ABSTRACT

There have been advances in understanding the potential for great tsunami earthquakes at the Cascadia subduction zone, motivating an effort to update the assessment of tsunami hazards on the Washington coast. Fine-resolution (1/3 arc-second) digital elevation models (DEMs) of the Strait of Juan de Fuca and northern Olympic Peninsula have recently been made available to assist in inundation and coastal infrastructure response planning. Indian tribes from the Quinault, Hoh, Neah Bay, and Makah Reservations and adjacent coast with the G:

Miles New Cascadia Subduction Zone Tsunami Inundation Modeling to Guide Relocation of Coastal Infrastructure for Indian Tribes on the Northern Washington Coast

INTRODUCTION

Earthquake Magnitude and Slip Distribution

Earthquakes at the Cascadia subduction zone have the potential to generate devastating tsunamis along the west coast of North America. The Cascadia subduction zone is characterized by a subducting slab of the Juan de Fuca plate that dips approximately 45° under the western United States. The plate interface is characterized by low seismicity, but when earthquake rupture occurs, it can be extensive. The largest earthquake in the historical record of the Cascadia subduction zone was the 1700 Cascadia subduction zone earthquake, which generated a tsunami that may have traveled more than 300 km offshore. The earthquake occurred at depth and was not well recorded by early seismometers, but the tsunami left evidence of widespread destruction. The magnitude of the 1700 earthquake is not well constrained, but it may have been as large as M 9.0. Other large earthquakes may have occurred in the past, but the evidence is not clear. The potential for future large earthquakes along the Cascadia subduction zone is an important issue for coastal communities and infrastructure planning.

CASCADIA SUBDUCTION ZONE

Subduction Zones

The Cascadia subduction zone is located off the Northwest coast of the United States of America, where the Juan de Fuca Plate is subducting beneath the North American Plate. The subduction zone extends from the Strait of Juan de Fuca in the north to the Oregon-California border in the south. The subduction zone is characterized by a subducting slab of the Juan de Fuca plate that dips approximately 45° under the western United States. The plate interface is characterized by low seismicity, but when earthquake rupture occurs, it can be extensive. The largest earthquake in the historical record of the Cascadia subduction zone was the 1700 Cascadia subduction zone earthquake, which generated a tsunami that may have traveled more than 300 km offshore. The earthquake occurred at depth and was not well recorded by early seismometers, but the tsunami left evidence of widespread destruction. The magnitude of the 1700 earthquake is not well constrained, but it may have been as large as M 9.0. Other large earthquakes may have occurred in the past, but the evidence is not clear. The potential for future large earthquakes along the Cascadia subduction zone is an important issue for coastal communities and infrastructure planning.

LIMITATIONS OF THESE SHAPES

The maps shown here are approximations of the potential tsunami inundation for the scenarios described in the text. The maps are based on numerical simulations of tsunami propagation and are not intended to be exact representations of the actual tsunami inundation. The maps are not intended to be used for emergency planning or evacuation purposes. The maps are for reference only and should not be used for navigation.

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REFERENCES

