

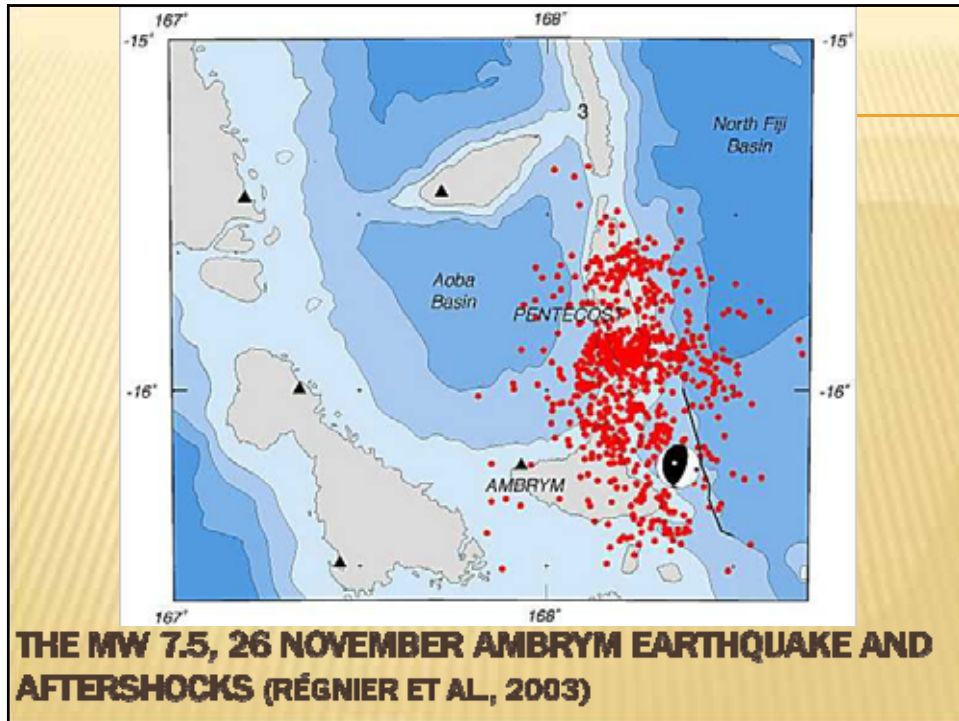
TSUNAMI WARNING AND MITIGATION IN VANUATU

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LOCAL AND REGIONAL TSUNAMIS IN VANUATU

- ❖ 21 April 1997 (Torres Mw 7.8),
- ❖ 26 November 1999 (Vanuatu central Vanuatu, Mw 7.5, 5 victims)
- ❖ 2000, Mw 7, Luganville Santo
- ❖ 2002, 2 January (Vate, Mw 7.3, depth of 21 km and located 50 km west of Port Vila city, a small tsunami generated in Port Vila harbour
- ❖ 2007, Mw7.0, Luganville Santo
- ❖ 2008, M7.1, Tanna
- ❖ 2009, M7.8, M7.7, M7.3, Torres/Santa Cruz islands





Storm ?, tsunami ? Deposit, Devil Point, Efate (photo B. Pelletier, 2007)

TSUNAMI WARNING IN VANUATU

- ❖ **First Participation of Vanuatu in Tsunami Warning issues in 2005 with :**
 - the 21st session of the intergovernmental co-ordination group for the Pacific Tsunami Warning and ion system (PTWS-XXI)
Melbourne 1-5th May 2005
 - Pacific wave 2005 exercise
 - Member of the South West Pacific Tsunami Working group, 2005.
 - Focal Point for Vanuatu Tsunami warning identified, 2005

ORGANIZATIONS INVOLVED WITH TSUNAMI WARNING

- ❖ Meteorological department: Focal point operating 18/7.
- ❖ Geology, Mines and Water Resources Department (Geo-Hazards Unit): Technical support and information interpretation.
- ❖ National Disaster Management office: Response to the provinces and communities.

PRELIMINARY ARRANGEMENT FOR TSUNAMI WARNING SYSTEM FOR THE PACIFIC WAVE 2005

- ❖ Warning from PTWC via fax, email and gts to the meteorological services
- ❖ Meteorology and Geohazards to arrange and issue bulletin
- ❖ Geo-hazards and Meteorology dept advises NDMO and Police operation centre
- ❖ NDMO and Meteorological services advise public

LESSONS LEARNT FROM THE PACIFIC WAVE 2005.

- ❖ Communication difficulties between the agencies in times of emergency.
- ❖ Communication delay from the warning center to the focal point to get the messages in time
- ❖ Communication limitations between the city and the remote islands of Vanuatu to reach the tsunami warning
- ❖ Poor organization within the responsible agencies to be able to respond quickly.
- ❖ Majority of the population do not have a clear understanding on tsunami warning system

IMPROVING TSUNAMI WARNING SYSTEM

- ❖ The institutional rearrangement of the 3 responsible agencies for Tsunami warning to facilitate a quick response.
- ❖ Basic tsunami hazards information is created for the communities and the school lower grades in bislama (Vanuatu national language).
- ❖ Tsunami hazard mitigation information is preached during any Disaster Awareness campaigns

TSUNAMI DIRECTIVE

- ❖ In 2008, after the recent Tsunami events in Asia, the Department of Vanuatu Meteorological Services and Geology and Mines sees the need to establish a warning system for Tsunami.
- ❖ A Tsunami Directive was developed in 2008 to direct the preparation as well as dissemination of the Tsunami messages
- ❖ The Directive indicate the requirements needed for the activation of the Tsunami Warning Center

TSUNAMI DIRECTIVE (CONT.)

- ❖ It categorize the stages of the warnings
- ❖ It lists contacts of people to be immediately contacted when the Tsunami Warning Center is activated
- ❖ It gives the format of the Tsunami bulletins

TSUNAMI WARNING STAGES

❖ Tsunami Information stages

Tsunami Information – The Information will contain the date and time of the issuance, the date and time of the earthquake or event, the earthquake magnitude, its distance from the epicenter to the nearest island of Vanuatu

- Information is intended to inform Emergency management officials and the public that an earthquake had occurred. In most cases there is no threat for a destructive Tsunami
- An information will be issued once only

TSUNAMI WARNING STAGES

❖ Tsunami Advisory

- A bulletin containing a Tsunami Advisory will specify that there is a potential for a Tsunami threat for the whole or any island of Vanuatu
- Subsequent advisories will be issued every one hour for regional Tsunami and every 30 minutes for local tsunami.
- An advisory will be issued based on the following conditions
 - The magnitude of the earthquake
 - The Depth

TSUNAMI WARNINGS

- ❖ The contents of the advisory will be based on the bulletins provided by the Pacific Tsunami Warning Center (PTWC)
 - Local conditions and topography is also taken into consideration when preparing the bulletins
 - Vanuatu Meteorological Services (VMS) receives the PTWC bulletins via the World Meteorological Organization Global Telecommunication System (GTS) and fax
- ❖ Tsunami forecast time is also included in the Advisory bulletins

EXAMPLE OF THE ADVISORY BULLETIN

Tsunami Advisory number 1 for Vanuatu jointly issued by the Vanuatu Meteorological Service and the Department of Geology and Mines at 09:00am local time, 02nd April 2007.

At 07:40am local time today **02nd April 2006**, an earthquake of magnitude **8.1** was located at **8.6** degrees south, **152.7** Degrees East. This is about **2,000 kilometers northwest of Santo**.

An earthquake of this size has the potential to cause destructive Tsunami that can strike coastlines near the epicenter within minutes and more distant coastlines within hours. People throughout Vanuatu should immediately take appropriate action and precautionary measures upon receiving this advisory. This includes moving away from coastal areas and to higher grounds.

The estimated initial Tsunami wave arrival times to the islands of Vanuatu is roughly about **11** o'clock local time today. People are advised to listen to Radio Vanuatu. The next advisory will be updated today at **10am** today.

DISSEMINATION OF THE BULLETINS

- ❖ Radio Vanuatu, FM 107 and Paradise FM will broadcast all information and advisories.
- ❖ The Warning Center may also arrange direct broadcast of the advisory, particularly the initial advisory
- ❖ Tsunami bulletins are also faxed to provincial headquarters and Principal Education Officers in provincial centers
- ❖ Tsunami bulletins are also available on the Vanuatu Meteorological Service website
<http://www.meteo.gov.vu/Warnings/TsunamiAdvisory/tabid/117/Default.aspx>

RECENT TSUNAMI EVENTS

- ❖ 30 September 2009
 - Only one information bulletin was issued, no advisories were issued
 - People were well informed via Radio Vanuatu on the details of the earthquake and the possibility of the Tsunami

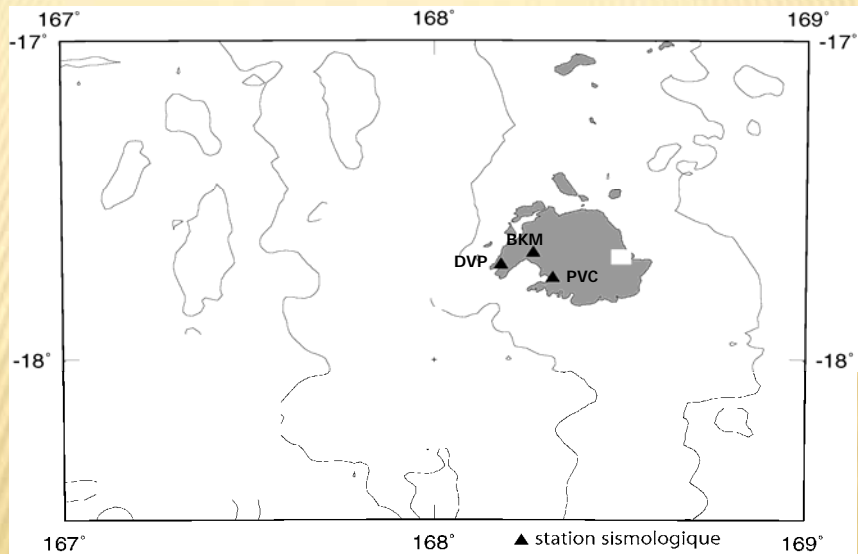
RECENT TSUNAMI EVENTS

- ❖ 08th of October 2009
 - A total of 3 Advisories were issued.
 - The first Tsunami advisory was issued at 9:30am. The warning bulletin issued from PTWC was at 092217UTC (9:17am local time) and received via GTS between 5-10 minutes later.
 - The second Tsunami advisory was issued at 10:00am, the third at 11:00am and the final/cancellation information bulletin at 12:00pm (midday)
 - All advisories were disseminated via Radio Vanuatu, FM107, Paradise FM, fax and uploaded on Vanuatu Meteorological Services website.

SMS WARNINGS

- ❖ Although procedures were in place for the dissemination of Tsunami Advisory via SMS, it did not eventuate.
 - Further discussions will be done to source alternatives to improve the determination of Tsunami Advisory via this medium

SEISMIC NETWORK FROM 2002 TO JUNE 7TH 2007



2 radio-telemetred remote sites (BKM and DVP) and a broadband seismometer as the central acquisition(PVC, Geoscope station).
Network stopped running after the June 2007 fire)

SEISMIC NETWORK FUNDED BY THE PACIFIC FUND THROUGH THE FRENCH INSTITUTE OF RESEARCH AND DEVELOPMENT (IRD) PARTLY FUNCTIONAL SINCE SEPTEMBER 2009



PERSPECTIVE FOR THE IMPROVEMENT OF TSUNAMI WARNING SYSTEM

- ❖ Project proposal is developed for siren dispatch in main cities of Vanuatu, Port Vila and Luganville.
- ❖ Ensure Radio signal is received by the remote areas ensuring everyone access warnings.
- ❖ Establish tsunami evacuation plan for Port Vila and Luganville.
- ❖ Promote scientific research to built historical tsunami database and establish tsunami inundation maps (for the main cities of Port Vila, Luganville and tafea province).

Geohazards perspective: Seismic network

Broadband Network			
Site	Transmission Mode	Seismological Equipment	Network
Santo	VSAT/ADSL	Nanometrics	Regional Seismic Network
Maewo	GPRS	Nanometrics	National Seismic Network
Pentecost	VSAT/ADSL	Nanometrics	Regional Seismic Network
Malekula	GPRS	Nanometrics	National Seismic Network
Tanna	VSAT	Kinematics	Regional Seismic Network
Short Period (3-Components)			
Site	Transmission Mode	Seismological Equipment	Purpose
Gaua	VSAT	Kinematics	National Volcanic Network
Ambrym	VSAT	Kinematics	National Volcanic Network
Ambae	VSAT	Kinematics	National Volcanic Network
Epi/Tongoa	GPRS	Kinematics	National Volcanic Network
Lopevi	GPRS	Kinematics	National Volcanic Network

GEO-HAZARDS PERSPECTIVE

