



## **Potential Significant Tsunami Hazard in the Puysegur Subduction Zone, South of New Zealand**

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Subduction zone seismogenesis and related tsunami potential have recently become a significant focus; yet none of the recent global studies have considered the Puysegur subduction zone, south of New Zealand, and its hazards. While several local studies have identified the southern and southwestern (Fiordland) margins as potential tsunami hazards, those models fail to take into account the oblique nature of subduction and the impact of that obliquity on earthquake slip and tsunami wave generation. We have undertaken a comprehensive study of the Puysegur subduction zone and its earthquake and tsunami hazards by analyzing the historical seismicity over the entire plate boundary region south of New Zealand and using that data to constrain the earthquake potential for the Puysegur trench. We have identified both seismicity clearly associated with the interplate megathrust, and using these events, determined the seismic moment deficit of the subduction plate boundary over the past 100 years. These calculations imply unreleased moment equivalent to a magnitude  $M_w$  8.4 earthquake, and thus suggest that this subduction zone has the potential to break in a great, tsunamigenic event. We model the tsunami hazard using this moment deficit and the location of the 1979 plate interface event, and find that a tsunami caused by a great earthquake on the Puysegur subduction zone poses a significant threat to the southern and western coasts of the South Island of New Zealand, the coasts of Tasmania, and also to the southeastern coast of Australia, nearly 2000 km distant.