

# The best spies in the skies analyze Mellaria

July 30 2018

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The network of satellites dubbed COSMO-SkyMed (CONstellation of Small Satellites for Mediterranean basin Observation) has analyzed 49 km<sup>2</sup> within the territory containing an ancient Roman city: Mellaria, located within the township of Fuente Obejuna, in the province of Cordoba, whose habitants are still called melarienses [Mellarians] today. The satellites were designed to carry out military espionage and ended up becoming one of the greatest allies of cultural heritage. Created by the Italian government, they now work for a Spanish university. In their new mission, however, they maintain a certain poetic link to their Italian origin.

The Upper Guadiato Archaeological Ager Mellariensis project headed by the University of Cordoba's Professor Antonio Monterroso Checa has been working on the Mellaria analysis for the past two years, using the constellation of four radar satellites. Its commercial use in Spain is managed by E-Geos-Telespazio Iberica, a Leonardo/Thales aerospace partnership company.

Monterroso explains that, in Spain the Mellaria project is pioneering the application of this technology to the analysis of its territory. The results were recently published in *Archaeological Prospection*, and have reported many important findings, including:

- the detection of invisible moist and floodable areas around the city
- groundwater flow that passed through Mellaria
- a possible stretch of the Roman road from Cordoba to Merida

nearby

- visual and topographical recovery of lost or destroyed stretches of medieval roads between the towns of Fuente Obejuna and Belmez and between the villages of La Granjuela and El Hoyo
- the development of some crops in the area

Few archaeology sites in the world have worked with this satellite constellation. Most of the ones that have were analyzed by the Italian-Chinese consortium, made up of the Istituto di Metodologie per l'Analisi Ambientale at Italy's National Research Council and the Institute of Remote Sensing and Digital Earth at the Chinese Academy of Sciences. In fact, the Italian peninsula and China are, to date, the areas with the highest coverage of images and applications from an archaeological perspective. Apart from those places, the Saqqara pyramids in Egypt, the Incan site of Pachacamac in Peru and the ancient cities of Sabratha (Libya) and Hierapolis (Turkey) are other examples of the few places where patrimonial proof was found using this image system. The territory of the Roman city Mellaria can now be added to this short list of [cultural heritage](#).

These radar satellites carry out other civil missions apart from archaeology. The COSMO-SkyMed (CSK) network is also used to prevent emergencies and manage environmental and humanitarian issues, such as observing human trafficking in the Mediterranean.

CSK offers the best resolution in Europe and the world for civil use, at 1m/pixel [spatial resolution](#). Professor Monterroso says, "In a military aspect, this technology can detect objects even in sandstorms at a precision of 0.40 m/pixel. That means a five-meter-long object can be analyzed pretty precisely." This last aspect "is a huge accomplishment considering that these satellites operate from a distance of 620 km." In addition, CSK is able to take 1,800 images a day and monitor a surface area of 400,000 square kilometers in 15 days at a spatial resolution of

3m/pixel. CSK shares data with the French optical platform Pleiades and with NASA, forming one of the most powerful consortia for Earth observation in the world.

**More information:** Antonio Monterroso Checa et al, COSMO SkyMed X-Band SAR application - combined with thermal and RGB images - in the archaeological landscape of Roman Mellaria (Fuente Obejuna-Córdoba, Spain), *Archaeological Prospection* (2018). [DOI: 10.1002/arp.1709](https://doi.org/10.1002/arp.1709)

Provided by University of Córdoba

Citation: The best spies in the skies analyze Mellaria (2018, July 30) retrieved 7 July 2024 from <https://phys.org/news/2018-07-spies-mellaria.html>

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