

How Infrasonic Imaging and Hf-Othr Technology can Favorably be Implemented for Detecting the On-Set of Tsunamis and the Real-Time Imaging of its Spreading

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Worldwide, medium - to short-term tsunami prediction is becoming ever more essential for safeguarding man due to an un-abating population increase within low-lying coastal regions. But hitherto there have been no verifiable methods of reliable tsunami prediction developed - except for a few isolated examples of placing arrays of costly short-lived sensors along the ocean bottom. This dilemma is a result of not yet having identified the proper approaches to tsunami prediction. The question on whether there do exist reliable prediction methods was answered long ago by the fauna living within the coastal littoral zone that are affected by tsunamis. Especially during the last devastating “Boxing Day – 050426 Tsunami” many verifiable episodes on how fish escaped the affected coastal region in time, elephants and other non-domesticated animals rushing for higher ground locations well in time before the tsunami crest approached, and so on provide proof that some electromagnetic or more likely infrasonic local warning signatures are received by these creatures relatively long before the approaching tsunami strikes. We presume that the signatures could be infra-sonic waves traveling at high speeds as underwater surface waves that could be detected by marine fauna as well as coastal animals and birds observing such precursors and acting instinctively without delay. Tsunamis have existed for millions of years and fauna of the affected coastal region has developed instinctive warning mechanisms that we need to explore. One such method, it is here surmised is the role infrasonic signatures must play. Various infrasonic imaging and wave reception methods will be discussed, and some viable solutions will be proposed for further in-depth consideration. Whereas such infrasonic signatures may – and may not – explain local hazard warning mechanisms that affected fauna in a long evolutionary process has developed, ; those yet unexplained sensor mechanisms are of little relevance for obtaining an overall understanding of the on-set and the rapid spreading of the tsunami across entire oceans and from one into the other, occasionally. Ideally, it would be desirable to have a huge fleet of distributed, equally spaced satellite altimeters roaming over the oceans like the GPS satellites, but that is currently only a dream. We require a more far-reaching ocean mapping technique which covers the affected wider region of for example the entire Indian Ocean – for now excluding satellite observations - from Sumatra around India to the African Coast from Somali down to the Cap. Such a device exists in principle, and it is based on the high-energy transmission and reception capabilities of the HF-OTHR (High Frequency – Over-The-Horizon-Radar) which makes use of the Ionosphere as

a reflector. The HF-OTHR can detect minute disturbances in the atmosphere via troposphere to lower mesosphere but also minute changes of the relative ocean surface height at the order of several centimeters. Although major ionospheric disturbances may impact high resolution ocean surface imaging, it is however possible to detect instantaneously the initiation, the rapid spreading of ocean-height and density changes generated by tsunamis and its impact on close to distant coastal shores. How such a HF-OTHR wide-area mapping and ocean-surface imaging system can be used, will be demonstrated by examples using open-literature information of the DSTO HF-OTHR at Jindalee near Alice Springs which covers most of the East Indian Ocean and beyond. Thereupon, a proposal is made on the future mission-oriented development of such mega-billion dollar facilities for covering all of the known Oceanic regions that have been affected in the past by tsunamis which are generated by sea-quakes along ocean submerged fault lines. Major attention will be paid to the regularly re-occurring tsunamis within the Indian Ocean, initiated along the outer coastal region of Sumatra, and so on.