PARTICLE SWARM OPTIMIZATION ALGORITHM FOR AUTOMATIC DETECTION OF INTERNAL WAVE OF 2004 TSUNAMI

Maged Marghany

Institute of Geospatial Applications

Faculty Geospatial and Real Estate,

Geomatika University College,

Lot 5-5-7, 5th Floor, Prima Peninsular,

Jalan Setiawangsa 11,

Taman Setiawangsa, 54200,

Kuala Lumpur, WP Kuala Lumpur,

Malaysia

Email: magedupm@hotmail.com

Abstract: In remote-sensing imaging, internal waves are among the foremost simply recognized of the oceanographic phenomena. The distinctive signatures of alternating bands of sunshine and dark, quasilinear strips are perceived in images of the ocean surface, in multispectral radiometer data, and in real and synthetic aperture radar data. Internal waves exist as a result of the deep waters of the ocean are denser than the surface waters. The novelty of this work is to implement the Particle Swarm Optimization algorithm for automatic detection of internal wave from ENVISAT data during the 2004 tsunami event. The results show the normalized radar cross section is ranged between -24 to -4 dB. The lowest normalized radar cross section of -28dB is described the low window zone shelter along the Andaman and Nicobar Islands. However, the highest backscatter of -4 dB describes the occurrence of whirlpool in the east of the Andaman Sea. This whirlpool is located between latitude of 14° N to 15° N and longitude of 94° E and 96°E. The whirlpool has a radius of 1.9 km and located above of water depth gradient of 1000 m. In conclusion, the Particle Swarm Optimization has automatically detected internal wave. In conclusion, 2004 tsunami generated internal wave along the Andaman Sea.

Keywords: Internal wave, automatic detection,   ENVISAT SAR radar image, Particle Swarm Optimization algorithm.