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Remote sensing data supporting EULAKES project

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EULAKES Project (European Lakes Under Environmental Stressors), funded by Central Europe Programme 2010-2013, includes four European lakes study: Garda Lake (Italy), Charzykowskie Lake (Poland), Neusiedl Lake (Austria) and Balaton Lake (Hungary). Aim of the Project is to evaluate lakes exposure to different type of risks in order to provide some useful tools to improve natural resources planning and management. The goal is to build an informatics system to support decision makers' purposes, which also provides a list of possible measures to be undertaken for water quality protection. Thanks to remote sensing techniques water quality characteristics have been assessed. Our activity provided photosynthetic cyanobacteria specific pigments spatial distribution in Charzykowskie Lake, macrophyte mapping in Garda Lake using MIVIS images, and common reeds change detection in Neusiedl Lake through Landsat satellite images analysis. 4800 MODIS 11A products, from 2004 to 2010, have been acquired to evaluate surface water temperature trends, significant input data for future global change scenarios. Temperature analysis allowed the evaluation of lakes different characteristics, temperature temporal trends and temperature spatial variability inside each lake. Optical active parameters (Chlorophyll-a, Total Suspended Matter, Colored Dissolved Organic Matter), as well as water transparency, have been estimated from 250 MERIS images processing. Satellite images, acquired following Water Frame Directive monitoring rules, have been corrected for adjacent effects using ESA Beam-Visat software (ICOL tool). Atmospheric correction has been performed applying different softwares: 6S radiative transfer code and Beam Neural-Network. Different algorithms for the water quality parameters estimation have been applied to reflectance values, after their validation with spectroradiometric field measures. Garda Lake has been analysed with ESA Case 2 Regional algorithm, while for Balaton and Neusiedl lakes a new dedicated algorithm from Case 2 Regional and Eutrophic algorithms integration have been purposely created. Eutrophic algorithm has been used for Charzykowskie Lake. Results, validated through limnological data, highlighted Garda Lake's oligotrophic characteristics and other lakes' mesoeutrophic properties. Neusiedl Lake came out as highly turbid and colored organic dissolved matter rich lake, while Charzykowskie Lake is characterised by frequent cyanobacteria blooms.