

An Enhanced SAR-Based Tsunami Detection System

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Abstract : Tsunami early detection and warning systems have proved to be of ultimate importance, especially after the destructive tsunami that hit Japan in March 2012. Such systems are crucial to inform the authorities of any risk of a tsunami and of the degree of its danger in order to make the right decision and notify the public of the actions they need to take to save their lives. The purpose of this research is to enhance existing tsunami detection and warning systems. We first propose an automated and miniaturized model of an early tsunami detection and warning system. The model for the operation of a tsunami warning system is simulated using the data acquisition toolbox of Matlab and measurements acquired from specified internet pages due to the lack of the required real-life sensors, both seismic and hydrologic, and building a graphical user interface for the system. In the second phase of this work, we implement various satellite image filtering schemes to enhance the acquired synthetic aperture radar images of the tsunami affected region that are masked by speckle noise. This enables us to conduct a post-tsunami damage extent study and calculate the percentage damage. We conclude by proposing improvements to the existing telecommunication infrastructure of existing warning tsunami systems using a migration to IP-based networks and fiber optics links.

Keywords : detection, GIS, GSN, GTS, GPS, speckle noise, synthetic aperture radar, tsunami, wiener filter

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