



Waste Management with Earth Observation Technologies

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The range of applications where Earth Observation (EO) can be useful has been notably increased due to the maturity reached in the adopted technology and techniques. In most of the cases, EO provides a manner to remotely monitor particular variables and parameters with a more efficient usage of the available resources. Typical examples are environmental (forest, marine, resources...) monitoring, precision farming, security and surveillance (land, maritime...) and risk / disaster management (subsidence, volcanoes...).

In this context, this paper presents a methodology to monitor waste disposal sites with EO. In particular, the explored technology is Interferometric Synthetic Aperture Radar (InSAR), which applies the interferometric concept to SAR images. SAR is an advanced radar concept able to acquire 2D coherent microwave reflectivity images for large scenes (tens of thousands kilometres) with fine resolution (< 1 m). The main product of InSAR is Digital Elevation Models (DEM) that provide key information about the tri-dimensional configuration of a scene, that is, a height map of the scene. In practice, this represents an alternative way to obtain the same information than in-situ altimetry can provide.

In the case of waste management, InSAR has been used to evaluate the potentiality of EO to monitor the disposed volume along a specific range of time. This activity has been developed in collaboration with the Agència de Residus de Catalunya (ARC) (The Waste Agency of Catalonia), Spain, in the framework of a pilot project. The motivation comes from the new law promoted by the regional Government that taxes the volume of disposed waste. This law put ARC in duty to control that the real volume matches the numbers provided by the waste processing firms so that they can not commit illegal actions. Right now, this task is performed with in-situ altimetry. But despite of the accurate results, this option is completely inefficient and limits the numbers of polls that can be generated and the number of waste sites that can be studied. As a consequence, the option to take profit of EO represents a good chance for ARC to improve the precision and quality of the monitoring tasks.

This paper will present the methodology developed for monitoring waste sites as well as some sample results obtained with ENVISAT images. These data have been acquired for a controlled waste site, which accounts the largest activity in the disposal of solid waste generated by the construction sector. Cross-checking with ground-truth acquired by ARC is also presented for validation purposes. In the current phase, the available data is still limited and this makes work conclusions tentative. Further data acquired for different sites shall be analyzed at short term before obtaining more conclusive results.