Introduction

The Cascadia Subduction Zone (CSZ) is an active subduction zone where the North American Plate and the Pacific Plate converge. The most recent CSZ event happened approximately 300 years ago, and similar events are likely to occur in the future. The probability of a magnitude 8-9 CSZ earthquake occurring over the next 30 years is 10%, which poses a significant risk to the Oregon coast. Understanding and mitigating this geologic hazard is crucial for ensuring public safety.

CSZ Model Specifications

To address the potential for destructive earthquakes and tsunamis, the DOGAMI (Department of Geology and Geophysics) has been conducting research on the CSZ. This includes identifying and mapping the tsunami inundation zones to prevent the construction of buildings in areas at risk. Senate Bill 379 line data were created by DOGAMI, and the tsunami inundation scenarios were modeled using federal guidelines.

How Tsunamis Occur

A tsunami is caused by the sudden release of energy in the form of a megathrust earthquake. When the two plates are stuck in place at the subduction zone, the energy is violently released, leading to a series of ground movements. Eventually, the locked zone ruptures and energy is violently released in the form of a megathrust earthquake and tsunami.

During a full-rupture running nearly parallel to the CSZ but closer to the Oregon coastline, the effect of this splay fault moving during a full-rupture occurring over the next 30 years is 10% and that such earthquakes should be expected. The increased seismicity of the CSZ is expected to result in tectonic uplift or subsidence, which can affect coastal areas. Ameliorating the effects of the splay fault is necessary to prevent significant coastal damage.

CSZ Frequency

The most recent CSZ event happened approximately 300 years ago, and there have been 19 full-rupture events off the Oregon coast over the past 10,000 years. This shows that the CSZ is a region of high seismic activity. Understanding the frequency and potential for future earthquakes is critical for disaster preparedness.

Tsunami Inundation Scenarios

The tsunami inundation scenarios are modeled to occur at high tide and to account for local subsidence or uplift of the ground surface. The computer model produces time series data for the respective amounts of slip, the frequency of occurrence, and the effect on coastal areas. The scenarios include the earthquake-produced subsidence and the tsunami-induced displacement of the Pacific Ocean, resulting in an increase of the vertical datum.

Conclusion

The Cascadia Subduction Zone is a region of high seismic activity, with significant potential for devastating earthquakes and tsunamis. Understanding the frequency and understanding the seismic risk is crucial for disaster preparedness. The DOGAMI has been working on identifying and mapping the tsunami inundation zones to prevent the construction of buildings in areas at risk. This will help in mitigating the potential for disastrous tsunami-related consequences by allowing for the development of safer coastal communities.

Data References

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