

東南極リュツォ・ホルム湾における表層環境に関連した 雪氷変動と海洋波浪に起因する特徴的な地震動

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Characteristic cryoseismic and oceanic waves associated with surface environments at the Lützow-Holm Bay, East Antarctica

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In a international geoscience prospect at the IPY, the ‘Polar Earth Observing Network (POLENET)’ was the largest contributions in establishing a seismic and GPS network in Antarctica. Several kinds of environmental signals associated with the atmosphere - ocean – cryosphere - solid earth systems were detected in the continental margins and surrounding oceans. Ice-related seismic motions for small magnitude events are generally named ‘ice-quakes’ (‘ice-shocks’) and can be generated by glacially related dynamics (Kanao et al., 2012). Such kinds of cryoseismic sources are consisted from the movements of ice sheets, sea-ice, oceanic tide-cracks, oceanic gravity waves, icebergs and the calving fronts of ice caps. Nettles and Ekstrom (2010), moreover, determined the hypocenter and magnitude of several large ice-quakes (glacial earthquakes) around Antarctica by using the long period surface wave data. These hypocenters locate mainly at the outlet of the large glaciers, otherwise the edge of ice shelves. Cryoseismic and oceanic waves (microseisms) are likely to be influenced by the variations in environmental conditions, including lower atmosphere, and the continuous study of their time-space variation provides indirect evidence of climate change. In this presentation, several characteristic features of cryoseismic waves observed the stations around the Lützow-Holm Bay (LHB) region are introduced, involving the surface environmental variations in vicinity of the area from continental coastal to the southern ocean. Hypocenters of local events, waveforms involving discharge of sea-ice, tide relating signals, as well as the tremor signals with characteristic frequency contents are demonstrated. As the glacial earthquakes are the most prominent evidence found recently in the polar region, these new innovative studies of polar seismology has been achieved on the basis of observational experiments and long-term monitoring under the extreme conditions in polar environment.