National Research Council of Italy – Institute of Methodologies for Environmental Analysis

Live Demo Session
2 February 2022
11:15-11:45

"User-centric approach for the monitoring of hazardous volcanic plumes to aviation" (PILOT S6P1)

Speaker: Lucia Mona, Senior Researcher, National Research Council of Italy – Institute of Methodologies for Environmental Analysis

Guest Speaker: Nikos Papagiannopoulos, Researcher, CNR-IMAA Atmospheric Observatory (CIAO)

Abstract

Volcanic eruptions are a natural disaster with significant impact on human activities. The unprecedented European Volcanic Ash Crisis in 2010 demonstrated the vulnerability of the infrastructure and the need for new approaches to enable stakeholders in the aviation sector to obtain fast and accurate information. Currently, there are many data sources available and cutting-edge technology to provide the means to detect and monitor high impact eruptions. However, the information from multiple data sources is not yet efficiently integrated and aviation-specific products incorporating multi-platform datasets is not in place. To this end, the integration of tailored ground-based, satellite, and model data as well as information from volcanic observatories in Europe is essential. The e-shape Pilot – Earth observation data for detection, discrimination & distribution (4D) of volcanic ash – aims to strengthen the Earth Observation and in-situ data exploitation and multi-source (satellite, remotely sensed, and ground-based network) data integration to provide a user-centric approach for the monitoring of hazardous to aviation volcanic plumes. The overall pilot structure, data handling, and tailored products will be presented as well as the selected visualization platform.

ARMINES
Live Demo Session

2 February 2022
11:15-11:45

Session #2 (Day 2):
PV nowcasting and short-term forecasting for energy trading with portfolio of PV rooftop systems

Speaker, Day 2: Rodrigo Amaro e Silva, MINES ParisTech

Abstract

The presented pilot is a GIS-tools, based on Jupyter Notebook, dedicated to high photovoltaic penetration at urban scale (City of Nantes, France), providing EO based information about urban energy system modeling, electric energy demand profiles and accurate electric production of fleet of PV rooftop systems.

Live Demo Session

2 February 2022
11:15-11:45
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Slot 1 "Services of co-designed showcase interactions: EBV Portal"

Speakers: Christian Langer (iDiv, Germany)

Guest Speaker: Dr. Ulf Mallast (UFZ, Germany – Showcase lead)

Abstract

This first of the myEcosystem presentation series, presenting main services of the showcase myEcosystem, will inform the audience about the interrelated nature of the showcase and gained benefits due to the co-designed interaction between all pilots. These type 3 co-design interactions led to the improvement of all services that will be outlined throughout the demos. Featured demos range from an Information Management System to provide access to in-situ data and metadata from long-term ecosystem sites and protected areas (DEIMS-SDR), over a software framework allowing the collaborative processing and provisioning of ecosystem relevant EO products in the multi-cloud landscape (VLAB), a portal that delivers Essential Biodiversity Variables (EBV), which capture major dimensions of biodiversity change, and are produced by integrating in-situ monitoring/ remote sensing in space and time (EBV portal), and the myEcosystem aggregator, which combines all services by visualizing showcase results.

This first part of the myEcosystem series of presentations features the EBV portal and will highlight the current status and its functionality which responds to key users' needs, to provide access to and link discoverable and harmonized EBV datasets from one unique location. The demo will be followed by a QA session to use this occasion for direct feedback and will refer to following parts of the myEcosystem presentation series.

Live Demo Session

2 February 2022
11:15-11:45
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slot 2: SC4-part2:
Services of co-designed showcase interactions: VLab

Speakers: Chiara Richiardi (CNR, Italy)

Abstract

This second of the myEcosystem presentation series features the VLab software framework which orchestrates data and model access to implement scientific processes for knowledge generation. The VLab lowers the entry barriers for both developers and users. It adopts mature containerization technologies to access models as source code and to rebuild the required software environment to run them on any supported cloud. This makes VLab fitting in the multi-cloud landscape, which is going to characterize the Big Earth Data analytics domain in the next year's.

The presentation will present models used in myEcosystem, outline the collaborative nature of the framework and highlight the versatility to use VLab in the currently available multi-cloud landscape. The demo will be followed by a QA session to use this occasion for direct feedback and will refer to following parts of the myEcosystem presentation series.

Live Demo Session

2 February 2022
11:15-11:45
11:45-12:15

Slot 3 "Services of co-designed showcase interactions: DEIMS-SDR"

Speakers: Christoph Wohner (EAA, Austria)

Guest Speaker: Johannes Peterseil (EAA, Austria)

Abstract

This third presentation of the myEcosystem presentation series features DEIMS-SDR. This Dynamic Ecological Information Management System allows discovering long-term ecosystem research sites around the globe, providing a wealth of information, including each site's location, ecosystems, facilities, parameters measured and research themes. Beside information about the research sites, DEIMS enables access to a growing number of datasets and data products associated with the research sites making it a central access point for various in-situ information.

The presentation will frame how DEIMS-SDR fits into the myEcosystem showcase, feature the current co-designed functionality and demonstrate how in-situ data of research sites and associated data can be discovered. The demo will be followed by a QA session to use this occasion for direct feedback and will refer to the following parts of the myEcosystem presentation series.

Live Demo Session

2 February 2022
11:15-11:45
11:45-12:15

Slot 4 "Services of co-designed showcase interactions: EcoSense"

Speakers: Vladan Minic (BSI, Serbia)

Guest Speaker: Dr. Ulf Mallast (UFZ, Germany)

Abstract

This fourth presentation of the myEcosystem presentation series features the myEcosystem integrator, EcoSense. This integrated visualization and analysis platform supports co-designed workflows and allows accessing relevant data services produced by VLab and DEIMS-SDR and provided by the EBV portal. Both, in-situ data gathered from selected sites across Europe and spatially explicit data from mySPACE (EO-value added products) and myVARIABLE (EBV products) are visualized and can be inspected by user along with relevant metadata information for each data set. Further functionalities will be co-designed with dedicated users to improve the EcoSense user uptake.

The live demo will show the current status of EcoSense, give visual insights into products that are currently discoverable and outline further needs to increase the service value of EcoSense. The demo will be followed by a QA session to use this occasion for direct feedback and will be concluded from a showcase perspective pointing out possible gaps and the sustainability of the all developed and presented services.

Deimos and Sea and Atmosphere Portuguese Institute (IPMA)

Live Demo Session
2 February 2022

11:15-11:45

"SC5/Pilot 5.5 – Monitoring fishing activity - A web-based tool in support of fisheries management"

Speaker: Pedro Ribeiro, Deimos
Guest Speaker: Miguel Chapela, Deimos

Abstract

Fisheries are the major activity exploiting marine resources and have a significant impact on marine life as well as on the economic development and food security of nations. Nowadays, more and more consumers are demanding sustainable and responsible fish products and the comprehensive monitoring of fishing activity provides new insights into improving the transparency of the fish supply chain. While policies and regulations attempt to control and manage the origins of fish, however, the traceability of the fish supply chain presents many obstacles concerning the data availability.

Deimos and IPMA (Instituto Português do Mar e da Atmosfera), with the support of the Portuguese Directorate-General for Natural Resources, Safety and Maritime Services (DGRM), are developing the pilot application "Monitoring Fishing Activity" for the e-shape project (Horizon 2020, Grant agreement ID: 820852). This is a unique initiative that brings together decades of public investment in Earth Observation (EO) and cloud computing resources to develop services for decision makers, citizens, industry and researchers, always in close collaboration with key users.

The main goal of this pilot is to strengthen the knowledge on the fish supply chain by developing an operational EO service that monitors the dynamics of vessels operating in the Northeast Atlantic waters, focusing on two fleets involved in pelagic fisheries of highly migratory oceanic species: the pole and line and the drifting longline fisheries targeting tuna and swordfish respectively. Using data from the 2012-2018 period recorded within the Portuguese ZEE, the results aim to characterize and quantify the fishing pressure of these fleets on marine ecosystems, and to relate fisheries with environmental parameters. A further objective is to raise awareness among key users of human footprint in marine ecosystems and motivate them towards more efficient, environmentally friendly and sustainable fishing strategies and practices, complying with international, European and national regulations.

Luxembourg Institute of Science and Technology (LIST)

Live Demo Session
2 February 2022

11:15-11:45

"An ensemble-based approach to map water bodies globally using Sentinel-1 data: The Global Flood Monitoring system of the Copernicus Emergency Management Service"

Speaker: Patrick Matgen, PhD, Head of Group, Remote sensing an natural resources modelling, Luxembourg Institute of Science and Technology (LIST)

Abstract

River floods can have enormous environmental, social and economic consequences. It is expected that climate change – combined with a growing global population in ill-planned flood-prone coastal and riverine areas – will further increase their destructive potential. Central to inundation risk mitigation are the acquisition and processing of high resolution and high frequency information on river discharge response to precipitation. To address this pressing societal need, we introduce the new global scale satellite Earth Observation-based flood mapping service – capitalizing on the quasi-continuous data stream generated by the radar onboard the Sentinel-1 satellite. In order to rapidly translate the large volume of SAR data into floodwater maps and value adding services, the European Commission's Joint Research Centre (JRC) recently added Global Flood Monitoring (GFM) products based on Sentinel-1 as a new component to its Copernicus Emergency Management Service. One of the core components of the service is an ensemble-based mapping algorithm that combines the outputs of three independent retrieval algorithms. One of the three algorithms was developed in the frame of the H2020 project eshape. The change detection algorithm maps all increases and decreases of floodwater extent and makes use of this information to regularly update the flood extent maps. The final floodwater map is obtained by integrating its results with those obtained with two independently developed algorithms. The demo of the system provides examples of current flood events occurring in different regions of the worlds and provides an overview of the system's main EO-derived products.

Technical University of Denmark

Live Demo Session
2 February 2022

11:15-11:45

"Co-designing for offshore wind energy"

Speaker: Dr. Merete Badger, Senior scientist, Technical University of Denmark

Abstract

The pilot 'Merging Offshore Wind Products' delivers EO-based products for offshore wind energy applications. Based on SAR and scatterometer wind fields, DTU provides wind maps in near-real-time as well as annual wind resource maps via a web service. A co-design process with different users from the wind energy industry has been initiated and the service has been upgraded according to some of the user's requirements. We will demonstrate the service itself and also the main outcomes of the co-design process.

Planetek Italia

Live Demo Session
2 February 2022

11:45-12:15
12:15-12:45

"The Rheticus Aquaculture service"

Speaker: Antonello Aiello, PhD, Planetek Italia

Guest Speaker: Angelo Amodio, Planetek Italia

Abstract

The Rheticus® Aquaculture service provides aquaculture farmers with daily information consisting of weekly bulletins with indicators calculated by the algorithms to increase production and profitability. The main benefits include determining the optimal time for harvesting and selling products by estimating the growth trends and the best-selling time. Rheticus Aquaculture was designed by a group of Technical Specialists of the Planetek's Rheticus team driven by the idea of a straight connection among Satellites, Aquaculture, and climate change.

Nowadays, the so-called Climate changes have led to changes in the sea temperature and the quantities of phytoplankton, affecting the growth rates and mortality of animals and, therefore, the productivity of farms and the quality of products.

Aquaculture represents the optimal solution to ensure the production of fish and shellfish necessary to meet global needs. The environmental context is essential for this activity since the temperature, chlorophyll, and turbidity of marine waters significantly affect animals' growth rate and health.

Indeed, Earth observation satellite data allow to carefully estimate multiple parameters such as sea temperature, chlorophyll concentration (proxy of the presence of phytoplankton), and water turbidity (proxy of water quality).

German Aerospace Center

Live Demo Session
2 February 2022

11:45-12:15

"Towards globally estimating health risk from air pollution in cities"

Speakers:

Marion Houdayer (MSc. Global Change Ecology)
Lorenza Gilardi (MSc Environmental Engineering)

Abstract

According to the European Environmental Agency's (EEA) Air Quality Report, 20,600 premature deaths in Europe in 2018 were attributable to air pollution, with the highest proportion of people exposed to levels above the World Health Organization's Air Quality Guidelines living in cities (EEA 2020).

Scope of the e-shape Showcase 2 Pilot 3 (S2P3) is to provide services for air pollution - health risk profiling in urban environments utilizing existing EO infrastructure in combination with health and socioeconomic data for health surveillance purposes. The Munich case study assesses in detail the air pollution burden, the population exposure and the related health risk increase for the Munich Metropolitan Region (MMR). In a co-design process an interactive e-shape service has been developed to explore the health risk at zip code level embedded in Alpine Environmental Data Analysis Center (AlpEnDAC) as part of the Virtual Alpine Observatory (VAO)(https:// www.alpendac.eu/eshape).

The risk increase is derived from in-situ measurements, chemical transport modelling (CTMs) and satellite data. With the major objective to apply the approach to cities worldwide, the uncertainties and differences between these data sources are quantified. In particular, the risk increases derived from satellite data and global CTMs are compared to those from in-situ measurements as a reference. Furthermore, satellite data is evaluated to improve the quantification of air pollution exposure for global applications. Since the impact on health is often estimated for individual pollutants only we provide also the aggregate risk increase (ΣRIs) from key air pollutants.

DHI
Live Demo Session
2 February 2022

12:15-12:45

"WindSight"

Speaker: Dr. Torsten Bondo, Senior Programme Advisor, DHI

Abstract

WindSight is a suite of novel EO-based products for characterization of the land surface roughness and topography anywhere in the world. Together with state-of-the-art flow modeling tools for wind energy planning and prospecting, WindSight can replace current procedures for land surface characterization, which are based on manual assessment, coarse global data sets, or costly airborne measurement campaigns. It will be explained how we work with WindSight user uptake in e-shape.

PMOD
World Radiation Center &
National Observatory of Athens

Live Demo Session
2 February 2022

12:15-12:45

"Energy Modeling Application - FlexiGIS"

Speakers: M.Sc. Susanne Weyand and M.Sc. Jethro Betcke, German Aerospace Center (DLR)

Abstract

EO-based data is integrated as an alternative to OpenStreetMap data into the FlexiGIS urban energy modeling software which is implemented as a QGIS plugin. FlexiGIS extracts, filters and categorizes georeferenced urban energy infrastructure elements, simulates the power consumption and its generation of renewable energy sources and quantifies the decentralized storage needs necessary for safe power supply operation in the urban environment. Typical users for modeling software such as e.g. FlexiGIS are planning experts in electricity supply and engineering offices, stakeholders responsible for potential analysis or business development in utilities and scientists in research institutes. The application also supports decision-makers in urban planning, aggregators for solar power trading, and citizens, e.g. in PV self-consumption optimization.

PMOD
World Radiation Center &
National Observatory of Athens

Live Demo Session
2 February 2022

12:15-12:45

"Solar energy forecasting developments on E Shape"

Speaker: Dr. Stelios Kazadzis (PMODWC)

Abstract

The demo aims to present the solar energy nowcasting and forecasting developments within E Shape. Main goal is the demonstration of the platform capabilities in an upscaled pan European level, the application to certain regions, the links with Copernicus Atmospheric Monitoring Service and the end user participation and engagement.

World from Space

Live Demo Session
2 February 2022

12:15-12:45

DynaCrop"

Speaker: Jan Labohý, CEO, World from Space

Abstract
DynaCrop pursues a synergy with companies already established in the food value chain and helps them to integrate EO-based information at scale. In this way, it minimizes resources needed for EO integration (money, time, human resources) and provides users with state-of-the-art service. Information is delivered through the value-added platform (API, white label web application, QGIS plugin) and users are receiving user-centric consulting and R&D cooperation as part of the cooperation. Within the e-shape project, it places special focus on farm-to-fork strategies and regenerative agriculture related tools.

Space Research Institute
National Academy of Sciences
of Ukraine and
State Space Agency of Ukraine

Live Demo Session
2 February 2022
12:15-12:45

"Crop yield forecasting for major crops in Ukraine"

Speaker Day 1 and 2 :

Sofia Drozd, Bachelor student, Physical and Technical Institute of NTTU "KPI", Department of Information Security, Group FB-91

Abstract

The agricultural sector plays an important role in Ukraine's economy. Modern methods allow predicting the productivity of land based on NDVI obtained from satellites. Yields are affected not only by soil properties but also by weather conditions. In this paper the correlation of weather conditions during March-September with the yield of lands of Kyiv region by the main sommer crops of Ukraine is investigated. The next step is to create two regression models based only on NDVI and on a combination of NDVI with weather conditions. The main goal is to build the model with the least error and evaluate its reliability.

Data on crop yields (legumes, beets, sunflowers, potatoes, vegetables) during 2010-2020 were obtained from the Main Department of Statistics of Kyiv region. Monthly weather data for 2010-2020 were obtained from the Meteopost meteorological archive. Regression analysis was performed using the average NDVI from the MODIS spectroradiometer, temperatures and precipitation for March-August. In the first model, only the NDVI itself, and in the second, a combination of these data were as independent variables, and land productivity as a dependent variable. As the strategy, one year at a time was removed and new regression models were developed, which were then used to predict the land productivity for the missing year. When combining regressors for each culture, the model with the smallest average MRE over the years was selected as the best.

According to the results, the model based on the combination of MODIS-NDVI with weather conditions was more accurate (maximum MRE 8.26%, sunflower.) Than the model based solely on MODIS-NDVI (maximum MRE 31.72%, sugar). Thus, it is established that with the help of regression model based on MODIS-NDVI data and weather conditions it is possible to effectively predict the productivity of land for sommer crops in Kyiv region.