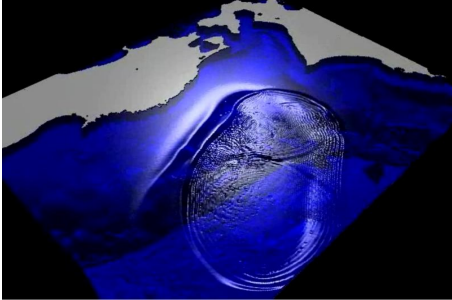



1. Title

Numerical model for tsunami inundation and making tsunami hazard map

ID:	DRH 33	
Hazard:	Tsunami	
Category:	Implementation Oriented Technology (IOT)	
		
Proposer:	Fumihiko Imamura	
Country:	JAPAN;	
Date posted:	27 March 2008	
Date published:	14 January 2009	

Tsunami generation and propagation by the simulation.

Copyright (C) 2009 Fumihiko Imamura All rights reserved.

Contact

Fumihiko Imamura
Prof. of Tsunami Engineering, Disaster Control Research Center, Tohoku University
6-6-11 Aoba, Sendai 980-8579, Japan
Imamura@tsunami2.civil.tohoku.ac.jp
+81-22-795-7513

2. Major significance / Summary

Technology to simulate a tsunami inundation by TUNAMI-model providing the numerical code with the manual and to support making hazard map at each region for tsunami mitigation plan

3. Keywords

Tsunami simulation, inundation, hazard map

II. Categories

4. Focus of this information

Implementation Oriented Technology (IOT)

5. Users

5-1. Anticipated users:Community leaders (voluntary base), Municipalities, Teachers and educators, Information technology specialists, Urban planners

5-2. Other users:Policy makers

6. Hazards focused

Tsunami

7. Elements at risk

Human lives, Human networks in local communities, Business and livelihoods, Infrastructure, Buildings, Urban areas, Rural areas, Coastal areas, River banks and fluvial basin, Agricultural lands

III. Contact Information

8. Proposer(s) information (Writer of this template)

Fumihiko Imamura

Prof. of Tsunami Engineering, Disaster Control Research Center, Tohoku University

6-6-11 Aoba, Sendai 980-8579, Japan

Imamura@tsunami2.civil.tohoku.ac.jp

+81-22-795-7513

9. Country(ies)/region(s) where the technology/knowledge/practice originated

JAPAN;

10. Names and institutions of technology/knowledge developers

Tsunami Engineering, Disaster Control Research Center, Tohoku University

11. Title of relevant projects if any

TIME(Tsunami Inundation Modeling Exchange) Project

12. References and publications

IOC/UNESCO MANURAL and GUIDES 35 “Numerical method of Tsunami Simulation with the Leap-frog Scheme”, 1997,

http://ioc3.unesco.org/indotsunami/documents/6-2_imamura.pdf

Imamura,F: Tsunami counter-measures in Japan; could people evacuate after receiving a warning ?, Marine Habitats, KNOW RISK, International Strategy for Disaster Reduction, United Nation,Tutor Rose Pub., pp.222-223, 2005.

<http://www.tsunami.civil.tohoku.ac.jp/hokusai3/J/projects/manual-ver-3.1.pdf>

Imamura, F., K. Goto, S. Ohkubo, A numerical model for the transport of a boulder by tsunami. Journal of Geophysical Research ?Ocean, Vol.113,C01008,doi:10.1029/2007JC004170, 2008

Abe,I., K. Goto, F. Imamura, K. Shimizu, 2007, Numerical simulation of the tsunami generated by the 2007 Noto Hanto earthquake and implications for unusual tidal surges observed in Toyama Bay. Earth, Planets and Space. Vol.60,pp.133-138, 2008

Maeno, F., and F. Imamura, Numerical investigations of tsunamis generated by pyroclastic flows from the Kikai caldera, Japan, Geophys.Res. Lett., 34, L23303, doi:10.1029/2007GL031222, 2007

Imamura,F., S.Koshimura,K.Goto,H.Yanagisawa and Y.Iwabuchi, Global disaster: The 2004 Indian ocean tsunami, Journal of Disaster Research, Vol.1.No.1, pp.131-135, 2006

13. Note on ownership if any

IV. Background

14. Disaster events and/or societal circumstances, which became the driving force either for developing the technology/knowledge or enhancing its practice

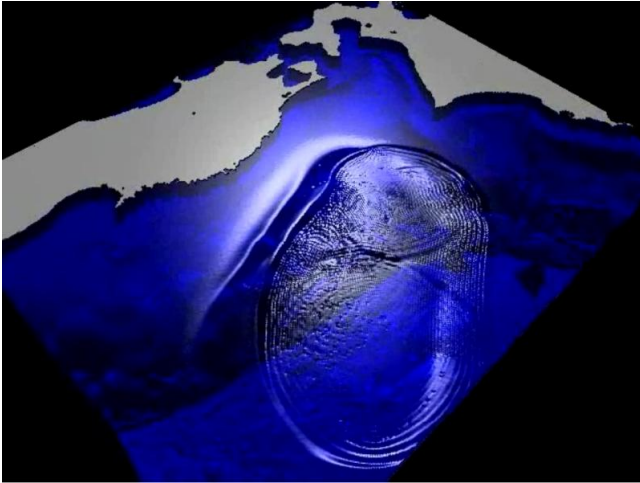
The TIME (Tsunami Inundation Modeling Exchange) started in 1991 is a joint project of IUGG and IOC/UNESCO in IDNDR. The Tsunami Engineering Laboratory, Disaster Control Research Center (DCRC) of Tohoku University, has been acting as the center of TIME, to transfer its technique of the tsunami numerical simulation to the countries which suffered or will suffer tsunami damages.

V. Description

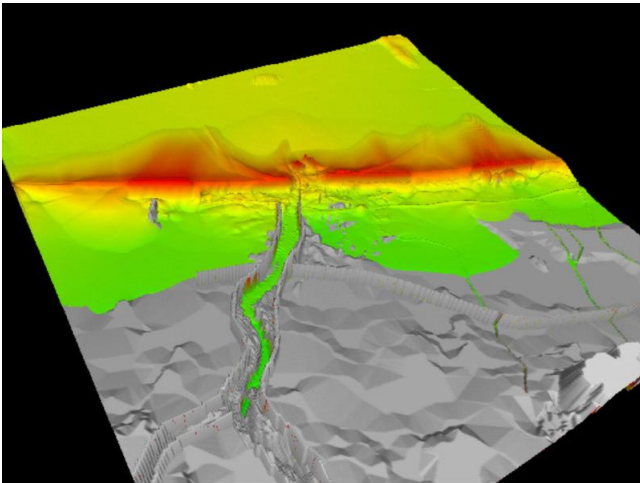
15. Feature and attribute

The estimation and/or prediction of the tsunami inundation in each area is indispensable in order to make a plan for countermeasure against the tsunami disaster which has the possibility of the occurrence in the future and dealing in the area in the past. Since various numerical value models were proposed we selected the

most expensive practical use and expensive including the reliability. And the preparation of the manual which is easy to use and the training was made.



Tsunami generation and propagation by the simulation. The snap shot is the propagation of the 1896 Meiji Sanriku Tsunami 10 minutes after the earthquake. The tsunami is one of the worst tsunami in the past, causing more than 22,000 death and recorded 38 meter of runup height.



nt reaches the land and runup into the area. One of your advantage on he wave front on the land and high accuracy of the inundation.

Community based hazard map as example. The map was made by the collaboration with Tohoku University, Higashi-matsushima city and Pacific consultant. The map provide not only the inundation area but also safety area and its direction.

16. Necessary process to implement

The computer facility to carry out the simulation by using TUNAMI, fortran numerical code is necessary. Input data are digital bathymetry data, fault parameters. The digital data of bathymetry and topography to cover the target area should be ready to use. Maps and information at the target area will be able to used to make the digital data.

17. Strength and limitations

In order to carry out the numerical simulation, the background and knowledge of wave/ fluid dynamics and FORTRAN is required.

18. Lessons learned through implementation if any

Technological transfer of the simulation was carried out in the 13 organization in 11 countries. And four young member research workers were invited in Tohoku university for the training and joint research on the tsunami mitigation. Report activities in ITSU (International Co-ordination Group for the Tsunami Warning System in the Pacific) gives the gratitude for the TIME –project every times. A manual is published as the 35th publication of IOC/UNESCO and it is being distributed. The argument of the report of the execution and the examination is made in the Tsunami subcommittee in IUGG (International Union of Geodesy and Geophysics).

VI. Resources required

19. Facilities and equipments required

20. Costs, organization, manpower, etc.

Free for non-profit purpose to transfer the code

Message from the proposer if any

21. Message

VIII. Self evaluation in relation to applicability

22. How do you evaluate the technology/knowledge that you have proposed ?

is shown to be effective based on case studies/experiments in field sites.

23. Notes on the applicability if any

IX. Application examples

No.1

E1-1. Project name if available

TIME (Tsunami Inundation Modeling Exchange)

E1-2. Place

No. of institutes/university and countries to be transferred the code and manual is 39 and 21. The TIME (Tsunami Inundation Modeling Exchange) started in 1991 as a joint effort of IUGG and IOC/UNESCO during IDNDR. The Disaster Control Research Center (DCRC), Tohoku University, Japan has been acting as the center of TIME, to transfer numerical technique of tsunami simulation to the countries which suffered or will suffer tsunami hazards.

E1-3. Year

1995-2005

E1-4. Investor

Profs. Nobuo Shuto, Fumihiko Imamura and Dr. Shunichi Koshimura

E1-5. People involved

E1-6. Monetary costs incurred

E1-7. Total workload required

Name : Modesto Ortiz, researcher. Institute: Centro de Investigacion Cientifica y de Educacion Superior de Ensenada. Country: Mexico. Period: From May to November, 1993. Name: Gegar Sapta Prasetya, researcher. Institute: Coastal Engineering Laboratory, LPTP-BPP Teknologi. Country: Indonesia. Period: From 15 October, 1995 to 25 November, 1995. Name : Nur, Adi Kristanto, researcher. Institute: Marine Geology Institute. Country: Indonesia. Period: From 2 October, 1996 to 31 March, 1997.

E1-8. Evidence of positive result

Several types of tsunami hazard maps have been made in the target area

X. Other related parallel initiatives if any

Message

XI. Remarks for version upgrade

Message

Attached files:

- > Imamura_et_al_(2008)_JGR.pdf (PDF - 1045 Kb)
- > template.xls (XLS - 53 Kb)
- > EPS2184NT_typeset.pdf (PDF - 1008 Kb)
- > 2007GL031222.pdf (PDF - 314 Kb)