# DIAGNOSING THE BURJASSOT URBAN DRAINAGE SYSTEM

*Sentinel-2B data is being used by the Climatology from Satellites Group to diagnose the current situation of the Burjassot Municipality drainage system.*

## The challenge

Climathon is a global 24-hour Climate Change Hackaton, organised by EIT Climate KIC, that takes place each year in different cities all over the world. The University of Valencia Climatology from Satellites Group (GCS), Valencia, Spain, organised the Burjassot Climathon 2017, focusing on Earth Observation in Support of a Sustainable Water Resources Management using Copernicus data. Burjassot Climathon 2017. It provided a clear idea to propose and hopefully achieve a Sustainable Urban Drainage System (SUDS) for Burjassot municipality. Burjassot is a small city close to Valencia where more than 70% of precipitation is concentrated in ±10 days per year, given the variability and distribution of the rain is extremely irregular. Besides, the orography and topography of the city and the massive urban growth with the so-called "hard infrastructures" have caused a significant regression of green areas, also triggering the occurrence of periodic issues of flooded streets, unusable infrastructure during and after the events and material and non-material damages.

## The space based solution

In order to improve the drainage system, accurate knowledge of the current land uses is needed to be able to identify and estimate the impervious surface areas (ISA) and propose adequate solutions to make them more sustainable and "flood resilient" through the development of green/blue infrastructures, permeable pavements, filter strips, etc. Copernicus Sentinel-2 MSI (MultiSpectral Imager) data are suitable for understanding the current situation of Burjassot. The figure below shows a supervised nearest-neighbour land use classification of the Burjassot Municipality using data from Copernicus Sentinel-2B MSI. Preprocessing begins with the combination of Maximum Noise Fraction (MNF) and Principal Components Analysis (PCA) to reduce the spectral dimensionality and selecting the bands with more information. Then, Pixel Purity Index (PPI) is applied to identify three extreme endmembers: high albedo (bright ISA and bare soil), low albedo (dark ISA, water, wet areas and shadows) and vegetation. Classifiers are applied to group both ISA classes (bright and dark) and define the sealed zones. This process is carried out with several images throughout the year to verify changes. Once the final classification is established, it is compared to high resolution images as well as to the Copernicus High Resolution Imperviousness product, by evaluating 100 points that generate a confusion matrix, together with the overall accuracy (OA), producer's accuracy (PA) and user's accuracy (UA).

Natural colour RGB (bands 4, 3, 2) image of Burjassot Municipality (Sentinel-2B EMS Copernicus Service, 17 Dec 2017, 10-m spatial resolution)

## Benefits to Citizens

As a consequence of the Burjassot Climathon 2017, the GCS is now closely collaborating with the Burjassot City Hall in some of

Thematic Area: TERRITORIAL MANAGEMENT AND URBAN PLANNING

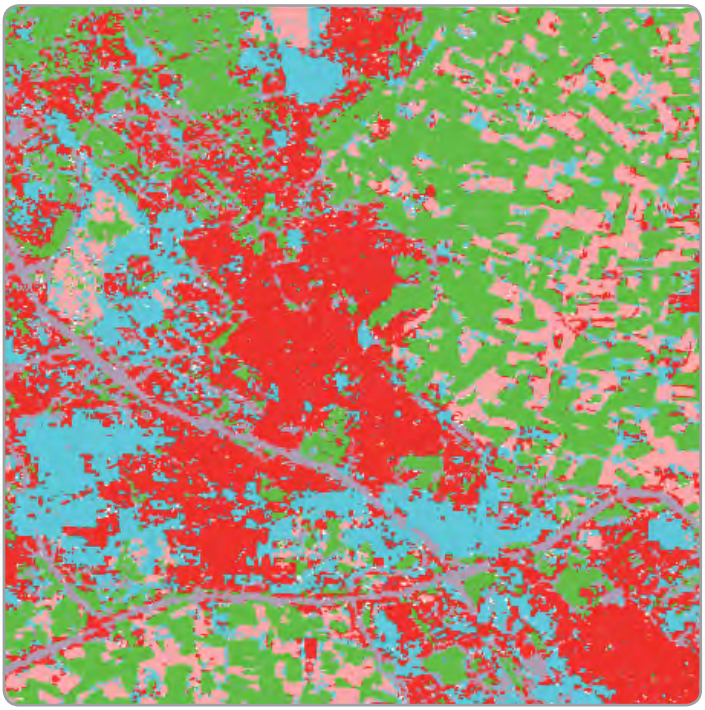
Region of Application: COMMUNITY OF VALENCIA

Sentinel mission used: S2

Copernicus Service used: –

Usage Maturity Level: 3

their significant water management issues. They jointly produced the Urban Adaptation to Climate Change report, which consists of a diagnostic study with a detailed work plan to carry out an evaluation and implementation project based on Copernicus Sentinel data and products. Implementation measures on critical identified areas will increase the citizens' quality of life thus favouring routine displacements during risk events and reducing restoring costs after them. Water reuse will also be encouraged when channelled to green zones, thus reducing costs in irrigation waters.



Burjassot Municipality land uses (Sentinel-2B EMS Copernicus Service, 17h Dec 2017, 10-m spatial resolution).

> "The proposals from the study on the Burjassot drainage system are absolutely necessary to avoid urban floods that our town undergoes quite often."
>
> ***Local Office for Sustainability, Burjassot Town Hall***

## Outlook to the future

The GCS has developed an innovative approach to be implemented into a pilot study to assist in future municipal water management issues consisting of a holistic methodology that puts together Copernicus EO data, a refined 3D digital elevation model and a statistic analysis of meteorological data. All this information is then inputted into an urban runoff model that will simulate different SDUS scenarios and help in the decision-making process.

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## ABOUT COPERNICUS4REGIONS

This Copernicus User Story is extracted from the publication "**The Ever Growing use of Copernicus across Europe's Regions: a selection of 99 user stories by local and regional authorities**", 2018, Edited by NEREUS, the European Space Agency and the European Commission.
The model cases focus on local and regional authorities who successfully applied Copernicus data in 8 major public policy domains.

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