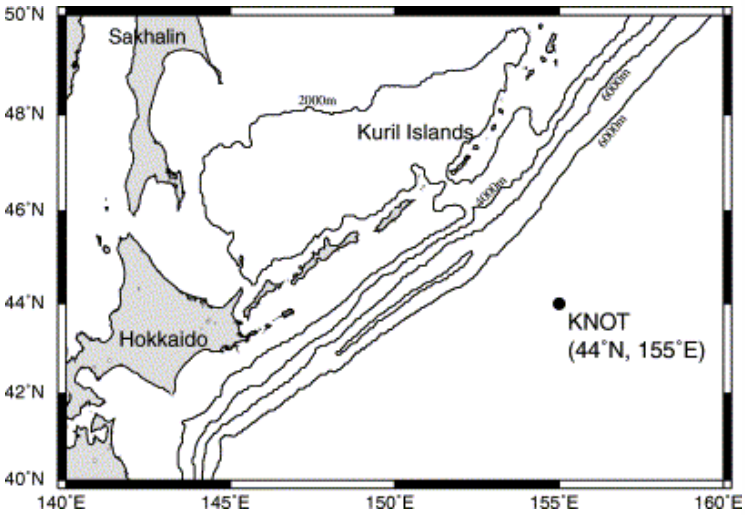
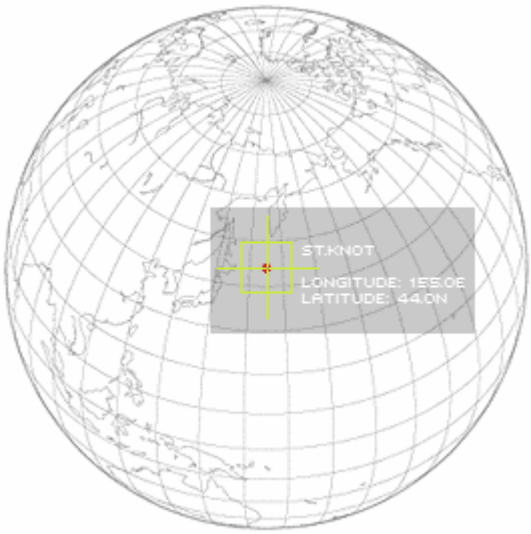




Kyodo North Pacific Ocean Time-series (KNOT)

(Kyodo is a Japanese word meaning "collaborative")

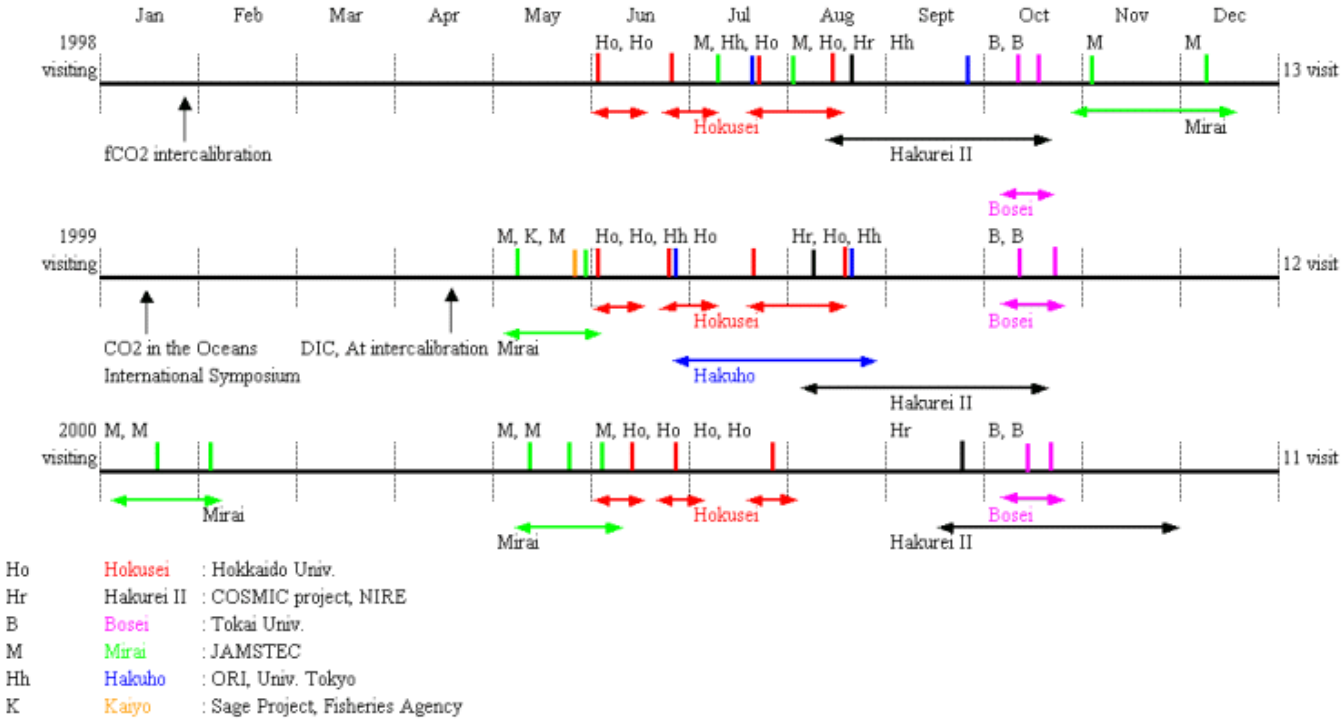
The KNOT station was located at 44°N, 155°E, approximately 400 km northeast of Hokkaido Island, Japan in 4900 m of water, and is representative of the southwestern subarctic gyre. KNOT field sampling was done from June 1998 to October 2000, after a previous (1988–1991) sediment trap experiment at the same location. Approximately monthly field observations were conducted to investigate the inorganic carbon system dynamics in response to variations in hydrography and biological processes, to investigate the response of the biological pump to climate forcing and to provide a data set from the western subarctic Pacific gyre for comparison to OSP in the eastern subarctic Pacific gyre. Measurements made during KNOT include carbonate system parameters, including dissolved inorganic carbon (DIC), alkalinity and the fugacity of carbon dioxide (fCO_2) in surface waters, as well as temperature, salinity, nutrients and oxygen. Surface layer measurements of biological activity, including chlorophyll a concentrations and primary productivity, were also made on nearly every cruise, along with collections of phyto- and zoo-plankton. For more than half of the cruises, floating sediment traps were deployed, and measurements were made of particulate and dissolved organic carbon (POC and DOC), iron, trace metals, halocarbons, methane, nitrous oxide, $^{13}CO_2$, $N_2/O_2/Ar$, and ^{234}Th.

Although the study region exhibits high seasonal variability in sea surface temperature and biological activity, there have been few observations to document the seasonal variations in carbon concentrations and related parameters. The location was chosen because it is located in the western subarctic gyre, and the travel time from Japan to the station is less than three days. In addition, measurements made by Hokkaido University during summer between 1992 and 1997 can be used for comparison.

Large seasonal variations in surface chemical and biological parameters occur at the KNOT station. Observed seasonal variations in surface seawater nutrients and DIC at KNOT were larger than those observed at the Hawaii Ocean Time-series (HOT) station, the Bermuda Atlantic Time-series Study (BATS) station, or Ocean Station Papa (OSP) in the subarctic eastern North Pacific. Although the primary productivity had a distinct seasonal variation, with a 10-fold change during the winter and spring, the light utilization index (the ratio of chlorophyll a specific productivity to PAR) was constant in all seasons. Although the surface nutrient and DIC variability were higher at station KNOT than those at OSP, primary productivity and estimated new production were not higher. This may be a result of the lower regenerated production and shallower summer mixed layer in the western subarctic North Pacific.

The following biogeochemical features were revealed:
1) Subtropical water (Kuroshio water) sometimes enters station KNOT.
2) Oceanography in 1998 was different from that in 1999, which might be associated with El Niño.
3) Seasonal variability in concentrations of nutrients and carbonate chemistry are significantly larger than that at other time-series station such as stations P, HOT and BATS.
4) Spring bloom was not always observed. Primary productivity is not significantly higher than that at station P.
5) Primary productivity and material flux is higher than those in the center of NPSG. It might be attributed to the higher eolian input and /or coastal water with high macro- and micro- nutrients.
6) Based on the sediment trap experiment, the ratio of carbon flux in deep sea to surface primary productivity (E-ratio$_{(deep)}$) is 5 ~ 2% and higher than other oceans and global average (~ 1%).

Station KNOT Ocean Time Series/Research Vessel Visiting Schedule (Sept. 2000 ver.)



Ho	Hokusei	: Hokkaido Univ.
Hr	Hakurei II	: COSMIC project, NIRE
B	Bosei	: Tokai Univ.
M	Mirai	: JAMSTEC
Hh	Hakuho	: ORI, Univ. Tokyo
K	Kaiyo	: Sage Project, Fisheries Agency

The establishment of KNOT was a joint JGOFS-Japan and JGOFS-NPTT (North Pacific Task Team) effort.

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Further information on KNOT are available at:
www.jodc.go.jp/JGOFS_DMO/testpage/Research/JP09/J09outline.htm.