BARRY ARM LANDSLIDE INTERAGENCY INFORMATION STATEMENT

U.S. Geological Survey, Alaska Division of Geological & Geophysical Surveys, National Tsunami Warning Center, Alaska Earthquake Center

Friday, 01 July 2022, 9 AM AKDT (05:00 UTC)

61°09'10" N 148°09'15" W

Executive Summary

- Satellite analysis from the last month revealed up to 11 cm (4.3 in) of movement on a one-half square mile area of the Barry Arm landslide immediately above the terminus of the Barry Glacier.
- The depth of the movement is currently unknown. We do not know if this type of movement is common as this is the first motion detected since direct monitoring began.
- It is unknown if this motion will continue.
- The interagency team will continue to monitor the landslide area and the water beneath it with existing instrumentation and satellite data. Tsunami warning capability is being tested, but not yet available.

Current observations

Analysis of Interferometric Synthetic Aperture Radar (InSAR) data obtained by the RADARSAT-2 satellite revealed local ground movement of a portion of the Barry Arm landslide in scenes that bracket the period spanning May 16 through June 16, 2022. Preliminary analysis suggests up to 11 cm (4.3 in) of localized motion in a 0.35 km2 (86.5 acre) area of the landslide immediately above the terminus of the Barry Glacier. This area is approximately 850 m (0.5 mi) wide by 650 m (0.4 mi) tall. At this time, we are unable to make estimates of potential volume as the depth of the current ground movement is unknown.

Retrospective analysis of InSAR data for the Barry Arm landslide reveals that this type of event may not be uncommon. Other published studies at Barry Arm have identified ground movement at similar or much greater rates since 2008. However, the recent ground movement identified in the imagery is notable in that it is in a location that coincides with a very active part of the Barry Glacier terminus. The glacier terminus itself has recently been experiencing changes in thickness that may influence nearby hillslopes. Analysis of other data, including high-resolution imagery and seismic signals reveal no visual changes or increases in seismic activity.

Prognosis

Localized ground movement is not necessarily a precursor to partial or complete failure of the Barry Arm landslide. The ground movement may cease without any additional landslide activity. The coincidence of ground movement in association with recent observations of changing glacier thickness suggests the recent movement is linked to glacier dynamics. Initial investigation of the glacier terminus revealed the increased presence of curvilinear crevasses that may signal an imminent large calving event.

If the ground movement pattern increases in extent or rate, it is likely that changes would be also seen in other datasets acquired by other monitoring instrumentation and in satellite imagery. The combined

use of these monitoring data streams may allow for detection of precursory signals in advance of catastrophic landslide failure and permit advance notice of increasing instability.

Current monitoring

There is a local monitoring network in Barry Arm that includes two seismometers, a ground-based radar, several weather stations, and four cameras. In addition, there is an infrasound array located in the town of Whittier, Alaska, approximately 50 km (31 miles) from the Barry Arm landslide. The National Tsunami Warning Center (NTWC) also operates three water level sensors in Barry Arm. In addition, systematic monitoring of optical imagery and remote sensing data, including InSAR, is conducted throughout the year. New satellite observations become available on weekly timescales. There is currently no operational real-time warning capability for the Barry Arm landslide and potential tsunami.

The interagency partners have plans to add to current monitoring capabilities, possibly by adding a local infrasound array, to the suite of instruments in Barry Arm this summer. In addition, plans are in place to increase the robustness and reliability of the telemetered data for real-time surveillance.

In the meantime, we continue to monitor the Barry Arm landslide using existing instrumentation and satellite data. Updates will be provided through the Alaska Division of Geological and Geophysical Surveys Barry Arm landslide webpage and email list (linked below).

Background

The Barry Arm landslide is a large (~500 M m3 or 650 M yd3) landslide located in the northwestern corner of Prince William Sound, Alaska. Rapid, catastrophic failure of the landslide could generate a tsunami that would be life-threatening for anyone in Barry Arm, Harriman Fiord, and parts of Port Wells. Significant risk might also exist in other, more distal locations of western Prince William Sound, including the town of Whittier, Alaska.

Existence of the landslide is evident in imagery dating back to the 1920s. Slow ground motion has been documented going back several decades. Increases in the rate of movement were documented during the rapid recession of the Barry Glacier from 2010 – 2016, with observed rates up to 26 ± 3 m/yr observed from May 2010 to September 2013. Deformation rates returned to a background level of approximately 1.3 ± 0.7 m/yr in March of 2017 as the retreat of the Barry Glacier ceased.

Additional Information

Visit the following agencies for information on the Barry Arm landslide and how you can prepare for a tsunami and other emergencies.

Alaska Division of Geological & Geophysical Surveys: The most up-to-date source of information on the Barry Arm landslide, including links to partner agencies, available at https://dggs.alaska.gov/hazards/barry-arm-landslide.html.

National Tsunami Warning Center: Information on tsunami preparedness, available at https://tsunami.gov/.

U.S. Geological Survey: Information on the Barry Arm landslide and tsunami monitoring, with links to related science and publications. https://www.usgs.gov/programs/landslide-hazards/science/barry-arm-alaska-landslide-and-tsunami-monitoring

Alaska Earthquake Center: Information on earthquake preparedness, available at https://earthquake.alaska.edu.

National Weather Service: Current tsunami alerts, available at https://www.weather.gov/safety/tsunami-alerts.

SUBSCRIBE TO BARRY ARM UPDATE MESSAGES by email: https://list.state.ak.us/mailman/listinfo/barryarm

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