

## Underwater topographic survey for inaccessible water areas, and its applications to submarine and sublake landslides

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Landslides, volcanoes, active faults and other hazard related topographies exist on the sea floor or lake bottoms. It is important to investigate them for assessing future hazard potential. But investigations for these underwater topographies are not so easy because it needs quite high cost, and its heavy weight equipment also requires a ship big enough to hold it. These days, dramatically advanced leisure-use fish finders enable us to investigate underwater topographic survey from shallow to several hundred meters deep. These fish finders are low cost and light weight, so can be equipped on inflatable rafts that is accessible into ultra shallow area of 0.5 - 20 m deep that is usually inaccessible for usual scientific research vessels. Thus the investigating method using the fish finder and an inflatable raft is more versatile than other technical ways. Some advanced fish finders have a side-scan sonar system that obtains 2D image of acoustic reflections, and it can identify bottom materials and underwater structures. Now we are trying to apply for studying submarine and sublake landslides in water areas that have not been surveyed. This presentation shows successful examples of our conducted investigations for the sublake landslides in Lake Kussharo and the 1923 Nebukawa landslide that a part of the landslide dived into the sea. These results have contributed the innovative discussion in generation of tsunamis on the lake, and revealed unknown submarine ruins that landslide devastated.

Keywords: fish finder, submarine landslide, underwater landslide, bathymetric survey, side-scan sonar