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Google Earth Engine and machine learning for Earth monitoring

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Hyperspectral images are a unique source for obtaining many kinds of information about the Earth's surface. Modern platforms support users to perform complex analyses with a collection of images without the use of any specialized software. Google Earth Engine (GEE) is a planetary-scale platform for Earth science data & analysis. Atmospheric, radiometric, and geometric corrections have been made on number of image collections at GEE. While working with row data, it Is possible to use build-in GEE function to filter data and create composites to get cloud score threshold and the percentile. It is also possible to use custom algorithms for atmospheric corrections. There are over 100 satellite image collections and modeled datasets. Some collections have a spatial resolution of up to 15 meters. GEE has the JavaScript online editor to create and verify code and Python API for advanced applications. All that made GEE very convenient tool for different Earth monitoring projects. Over the last decades there has been considerable progress in developing a machine learning methodology for a variety of Earth Science applications involving trace gases, retrievals, aerosol products, land surface products, vegetation indices, fire and flood tracking, ocean applications, and many others. In this report, we will review basic GEE functions and practice, some examples of successful applications, and our experience in environmental monitoring.

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