Listening to glacier infrasound in Northwest Greenland

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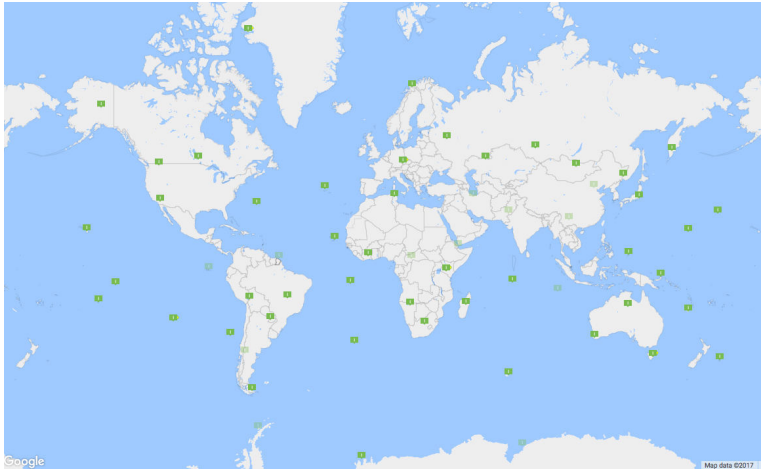
The infrasound component of the International Monitoring System



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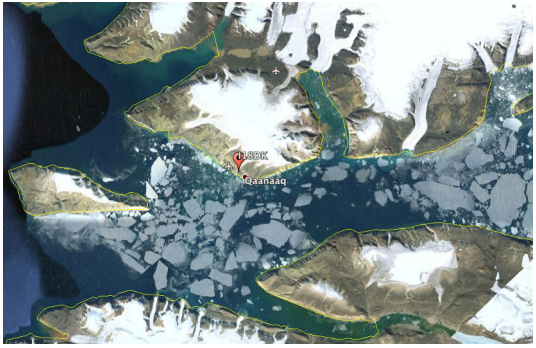
- Arrays of microbarometers to measure inaudible sound waves, i.e., infrasound, in the atmosphere from nuclear test explosions
- Total: 60
  Certified: 49
  Under construction: 3
  Planned: 8
  Status June 2017

I18DK, Quanaq, Northwest Greenland [77°N,69°W]



- I18DK is located in Northwest Greenland around 77°N, well above the polar circle (66.5°N)

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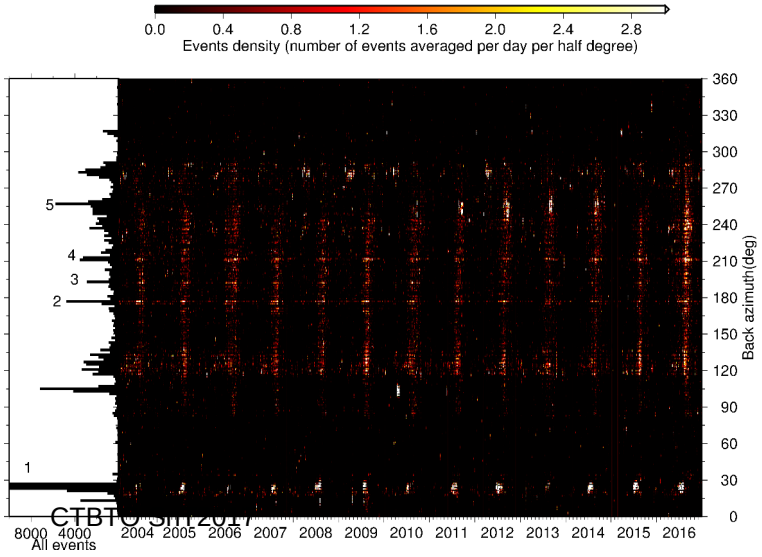
I18DK, Quanaq, Northwest Greenland [77°N,69°W]

- I18DK is configured as an array of eight microbarometers allowing for direction finding of signals of interest

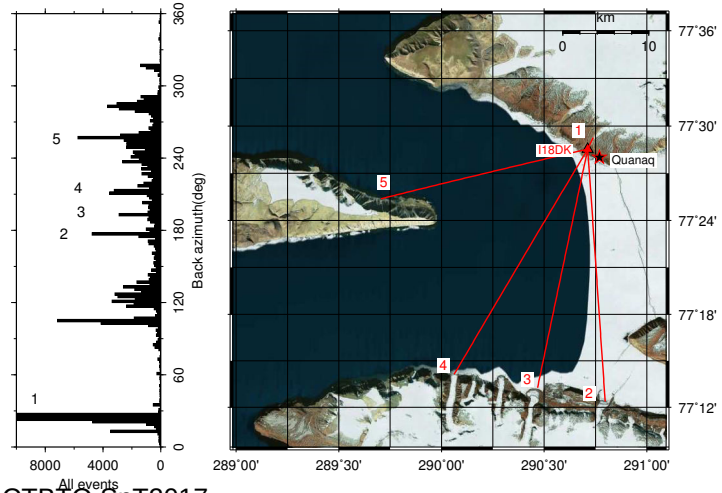
CTBTO Sept 2012

Infrasonic events over 13 years



- Bright colors: many events, dark colors: few/no events
- Vertical bands: strong activity in summer, non in winter
- Horizontal bands: events appear from specific directions over the years
- Yearly variations in infrasonic activity

Infrasound from land and sea-terminating glaciers around I18DK



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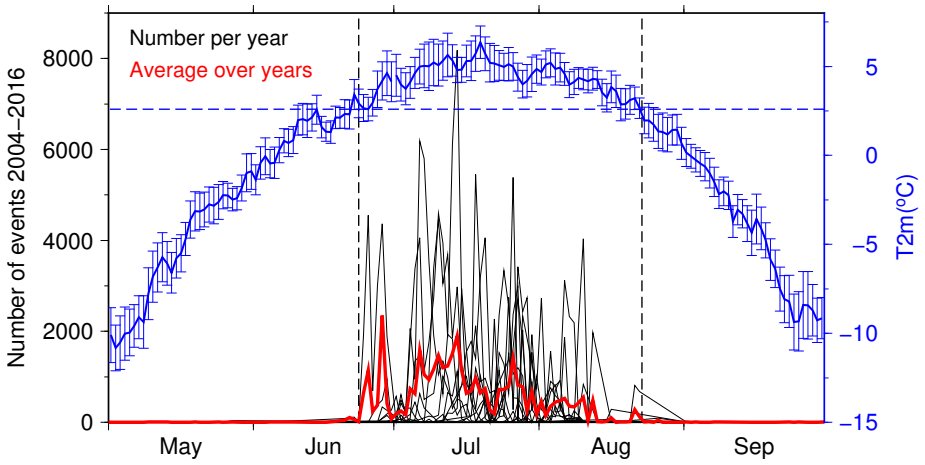
- 1, Land-terminating Quanaq glacier 1.5 km to North of I18DK
- 2-4, Three sea-terminating glaciers 30 km to the South
- 5, unidentified infrasonic source on/near Herbert Island

Infrasonic events at the land-terminating Quanaq glacier



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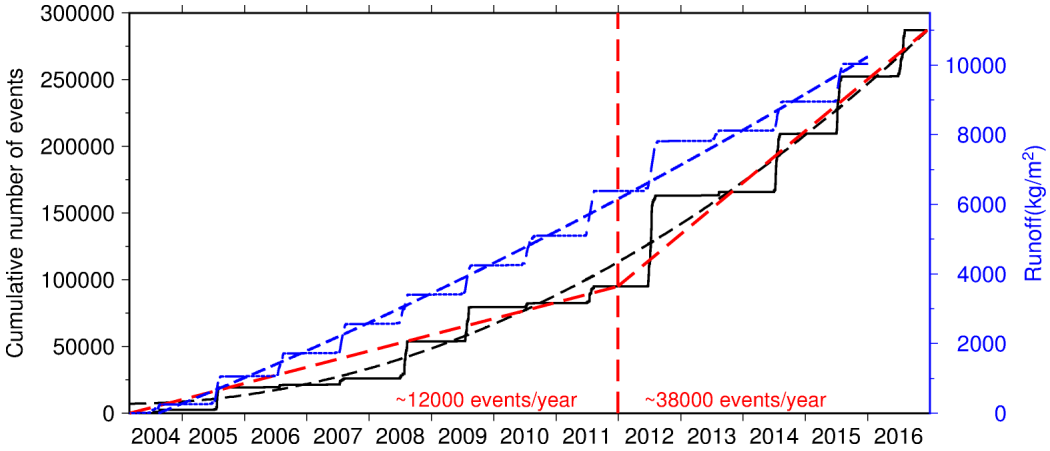
- Infrasonic event rate in phase with atmospheric temperature

Infrasonic events related to glacier run-off



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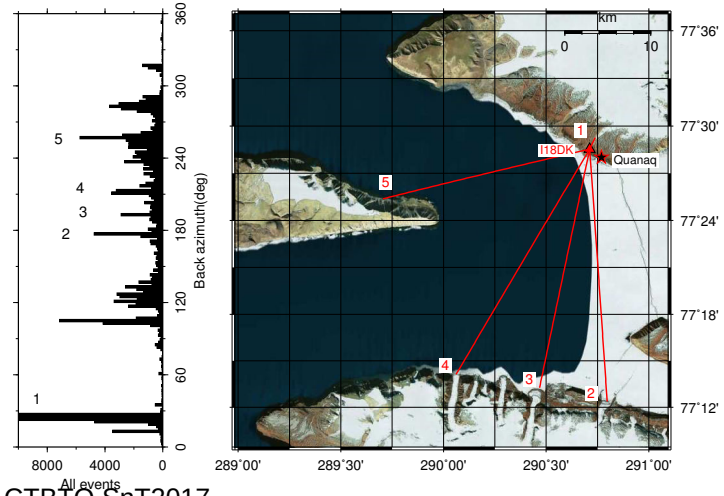
- Infrasonic event rate in phase (time) with run-off, amounts differ

Infrasound from the Quanaq glacier

http://wwwice.lowtem.hokudai.ac.jp

- Quanaq glacier is a land-terminating non-calving glacier
- Infrasonic activity driven by atmospheric temperature
- Infrasound is generated by run-off and the associated (subglacial) drainage system
- River associated infrasound beyond termination point of glacier

Infrasound from land and sea-terminating glaciers around I18DK



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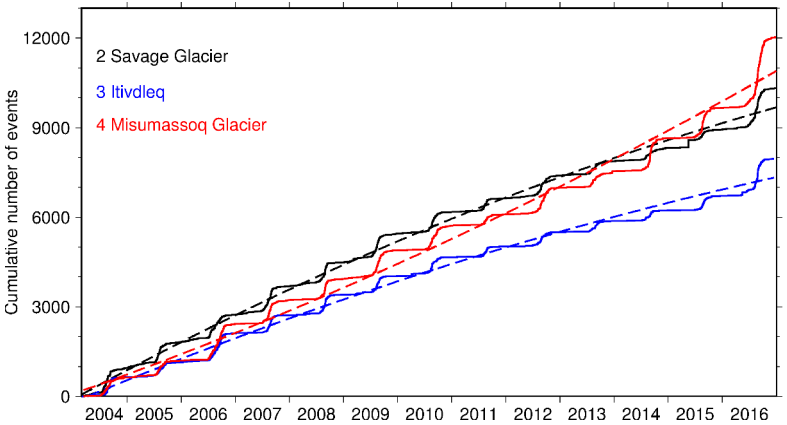
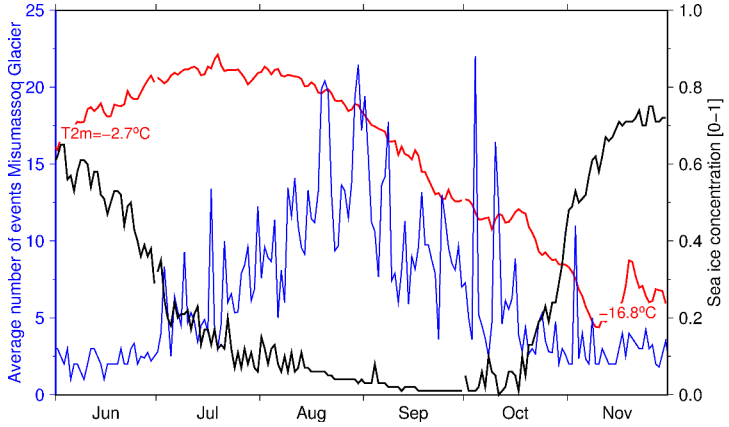
Infrasound from sea-terminating glaciers



- Savage glacier and Itivdleq slighty decreasing infrasonic event rates
- Misumassoq glacier slight increase over time
- 2016: most infrasonic activity for all three sea-terminating glaciers in 13 years

Infrasonic activity from calving sea-terminating glaciers



- Infrasonic events in phase with sea-ice concentration
- Sea-ice concentration is a proxy for sea-water temperature
- Warmer sea water in summer leads to calving of sea-terminating glaciers

Concluding remarks

- High resolution observations of glacier dynamics for inter-seasonal and yearly variations
- Calving and run-off mechanisms retrieved for resp. sea and land-terminating glaciers
- Infrasonic event rates controlled by atmospheric (run-off) and sea-water temperature (calving)