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Avalanche induced Tsunamie in Askja caldera lake Iceland, June 21st. 2014.

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On July 21st 2014 a group of earth scientists and students from the University of Iceland and University of Santa Barbara, Ca, visited the caldera lake Öskjuvatn Iceland. Lake Öskjuvatn is about 12 km2, elliptical with a diameter of some 3.5 to 2.5 km. It was formed after a major eruption/rifting event that began in 1875, and culminated in March the same year by a major Plinian eruption. The lake is about 220 m deep where it is deepest. During the visit of the group a major part of the south eastern corner of the caldera was beginning to fail, only observed by analyzing photographs taken on the evening of 21st July. The group left the area at about 21:00 in the afternoon. At about 23:20 a large part of the SE mountain range fell into the caldera and the lake occupying it. Photos taken from some 15 km distance at 23:27 show a large plume rising from the within the caldera. The day after the group returned to the caldera lake after receiving news of the event. A scar of some 0.7 to 1 km wide and 400 m high indicated a major avalanche had fallen into the lake. Flood marks observed around the caldera lake indicated that a major tsunamie had followed the avalanche. Around a solfatara Viti, situated in the NE corner of the lake highest flood marks indicated that squashes had reached as high as 55-60 m. The group did surveillance of highest flood marks around the lake. The measurements show that the wave was about 25 to 30 m high passing over the entire lake leaving behind marks in the snow and firn reaching down to previous lake level. Where the lake shallows flood marks could be traced up to 40 to 60 m. Further investigation of the wave showed that since the lake is enclosed a bathtub effect was initiated. Strandlines after more than 10 waves could be identified of which 4 reached above 20 m (with regard to the lake level 1050 m.a.s.l.). 19 hours after the avalanche fell into the lake there was still observed a resonance in the lake. High and low rise of the lake could be observed at an interval of some 20 min. Lake leveling indicates that the lake level rose some 1-2 m in the event, that suggests an injection into the lake of >12 million m3 of debris. We shall present effects of the avalanche observed only 19 hours after the event and observations on the change in Lake Bottom by combining multi-beam measurements from 2012 with multibeam measurements after the avalanche.