CIMA
RESEARCH FOUNDATION

Live Demo Session

1 February 2022
10:30-11:00

"A complete meteo-hydrological chain to support early warning systems from weather scenarios to flooded areas: the Apollo medicane use case (PILOT S6P2)"

Speaker: Antonio Parodi, (CIMA RESEARCH FOUNDATION)

Abstract

During the last week of October 2021 an intense Mediterranean hurricane (medicane), named Apollo by the Eumetnet Storm Naming project, affected many countries on the Mediterranean coasts. The deaths toll peaked up to 7 people, due to flooding from the cyclone in the countries of Tunisia, Algeria, Malta, and Italy.

The Apollo medicane persisted over such areas for about one week (24 October – 1 November 2021) and produced very intense rainfall phenomena and widespread flashflood and flood episodes especially over eastern Sicily on 25-26 October 2021.

CIMA Foundation hydro-meteorological forecasting chain, including the cloud-resolving WRF model assimilating radar data and in situ weather stations (WRF-3DVAR), the fully distributed hydrological model Continuum, the automatic system for water detection (AUTOWADE), and the hydraulic model TELEMAC-2D, has been operated in real-time to predict the weather evolution and the corresponding hydrological and hydraulic impacts of the medicane Apollo, in support of the Italian Civil Protection Department early warning activities and in the framework of the H2020 LEXIS and E-SHAPE projects.

This work critically reviews the forecasting performances of each model involved in the CIMA hydro-meteorological chain, with special focus on temporal scales ranging from very short-range (up to 6 hours ahead) to short-range forecasts (up to 48 hours ahead).

The WRF-3DVAR model showed very good predictive capability concerning the timing and the location of most intense rainfall phenomena over Catania and Siracusa provinces in Sicily, thus enabling also very accurate discharge peaks and timing predictions for the creeks hydrological network peculiar of eastern Sicily. Based on the WRF-3DVAR model predictions, the daily run of the AUTOWADE tool, using Sentnel-1 (S1) data, was anticipated with respect to the schedule to quickly produce a flood map (S1 acquisition performed on Oct. 25th, 2021, at 5.00 UTC, flood map produced on the same day at 13.00 UTC). Moreover, considering that no S1 images of eastern Sicily were available during the period Oct. 26-30, 2021, an ad hoc tasking of the COSMO-SkyMed satellite constellation was performed, again based on the on the WRF-3DVAR predictions, to overcome the S1 data latency. The resulting automated operational mapping of floods and inland

waters was integrated with the subsequent execution of the hydraulic model TELEMAC-2D. The strengths and weaknesses of satellite data and hydraulic modeling are highlighted by this application, their integration allows to obtain a more complete final product. The medicane Apollo case study paves the way to future similar applications in the Mediterranean areas where intense rainfall processes are expected to become more frequent considering the ongoing climate change phenomena.

ARMINES
Live Demo Session

1 February 2022
10:30-11:00

Session #1 (Day 1):
PV self-consumption
(sizing individual systems,
In Sun We Trust)

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

Speakers, Day 1:
Introduction: Lionel Menard, MINES ParisTech
Presentation: Prof. Philippe Blanc, Directeur de recherche MINES ParisTech (HDR, Dr)

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.

EuroGeoSurveys

Live Demo Session

1 February 2022
10:30-11:00

"Geohazards in urban areas. From satellite InSAR data to assessing products: Case studies on Spain, Italy and Poland"

Speaker: Pablo Ezquerro Martín, Geohazards InSAR Laboratory and Modelling Group, Geohazards and Climate Change Department, Geological Survey of Spain (IGME)

Abstract
During this presentation the main characteristics of the pilot will be described, highlighting the lessons learnt. The potential of the designed products will be showed using three of the "on-demand" test sites proposed in the pilot.

SMHI
Live Demo Session

1 February 2022
11:00-11:30

"An EO-based hydrological service to provide historical water availability and quality information over the globe"

Speaker: Dr Ilias Pechlivanidis, Senior Researcher, Swedish Meteorological & Hydrological Institute (SMHI)

Abstract

There is plethora of services on the water-relevant sectors which depend on accurate and reliable hydro-climatic information at scales from regional to global. The Swedish Meteorological and Hydrological Institute (SMHI) has developed and setup the Hydrological Predictions for the Environment (HYPE) model to a number of domains to address the needs from a number of users (i.e. hydropower, water authorities, emergency response management centres, general public etc.). The hydrological models run operationally at SMHI's servers with geographical focus on Sweden, Europe, and globe. These models provide operationally open information at different time horizons (i.e. historical records, short range and seasonal forecasts, hydro-climatic projections) to targeted users and the general public.

In this demo we are focusing on the global hydrological model named WW-HYPE, which was recently setup allowing for improved water information at different geographic locations, and giving the potential at later state to regionalize, and even customize, the service to the local conditions. WW-HYPE model setup is based on high resolution openly available topography, land cover and river discharge data, including delineation of both lakes and rivers, which makes it better adapted than previous setups for assimilation of earth observation (EO) data representing soil moisture, evapotranspiration, snow extent and snow water equivalent. The operational application of the WW-HYPE model is currently available and provides on a daily basis, historical and near real-time analyses of the hydrological status over the entire globe. In the presentation we also demonstrate the model performance in terms of different signatures and for different variables using both in-situ and EO data in order to further communicate to the users the reliability of the modelled outputs.

European Association of Remote Sensing Companies (EARSC)

Live Demo Session

1 February 2022
11:00-11:30

"eoWIKI-eoMALL enhancing EO services sustainability"

Speaker: Francesca Piatto, Project Officer, EARSC

Abstract

The market for Earth Observation services is undergoing a profound transformation; it is moving from its traditional bespoke character to an online presence, whereby users can browse, access, and consume services from the various available platforms. Whilst this presents an enormous opportunity for both providers (who can expose their services to larger audiences) and users (who can select from a wider range of available services) it also brings significant challenges. Multiple, seemingly similar, vendor propositions, different metadata structures, functionalities, etc make it difficult for providers to know what the appropriate way to present their services is or for users to find what best suits their purposes.

This break-out session will inform about EO-mall and eoWIKI, two web platforms developed by EARSC dedicated to raising awareness around EO capabilities, highlighting the need of EO online solutions and the challenges faced of delivering online services, showcasing their full potential for the e-shape project.

While EO-mall is designed for the promotion and selling of EO services, eoWIKI, supports the awareness and the communication of EO activities from Academy, Research, and the commercial sector, promoting EU capabilities.

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

Live Demo Session

1 February 2022
11:30-12:00

"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.