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Editorial

Remote Sensing Studies Applied to the Use of Satellite Images in Global Scale

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The present editorial intended to introduce and complement the special issue entitled remote sensing studies applied to the use of satellite images in global scale. In the current years the new evaluation techniques for the unprecedented Sentinel-3B OLCI satellite imagery involve possible uncertainties in the methodologies employed but provide a further avenue for analysis to researchers around the world. Multi-analytical approaches, modern progress in nano-geochemical studies, as well as new developments in nano-science may have important consequences for physicogeochemical work and remote sensing, which may allow for the identification of terrestrial objects in high resolution satellite images. They may also enhance the identification and solution of problems related to pollution in water resources, serving as a methodology for environmental recovery and supporting the formation and construction of public policies aimed at the preservation of the environment in order to guarantee future sustainability proposals on a global scale.

Geospatial analyses have gained fundamental importance on a global scale following emphasis on sustainability in the article Geospatial Analysis with Landsat Series and Sentinel-3B OLCI Satellites to Assess Changes in Land Use and Water Quality over Time in Brazil [1]. Geospatially analyze images from Landsat 2/5/7/8 satellites captured during 1975 to 2020 in order to determine changes in land use. Sentinel-3B OLCI (Ocean Land Color Instrument) images obtained in 2019 and 2021 were utilized to assess water resources, based on water turbidity levels (TSM_NN), suspended pollution potential (ADG_443_NN) and the presence of chlorophyll-a (CHL_NN) in order to temporally monitor the effectiveness of Brazilian legislation currently in force [1]. This work on sustainability standards was applied to a hydrographic basin dedicated to agricultural production located in southern Brazil. Satellite images from Landsat 2/5/7/8 (1975 to 2020) and Sentinel-3B OLCI (2019 and 2021) revealed that changes in land use, vegetation cover and water in the Capinguí Dam reservoir detected high concentrations of ADG_443_NN (3830 m^{-1}), CHL_NN (20,290 mg m^{-3}) and TSM_NN (100 gm^{-3}). These results can alert the population to the risks to public health and harm to hydrographic preservation, capable of covering large regions.

Artisanal gold mining causes widespread health problems due to illegal exposure to hazardous inorganic compounds, such as arsenic (As) and mercury (Hg). The sources and prevalence of mining pollution are strongly influenced by topography, stream dynamics, soil type, and land use. Akinyemi [2] studied, the potential hazardous elements (PHEs), absorption abilities of nanoparticles (NPs), and ultrafine particles (UFPs) were analysed from clandestine gold mining soils in Colombia. The proportions of PHEs including As, Hg, Cu, Cr, and Pb in carbonates, sulfides, clays, oxides, hydroxides, and sulfates were determined by field-emission scanning electron microscopy (FE-SEM), high-resolution transmission electron microscopy (HR-TEM), and selected area electron diffraction (SAED)/micro-beam diffraction (MBD)/energy dispersive X-ray spectroscopy (EDS). The results revealed that the concentrations of As, Hg, and Zn were significantly higher in clay particles when compared to the other soil samples. Furthermore, Al and Fe manifested excellent PHEs

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sorption abilities in the artisanal gold mining soils. The results presented will be useful for future mitigation measures in the gold mining areas in the article Geochemical and Advanced Electron Microscopical Characterisations of Artisanal Gold Mining Rejects in Colombia [2].

The materials used in civil construction are undergoing significant advances to achieve reduced maintenance and increased durability. Ehrenbring in the article Analysis of the Self-Cleaning Potential of Glass Fiber Reinforced Concrete (GRC) with TiO_2 Nanoparticles [3] analyzed the self-cleaning potential of Glass fiber Reinforced Concrete (GRC) with the addition of titanium dioxide (TiO_2) in contents of 3, 5, and 7% with respect to the mass of cement. We evaluated the self-cleaning GRC plates and the compressive and flexural strength of cylindrical and prismatic specimens. Prepared GRC sample plates were stained with dye solution (rhodamine B and methylene blue) and exposed to the four cardinal solar orientations of a building façade (north, south, east, and west) at different inclination angles (0°, 45°, and 90°) with respect to ground level. Results showed that the samples that presented the greatest performance were plates positioned in a north orientation and inclined at 0° in relation to ground level. The inclusion of TiO_2 positively affected the consistency of the mixtures and improved the properties of the GRC in the hardened state. Measured rupture stresses were greater than 100 MPa in compressive strength and 20 MPa in flexure. The results of this study showed that the introduction of TiO_2 in concrete with high strengths did have great relevance for the self-cleaning of white concrete.

The use of images from the Sentinel-3B SYN satellite (surface reflectance and aerosol parameters over land) is currently one of the most advanced technologies utilized to identify atmospheric aerosol concentrations on a global scale. The general aim of Neckel in the article Using the Sentinel-3B Satellite in Geospatial Analysis of Suspended Aerosols in the Kiev, Ukraine Region [4] is to analyze the evolution of aerosols in the atmosphere of the Kiev region in northern Ukraine during 2019, 2020, 2021 and 2022. Due to this study's timing, both prior to and during the current military incursion into Ukraine, this study also evaluates the consequences of the invasion of the Russian army on the territory of Ukraine, in relation to the quantitative levels of aerosols present in the atmosphere. Satellite image data were modelled in SNAP software (Sentinel Application Platform). Using the JASP software (version 0.14.1.0), clusters with variations of T550 (Aerosol Optical Thickness) were generated. The Sentinel-3B SYN satellite images were made available by the European Space Agency (ESA), with moderate spatial resolution (>300 m), calibrated and normalized to an average standard of 0.83 μg/mg, with a maximum error of 6.62% in the 30 sampled points. Satellite image data were modelled in SNAP software. Using the JASP software (version 0.14.1.0), clusters with variations of T550 (Aerosol Optical Thickness) were generated. The results show variations in the concentration of T550 in different periods, revealing that the military conflict between Russia and Ukraine directly influenced the dynamics of aerosol concentration, attributed to factors incompatible with environmental sustainability.

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