**Calibration and Delivery of Global-Scale Commercial Imagery in a Cloud-Based
Computational Platform Optimized for Analysis such as
Temporal Regressions, Machine Learning, and Change Detection**

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Continuing improvements in computing capabilities and performance is driving rapid changes and improvements in commercial sensor development, imagery processing and storage technologies. Multi-decadal remote sensing datasets at the petabyte scale are now available in commercial clouds, with new satellite constellations generating petabytes/year of daily varying resolutions of global coverage imagery.

Cloud computing and storage, combined with recent advances in machine learning are enabling understanding of the world at a scale and at a level of detail never before feasible. This presentation will discuss briefly additional technology impacts to commercial remote sensing in the next decade and focus on:

- commercial data processing at terabyte rates in the cloud using multi-modal sensor data utilizing calibrated, georeferenced imagery to build videos of the Earth at varying temporal and spatial resolutions which include the data processing and automated analysis, with scripts detecting, importing and processing daily imagery from NASA, USGS, NOAA, ESA and Planet Labs internet servers within minutes of data availability (keeping in mind the technology is data stack agnostic)
- utilizing machine learning to demonstrate ways in which a global scale automated data platform enables quick prototyping of various commercial satellite imagery analysis algorithms with multi-sensor data, from general land use land cover classification and fast mosaics to change and object detection.
- general data flow and computational aspects required for prototyping such algorithms using open source software and cloud computing resources
- a system architecture which demonstrates automated:
    - continual ingest
    - geo-referencing
    - cloud removal
    - quality assessment
    - analysis of petabytes of satellite imagery [served via WMS and REST access leveraging a proprietary code base of cloud-native services for leading open source scalable technologies with Docker containers running on scalable clusters of virtual machines (Ubuntu Linux base machines) across multiple data centers, which run in both Google and Amazon commercial clouds].
    - standard library usage with GDAL and kakadu (JPEG2000) for file access to remote sensing imagery
    - data and analysis delivery to customers [via web-based APIs and high-performance WMS layers for easy consumption and inclusion in in open source and/or widely used proprietary geographical information systems].

More important than the technology utilized to serve and analyze commercial imagery is the preparation of the data or the **refinement of raw imagery to analysis-ready format. This presentation will also discuss the global scale processes as** each image is retrieved, is uncompressed, and the image metadata is parsed and the raw pixel information is converted into meaningful units. Imagery delivery and storage as appropriately sized pieces using a consistent equal-area world-wide tiling of the sphere, (with any necessary co-ordinate transformations and data compressions) with follow on access will be demonstrated. Finally the use of imagery for a**utomated extraction of high-level business intelligence will be demonstrated through** proprietary automated analysis models.