Potential of Sentinel and high resolution EO data for monitoring nature protection in cities – the SeMoNa22 project

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At the end of the 1980s the Municipal Department for Environmental Protection of Vienna - MA 22 initiated a detailed biotope mapping on the basis of the Viennese nature conservation law. Approximately 40 % of Vienna's city area were covered, however only 2 % of the densely populated areas. This biotope mapping was the basis for the biotope types mapping (2005-2011) and of the green areas monitoring (2005). An update of these surveys has been planned in order to meet the various requirements of urban nature conservation and the national and international, respectively, legal monitoring and reporting obligations.

Since the 1970s the municipality of Vienna has built up a comprehensive database and uses state-of-the-art methods for collecting geodata carrying out services for surveying, airborne imaging and laser-scanning. Currently systems for mobile mapping, oblique aerial photos and a surveying flight with a single photon LiDAR system are being implemented or prepared. Because of the numerous high-resolution data available within the municipality and limitations mainly in spatial resolution of satellite data, the City of Vienna saw no need or benefit in integrating satellite images until now.

However, satellite data are now available within the European Copernicus program, which have considerable potential for monitoring green spaces and biotope types due to their high temporal resolution and the large number of spectral channels and SAR data. For the first time, the Sentinel-1 mission offers a combination of high spatial resolution in Interferometric Wide Swath (IW) recording mode and high temporal coverage of up to four shots every 12 days in cross-polarization in the C-band. The Sentinel-2 satellites deliver multispectral data in 10 channels every 5 days with spatial resolutions of 10 or 20 m.

Within the SeMoNa22 project, various indicators are derived for the Vienna urban area (2015-2020) and used for object-oriented mapping and classification of biotope types and

characterization of the green space:

- Sentinel-1 data (-> time series on the annual cycles in the backscattering properties of the vegetation, phenology),

- Sentinel-2 data (-> multispectral time series via parameters for habitat classification / vegetation indices),

- High-resolution earth observation data (airborne laser scanning (ALS), image matching, orthophoto -> various parameter describing the horizontal and vertical vegetation structure).

The main goals of SeMoNa22 is to explore efficient and effective ways of knowing if, how and to what extent the data collected can form the basis and become an integrative part of urban conservation monitoring. For this purpose, combinations of different earth observation data (satellite- and aircraft- supported or terrestrial sensors) and existing structured fieldwork data collections (species mapping, soil parameters, meteorology) are examined by means of pixel- and object-oriented methods of remote sensing and image processing. The study is done for several test sites in Vienna covering different ecosystems. In this contribution the ongoing SeMoNa22 project will be presented and first results will be shown and discussed.