

POMPEI PROJECT: MONITORING AND DISCOVERY OF ARCHAEOLOGICAL SITES USING REMOTE SENSING TECHNIQUES

G. Milillo¹, L. Dini¹, T. Loré², A. Valentino², G. Pandiscia³, F. Marucci⁴

¹ ASI-CGS (Agenzia Spaziale Italiana - Centro di Geodesia Spaziale); Loc. Contrada Terlecchia 75100 Matera, Italy; Tel: +390835377218, Fax: +390835339005; giovanni.milillo@asi.it, lugi.dini@asi.it

² INNOVA Consorzio per L'informatica e la Telematica; Recinto II Fiorentini 75100 Matera, Italy; Tel:+390835307760, Fax:+39 0835 264705; lore@consorzio-innova.it, valentino@consorzio-innova.it

³ TELESPAZIO S.p.A. - Centro Spaziale di Matera; Loc. Contrada Terlecchia 75100 Matera, Italy; Tel: +39 0835 375419; Fax: +39 0640999975; gianfranco.pandiscia@telespazio.com

⁴ASI (Agenzia Spaziale Italiana); Viale Liegi 26, 00198, Rome, Italy; Tel: +39 06 85 67 375; franco.marucci@asi.it

ABSTRACT

1. INTRODUCTION

The Italian Space Agency (ASI) has set up the Pompei project to realize a pilot program that will consent the monitoring of archaeological and cultural heritage sites using Remote Sensing techniques. The need, expressly noted by major Archaeological and Heritage organizations, will be put into practice starting from key areas such as Pompei, Ercolano and Castellammare di Stabia. Other areas may be added by other organizations in the field.

ASI will take direct part of the initiative, in collaboration with Telespazio SpA and Innova Consorzio per l'Informatica e la Telematica of Matera. Each company will contribute assets and specific know-how to the project.

1.1 Technical description

Italy is a country with considerable cultural, archaeological and historical heritage. The pilot program would give the tools to monitor and safeguard all existing areas and the possibility to discover new ones using non-invasive Remote Sensing techniques.

Invaluable high resolution SAR and Optical data can be provided by the COSMO-SkyMed constellation, and from International collaboration missions such as Orfeo with France and SIASGE with Argentina.

Recent global scale data reports that:

- a) archaeological and cultural heritage sites need impending monitoring to detect changes and deterioration, even linked to anthropization or natural events;
- b) Earth Observation data and techniques can provide specific information on all above changes;
- c) 400 archaeological sites have been located thanks to Earth Observation satellites, of which one site that dates to 5000 years ago;
- d) the sites that have been found using EO satellites represent approximately 0,01% of the sites that could be detected;
- e) amongst the most suited satellites for this purpose we have COSMO-SkyMed and high resolution optical satellites;

The project plans to fine tune analysis procedures and the certification of software applications to monitor and control archaeological sites that can be utilized also for cultural heritage sites. The project has great

potential to contribute also to the discovery of new sites and becoming an essential part of preventive archaeology methods. Specific priority will be given to data from the COSMO-SkyMed mission. The project will involve all of ASI's current and future Earth Observation missions, with national and international collaboration.

Such cross-involvement will bring harmonization and rationalization to ASI's intervention in the archaeology and heritage field. Furthermore, where necessary and possible, existing synergies will be utilized, such as in the field of Geodynamics for orbital and geopositioning aspects.

The project foresees initially to utilize EO data and techniques to:

- a) monitor geometric variations of archaeological artefacts;
- b) detect deterioration and/or damage of archaeological sites;
- c) control the stability of the sites, also in connection with natural or man induced phenomena;
- d) operational and management methods for permanent monitoring of archaeological sites.

Test case archaeological sites will be Pompei, Ercolano and Castellammare di Stabia. The set up of the current project, budget and timeline have been done for these three sites.

1.2 Project aims

The main aims of the project are to:

- a) acquire COSMO-SkyMed images on a periodic and continual basis;
- b) apply the user-oriented service portfolio already in existence for the activities in question;
- c) emphasize the results of the project with EO products on the specific areas of interest and collect user feedback to refine the monitoring service;
- d) foresee divulgation and dissemination actions for the obtained results;
- e) installation at the client's Headquarters of the application developed and necessary training. The environment used during the development phase will remain active in ASI in order to develop higher end products as new research activities or improvements are introduced.

1.3 Future activities

The project will create the basis on which it will be possible to reproduce and expand the activities to:

- a) the monitoring of other sites;
- b) the introduction of cultural heritage sites;
- c) offer valuable support to the research activities of new sites and preventive archaeology activities.