Geophysical Research Abstracts
Vol. 15, EGU2013-9430, 2013
EGU General Assembly 2013

Holocene earthquake-triggered turbidites from the Saguenay (Eastern Canada) and Reloncavi (Chilean margin) fjords

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Fjords are unique archives of climatic and environmental changes, but also of natural hazards. They can preserve thick sedimentary sequences deposited under very high sediment accumulation rates, making them ideally suited to record historical and pre-historical sedimentological events such as major landslides, floods or earthquakes. In fact, by carefully characterizing and dating the sediments and by comparing the basin fill seismic stratigraphy and sedimentary records with historical events, it is possible to "calibrate" recent rapidly deposited layers such as turbidites with a trigger mechanism and extend these observations further back in time by using seismic reflection profiles and longer sediment cores. Here, we will compare earthquake-triggered turbidites in fjords from the Southern and Northern Hemispheres: the Saguenay (Eastern Canada) and Reloncavi fjords (southern Chilean margin). In both settings, we will first look at basin fill geometries and at the sedimentological properties of historical events before extending the records further back in time.

In both fjords, several turbidites were associated with large magnitude historic and pre-historic earthquakes including the 1663 AD (M>7) earthquake in the Saguenay Fjord, and the 1960 (M 9.5), 1837 (M$\sim$8) and 1575 AD major Chilean subduction earthquakes in the Reloncavi Fjord. In addition, a sand layer with sea urchin fragments and the exoscopic characteristics typical of a tsunami deposit was observed immediately above the turbidite associated with the 1575 AD earthquake in the Reloncavi Fjord and supports both the chronology and the large magnitude of that historic earthquake. In both fjords, as well as in other recently recognized earthquake-triggered turbidites, the decimeter-to meter-thick normally-graded turbidites are characterized by a homogeneous, but slightly fining upward tail. Finally, new radiocarbon results will be presented and indicate that at least 19 earthquake-triggered turbidites were recorded in the Reloncavi Fjord during the last 7500 cal BP.