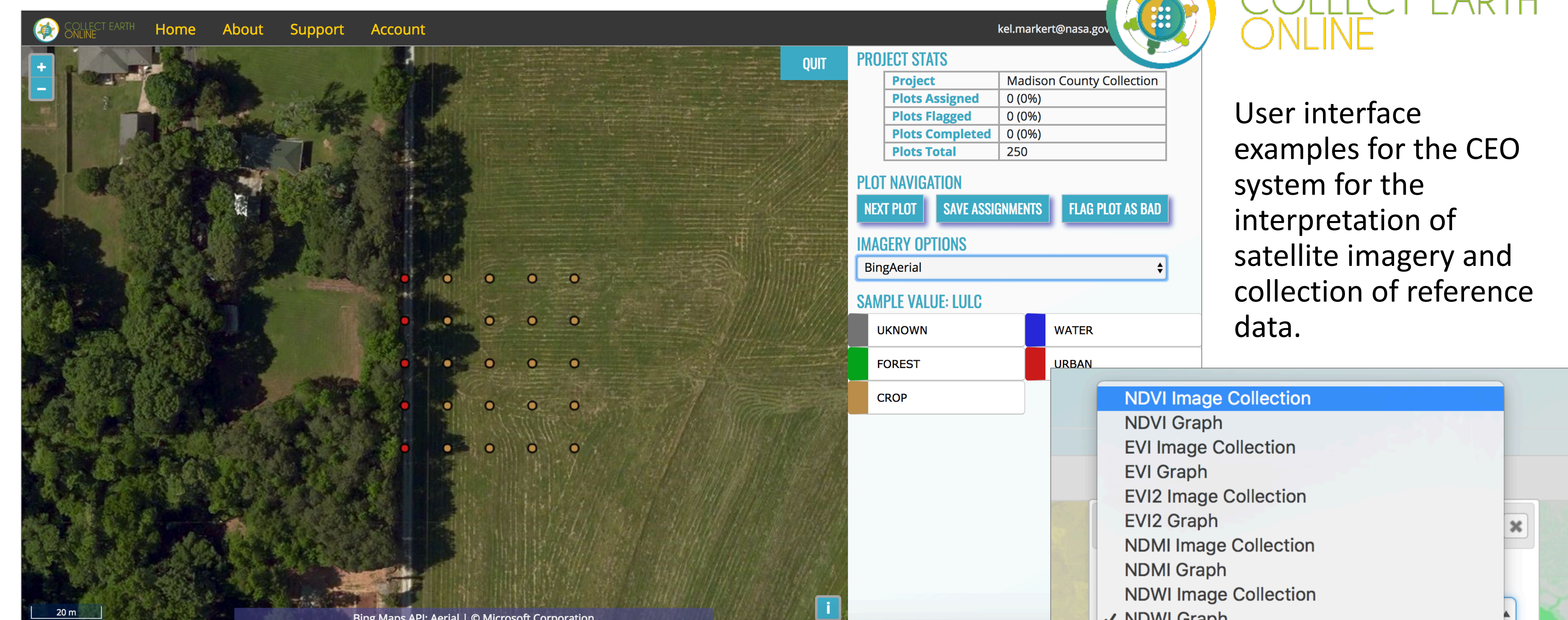
Fig. 2 Example of the CEO Collection Page for users to assign land cover types to sub-plot samples.

User interface examples for the CEO system for the interpretation of satellite imagery and collection of reference data.
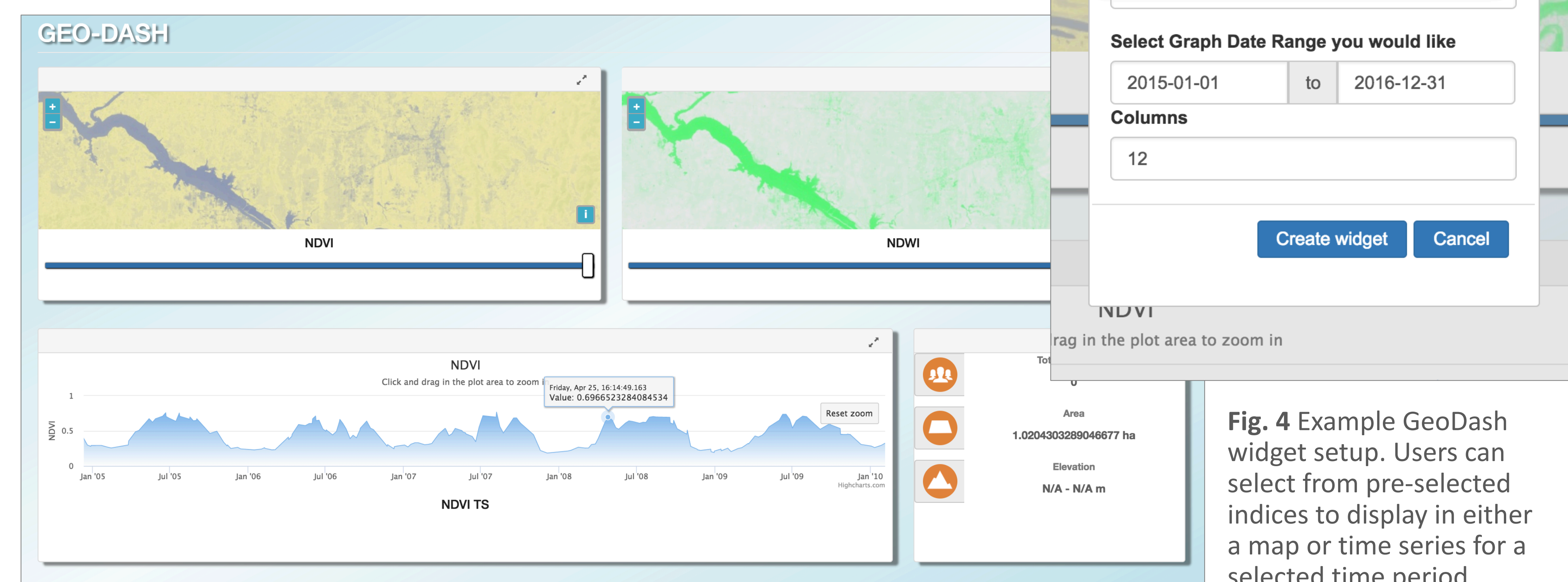

Fig. 3 Example of the GeoDash Page for users to assess additional information gleaned from Landsat. Index values in maps or time series to be viewed to identify, for example, seasonality.

Fig. 4 Example GeoDash widget setup. Users can select from pre-selected indices to display in either a map or time series for a selected time period

Conclusions

▸ CEO facilitates collaboratively collecting reference data within a free and open online system.

▸ GeoDash is a flexible system that leverages GEE for custom widget creation to access and view petabytes of data in meaningful information.

▸ This system enables the collection of more information within the CEO systems by allowing users to view data relevant to identifying land cover types.

▸ The exploration for use of CEO and GeoDash for other application such as identification of surface water is on going and will continued to be pursued.

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Project Partners

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Contact

Questions?
About Project – kel.markert@nasa.gov
About SERVIR – servirglobal.net
About CEO – ceo.sig-gis.com
About OpenForis – openforis.org

Code repositories -
- github.com/openforis/collect-earth-online
- github.com/openforis/gee-gateway