AN OVERVIEW OF THE WEB-BASED GOOGLE EARTH COINCIDENT IMAGING TOOL

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1. INTRODUCTION

Increasingly, data from multiple sensors are used to gain a more complete understanding of Earth's processes. The information about near-simultaneous Earth surface observations acquired by two or more sensors is not readily available to the Calibration and Validation (Cal/Val) community so they can focus on the scientific analysis of the data. Instead, most standard exercises require substantial manual effort by users to identify corresponding image pairs. Depending on the application scope, such efforts often account for a significant portion of the total effort and can result in a substantially reduced amount of time available for data analysis. Existing tools are often developed for specific campaigns or events with little desire for broad application.

This paper describes a Web-based Google Earth coincident imaging tool to identify the potential near-simultaneous Earth surface observations of Earth from multiple sensors that have different ground tracks and repeat cycles. The Committee on Earth Observing Satellites (CEOS), which includes 29 space agencies and 20 other national and international organizations, is currently operating and planning over 240 Earth observation satellites in the next 15 years. The technology described here will better support a diverse international group and enable the use of multiple sensors to promote increased coordination among CEOS agencies toward a Global Earth Observation System of Systems (GEOSS).

2. THE COINCIDENT IMAGING TOOL

The NASA CEOS Systems Engineering Office (SEO), in conjunction with the CEOS Working Group on Calibration and Validation (WGCV), developed the CEOS Visualization Environment (COVE) tool [1]. The objective was to develop a simple and intuitive application tool that leverages the capabilities of Google Earth to

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display satellite sensor coverage areas and to identify coincident scene locations along with dynamic menus for flexibility and content display. Key features and capabilities include user-defined evaluation periods (start and end dates) and regions of interest (rectangular areas), and multi-user collaboration. COVE allows predefined geographical locations (CEOS reference standard test sites [2], continents, countries, etc.) or a point search (specific lat/long) capability. Users can select two or more sensors from a database, containing Satellite Tool Kit (STK) generated orbit information (satellite latitude & longitude), and perform rapid calculations to identify coincident scenes where the ground tracks of the sensor fields-of-view intersect. Calculated results are displayed on a customized Google Earth Web interface to view location and time information along with optional output to EXCEL table format. In addition, multiple viewports can be used for comparisons. The simplicity of the tool allows a user to access and execute the tool with only a Web browser. There is no need to download large amounts of data and learn data formats or programming.

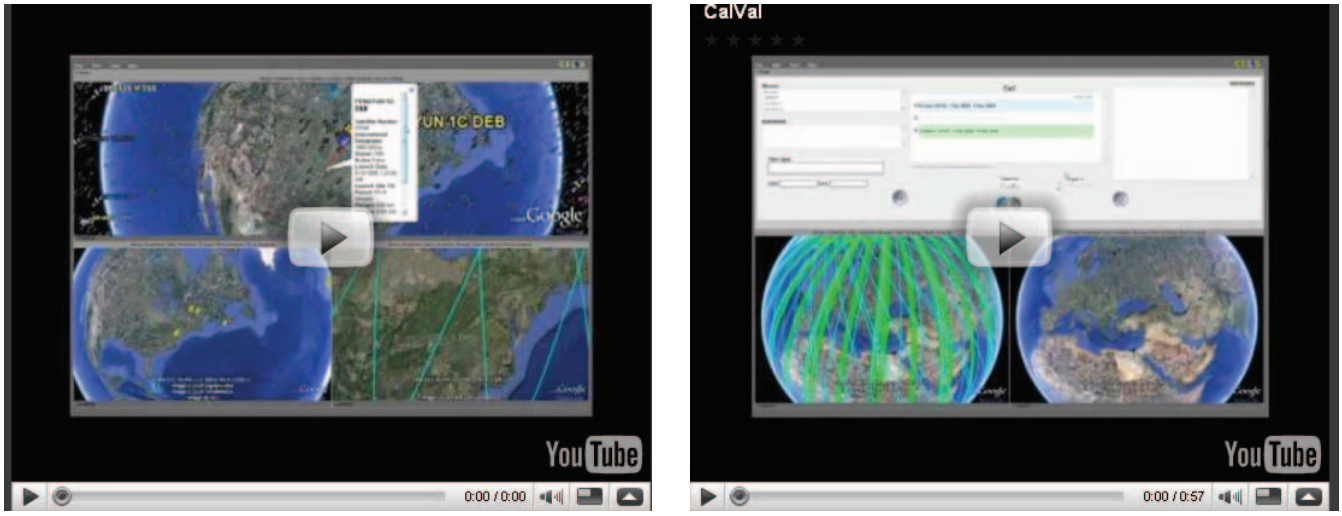

Fig. 1. Training Movies on YouTube showing the a) Application Overview and b) Multiple Viewports

The 10 sensors that are already part of the COVE database are

1. Advanced Land Observing Satellite (ALOS) Advanced Visible and Near Infrared Radiometer type 2 (AVNIR-2),
2. China-Brazil Earth Resources Satellite (CBERS-2B) High-Resolution CCD Sensor (HRCCD),
3. Envisat Medium Resolution Imaging Spectrometer Instrument (MERIS),
4. Greenhouse gases Observing SATellite "IBUKI" (GOSAT) Thermal And Near infrared Sensor for carbon Observations - Fourier Transform Spectrometer (TANSO-FTS),
5. Indian Remote-Sensing Satellite (IRS-P6) Advanced Wide Field Sensor (AWiFS),
6. Landsat 7 (L7) Enhanced Thematic Mapper Plus (ETM+),
7. Sentinel-2 Multi-spectral Instrument (MSI),

8. Systeme Pour l'Observation de la Terre (SPOT-5) High Resolution Geometric (HRG),
9. Terra Moderate Resolution Imaging Spectroradiometer (MODIS), and
10. Thailand Earth Observation System (THEOS) Multispectral (MS) camera.

The capabilities and applications of COVE can support a variety of international Cal/Val activities [3] and provide general information on Earth observation coverage for education (see Fig. 1) and societal benefit [4]. This project demonstrates the utility of a systems engineering tool with broad international appeal for enhanced communication and data evaluation opportunities among international CEOS agencies. The COVE tool is publicly accessible via NASA servers [5].

3. REFERENCES

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