

CURRICULUM VITAE
SUNYOUNG PARK

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EDUCATION

1991.3	1995.2	B.S.	Seoul National University	Oceanography (Chemistry Minor)
1995.3	1997.2	M.S.	Seoul National University	Chemical Oceanography
1999.8	2005.5	Ph.D.	University of California, Berkeley	Earth and Planetary Science

EMPLOYMENT

2005.7	2008.6	Postdoctoral Research Fellow	Harvard University	School of Engineering and Applied Sciences
2008.7	2011.7	Research Associate	Harvard University	Earth and Planetary Sciences
2011.5	2013.2	Research Professor	Seoul National University	School of Earth and Environmental Sciences
2013.3	present	Assistant Professor	Kyungpook National University	Oceanography

RESEARCH INTERESTS

Air-Sea Gas Exchange and Chemical Oceanography, Biogeochemical Cycles of Carbon and Nitrogen, Isotope Biogeochemistry, Natural/Anthropogenic Greenhouse Gases, Laser-based Spectroscopy, Isotope Ratio Mass Spectrometers, Atmospheric Chemistry and Chemical Tracer Transport

CURRENT RESEARCH TOPICS

2013 – Present, Kyungpook National University

Keywords: Biogeochemical Cycles of Natural Greenhouse Gases, Continuous *In situ* Measurements of Stable Isotopic Compositions of Greenhouse Gases, Air-Sea Gas Exchange, Natural and Anthropogenic Greenhouse Gas Monitoring,

- High frequency, high precision measurements for carbon isotopic compositions from dissolved CO₂ and CH₄ in the surface ocean to understand flux pathways and production/consumption processes occurring in the air-sea boundary (*funded for the instrumental set-up by CATER 2012-3010 and a proposal for lab/field studies is under review*).
- Investigation of the spatial characteristics in phytoplankton productivity seasonality using SeaWiFS chlorophyll-*a* data in the East Sea (*published in Journal of Marine System in Aug. 2014*).
- Study of a new approach to estimate organic carbon export ratio from the surface ocean using SeaWiFS chlorophyll-*a* data of the East Sea: application of Sverdrup's critical depth model (*a manuscript is to be submitted to Biogeoscience in Oct. 2014*).
- High frequency, *in situ* measurements of COS (carbonyl sulfide) at Gosan in Jeju Island: a potential carbon cycle tracer (*funded by KNRF*).
- Development of a statistical method to define regional baseline concentrations from multi-decadal time series data of CO₂ in Korea: based on the cyclostationary empirical orthogonal function (CSEOF) analysis (in collaboration with K.W. Kim of SNU) (*funded by CATER 2012-3010*).
- Assessments of the atmospheric distributions and temporal behavior of the natural/anthropogenic greenhouse gases CO₂, N₂O, CH₄, CO, chlorofluorocarbons, chlorocarbons, bromocarbons and hydrohalocarbons from continuous measurements of the atmospheric concentrations at a remote site in East Asia (*funded by CATER 2012-3010*).
- Determination of the magnitudes and spatial distributions of the surface sources of anthropogenic halocarbons, and the temporal variability of the source strengths, using an air mass trajectory analysis and high frequency trace gas data (*published in Environmental Science and Technology in Jan. 2014*).

FIELD EXPERIENCES

Ocean cruise missions

- CREAMS (Circulation Research of the East Asian Marginal Seas): Korea-Japan-Russia international cooperative program, *March–April 1997; February, July–August 1996; July–August 1995; July 1994*
- Ocean Flux and Biogeochemical Cycle in the Yellow Sea: Korea-China joint program, *April 1996*

Aircraft observation missions

- Stratosphere-Troposphere Analyses of Regional Transport (START08): NSF/NCAR GV aircraft experiments in the extratropical upper troposphere and lower stratosphere

(ExUTLS) to understand the multi-scale dynamical processes that control the chemical composition, *April–June 2008*

- NASA Tropical Composition, Cloud and Climate Coupling (TC4) mission: NASA DC-8, ER-2 and the WB-57 aircraft science flights in the tropical Eastern Pacific to validate satellite data and to provide critical observations not available from the satellites of the tropical upper troposphere and lower stratosphere, *July–August 2007*
- NASA Costa Rica-Aura Validation Experiment (CR-AVE) mission: WB-57F aircraft observations in the tropical upper troposphere and lower stratosphere (UTLS) for comparison to satellite observations, *January–February 2006*

PROFESSIONAL AFFILIATIONS

Member, American Geophysical Union, Atmospheric Science and Biogeosciences Sections

Member, American Chemical Society

Member, Korean Meteorological Society

Member, Korean Society for Atmospheric Environment

Member, Korean Society of Oceanography

OTHER EXPERIENCES

Stable Isotope Ecology Course, Biology Department at the University of Utah, June 2004

AWARDS

BASC research awards for 2003 and 2004, UC Berkeley Atmospheric Sciences Center

TEACHING

OECA235-001 (Spring 2014)

Biogeochemical Cycles I

OECA218-001 (Spring 2014)

Chemical Oceanography I

CLTR216-017 (Fall 2013)

Chemistry II

OCEA214-001 (Spring 2013)

Seawater Analysis

OCEA212-001 (Spring 2013)

Chemical Oceanography I

OECA232-001 (Fall 2013)

Chemical Oceanography II

SNU (Fall 2012)

Advanced Aquatic Chemistry

UC Berkeley (*Teaching Assistantships*)

EPS 12 (Spring 2000)

The Planets

EPS 120 (Fall 2000, 2001)

Environmental Data Analysis

PUBLICATIONS

To be submitted (Oct. 2014)

<i>Authors</i>	<i>Title</i>	<i>Journal</i>	<i>Rank</i>	<i>DOI</i>	<i>Note</i>
C.O. Jo, S. Park , C. K. Kang, J. H. Kwak, M.-K. Park, S. Li, K.R. Kim	A new approach to estimate export ratio in the East/Japan Sea: Application of Sverdrup's critical depth model	<i>Biogeosciences</i> (IF 4.193)	5% (8/170) Geosci.	To be submitted Oct. 2014	Corresponding author

Under revision/review (Aug. 2014)

<i>Authors</i>	<i>Title</i>	<i>Journal</i>	<i>Rank</i>	<i>DOI</i>	<i>Note</i>
A. Fortems-Cheiney, M. Saunois, I. Pison, F. Chevallier, P. Bousquet, C. Cressot, S.A. Montzka, P.J. Fraser, M.K. Vollmer, P.G. Simmonds, D. Young, S. O'Doherty, F. Artuso, B. Barletta, D.R. Blake, S. Li, C. Lunder, B.R. Miller, S. Park , R. Prinn, T. Saito, L.P. Steele, and Y. Yokouchi	Increase in HFC-134a emissions in response to the success of the Montreal Protocol	<i>Journal of Geophysical Research</i> (IF 3.021)	12% (21/170) Geosci.)	Under review	Co-author

Published (Aug. 2014)

<i>Authors</i>	<i>Title</i>	<i>Journal</i>	<i>Rank</i>	<i>DOI</i>	<i>Note</i>
C.O. Jo, S. Park , Y.H. Kim, K.-A. Park, J.J. Park, M.-K. Park, S. Li, J.-Y. Kim, J.-E. Park, J.-Y. Kim, K.R. Kim	Spatial distribution of seasonality of SeaWiFS chlorophyll-a concentrations in the East/Japan Sea	<i>Journal of Marine Systems</i> (IF 2.655)	18% (42/170) Geosci.	139, 288–298 (doi:10.1016/j.jmarsys.2014.07.004), Jul.15, 2014	Corresponding author
S. Li, S. Park , M.-K. Park, C. O. Jo, J.-Y. Kim, J.-Y. Kim, and K.-R. Kim	Statistical Back Trajectory Analysis for Estimation of CO ₂ Emission Source Regions	<i>Atmosphere, Korean Meteorological Society</i>	-	24(2) 245–251, (doi:10.14191/Atmos.2014.24.2.245) Jan. 2, 2014	Corresponding author

<p>S. O'Doherty, M. Rigby, J. Mühle, D. J. Ivy, B. R. Miller, D. Young, P. G. Simmonds, S. Reimann, M. K. Vollmer, P. B. Krummel, P. J. Fraser, L. P. Steele, B. Dunse, P. K. Salameh, C. M. Harth, T. Arnold, R. F. Weiss, J. Kim, S. Park, S. Li, C. Lunder, O. Hermansen, N. Schmidbauer, L. X. Zhou, B. Yao, R. H. J. Wang, A. J. Manning, and R. G. Prinn</p>	<p>Global emissions of HFC-143a (CH₃CF₃) and HFC-32 (CH₂F₂) from in situ and air archive atmospheric observations</p>	<p><i>Atmospheric Chemistry and Physics</i> (IF 5.510)</p>	<p>3% (2/71) Meteo &Atm. Sci.</p>	<p>14, 6471-6500, 2014 (doi:10.5194/acpd-14-6471-2014) Jun. 17, 2014</p>	<p>Co-author</p>
<p>J. Kim, P. Fraser, J. Mühle, S. Li, A. Manning, A. Trebler, A. Stohl, A. Ganesan, P. Krummel, P. Steele, T. Saito, S. Park, S.-K. Kim, M.-K. Park, T. Arnold, C. Harth, P. Salameh, Y. Yokouchi, R. Weiss, R. Prinn and K.-R. Kim</p>	<p>Quantifying aluminum and semiconductor industry perfluorocarbon emissions from atmospheric measurements</p>	<p><i>Geophysical Research Letters</i> (IF 3.792)</p>	<p>5% (9/170) Geosci.</p>	<p>41, 4787-4794, (doi:10.1029/2014GL059783), Jun. 10, 2014</p>	<p>Co-author</p>
<p>G.W. Santoni, B.C. Daube, E.A. Kort, R. Jimenez, S. Park, J.V. Pittman, E. Gottlieb, B. Xiang, M.S. Zahniser, D.D. Nelson, J.B. McManus, J. Peischl, T.B. Ryerson, J. Holloway, A. Andrews, C. Sweeney, B. Hall, E.J. Hintsa, F.L. Moore, J.W. Elkins, B. Stephens, and S. C. Wofsy</p>	<p>Evaluation of the Airborne Quantum Cascade Laser Spectrometer (QCLS) Measurements of the Carbon and Greenhouse Gas suite—CO₂, CH₄, N₂O, and CO—during the CalNex and HIPPO campaigns</p>	<p><i>Atmospheric Measurement Techniques</i> (IF 3.205)</p>	<p>18% (13/71) Meteo &Atm. Sci.</p>	<p>7, 1509-1526, (doi:10.5194/amt-7-1509-2014), Jun. 2, 2014</p>	<p>Co-author</p>
<p>X. Fang, R.L. Thompson, T. Saito, Y. Yokouchi, J. Kim, S. Li, K.R. Kim, S. Park, F. Graziosi, and A. Stohl</p>	<p>Sulfur hexafluoride (SF₆) emissions in East Asia determined by inverse modeling</p>	<p><i>Atmospheric Chemistry and Physics</i> (IF 5.510)</p>	<p>3% (2/71) Meteo &Atm. Sci.</p>	<p>14, 4779-4791 (doi:10.5194/acpd-14-4779-2014), May. 14, 2014</p>	<p>Co-author</p>

A. L. Ganesan, M. Rigby, A. Zammit-Mangion, A. J. Manning, R. G. Prinn, P. J. Fraser, C. M. Harth, K.-R. Kim, P. B. Krummel, S. Li, J. Mühle, S. J. O'oherty, S. Park , P. K. Salameh, L. P. Steele, and R. F. Weiss	Characterization of uncertainties in atmospheric trace gas inversions using hierarchical Bayesian methods	<i>Atmospheric Chemistry and Physics</i> (IF 5.510)	3% (2/71) Meteo &Atm. Sci.	14, 3855–3864 (doi:10.5194/acp-14-3855-2014 Apr. 17, 2014	Co-author
S. Li, J. Kim, S. Park , S.-K. Kim, M.-K. Park, J. Mühle, G. Lee, M. Lee, C.-O. Jo	Source identification and apportionment of halogenated compounds observed at a remote site in East Asia	<i>Environmental Science and Technology</i> (IF 5.228)	4% (8/205) Environ. Sci.	10.1021/es40277w Dec. 31, 2013 (online)	Corresponding author
S.S. Kulawik, J.R. Worden, S.C. Wofsy, S.C. Biraud, R. Nassar, D.B. A. Jones, E.T. Olsen, R. Jimenez, S. Park , G.W. Santoni, B.C. Daube, J.V. Pittman, B.B. Stephens, E.A. Kort, G. B. Osterman, and TES team	Comparison of improved Aura Tropospheric Emission Spectrometer CO ₂ with HIPPO and SGP aircraft profile measurements	<i>Atmospheric Chemistry and Physics</i> (IF 5.510)	3% (2/71) Meteo &Atm. Sci.	13(6), 3205–3225, (doi:10.5194/acp-13-3205-2013), Mar. 18, 2013	Co-author
Y. Kim, K.-Y. Kim, S. Park	Seasonal scale variability of the East Asian winter monsoon and the development of a two-dimensional monsoon index	<i>Climate Dynamics</i> (IF 4.231)	9% (5/71) Meteo &Atm. Sci.	doi 10.1007/s00382-013-1724-x Mar. 19, 2013	Co-author
E. Saikawa, M. Rigby, R. G. Prinn, S. A. Montzka, B. R. Miller, L. J. M. Kuijpers, P. J. B. Fraser, M. K. Vollmer, T. Saito, Y. Yokouchi, C. M. Harth, J. Mühle, R. F. Weiss, P. K. Salameh, J. Kim, S. Li, S. Park , K.-R. Kim, et al.	Global and regional emissions estimates for HCFC-22	<i>Atmospheric Chemistry and Physics</i> (IF 5.510)	3% (2/71) Meteo &Atm. Sci.	12, 10033–10050, (doi:10.5194/acp-12-10033-2012), Nov. 1, 2012	Co-author

J. Kim, S. Li, J. Mühle, A. Stohl, S.-K. Kim, S. Park , M.-K. Park, R. Weiss, K.-R. Kim	Overview of the Findings from Measurements of Halogenated Compounds at Gosan (Jeju Island, Korea) for Quantifying Emissions in East Asia	<i>Journal of Integrative Environmental Sciences</i> (IF 0.724)	N/A	1(1), 1-10, July 6, 2012	Co-author
S. Park , P. Croteau, K. A. Boering, D.M. Etheridge, D. Ferretti, P. J. Fraser, K.-R. Kim, P.B. Krummel, R.L. Langenfelds, T.D. van Ommen, L.P. Steele, and C.M. Trudinger	Trends and seasonal cycles in the isotopic composition of nitrous oxide since 1940	<i>Nature Geoscience</i> (IF 12.367)	0.6% (1/170) Geosci.	5(4), 261-265, (doi: 10.1038/NGEO1421), April 1, 2012	First-author
S. C. Wofsy, B. C. Daube, R. Jimenez, E. Kort, J. V. Pittman, S. Park , R. Commane, Bin Xiang, G. Santoni, D. Jacob, et al.	HIAPER Pole-to-Pole Observations (HIPPO): Fine grained, global scale measurements of climatically important atmospheric gases and aerosols	<i>Philosophical Transactions of the Royal Society A.</i> (IF 2.874)	76% (42/55) Multi-discipl. Sci.	369 (1943), 2073-2086, (doi: 10.1098/rsta.2010.0313), May 28, 2011	Co-author
S. Park , T. Pérez, K.A. Boering, S.E. Trumbore, J. Gil, S. Marquina and S.C. Tyler	Can N ₂ O stable isotopes and isotopomers be useful tools to characterize sources and microbial pathways of N ₂ O production and consumption in tropical soils?	<i>Global Biogeochemical Cycles</i> (IF 4.682)	3% (5/170) Geosci.	25, 16 PP GB1001, (doi:10.1029/2009GB003615), Jan. 5, 2011	First-author

<p>D. Wunch, G.C. Toon, P.O. Wennberg, S.C. Wofsy, B.B. Stephens, M.L. Fischer, O. Uchino, J.B. Abshire, P. Bernath, S.C. Biraud, J.F.L Blavier, C. Boone, K.P. Bowman, E.V. Browell, T. Campos, B.J. Connor, B.C. Daube, N.M. Deutscher, M. Diao, J.W. Elkins, G. Gerbig, E. Gottlieb, D.W.T. Griffith, D.F. Hurst, R. Jiménez, G. Keppel-Aleks, E. Kort, R. Macatangay, T. Machida, H. Matsueda, F. Moore, I. Morino, S. Park, et al.</p>	<p>Calibration of the total carbon column observing network using aircraft profile data</p>	<p><i>Atmospheric Measurement Techniques</i> (IF 3.205)</p>	<p>18% (13/71) Meteo &Atm. Sci.</p>	<p>3(5), 1351-1362, (doi:10.5194/amt-3-1351-2010), Oct. 6, 2010</p>	<p>Co-author</p>
<p>S. Park, E.L. Atlas, R. Jiménez, B.C. Daube, E.W. Gottlieb, J. Nan, D.B.A. Jones, L. Pfister, T.J. Conway, T.P. Bui, and S.C. Wofsy</p>	<p>Vertical transport rates for the Tropical Tropopause Layer from observations of CO₂: implication for distributions of long- and short-lived chemical species</p>	<p><i>Atmospheric Chemistry and Physics</i> (IF 5.510)</p>	<p>3% (2/71) Meteo &Atm. Sci.</p>	<p>10(14), 6669-6684, (doi:10.5194/acp-10-6669-2010), July 21, 2010</p>	<p>First-author</p>
<p>N. M. Deutscher, D. W. T. Griffith, G. W. Bryant, P. O. Wennberg, G. C. Toon, R. A. Washenfelder, G. Keppel-Aleks, D. Wunch, Y. Yavin, N. T. Allen, J.-F. Blavier, R. Jiménez, B. C. Daube, A. V. Bright, D. M. Matross, S. C. Wofsy, and S. Park</p>	<p>Total column CO₂ measurements at Darwin, Australia site description and calibration against in situ aircraft profiles</p>	<p><i>Atmospheric Measurement Techniques</i> (IF 3.205)</p>	<p>18% (13/71) Meteo &Atm. Sci.</p>	<p>3(4), 947-958, (doi:10.5194/amt-3-947-2010), July 19, 2010</p>	<p>Co-author</p>

S. Park , R. Jiménez, B. C. Daube, L. Pfister, T. J. Conway, E. W. Gottlieb, V. Y. Chow, D. J. Curran, D. M. Matross, A. Bright, E. L. Atlas, T. P. Bui, R.-S. Gao, C. H. Twohy, and S. C. Wofsy	The CO ₂ tracer clock for the Tropical Tropopause Layer	<i>Atmospheric Chemistry and Physics</i> (IF 5.510)	3% (2/71) Meteo &Atm. Sci.	7(14): 3989-4000, July 27, 2007	First-author
T. P. Marcy, P. J. Popp, R. S. Gao, D. W. Fahey, E. A. Ray, E. C. Richard, T. L. Thompson, E. L. Atlas, M. Loewenstein, S. C. Wofsy, S. Park , E. M. Weinstock, W.H. Swartz, and M.J. Mahoney	Measurements of trace gases in the tropical tropopause layer	<i>Atmospheric Environment</i> (IF 3.465)	12% (25/205) Environ. Sci.	41(34): 7253-7261, (doi: 10.1016/j.atmosenv.2007.05.032), Nov. 2007	Co-author
R. Jiménez, S. Park , B.C. Daube, J.B. McManus, D.D. Nelson, M.S. Zahniser, and S.C. Wofsy	A new quantum-cascade laser based spectrometer for high-precision airborne CO ₂ measurements	<i>13th WMO/IAE A Meeting</i>	N/A	<i>WMO/GAW</i> , 168: 100-105, 2006	Co-author
S. Park , K.A. Boering, and E.L. Atlas	Measurements of nitrous oxide isotopologues in the stratosphere: The influence of transport on the apparent enrichment factors and implications for the global N ₂ O isotope budget	<i>Journal of Geophysical Research</i> (IF 3.021)	12% (21/170) Geosci.	109 (D1), D01305, 21pp (doi:10.1029/2003JD003731), Jan. 15, 2004	First-author
J. Kaiser, S. Park , K.A. Boering, C.A.M. Brenninkmeijer, A. Hilker, T. Röckmann	Mass-spectrometric method for the absolute calibration of the intermolecular nitrogen isotope distribution in nitrous oxide	<i>Analytical and Bio-analytical Chemistry</i> (IF 3.778)	5% (4/72) Bio-chem. Method	378 (2): 256-269, (doi: 10.1007/s00216-003-2233-2), Jan. 2004	Co-author

D.-J. Kang, S. Park , Y.-G. Kim, K. Kim, and K.-R. Kim	A moving-boundary box model (MBBM) for oceans in change: An application to the East/Japan Sea	<i>Geophysical Research Letters</i> (IF 3.792)	5% (9/170) Geosci.	30(6), 1299, 4pp, Mar. 22, 2003	Co-author
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RESEARCH EXPERIENCE

2011–2013, Seoul National University

Keywords: Continuous *In situ* Measurements of Stable Isotopic Compositions of Greenhouse Gases, Natural/Anthropogenic Greenhouse Gas Monitoring

- High precision measurements of isotopic composition and atmospheric concentration of CH₄ at Gosan, Jeju Island for quantitative understanding CH₄ sources and sinks in the present-day climate for the East Asia region
- Assessments of the atmospheric distributions and temporal behavior of the natural/anthropogenic greenhouse gases CO₂, N₂O, CH₄, CO, chlorofluorocarbons, chlorocarbons, bromocarbons and hydrohalocarbons from continuous measurements of their concentrations in East Asia
- Determination of the magnitudes and spatial distributions of the surface sources of anthropogenic halocarbons, and the temporal variability of the source strengths, using an air mass trajectory analysis and high frequency trace gas data

2005–2011, Harvard University

Keywords: Quantum Cascade Laser Spectrometry for Continuous, *In situ* Measurements of GHGs, Aircraft Observations of Greenhouse Gases, Atmospheric Chemistry and Stratosphere-Troposphere Exchange

- Development/optimization of new Quantum Cascade Laser (QCL) spectrometers for accurate *in situ* measurements of atmospheric CO, CH₄, N₂O, and CO₂ concentrations. (in collaboration with M. Zahniser and D.D. Nelson of Aerodyne Research, Inc.)
- Analysis of CO₂ tracer clocks observed from the NASA WB-57F aircraft in the tropical tropopause layer: Inferring the mean age and age spectrum for the tropical upper troposphere and lower stratosphere (UTLS) and determining distributions in the TTL of short-lived organic/inorganic halogens and non-methane hydrocarbons with surface sources and their inputs into the stratosphere.
- Global-scale (“pole-to-pole”) observations of atmospheric tracers (CO₂, CH₄, CO, N₂O) from the surface to the tropopause through the annual cycle: testing global transport models to distinguish which accurately simulate vertical and meridional tracer distributions and determining the distribution of sources and sinks for CO₂ and other major atmospheric tracer gases.

1999– 2005, UC Berkeley

Keywords: Isotope Biogeochemistry, Isotope Ratio Mass Spectrometry, Atmospheric Chemistry and Air Mass Transport

- Analysis of N₂O isotopologues and isotopomers in stratospheric whole air samples collected from the NASA ER-2 aircraft and high altitude scientific balloons: Insights into chemistry and transport and estimates of the flux of heavy N₂O to the troposphere.
- The absolute calibration of the intramolecular nitrogen isotope distribution in N₂O (in collaboration with J. Kaiser, T. Röckmann, and C.A.M Brenninkmeijer of Max Planck Institute for Chemistry)
- Measurements of N₂O isotopologues emitted from Amazon forest soils and characterization of N₂O isotopologues produced by nitrification and denitrification in field incubation experiments (in collaboration with T. Perez, S. Trumbore, and S. Tyler of University of California, Irvine)
- Measurements of the intramolecular ¹⁵N distribution in N₂O produced by denitrifying bacteria in laboratory microbial cultures (in collaboration with A. Thompson, M. Firestone and R. Amundson of Ecosystem Science Division, ESPM, UC Berkeley)
- Analysis of δ¹⁵N, site-specific δ¹⁵N, and δ¹⁸O of N₂O in the surface boundary layer of the Oklahoma DOE ARM site and comparisons with the isotope signatures from tropical rain forest soils and with observations in the free troposphere (in collaboration with M. Torn of Lawrence Berkeley National Laboratory)
- Investigation of possible trends in the isotopic compositions (δ¹⁵N, site-specific δ¹⁵N, and δ¹⁸O) of free tropospheric N₂O from measurements on archived free tropospheric air samples dating back to the mid-1900s and in firn air samples (in collaboration with R. Francey and P. Steele of CSIRO Atmospheric Research, Aspendale, Australia)

1995– 1997, Seoul National University

Keywords: Chemical Oceanography, Carbon Cycle in Seawater, Aquatic Chemistry

- Study of the biogeochemical cycle of natural and anthropogenic CO₂ in the East Sea by analyzing carbonate parameters such as total carbon, alkalinity, pH, dissolved oxygen, and nutrients in seawater and developing a moving-boundary box model
- Development of a vacuum line for extracting CO₂ and O₂ gases from seawater and groundwater (in collaboration with T. Nakamura of Dating and Material Research Center, Nagoya University, Japan)
- Use of a potentiometric titration system to measure total carbon and total alkalinity in seawater (in collaboration with F.J. Millero of Rosentiel School, University of Miami, USA)