

SYNTHETIC APERTURE RADAR INTERFEROMETRY FOR STRUCTURAL HEALTH MONITORING OF BRIDGES: POTENTIALITIES AND OPEN RESEARCH QUESTIONS

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Key words: Satellite monitoring, Structural Health Monitoring, InSAR, European Ground Motion Service, COSMO-SkyMed, Sentinel-1, Environmental effect, Civil structure, Bridge.

Abstract. The development of synthetic aperture radar (SAR) interferometry has provided unprecedented opportunities to remotely analyze the behavior of civil structures, transcending traditional limitations associated with in-situ methods. However, while the effectiveness of SAR technology in monitoring wide-area geohazards is demonstrated in several applications, its extension to civil structures, which have a much smaller footprint, requires further investigation of several aspects. This paper investigates the potentialities and challenges connected with the use of SAR technology for civil engineering artifacts, fostered by the availability of remote satellite open data. Recently, the European Space Agency has introduced the European Ground Motion Service (EGMS) under the Copernicus program. This innovative and freely accessible resource provides comprehensive information regarding ground motion across Europe through multitemporal interferometric analysis of Sentinel-1 images acquired since 2015. In this paper the focus is on the Palatino Bridge in Rome, Italy. Data from the ascending and descending orbit are combined to obtain vertical and longitudinal displacements of the structure, allowing for a better estimation of the bridge's response to varying environmental conditions. Results are then compared with those obtained processing high resolution data from COSMO-SkyMed of the Italian Space Agency, showing the consistency of findings.