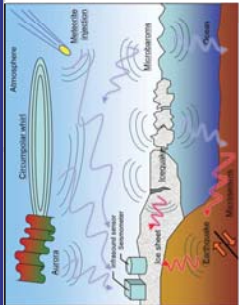
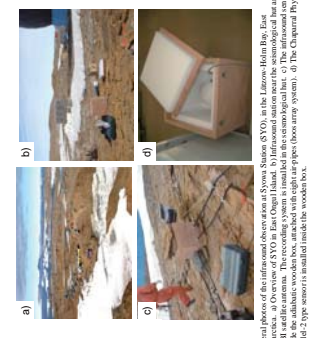
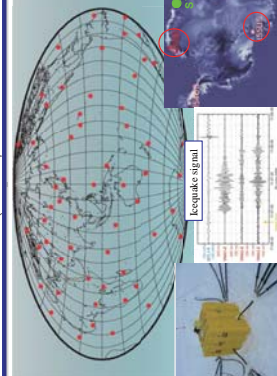


## Physical interaction between Solid Earth & Atmosphere – Ocean – Crossphere System

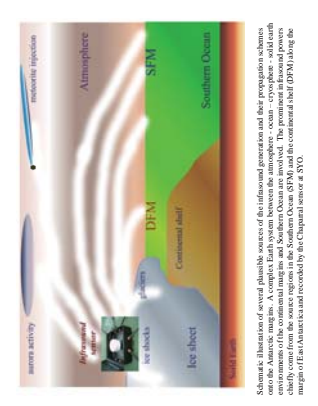


- Several kind of seismic & infrasonic waves propagate from various environmental variations and generating sources around Polar regions

## Comprehensive Nuclear Test-Ban Treaty Organization (CTBTO)

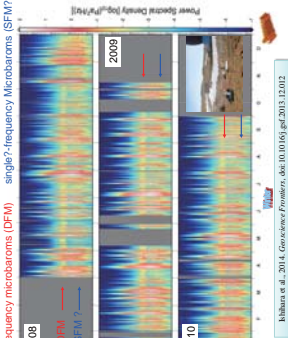


Several photos of the infrasonic observation at Syowa Station (SYO). In the Litzow-Holm Bay, East Antarctica, at the coast of the continent, the observation site is located. The observation site is located on the ice shelf. The observation site is located on the ice shelf. The observation site is located on the ice shelf. The observation site is located on the ice shelf.



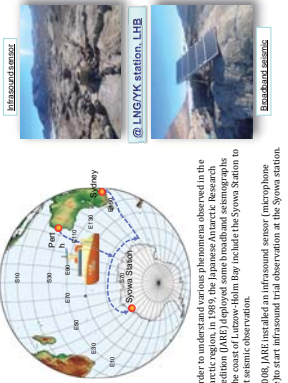
Schematic illustration of several plausible sources of the infrasonic waves and their propagation schemes. The wave originates from the Southern Ocean, propagates through the atmosphere, and is reflected by the ice sheet and continental shelf. The wave originates from the Southern Ocean, propagates through the atmosphere, and is reflected by the ice sheet and continental shelf. The wave originates from the Southern Ocean, propagates through the atmosphere, and is reflected by the ice sheet and continental shelf. The wave originates from the Southern Ocean, propagates through the atmosphere, and is reflected by the ice sheet and continental shelf.

## Infrasonic Spectrum @ SYO 2008-2010



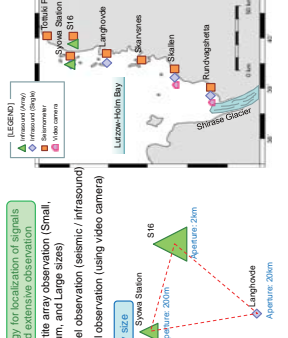
Kubota et al., 2011, *Geoscience Frontiers*, doi:10.1016/j.gsf.2010.12.012

## Present Status on Observation around LHB



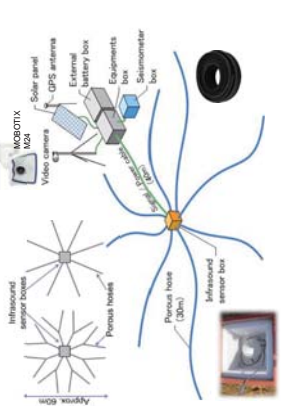
In order to understand various phenomena observed in the Antarctic region in 1995, the Japanese Antarctic Research Expedition (JARE) established an infrasonic sensor (microphone type) to start infrasonic observation at the Syowa station.

## Field observation by JARE-54 summer, 2013 Jan.

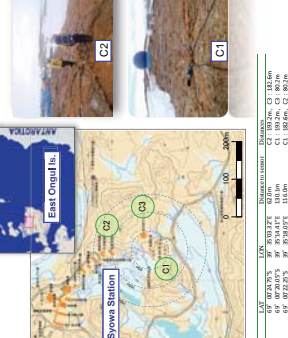


Strategy for localization of signals and extensive observation (Small, Medium, and Large sizes) Parallel observation (seismic / infrasonic) Visual observation (using video camera)

## Observation image of the seismic & infrasonic

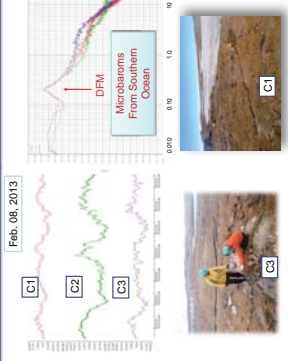


## Infrasonic array at Syowa Station (SYO)



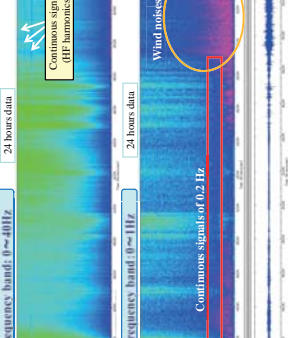
Feb. 08, 2013

## Infrasonic array data at Syowa Station (SYO)



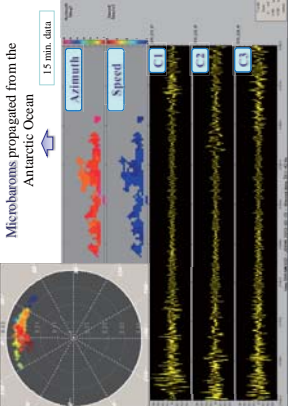
Feb. 08, 2013

## Infrasonic signals observed at SYO (2013/02/14)



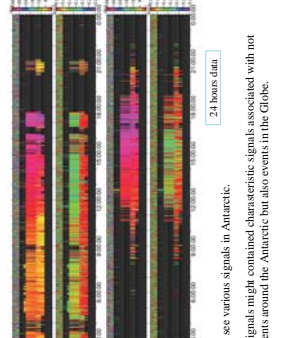
Microbaroms propagated from the Antarctic Ocean

## What's the source of wavelets in 0.2Hz ?



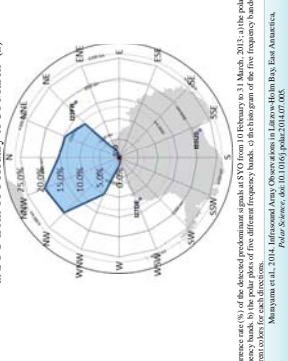
15 min. data

## Detected signals for 2 days (SYO)



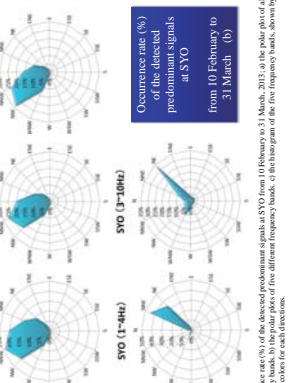
24 hours data

## Occurrence rate (%) of the detected predominant signals at SYO from 10 February to 31 March (a)



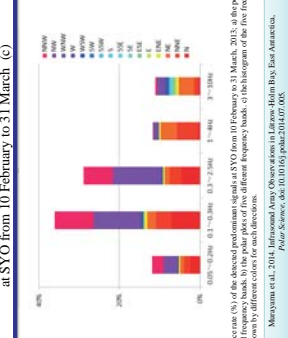
Occurrence rate (%) of the detected predominant signals at SYO from 10 February to 31 March, 2013: at the polar plot of all frequency bands by the polar plots of the different frequency bands. of the histogram of the five frequency bands, shown by different colors for each direction.

## Occurrence rate (%) of the detected predominant signals at SYO from 10 February to 31 March (b)



Occurrence rate (%) of the detected predominant signals at SYO from 10 February to 31 March, 2013: at the polar plot of all frequency bands by the polar plots of the different frequency bands. of the histogram of the five frequency bands, shown by different colors for each direction.

## Occurrence rate (%) of the detected predominant signals at SYO from 10 February to 31 March (c)



Occurrence rate (%) of the detected predominant signals at SYO from 10 February to 31 March, 2013: at the polar plot of all frequency bands by the polar plots of the different frequency bands. of the histogram of the five frequency bands, shown by different colors for each direction.

## Conclusion

- Characteristic features of the infrasonic waves are demonstrated by the array stations at Syowa Station (SYO), the Litzow-Holm Bay (LHB), East Antarctica, on the basis of newly retrieved data from January 2013. The established infrasonic arrays in LHB clearly detected temporal variations and frequency dependence on propagating directions of the microbaroms from Southern Ocean. Microbaroms measurements are a useful tool for characterizing ocean wave climate, complementing other oceanographic and geophysical data in the Antarctic.
- Moreover, several kind of remarkable infrasonic signals are introduced, including double-frequency microbaroms, single-frequency microbaroms as well as the block system generated from the abrupt of meteorite impact in the northern hemisphere. Detail and continuous measurements of infrasonic waves in Antarctica is a new proxy for monitoring regional environmental change together with temporal climate variations in polar region.

## A source identification in the coastal and marine environment inferred from infrasonic array observations in the Litzow-Holm Bay, East Antarctica

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