Passive Earth Observations: new platforms, sensors and approaches

Objectives of the course: This course will provide an introduction to the latest and the next generation of environmental monitoring and spatial sampling platforms (small fixed- and rotary-wing unmanned aerial vehicles (sUAVs), airborne and space-based platforms and the latest instruments (RGB, multispectral and thermal cameras, thermal radiometers, spectrometers and hyperspectral fluorescence sensors). Advanced EO analytical methods for both commercial and scientific applications will be introduced and practical skills gained

Planned lectures: 1. Introduction to the course and to the practical's and assessed assignment. 2. Introduction to passive Earth Observation. 3. Basics of photogrammetry. 3. Thermal remote sensing. 4. Multispectral Earth observations and imaging. 5. Hyperspectral Earth observations and imaging. 6. Health and safety issues and national and international legislation for the use of near-ground EO platforms. 7. Control and navigation systems for near-ground EO platforms. 8. Earth observation sampling strategies near-ground EO platforms.

Planned practical exercises: Practical exercises in processing of hyperspectral and imagery data. Practical exercises in UAV mission planning. Practical exercises in UAV sampling strategies. Practical exercises in use of sUAVs based on simulated and real flights. Correction of camera inherent distortions and hyperspectral data. Practical exercises in use of topographical mapping and 3-D image generation.

Application of Geo-informatics to natural hazards mapping and monitoring

Objectives of the course: The main aim of the course is to provide critical understanding of the geo-spatial data base generation, analysis and utilization in disaster preparedness, risk assessment, and disaster monitoring. Participants will gain skills in extraction of hazard-related information from remote sensing image data and GIS-based driven modelling for mapping of hazards susceptibility. Students will get knowledge in designing, developing and undertaking research in the field of Natural Hazards and Disaster Risk Management (NHDRM) using Geo-informatics tools and techniques (Remote Sensing- satellite, airborne and UAV; GIS, GPS and allied spatial technologies). Among natural hazards, spatial attention will be paid on: droughts, floods, forest fires, cyclones, tornadoes, landslides and coastal erosion.

Planned lectures: 1. Introduction to the course and to the practical's and assessed assignment; 2. Identification of natural hazards at global and regional scales, databases for natural hazards and EO data sources for natural hazards monitoring; 3. Cyclones, tornadoes and fires hazards monitoring and assessment using EO data; 4. Floods and drought hazards monitoring and assessment using EO data; 5. Landslides and earthquakes hazard identification and assessment using EO data; 6. Application of geo-informatics to assess urban hazards; 7. Application of geo-informatics to assess the coal mine related hazards and changes of land forms and geomorphology at the mines areas; 8. Application of geo-informatics to identify and assess the geomorphological hazards at the coast and glaciers

Planned practical exercises: Practical exercises in processing of hyperspectral and imagery data for natural hazards identification, monitoring and assessment. Different global, regional and local scales assessment will be performed using satellite and airborne platforms. Topics covered: Remote sensing (RS) data analyses for lithological, structural/tectonics and geomorphological mapping; RS data analyses for landslide and surface deformation monitoring and mapping, RS data analyses for floods and droughts monitoring and mapping; RS data analyses for fire and storm affected areas mapping and analyses. Mapping of building vulnerability and damage assessment caused by natural hazards; RS data analyses for coastal hazards.