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Towards a global mineral mapping of Earth's surface

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GEO, the Group on Earth Observation recognises the societal importance energy and minerals and has recently established a new “Energy and Mineral Resource Management” Societal Benefit Area (SBA) in its 2016-2025 Work Plan. This new SBA includes a specific Community Activity, namely “EO data and Mineral Resources” (CA-06).

The objectives of a GEO Community Activity are *“to allow stakeholders to cooperate flexibly and with a low initiation cost and include a broad variety of activities with varying degrees of coordination. A community activity may, for example, define user needs, explore new frontier applications or demonstrate technical possibilities, or agree on specific observation or analysis protocols and data exchange”*.

High spectral resolution remote sensing tools have proven their invaluable capabilities in mapping minerals at Earth's surface. Numerous studies and projects demonstrated the value of imaging spectroscopy in particular in mineral prospecting as well as in the assessment of environmental impacts of mining and post-mining. The “mineral community” however lacks dedicated EO system or program and currently use systems and programs from other GEO SBAs. Apart from the Advanced Spaceborne Thermal Emission and Reflection Radiometer (ASTER) program global coverage by high-spectral resolution spaceborne sensors in particular is not available yet.

The ASTER Geoscience Map of Australia [1] and [2] has been generated from satellite ASTER data. Thanks to the 14 spectral bands of ASTER, it provides a set of 17 mineral abundance products covering the entire Australian territory.

The Airborne imaging spectrometer HyMap, with its 126 spectral bands in the visible, near infrared and shortwave spectral range has been used to produce surface mineral maps of Afghanistan (iron-bearing mineral and carbonates, phyllosilicates, sulphates and altered minerals) [3].

These two examples, among others, open wide perspective for a global mapping of minerals. Amid the objectives of the CA-06 leads are the generation of public, ASTER global geoscience maps for delivery to GEO data archive and the definition of possible global, public hyperspectral satellite land surface composition product standards.

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[2] Australian ASTER Geoscience Product Notes, Version 1, 7th August, 2012 – CSIRO *ePublish* No. EP-30-07-12-44

[3] Kokaly, R.F., King, T.V.V., and Hoefen, T.M., 2013, Surface mineral maps of Afghanistan derived from HyMap imaging spectrometer data, version 2: U.S. Geological Survey Data Series 787, 29 p., <http://pubs.usgs.gov/ds/787/>.

