

# Diurnal and seasonal variations of pH in Oshoro Bay, Hokkaido, Japan

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Coastal marine organisms have already been experiencing low pH environment (< 7.9) that is not predicted to occur until 2100 in open ocean systems. To properly assess the impacts of ocean acidification on them inhabiting wide ranges of diurnal variation of pH, we need to conduct long-term, high-frequency monitoring measurements of environmental parameters. To investigate diurnal and seasonal variations of pH in a subarctic region, we have conducted monitoring measurements of seawater pH, temperature, and salinity in Oshoro Bay, Hokkaido, Japan since 2013 (Fig. 1). Large seasonal variation of pH was found based on seawater sample analysis (Table 1). Annually maximum pH value (8.35) was observed in April, which is consistent with timing of seaweed growth. On the other hand, annually minimum pH value (8.05) appeared in July, consistent with timing of strong grazing by sea urchins. Maximum and minimum of hourly pH value obtained by a pH sensor during the monitoring period were 8.40 and 7.33, respectively, high in the daytime and low in the night time, in all monitoring periods. Therefore, the fluctuation was relatively larger in hourly pH value (1.07) than in seasonal pH value (0.30). These results indicate that marine organisms in the bay have already experienced extremely low pH conditions that may appear more commonly in the high CO<sub>2</sub> world.

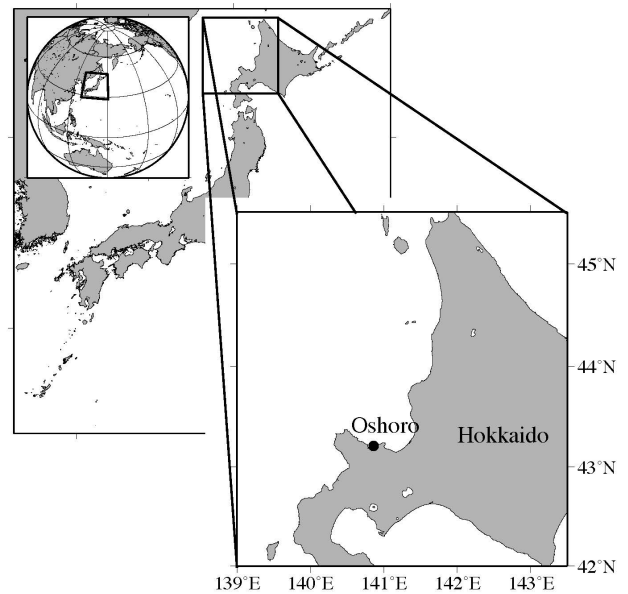


Figure 1. Study site

Table 1. Comparison of ranges between diurnal and seasonal variation of pH

	<b>Mean</b>	<b>Min. pH value</b>	<b>Max. pH value</b>	<b>Maximum range</b>
Diurnal	8.02	7.33	8.40	0.83
Seasonal	8.20	8.05	8.35	0.30
Difference	0.18	0.72	0.05	0.53