

# Curriculum Vitae

## Gray E. Bebout, Professor, Lehigh University

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### Education

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| Ph.D. | (Geology; 9/89) | University of California, Los Angeles<br>Thesis: Geological and Geochemical Investigations of Fluid Flow and Mass Transfer during Subduction-Zone Metamorphism (Mark D. Barton, advisor) |
| M.A.  | (Geology; 9/84) | University of Texas at Austin<br>Thesis: Fluid Evolution and Transport during Metamorphism: Evidence from the Llano Uplift, Texas (William D. Carlson, advisor)                          |
| B.S.  | (Geology; 9/81) | University of Texas at Austin  |

### Employment History/Professional Experience

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| 2019 -      | <b>Department Chair</b> , Department of Earth and Environmental Sciences, Lehigh University (began in July, 2019)   |
| 2017 -      | <b>Specially Appointed Professor</b> , Institute for Planetary Materials, Okayama University at Misasa, Japan (current appointment: April, 2020 to March, 2022)         |
| 2013 - 2016 | <b>Visiting Collaborative Researcher</b> , Institute for Study of the Earth's Interior, Okayama University at Misasa, Japan (now the Institute for Planetary Materials) |
| 2011 - 2013 | <b>Visiting Foreign Professor</b> , Institute for Study of the Earth's Interior, Okayama University at Misasa   |
| 2006 - 2011 | <b>COE21 Visiting Foreign Professor (Affiliated Faculty)</b> , Institute for Study of the Earth's Interior, Okayama University at Misasa, Japan                         |
| 2006        | <b>Visiting Foreign Professor</b> , Institute for Study of the Earth's Interior, Okayama University at Misasa, Japan (2.5 month visit; summer, 2006)                    |
| 2003 -      | <b>Full Professor</b> , Department of Earth and Environmental Sciences, Lehigh University (as of September, 2003)   |
| 2000        | <b>Visiting Foreign Professor</b> , Institute for Study of the Earth's Interior, Okayama University at Misasa, Japan (full-year, funded by the Japanese government)     |
| 1997 - 2003 | <b>Associate Professor</b> , Department of Earth and Environmental Sciences, Lehigh University (as of September, 1997)  |
| 1991 - 1997 | <b>Assistant Professor</b> , Department of Earth and Environmental Sciences, Lehigh University (as of December 1, 1991)   |

1989 - 1991     **Postdoctoral Fellow**, Geophysical Laboratory, Carnegie Institution of Washington  
(additional work at the Department of Terrestrial Magnetism)

### **Editing Projects Recently Completed or Underway**

- 2021 -            Co-editor of *Chemical Geology* Article Collection in tribute to the late Dave Hilton (Earth's Volatile Cycle within the Crust-Mantle System: A volume in memory of Dave Hilton; editors Peter Barry, Saemi Halldorsson, Justin Kulongoski, Gray Bebout, and Evelyn Furi).
- 2011 - 2022     Lead editor for large electronic-only publication on subduction-zone processes, as a follow-up to the "best-selling" 1996 *American Geophysical Union Geophysical Monograph* v. 96 (Subduction Top to Bottom 2 or ST2B-2; co-editors Dave Scholl, Bob Stern, Laura Wallace, and Philippe Agard; publication window was 2016-2021. Seventy four papers have been published in a Themed Issue in the journal *Geosphere* of the Geological Society of America.
- 2011 - 2013     Chief editor for special issue of *ELEMENTS* (journal of the Geochemical Society) on nitrogen (biogeocosmo)chemistry (co-editors Marilyn Fogel, University of California, Merced, and Pierre Cartigny, IPGP, Paris), published in October, 2013.

### **Honors/Awards**

- 2018 -            **Elected as Fellow of the Mineralogical Society of America** (professional society) — awarded this fellowship in November, 2018.

### **Current External Funding**

**NSF PIRE Program** (Partnerships in International Research and Education; host institution Boise State University; \$260K to Lehigh University over five years; "PIRE: ExTerra Field Institute and Research Endeavor (E-FIRE)")

**NSF EAR-Petrology and Geochemistry Program** (\$466K to Lehigh University over three years, collaborative with Bruce Christenson (GNS, New Zealand), Hirochika Sumino (University of Tokyo), and Ikuko Wada (University of Minnesota); "Collaborative Research: Integrated He-CO<sub>2</sub>-N<sub>2</sub> Isotope and Petrologic Study of Volatiles Cycling via the New Zealand Subduction System")

Analytical support from the **Institute for Planetary Studies, Okayama University**, Misasa, Japan

### **Publications**

[Lehigh University student authors in bold type]

#### **Books Edited —**

Bebout, G. E., Scholl, D. W., Kirby, S. H., and Platt, J. P., editors, 1996, *Subduction Top to Bottom*, American Geophysical Union Geophysical Monograph, v. 96.

#### **Chapters in Books —**

Bebout, G. E., 2014, 4.20. Chemical and isotopic cycling in subduction zones, in Rudnick, R. L., ed., 2<sup>nd</sup> Ed. Volume 4, *Treatise on Geochemistry: The Crust*, Elsevier, pp. 703-747.

- Bebout, G. E., 2012, Chapter 9. Metasomatism in subduction zones of subducted oceanic slabs, mantle wedges, and the slab-mantle interface, invited chapter, in Harlov, D., and Austrheim, H., eds., *Metasomatism and the Chemical Transformation of Rock, The Role of Fluids in Terrestrial and Extraterrestrial Processes*, Springer-Verlag.
- Bebout, G. E., 2011, Chapter 3. Trace element and isotopic fluxes/subducted slab, in *Isotope Geochemistry: A Derivative of Treatise on Geochemistry* (eds. H. D. Holland, and K. K. Turekian), Elsevier (hard-copy publication of a special book containing a subset of the chapters from *Treatise on Geochemistry*; this paper was previously published only electronically on ScienceDirect), p. 39-86.
- Grove, M., Bebout, G. E., Jacobson, C. E., Barth, A. P., Kimbrough, D. L., **King, R. L.**, Zou, H., Lovera, O. M., Mahoney, B. J., Gehrels, G. E., 2008, The Catalina Schist: evidence for mid-Cretaceous subduction erosion of southwestern North America, in *Formation and Applications of the Sedimentary Record in Arc Collision Zones, GSA Special Paper 436*, eds., Draut, A. E., Clift, P. D., and Scholl, D. W.
- Bebout, G. E., 2007, Ch. 3.20. Trace element and isotopic fluxes/subducted slab, in *Treatise on Geochemistry*, Elsevier (invited paper; eds. K. K. Turekian, H. D. Holland, and R. Rudnick), online only, p. 1-50.
- Sadofsky, S. J.**, and Bebout, G. E., 2006, Field and isotopic evidence for fluid mobility in the Franciscan Complex: forearc paleohydrogeology to depths of 30 kilometers, in *Phase Relations, High Pressure Terranes, P-T-ometry, and Plate Pushing, GSA International Special Paper Series*, eds. J. G. Liou and M. Cloos), p. 597-632, this paper previously appeared in *International Geology Reviews* in 2004.
- Bebout, G. E., and **Sadofsky, S. J.**, 2004,  $\delta^{15}\text{N}$  analyses of ammonium-rich silicate minerals by sealed-tube extractions and dual inlet, viscous-flow mass spectrometry (invited paper), in *Handbook of Stable Isotope Techniques* (Pier de Groot, editor).
- Bebout, G. E., 1996, Volatile transfer and recycling at convergent margins: mass-balance and insights from high-P/T metamorphic rocks, in Bebout, G. E., Scholl, D. W., Kirby, S. H., and Platt, J. P., editors, *Subduction Top to Bottom*, American Geophysical Union Geophysical Monograph, v. 96, p. 179-193.
- Ryan, J., Morris, Bebout, G., and Leeman, B., 1996, Describing chemical fluxes in subduction zones: insights from “depth-profiling” studies of arc and forearc rocks, in Bebout, G. E., Scholl, D. W., Kirby, S. H., and Platt, J. P., editors, *Subduction Top to Bottom*, American Geophysical Union Geophysical Monograph, v. 96, p. 263-268.
- Bebout, G. E., and Barton, M. D., 1993, Metasomatism during subduction: products and possible paths in the Catalina Schist, California, in *Recent Advances in the Geosciences*, Elsevier book with selected papers representing research presented at the 1993 European Union of Geosciences Meeting, Strasbourg, France (this paper also appeared in *Chemical Geology* in 1993; see reference below).
- Barton, M. D., Battles, D., Bebout, G. E., Capo, R. C., Christensen, J. N., Davis, S. R., Hanson, R. B., Michelsen, C. J., and Trim, H. E., 1988, Mesozoic contact metamorphism in the western U. S., in Ernst, W. G. (ed.), *Metamorphism and Crustal Evolution, Western Conterminous United States*, Rubey Volume VII, Prentice-Hall, p. 110-178.

### Journal issues edited —

- Bebout, G. E. (Lead Editor), Scholl, D. W., Stern, R. J., Wallace, L. M., and Agard, P., 2016-2021, “Subduction Top to Bottom 2 (ST2B-2)” (Themed Issue in *Geosphere*, electronic-only journal of the Geological Society of America; <https://pubs.geoscienceworld.org/geosphere/pages/st2b2>; 75 papers).

Bebout, G. E., Fogel, M. L., and Cartigny, P., 2013, Nitrogen and its (BioGeoCosmo)Chemical Cycling, special issue of *ELEMENTS* (Geochemical Society), v. 9, no. 5 (Bebout chief editor; co-editors Pierre Cartigny, IPGP, Paris; Marilyn Fogel, University of California, Merced).

Bebout, G. E., and Elliott, T., 2003-2005, Trench to Subarc: Diagenetic and Metamorphic Mass Flux in Subduction Zones, Special Section, *Geochemistry, Geophysics, and Geosystems* (*G-cubed*; 17 papers).

## Articles in Refereed Journals —

### Some manuscripts in revision, in review, or *actively* in preparation

**Kraft, K., Epstein, G. S., House, B. M., and Bebout, G. E., in preparation**, Transfer of organic carbon through forearcs: Record in HP/UHP metamorphic rocks and bearing on estimates of the sources of arc volcanic gases, to be submitted to *Geochemistry, Geophysics, and Geosystems* (*G-cubed*).

Förster, B., Bebout, G. E., Bianchini, G., Natali, C., Aulbach, S., and Braga R., **in revision**, Multi-stage carbonation and decarbonation in the mantle-wedge: Stable-isotope compositions of carbonate phases in ultramafic rocks of the Ulten Zone (Eastern Alps, Italy), for *Chemical Geology*.

### Published

**Nikitzuk, M. P., Bebout, G. E., Geiger, C. A., Ota, T., Kunihiro, T., Mustard, J. F., Halldórsson, S. A., and Eizo Nakamura, 2022**, Nitrogen incorporation in potassic and micro- and meso-porous minerals: Potential biogeochemical records and targets for Mar sampling, *Astrobiology*.

Scambelluri, M., Cannaò, E., Guerini, S., **Epstein, G.**, Bebout, G. E., Tartarotti, P., and Rotondo, F., 2022, Carbon mobility and exchange in a plate-interface subduction mélange, *Lithos*.

Bebout, G. E., Ota, T., Kunihiro, T., Carlson, W. D., and Nakamura, E., 2022, Lithium in garnet as a tracer of subduction zone metamorphic reactions: The record in UHP metapelites at Lago di Cignana, Italy, *Geosphere*.

**Nikitzuk, M. P., Bebout, G. E., Ota, T., Kunihiro, T., Mustard, J. F., Flemming, R. L., Tanaka, R., Halldórsson, S. A., and Nakamura, E., 2022**, Nitrogenous altered volcanic glasses as targets for Mars sample return: Examples from Antarctica and Iceland, *Journal of Geophysical Research-Planets*.

**Epstein, G. S., Bebout, G. E., Christenson, B. W., Sumino, H., Wada, I., Werner, C., and Hilton, D. R., 2021**, Cycling of CO<sub>2</sub> and N<sub>2</sub> along the Hikurangi subduction margin, New Zealand: An integrated geological, theoretical, and isotopic approach, *Geochemistry, Geophysics, and Geosystems*.

Halama, R., Bebout, G. E., and Bea, F., 2021, Nitrogen loss and isotopic fractionation during granulite-facies metamorphism in the lower crust (Ivrea Zone, NW Italy), *Chemical Geology* (*special issue in tribute to David Hilton*).

Rader, S. T., Gaschnig, R. M., Owens, J. D., Bebout, G. E., Mirakian, M. J., and Newby, S. M., 2021, Thallium behavior during high-pressure metamorphism in the western Alps, Europe, *Chemical Geology*.

Muñoz-Montecinos, J., Angiboust, S., Garcia-Casco, A., Glodny, J., and Bebout, G. E., 2021, Episodic hydrofracturing and large-scale flushing along deep subduction interfaces: Implications for fluid transfer and carbon recycling, *Chemical Geology*.

- Epstein, G. S.**, Bebout, G. E., and Angiboust, S., 2020, Fluid and mass transfer along transient subduction interfaces in a deep paleo-accretionary wedge (W. Alps), *Chemical Geology*.
- Halama, R., and Bebout, G., 2020, (Invited) Earth's nitrogen and carbon cycles, in Introduction to reading terrestrial planet evolution in isotopes and element measurements, *International Space Science Institute*.
- Bebout, G. E., 2020, 00140. Insights into subduction zone dynamics, *Encyclopedia of Geology*, 2<sup>nd</sup> Edition, Elsevier.
- Cannaò, E., Scambelluri, M., Tiepolo, M., and Bebout, G. E., 2020, Into the deep and beyond: carbon and nitrogen subduction recycling in secondary peridotites, *Earth and Planetary Science Letters*.
- Cannaò, E., Scambelluri, M., Bebout, G. E., Agostini, S., Pettke, T., and Godard, M., 2020, Ophicarbonatite evolution from seafloor to subduction and implications for deep-Earth C cycling, *Chemical Geology*.
- Epstein, G. S.**, Bebout, G. E., Angiboust, S., and Agard, P., 2019, Scales of fluid-rock interaction and carbon mobility in the deeply underplated and HP-metamorphosed Schistes Lustrés, Western Alps, *Lithos*, 354-355, <https://doi.org/10.1016/j.lithos.2019.105229>.
- House, B. M., Bebout, G. E., and Hilton, D. R., 2019, Carbon cycling at the Sunda margin, Indonesia: A regional study with global implications, *Geology*, <https://doi.org/10.1130/G45830.1>.
- Barnes, J. D., Penniston-Dorland, S. C., Bebout, G. E., Hoover, W., Beaudoin, G. M., and Agard, P., 2019, Chlorine and lithium behavior in metasedimentary rocks during prograde metamorphism: a comparative study of exhumed subduction complexes (Catalina Schist and Schistes Lustrés), *Lithos*.
- Nakamura, E., Kunihiro, T., Ota, T., Sakaguchi, C., Tanaka, R., Kitagawa, H., Kobayashi, K., Yamanaka, M., Shimaki, Y., Bebout, G. E., Miura, H., Yamamoto, T., Malkovets, V., Grokhovsky, V., Koroleva, O., and Litasov, K., 2019, Hypervelocity collision and water-rock interaction in space preserved in the Chelyabinsk ordinary chondrite, *Proceedings of the Japan Academy*.
- Tartarotti, P., Guerini, S., Rotondo, F., Festa, A., Balestro, G., Bebout, G. E., Cannaò, E., **Epstein, G. S.**, and Scambelluri, M., 2019, Superposed sedimentary and tectonic block-in-matrix fabrics in a subducted serpentinite mélange (high-pressure Zermatt Saas ophiolite, Western Alps). *Geosciences*, 9, 358.
- Jaekel, K.**, Bebout, G. E., and Angiboust, S., 2018, Deformation-enhanced fluid and mass transfer along western and central Alps paleo-subduction interfaces: Significance for carbon cycling models. *Geosphere*, v. 14(6), doi: 10.1130/GES01587.1.
- Bebout, G. E., Scholl, D. W., Stern, R. J., Wallace, L. M., and Agard, P., 2017, Twenty years of subduction zone science: Subduction Top to Bottom 2 (ST2B-2), *GSA Today*, 28, doi: 10.1130/GSATG354A.1.
- Bebout, G. E., Banerjee, N. R., Izawa, M. R., **Lazzeri, K.**, **Ranieri, L. A.**, Kobayashi, K., and Nakamura, E., 2017, Nitrogen concentrations and isotopic compositions of seafloor-altered terrestrial basaltic glass: Implications for astrobiology, *Astrobiology*, 18(4), DOI: 10.1089/ast.2017.1708.
- Anderson, L. D.**, Bebout, G. E., Izawa, M. R. M., Bridge, N. J., and Banerjee, N. R., 2017, Chemical alteration and preservation of sedimentary/organic nitrogen isotopic signatures in a 2.7 Ga seafloor volcanic sequence, *International Journal of Astrobiology*, doi.org/10.1017/S1473550417000441.

- Lazzeri, K. E.**, Bebout, G. E., and Geiger, C., 2016, Nitrogen and carbon concentrations and isotopic compositions of the silica clathrate melanophlogite (Letter and Notable Paper), *American Mineralogist*, doi.org/10.2138/am-2017-5876.
- Angiboust, S., Yamato, P., Hertgen, S., Hyppolito, T., Bebout, G. E., and Morales, L., 2016, Fluid pathways and high pressure metamorphism in a subducted continental slice (Mt. Emilius klippe, W. Alps), *Journal of Metamorphic Geology*, doi.org/10.1111/jmg.12241.
- Sievers, N. E., **Tenore, J.**, Penniston-Dorland, S. C., and Bebout, G. E., 2016, Fingerprints of forearc element mobility in blueschist-facies metaconglomerates, Catalina Schist, California, *International Geology Reviews*, doi.org/10.1080/00206814.2016.1253038.
- Halama, R., Bebout, G. E., Marschall, H., and John, T., 2016, Fluid-induced breakdown of white mica controls nitrogen transfer during fluid-rock interaction in subduction zones, *International Geology Reviews*, doi.org/10.1080/00206814.2016.1233834.
- Bebout, G. E., 2016, Caesium: element and geochemistry, invited entry for *Encyclopedia of Geochemistry* (William D. White, editor), Earth Science Series, Springer.
- Scambelluri, M., Bebout, G., Gilio, M., Belmonte, D., Campomenosi, N., **Collins, N. C.**, and Crispini, L., 2016, Carbonation of subduction interface ultramafic rocks and implications for the deep carbon cycling: Evidence from hybrid serpentinite-marble in the Voltri Massif, Italy, *Earth and Planetary Science Letters*, doi:10.1016/j.epsl.2016.02.034.
- Bebout, G. E., **Lazzeri, K.**, and Geiger, C., 2015, Pathways for nitrogen cycling in Earth's crust and upper mantle: A review and new results for microporous beryl and cordierite, *Invited Centennial Article*, *American Mineralogist*, 101, 7-24.
- Bebout, G. E., and Penniston-Dorland, S. C., 2015, Fluid and mass transfer at subduction interfaces – The field metamorphic record, *Invited Review Article*, *Lithos*, 240-243, 228-258.
- Collins, N. C.**, Bebout, G. E., Angiboust, S., Agard, P., Scambelluri, M., Crispini, L., and John, T., 2015, Subduction zone metamorphic pathway for deep carbon cycling: II. Evidence from HP/UHP metabasaltic rocks and ophiicarbonates, *Chemical Geology*, 412, 132-150.
- Penniston-Dorland, S. C., Gorman, J. K., Bebout, G. E., Piccoli, P. M., and Walker, R. J., 2014, Reaction rind formation in the Catalina Schist: Deciphering a history of mechanical mixing and metasomatic alteration, *Chemical Geology*, 384, 47-61.
- Cook-Kollars, J. E.**, Bebout, G. E., **Collins, N. C.**, Angiboust, S., and Agard, P., 2014, Subduction-zone metamorphic pathway for deep carbon cycling: I. Evidence from HP/UHP metasedimentary rocks, Italian Alps, *Chemical Geology*, 348, 31-48.
- Bebout, G. E., Fogel, M. L., and Cartigny, P., 2013, Nitrogen: Highly volatile yet surprisingly compatible, introductory paper for special issue of *ELEMENTS*, Geochemical Society publication (Nitrogen and its (BioGeoCosmo)Chemical Cycling), eds. Bebout, G. E., Fogel, M. L., Cartigny, P., v. 9, pp. 333-338.
- Busigny, V., and Bebout, G. E., 2013, Mineralogy, residency, and isotopic behavior of nitrogen, for special issue of *ELEMENTS*, Geochemical Society publication (Nitrogen and its (BioGeoCosmo)Chemical Cycling), eds. Bebout, G. E., Fogel, M. L., Cartigny, P., v. 9, 353-358.

- Bebout, G. E., Agard, P., Kobayashi, K., Moriguti, T., and Nakamura, E., 2013, Devolatilization history and trace element mobility in deeply subducted sedimentary rocks: SIMS evidence from Western Alps HP/UHP suites, *Chemical Geology*, 342, 1-20, <http://dx.doi.org/10.1016/j.chemgeo.2013.01.009>.
- Godfrey, L. V., Poulton, S. W., Bebout, G. E., and Fralick, P., 2013, Stability of the nitrogen cycle during development of sulfidic water in the redox-stratified late Paleoproterozoic Ocean, *Geology*, doi:10.1130/G33930.1.
- Evans, M. A., Bebout, G. E., and **Brown, C. H.**, 2012, Changing fluid conditions during folding: An example from the central Appalachians, *Tectonophysics*, doi: 10.1016/j.tecto.2012.03.002.
- John, T., Gussone, N., Podladchikov, Y. Y., Bebout, G. E., Dohmen, R., Halama, R., Klemd, R., Magna, T., and Seitz, M., 2012, Pulsed long-distance fluid flow through subducting slabs feeds volcanic arcs, *Nature Geoscience*, doi: 10.1038/NGEO1482.
- Halama, R., Bebout, G. E., John, T., and Scambelluri, M., 2012, Nitrogen recycling in subducted mantle rocks and implications for the global nitrogen cycle, *International Journal of Earth Sciences*, special issue reporting results of Collaborative Research Center (SFB 574; Volatiles and Fluid in Subduction Zones), doi: 10.1007/s00531-012-0782-3.
- Gonyo, A.**, Yu, Z., and Bebout, G., 2012, Late Holocene change in climate and atmospheric circulation inferred from geochemical records at Kepler Lake, south-central Alaska, *Journal of Paleolimnology*, 48, 55-67, doi: 10.1007/s10933-012-9603-8.
- Zelanko, P.**, Yu, Z., Bebout, G. E., and Kaufman, A. J., 2012, Multiple early Holocene climate oscillations at Silver Lake, New Jersey and their possible linkage with outburst floods, *Palaeogeography, Palaeoclimatology, Palaeoecology*, doi:10.1016/j.palaeo.2012.06.028.
- Penniston-Dorland, S. C., Bebout, G. E., Pogge von Strandmann, A. E., Elliott, T., Sorensen, S. S., 2011, Lithium and its isotopes as tracers of forearc fluids and metasomatic processes: Evidence from the Catalina Schist, California, USA, *Geochimica et Cosmochimica Acta*, doi: 10.1016/j.gca.2011.10.038.
- Li, L.**, Yu, Z., Bebout, G. E., **Stretton, T.**, Eby, N., **Allen, A.**, and **Passaris, P.**, 2010, Tree-ring width and  $\delta^{13}\text{C}$  records of industrial stress and recovery in Pennsylvania and New Jersey forests: Implications for  $\text{CO}_2$  uptake by temperate forests, *Chemical Geology*, doi:10.1016/j.chemgeo.2010.02.026.
- Zhao, C.**, Yu, Z., **Li, L.**, and Bebout, G., 2010, Major shifts in multidecadal moisture variability in the Mid-Atlantic region during the last 240 years, *Geophysical Research Letters*, doi:10.1029/2010GL043133.
- Palya, A. P.**, Buick, I. S., and Bebout, G. E., 2010, Storage and mobility of nitrogen in the continental crust: Evidence from partially melted metasedimentary rocks at Mount Stafford, North-Central Australia, *Chemical Geology*, doi:10.1016/j.chemgeo.2010.12.009.
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- Svensen, H., Bebout, G., Kronz, A., **Li, L.**, Planke, S., Chevallier, L., and Jamtveit, B., 2008, Nitrogen geochemistry as a tracer for fluid flow in a sedimentary basin piercement structure, the Karoo Basin, South Africa, *Geochimica et Cosmochimica Acta*, 72, 4929-4947.

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- Li, L., Yu, Z., Moeller, R. E., and Bebout, G. E., 2008, Complex trajectories of aquatic and terrestrial ecosystem shifts caused by multiple human-induced stresses, *Earth and Planetary Science Letters*, 72, 4338-4351.
- Bebout, G. E., 2007, Metamorphic chemical geodynamics in subduction zones, synthesis paper for *Earth and Planetary Science Letters* (invited *EPSL* Frontiers article), 260, 373-393.
- Li, L., Bebout, G. E., and Idleman, B. D., 2007, Nitrogen concentration and isotopic compositions of altered oceanic crust obtained on ODP Legs 129 and 185: Insights into alteration-related nitrogen enrichment and the nitrogen subduction budget, *Geochimica et Cosmochimica Acta*, 71, 2344-2360.
- King, R. L., Bebout, G. E., Grove, M., Moriguti, T., and Nakamura, E., 2007, Boron and lead isotope signatures of subduction-zone melange formation: Hybridization and fractionation along the slab-mantle interface beneath volcanic arcs, *Chemical Geology*, 239, 305-322.
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- Bebout, G. E., Bebout, A. E., and Graham, C. M., 2007, Cycling of B, Li, and LILE (K, Cs, Rb, Ba, Sr) into subduction zones: SIMS evidence from micas in high-P/T metasedimentary rocks, *Chemical Geology*, 239, 284-304.
- Li, L., and Bebout, G.E., 2006, Carbon and nitrogen geochemistry of wedge sediments at ODP Site 1040: evidence for sediment sources, diagenetic history, and fluid mobility, in Morris, J.D., Villinger, H.W., Klaus, A. (eds.), *Proceedings Ocean Drilling Program, Scientific Results*, 205 [Online]. [http://www-odp.tamu.edu/publications/205\\_SR/214/214.htm](http://www-odp.tamu.edu/publications/205_SR/214/214.htm) (no citations information available).
- King, R. L., Bebout, G. E., Moriguti, T., and Nakamura, E., 2006, Elemental mixing systematics and Sr-Nd isotope geochemistry of mélangé formation: Obstacles to identification of fluid sources to arc volcanics, *Earth and Planetary Science Letters*, 246, 288-304.
- Rygel, A. C., Anastasio, D. J., and Bebout, G. E., 2006, Syntectonic fluid-rock interactions involving surficial waters in the Sevier thrust belt, Tendoy Mountains, Southwest Montana, *Geofluids*, 6, 1-14.
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### **Conference Proceedings**

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### **Reviews**

Bebout, G. E., 1996, Metamorphic petrology, *Geotimes* 41, 51-52 (invited synthesis of recent advancements in this field).

### **Conference Abstracts (last eight years only)**

**Epstein, G. S.,** Bebout, G. E., Christenson, B. W., Sumino, H., Wada, I., Werner, C. A., and Hilton, D. R., 2022, Thermodynamic and volcanic gas geochemical insights into volatile release during subduction along the Hikurangi margin, New Zealand, American Geophysical Union Fall Meeting, Chicago, Illinois.

**Bustos-Moreno, J. F.,** Bebout, G. E., Chen, Y.-X., and Schertl, H.-P., 2022, Nitrogen behavior during fluid-rock interactions in a continental subduction zone: Results from the Dora-Maira Massif whiteschists, International Eclogite Conference, Lyon, France.

Rader, S. T., Gaschnig, R. M., Penniston-Dorland, S. C., and Bebout, G. E., 2022, Thallium behavior within subduction zone metamorphism and related metasomatic processes, Goldschmidt Conference, Hawaii.

Bebout, G. E., 2022, Toward more complete (and realistic) assessment of deep carbon subduction: The devil (could be) in the details (invited), JpGU Meeting (hybrid), July 2022.

Codillo, E., Le Roux, V., Klein, B. Z., Behn, M. D., Marschall, H., and Bebout, G. E., 2021, Experimental constraints on the density sorting and mélange melting in subduction zones, American Geophysical Union Fall Meeting, New Orleans, Louisiana.

Bebout, G. E., Ota, T., Kunihiro, T., Carlson, W. D., and Nakamura, E., 2021, Lithium in garnet as a tracer of subduction zone metamorphic reactions: The record in UHP metapelites at Lago di Cignana, Italy, American Geophysical Union Fall Meeting, New Orleans, Louisiana.

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- Le Roux, V., Codillo, E. A., Behn, M., Marschall, H., and Bebout, G. E., 2021, Experimental constraints on the physical properties of mélange rocks and their relationship to arc magmas, Goldschmidt Conference, Lyon, France.
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- Epstein, G. S.**, Bebout, G. E., Christenson, B. W., Sumino, H., Wada, I., and Hilton, D. R., 2019, Tracking volatiles cycling at the Hikurangi subduction margin, North Island, New Zealand: An integrated geologic, petrologic and isotopic approach, American Geophysical Union Fall Meeting, San Francisco, California, December, 2019, T32C-08.
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- Epstein, G. S.**, Bebout, G. E., and Angiboust, S. A., 2019, Trace element and C, O, N isotope behavior during open-system fluid flow along transient paleo-subduction interfaces, Goldschmidt Conference, Barcelona, Spain, August, 2019.
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- Nikitzuk, M. P.**, Bebout, G. E., Ota, T., Kunihiro, T., Kobayashi, K., Tanaka, R., and Nakamura, E., 2018, Altered basaltic volcanics as targets for Mars sample return, Misasa VII — Sample-returns and Astrobiology, Yonago, Japan, December 19-21.
- Bebout, G. E., **Nikitzuk, M. P.**, Ota, T., Kunihiro, T., Kobayashi, K., and Nakamura, E., 2018, Possible nitrogenous biosignatures in palagonitized glass and minerals present on the Mars surface, Misasa VII — Sample-returns and Astrobiology, Yonago, Japan, December 19-21.
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- Scholl, D. W., Bebout, G. E., Stern, R. J., Wallace, L. M., and Agard, P., 2018, Twenty years of subduction zone science: Subduction Top to Bottom 2 (ST2B-2), American Geophysical Union Fall Meeting, Washington, D.C. (December, 2018), T21F-0267.
- Epstein, G.**, and Bebout, G. E., 2018, Reconciling records of forearc dynamics and fluid generation with estimates of carbon output in forearc springs and arc volcanic gases, American Geophysical Union Fall Meeting, Washington, D.C. (December, 2018), DI33B-0033.
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- Epstein, G. S., Bebout, G. E., Angiboust, S., and Agard, P., 2018, Fluid-rock interactions in deeply subducted and underplated oceanic sediments: Scales of fluid infiltration and carbon mobilization, Goldschmidt Conference, Boston, MA, August, 2018.
- Kraft, K.**, and Bebout, G. E., 2017, Fate of subducting organic carbon: Evidence from HP/UHP metasedimentary suites, American Geophysical Union Fall Meeting, New Orleans, Louisiana (December, 2017).
- Epstein, G.**, Bebout, G. E., Angiboust, S., and Agard, P., 2017, Pre-Alpine tectonic and geochemical history of the Schistes Lustrés: Stable isotope evolution of accreted and subducted marine sediments, American Geophysical Union Fall Meeting, New Orleans, Louisiana (December, 2017).
- Bebout, G. E., and Scholl, D. W., 2017, Subduction Top to Bottom (ST2B) concept and online, *Geosphere* publication venue, Geological Society of American Annual Meeting, Seattle, Washington (October, 2017).
- Hoover, W. F., Penniston-Dorland, S. C., Bebout, G. E., and Selverstone, J., 2017, Lithium mobility during dehydration, fact or fiction?: Insights from Li isotopes in Alpine metasedimentary rocks, Geological Society of American Annual Meeting, Seattle, Washington.
- Halama, R., and Bebout, G. E., 2017, Tracking nitrogen transfer through the Earth's crustal reservoirs, GeoBremen, Bremen, Germany, September 24-29.
- Halama, R., and Bebout, G. E., 2017, Nitrogen transfer in crustal rocks, Goldschmidt Conference, Paris, France (August, 2017).
- Rotondo, F., Guerini, S., Tartarotti, P., Scambelluri, M., Cannà, E., Bebout, G. E., and **Epstein, G.**, 2017, Oceanic and subduction ophiocarbonates in the Champorche Zermatt-Saas ophiolite (Aosta Valley, Northwestern Alps), PISA 2017, Pisa, Italy, September 3-6.
- Halama, R., Bebout, G. E., and Bea, F., 2017, Nitrogen in deep crustal rocks from the Ivrea Zone (Southern Alps, Italy), Metamorphic Studies Group, Oxford, UK, March, 2017.
- Bebout, G. E., Scholl, D. W., and Kirby, S. H., 2016, Subduction Top to Bottom: A brief history of an idea and publication concept, T41G-06, American Geophysical Union Fall Meeting, San Francisco, CA.

- Jaekel, K. P.**, Bebout, G. E., and Angiboust, S., 2016, Carbon mobility at subduction interfaces via deformation-enhanced fluid infiltration: Evidence from the Swiss/Italian Alps, T31E-2954, American Geophysical Union Fall Meeting, San Francisco, CA.
- House, B. M., Bebout, G. E., and Hilton, D. R., 2016, Ins and outs of a complex subduction zone: C cycling along the Sunda margin, Indonesia, V24A-06, American Geophysical Union Fall Meeting, San Francisco, CA.
- Cannaò, E., Bebout, G. E., Agostini, S., and Scambelluri, M., 2016, Textural and geochemical evolution of ophicarbonates from ocean to deep subduction, European Mineralogical Conference, Rimini, Italy, August, 2016.
- Förster, B., Bebout, G. E., Bianchini, G., Natali, C., Aulbach, S., Braga R., and Scambelluri, M., 2016, Multi-stage carbonation and decarbonation in the mantle-wedge: Stable-isotope compositions of carbonate phases in ultramafic rocks of the Ulten Zone (Eastern Alps, Italy), European Mineralogical Conference, Rimini, Italy, August, 2016.
- Scambelluri, M., Bebout, G., Gilio, M., Belmonte, D., Campomenosi, N., Crispini, L., 2015, Carbonation of subduction interface ultramafic rocks and implications for deep carbon cycling: Evidence from hybrid serpentinite-marble in the Voltri Massif, Italy, American Geophysical Union Fall Meeting, San Francisco, CA, December, 2015.
- Penniston-Dorland, S., Roble, L. A., Bebout, G. E., Sorensen, S. S., 2015 (invited), Lithium isotopes as a tracer of fluids in reaction zones of the Catalina Schist, Geological Society of America Annual Meeting, Baltimore, Maryland, Nov. 1-4, 2015.
- Bebout, G.E., Tsujimori, T., Ota, T., Shimaki, Y., Kunihiro, T., Carlson, W. D., Nakamura, E., 2015 (invited), Lithium in UHP metasedimentary garnets from Lago di Cignana, Italy: coupled substitutions and the role of accessory phases, Geological Society of America Annual Meeting, Baltimore, Maryland, Nov. 1-4, 2015.
- Bebout, G. E., Banerjee, N. R., Izawa, M. R. M., **Lazzeri, K. E.**, Kobayashi, K., Nakamura, E., 2015, Enrichment of sedimentary/organic nitrogen in altered terrestrial glassy basaltic rocks: possible implications for astrobiology, AbSciCon, Chicago, June, 2015.
- Bebout, G. E., Banerjee, N. R., Izawa, M. R. M., Kobayashi, K., **Lazzeri, K. E.**, **Ranieri, L. A.**, Nakamura, E., 2015, Isotopic Compositions and Mineral Residency in Altered Terrestrial Glassy Basaltic Rocks: Implications for Astrobiology, Misasa V: Comprehensive Exploration of the Solar System (sample return and analysis), Misasa, Japan, March, 2015.

+ 165 refereed abstracts published prior to 2015

### **Recent Research Collaborators (active in last 36 months)**

Philippe Agard - Universite PM Curie, France  
 Samuel Angiboust – Ecole Normale Supérieure (ENS) de Lyon, France  
 Jaime Barnes - University of Texas at Austin  
 Lukas Baumgartner - University of Lausanne, Switzerland  
 Enrico Cannaò - University of Milan  
 Bill Carlson - University of Texas at Austin (retired)  
 Bruce Christenson - GNS Science, New Zealand

Richard Gaschnig - University of Massachusetts, Lowell  
 Charles Geiger - University of Salzburg  
 Ralf Halama - University of Keele, UK  
 David Hilton - University of California, San Diego (recently deceased)  
 Katsura Kobayashi - IPM, Misasa, Japan  
 Takuya Kunihiro - IPM, Misasa, Japan  
 Veronique Le Roux - Woods Hole Oceanographic Institute  
 Jack Mustard - Brown University  
 Eizo Nakamura - IPM, Misasa, Japan  
 Tsutomu Ota - IPM, Misasa, Japan  
 Sarah Penniston-Dorland - University of Maryland  
 Marco Scambelluri - Università di Genova  
 Hirochika Sumino - University of Tokyo  
 Paola Tartarotti - University of Milan  
 Cynthia Werner - USGS, consultant

### **Editor/Editorial review board memberships for scholarly publications**

- 2015 - 2022      Lead Guest Editor, Themed Issue in *Geosphere*, an all-electronic publication of the Geological Society of America (4 other Guest Editors and 22 Associate Guest Editors; theme title “Subduction Top to Bottom 2” or “ST2B-2”). AGU Geophysical Monograph 96 (“Subduction Top to Bottom”) was an AGU "best-seller" and ST2B-2 is the 20<sup>th</sup> anniversary follow-up to that publication. The issue is now completed and contains 74 papers.
- 2005 - present      Associate Editor, *Lithos* (Elsevier journal)
- 2012 - 2013      Lead Guest editor, special issue of *ELEMENTS*, publication of the Geochemical Society (“Nitrogen and its (BioGeoCosmo)Chemical Cycling”), co-editors Marilyn Fogel, Univ. California, Merced, and Pierre Cartigny, IPGP, Paris (October 2013 issue)
- 1999 - 2013      Member of Books Board, American Geophysical Union (oversaw book projects with significant components of solid-Earth petrology/geochemistry, evaluating proposals and external reviews, coordinating development after approval, and approving final products before publication)
- 2005 - 2009      Associate Editor, *Geochemistry, Geophysics, and Geosystems* (AGU journal)
- 1999 -      Co-editor (with Tim Elliott, Bristol University) of subduction-zone-flux sections of GERM (Geochemical Earth Reference Model; <http://earthref.org/>)
- 1996 - 2006      Associate Editor, *American Mineralogist*
- 2002 - 2004      Guest editor, special section of *Geochemistry, Geophysics, and Geosystems* related to GERM/MARGINS-sponsored AGU special session at 2001 Fall AGU meeting (“Trench to Subarc; Diagenetic and Metamorphic Mass Flux in Subduction Zones”), co-editor Tim Elliott, Bristol University.
- 1995 - 1996      Chief Editor “*Subduction Top to Bottom*”, AGU Geophysical Monograph., v. 96 This volume is regarded as a “bestseller” among AGU books (resulting from SUBCON meeting in 1994), co-editors D Scholl and S. Kirby (both now retired, USGS) and John Platt (Univ. Southern California). We are now pursuing a follow-up all-electronic publication (as a theme issue) in the journal *Geosphere*.



## Recent professional presentations

### Invited lectures (and workshop participation)

- September, 2016      Invited Distinguished Professor, University of Science and Technology, Hefei, China (invited visit for two weeks, giving a total of four lectures, one of them a “Plenary Lecture” open to the full university community)
- May, 2014              Invited lecture at the Institute for Study of the Earth’s Interior, Okayama University, Misasa, Japan; talk title: “Subduction-Zone Devolatilization and Element Mobility Elucidated by Study of HP/UHP Metamorphic rocks”
- March, 2014            Invited lecture at Lafayette College; talk title: “Metamorphism, Melting, Magmatism, and (Maybe) Mars: A Nitrogen Isotopic Perspective”
- September, 2012      Invited lecture at the Institute for Study of the Earth’s Interior, Okayama University, Misasa, Japan; talk title: “Storage and Cycling of Volatiles in the Deep Earth (Subduction Zones, Continental Crust)”

### Other Recent Professional Activities (last ten years only)

- 2022                    Co-chaired session for Fall AGU Meeting, in Chicago, Illinois (Subduction Top to Bottom (ST2B) — Origin and Evolution of Magmatic Arcs; co-chaired by Dave Scholl, Bob Stern, and Ikuko Wada; 32 abstracts)
- 2021                    Co-chaired session for Fall AGU Meeting, in New Orleans, Louisiana (Subduction Top to Bottom 2 (ST2B-2): Focus on the Forearc; co-chaired by Dave Scholl, Bob Stern, and Ikuko Wada; 66 abstracts)
- 2021                    Co-chaired session for the JpGU meeting in Chiba, Japan (Volatiles in the Earth – from Surface to Deep Mantle; co-chaired with Takeshi Hanyu, Hirochika Sumino, and Yuji Sano)
- 2020                    Co-chaired session for Fall AGU Meeting, in San Francisco, California (Subduction Top to Bottom 2 (ST2B-2): A Major Publication Venture Celebrating 20 Years of Subduction Zone Science; co-chaired by Dave Scholl, Bob Stern, Laura Wallace, and Philippe Agard; 31 abstracts)
- 2020                    Co-chaired session for the JpGU meeting in Chiba, Japan (Volatiles in the Earth – from Surface to Deep Mantle; co-chaired with Takeshi Hanyu, Hirochika Sumino, and Yuji Sano)
- 2019                    Co-chaired session for Fall AGU Meeting, in Washington, D.C. (Subduction Top to Bottom-2: Processes and Products, Modern and Ancient; co-chaired by Dave Scholl, Bob Stern, Laura Wallace, and Philippe Agard; 82 abstracts)
- 2019                    Co-chaired session, accepted for Annual GSA Meeting, in Phoenix, Arizona (Subduction Top to Bottom, Modern and Ancient; co-chaired by Dave Scholl, Bob Stern, and Laura Wallace)
- 2018                    Co-chaired session for Fall AGU Meeting, in Washington, D.C. (Subduction Top to Bottom-2; co-chaired by Dave Scholl, Bob Stern, Laura Wallace, and Philippe Agard; 87 abstracts)

- 2017 Co-chaired session for Fall AGU Meeting, in New Orleans (Subduction Top to Bottom, with a Caribbean Flavor; co-chaired by Dave Scholl, Bob Stern, and Philippe Agard; 73 abstracts)
- 2017 Co-chaired session for Annual GSA Meeting, in Seattle (Subduction Top to Bottom: Cascadia and Beyond; co-chaired by Dave Scholl, Bob Stern, Anne Trehu, Joan Gomberg, and Tom Sisson; 19 abstracts)
- 2016 Co-chaired session for Fall AGU Meeting, in San Francisco (Subduction Top to Bottom 2 (ST2B-2); co-chaired by Dave Scholl, Bob Stern, Laura Wallace, and Philippe Agard; 136 abstracts)
- 2017 Participant as Senior Scientist in GeoPRISMS/ExTerra/E-FIRE (PIRE/NSF-funded) field workshop in the Swiss and Italian Alps (July 24-August 19)
- 2014 Invited participant in ExTerra/GeoPRISMS lunch discussion at the Fall Meeting, American Geophysical Union, San Francisco, December 16, 2014
- 2013 Invitation to be a discussion leader for a Deep Carbon Observatory workshop on Tectonic Fluxes of Carbon (workshop leaders Jay Ague, Yale University, and Olivier Beyssac, CNRS IMPMC Paris), at Fall AGU Meeting, San Francisco, Dec. 8 (the DCO is funded by the Sloan Foundation; see <http://deepcarbon.net/>)
- 2013 Co-author of white paper for ExTerra (lead author Sarah Penniston-Dorland, University of Maryland), a part of GeoPRISMS aimed at encouraging study of exhumed metamorphic rocks representing ancient subduction, December, 2013; see <http://www.geoprisms.org/>)
- 2013 Involvement as sponsor of white paper for GeoPRISMS Planning Workshop (for study of metamorphic rocks at the New Zealand Primary Site, April 15-17, 2013; see <http://www.geoprisms.org/>)
- 2012 Participation in preparation of white paper for ExTerra: Understanding Convergent Margin Processes Through Studies of Exhumed Terranes (this document includes a description of a planned field trip to Santa Catalina Island to examine exposures of exhumed high-P/T metamorphic rocks). ExTerra is a part of the GeoPRISMS initiative (see <http://www.geoprisms.org/>).
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