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International Tsunami Survey Team's Impact on the NCEI Global Historical Tsunami Database

Final Paper Number: 377-3

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Introduction

An International Tsunami Survey Team (ITST) consists of scientists and engineers from more than one country who conduct post-tsunami event reconnaissance studies. As ITSTs began to be formally organized, the initial focus of only collecting water height data eventually evolved to include other types of data such as geologic and socio-economic effects. The NOAA National Centers for Environmental Information (NCEI) and collocated World Data Service for Geophysics (WDS) provides long-term archive, data management, and access to national and global tsunami data. The NCEI Global Historical Tsunami Database includes two related tables: global observations of tsunami sources and tsunami runup records (locations where tsunami waves were observed by eyewitnesses, field reconnaissance surveys, tide gauges or deep ocean sensors). The tsunami runup table includes distance from the source, type of measurement, maximum wave height, maximum inundation, and socio-economic data for the specific runup location. The NCEI Global Historical Tsunami Database includes information on over 2,200 tsunami sources and over 26,000 runups or wave observations.

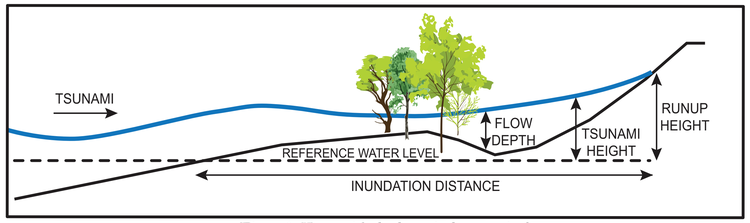

Figure 1. Tsunami hydrodynamic data terminology.

ITST Data Collection Types

ITSTs collect water level and inundation data including tsunami heights, flow depths, runups and inundation distance (Figure 1). The NCEI database has adapted to include the ITST's distinct measurement types. The database user is able to filter data points based on measurement type. Social and economic scientists, ecologists, and engineers are also now commonly involved in ITSTs. As a reflection of the growing diversity in ITSTs, the number of deaths, injuries, economic losses, and buildings damaged reported in ITSTs are collected in the NCEI database.

Understanding characteristics of the tsunami (e.g. water levels, tsunami deposits, damage) often requires ITST members to interview eyewitnesses to confirm water height or inundation extent, number and timing of significant surges, and localized impacts.

Following the 2007 Solomon Islands earthquake and tsunami, ITST member measures tsunami flow depth at Ghizo Island. (Credit: H. Fritz/ITIC)

Following the 2012 El Salvador earthquake and tsunami, ITST member interviews a tsunami survivor (center) while another ITST member prepares to take measurements of the survivor's account of the tsunami water level height and inundation. (Credit: J. Leonard/ITIC)

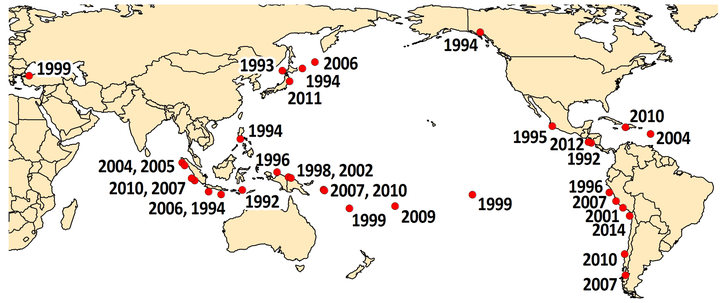

Figure 2. ITSTs have documented a total of 33 tsunami events in the Pacific and Indian Oceans, and Caribbean and Mediterranean Seas.

ITST Data in NCEI Database

A total of 33 designated ITSTs (Figure 2) have provided approximately 10,000 data points to the NCEI tsunami runup table, which is approximately 40% of the table. Approximately 50% of all ITST runup observations were <5 m. The 2011 Japan tsunami provided over 5,800 tsunami observations from ITSTs. Over 1,000 observations were ≥15 m (Figure 3). Approximately 24% of all tsunami runups in the NCEI database are from the 2011 Japan tsunami. In 1998, the 1st edition of the Post-Tsunami Survey Field Guide was published by the Intergovernmental Oceanographic Commission (IOC) and International Tsunami Information Center (ITIC) to promote consistency in data collection. This guidance has fostered the ability to compare data across events.

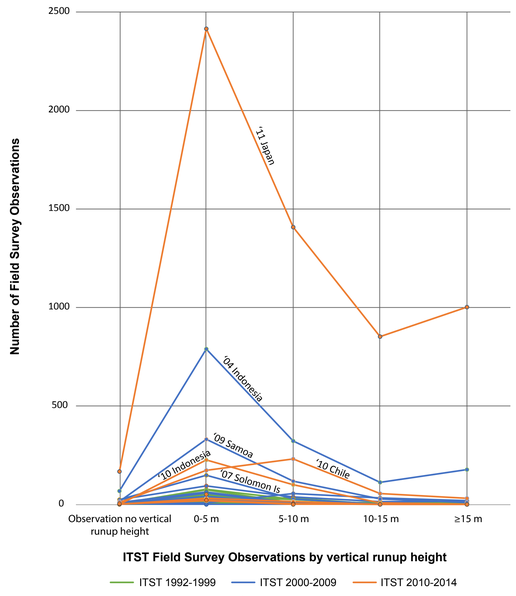

Figure 3. ITST Field Survey Observations binned into five groups (no value, 0-5 m, 5-10 m, 10-15 m and ≥15 m).

The 26 December 2004 and 11 March 2011 tsunami events

The 26 December 2004 Indonesia and 11 March 2011 Japan tsunamis make up approximately 75% of the ITST data points in the NCEI database. The large tsunami events of recent years have increased the quantity of data points in the database but the advancement of ITST's data collection and distribution methods have improved the quality of those data points (Figure 4). The 2004 tsunami event resulted in over 227,000 deaths. Hundreds of researchers and dozens of ITSTs surveyed 19 countries and territories to document the 26 December 2004 tsunami event (Figure 5).

The First ITST

The first ITST involved scientists and engineers from Japan and the U.S., along with local Nicaraguan scientists and engineers. The ITST surveyed the impacted areas within 3 weeks of the 2 September 1992 earthquake and tsunami event. The ITST survey was conducted along more than 250 km of the Nicaraguan coast. ITST efforts are now coordinated by the IOC and ITIC, when requested by the impacted country.

Members of the first ITST document two houses in Popoyo that survived the 1992 Nicaragua earthquake and tsunami—all the others were washed away. (Credit: Harry Yeh/NCEI)

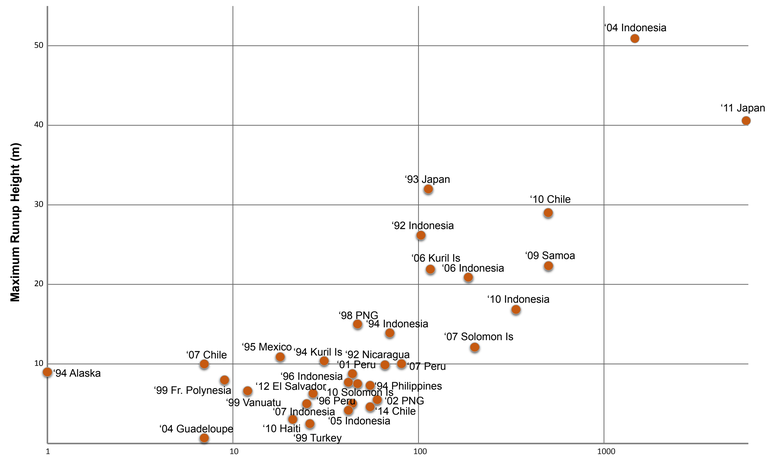

Figure 4. ITST Field Survey maximum tsunami runup height relative to total number of data points collected.

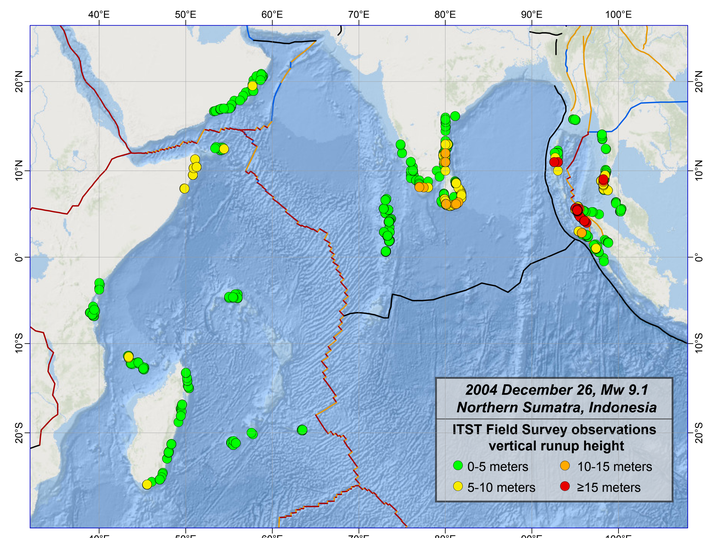

Figure 5. ITSTs of the 26 December 2004 tsunami event collected a total of 1468 runup observations, of which 177 were ≥15 m. The maximum tsunami runup height was 50.9 m at Labuhan, Aceh, Indonesia.