Submitted Abstract

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Title	Calculation Of The Mountain Green Cover Index (Mgci) For Austria Based On A Semantic Earth Observation Data Cube (Sen2cube.At).
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Abstract

Mountain areas provide important ecosystem services like climate regulation, water treatment or hazard prevention. In this context, there is a direct correlation between the vegetation coverage of mountain areas and their ability to provide these services.

For this reason, the Food and Agriculture Organization (FAO) of the United Nations (UN) developed the MGCI to measure the extent of green coverage and related changes in mountain areas and is defined as the area ratio of all green plants in the mountain, including the area of forests, shrubs, woodlands, pastures, and farmland to the total area of mountains. The MGCI is an official indicator (15.4.2) for the UN's Sustainable Development Goal (SDG) 15 respectively the target 15.4, which is defined as follows: "By 2030 ensure the conservation of mountain ecosystems, including their biodiversity, to enhance their capacity to provide benefits which are essential for sustainable development" (United Nations, 2021)

The MGCI was established in 2016 and was first calculated based on a visual interpretation of global sample plots of satellite imagery with the Collect Earth tool developed by the FAO with support of Google Earth Outreach combined with the UNEP-WCMC mountain classification. There are several more recent calculation approaches, like FAO's new methodological approach from 2020, which is based on a quantitative analysis of standardized and yearly updated land cover maps (ESA CCI-LC), or Normalized Difference Vegetation Index (NDVI)-based MGCI calculations. There are also methodologies and approaches by single National Statistical Offices like in Germany. In Austria, there currently is no official nation-wide data for the MGCI available, but it is planned to be published in the future. However, sample-based methods can be time-consuming and error-prone. There is room for improvement to allow calculations on demand or to use the full spectral information provided from the sensors.

We present an approach for an Austrian-wide MGCI calculation based on semantic, sample-free remote sensing methods within a semantic Earth Observation (EO) data cube (Sen2Cube.at). Sen2Cube.at allows programming-free access to multidimensional semantically enriched EO data using semantic querying. In this context, we demonstrate a semantic query that combines multiple queries of satellite imagery (Sentinel-2) to detect vegetated mountain areas in certain time periods (e.g. a year or vegetation period) which can be compared afterwards. The semantic queries are stored in a knowledgebase and can be reused in the future on-demand. This allows a time and cost-efficient monitoring of the MGCI, especially useful for public authorities.