

DOROTHY Z. OEHLER

ABBREVIATED CURRICULUM VITAE

EDUCATION

Ph. D. *cum laude*, Department of Earth, Planetary, and Space Sciences, University of California at Los Angeles (UCLA)

PROFESSIONAL EXPERIENCE

2016 - present *Senior Scientist* - Planetary Science Institute
2012 - 2016 *Participating Scientist* – MSL 1st Science Team
2003 - 2016 *Research Scientist* - Astromaterials Research and Exploration Science, Johnson Space Center
1977 - 2003 *Research/ Exploration Geologist* - Conoco Inc.; Conoco (UK) Ltd. (London); Intl. Petrol. Co's.

AWARDS and GRANTS

2012 Distinguished Alumna Award - Depart. Earth , Planetary, and Space Sciences, UCLA
2012 NASA - Mars Science Laboratory (MSL) - Participating Scientist Grant (4.5 yr) - PI
2008 ARES, JSC - Mission Enabling Science Grant (4 yr) - PI
2007 NASA - Exobiology Grant (3 yr) – Science PI
2006 NASA - NPP Program Senior Fellow (3 yr) - PI
2004 Visiting Scholar Award - Australian Center for Astrobiology
1973 Graduate Woman of the Year - UCLA
1967 Phi Beta Kappa

PROFESSIONAL ACTIVITIES

- *Co-Editor*: Martian Geological Enigmas, Elsevier, 2021
- *Co-Convener*: Mars Fluid Circulation, Fluid-Rock Interactions & Cryosphere, EPSC 2019
- *NASA ICE-SAG Invited Participant*, Jan. 2019.
- *Invited consultant*: Jacobs University, Dept. Earth and Planetary Science, Oct. 2017.
- *Invited Participant*: Keck Institute for Space Studies, Caltech - METHANE ON MARS, Invitation-only Workshop, June 2016.
- *Invited Presentation*: MARS EXPLORATION: Past, Present, Future. Dept. Physics, Univ. Houston, 2015.
- *Requested Review* of MARS-2020 Organic Contamination Panel Report, July, 2014.
- *Invited Presentation*: EXPLORATION OF MARS, Soc. Expl. Geophysicists, 2013.
- *Invited Presentation*: Concentration and Preservation of Organics, MSL Landing Site Working Group, 2010.
- *Invited Presentation*: Sediment Prediction through Basin Analysis, 1st Intl. Conf. Mars Sedimentology and Stratigraphy, 2010.
- *Invited Participant*: World Summit on Ancient Microscopic Fossils, Center for Study of Evolution and the Origin of Life, UCLA, 2008.
- *Keynote*: Bona fide biosignatures: Insights from combined NanoSIMS-SIMS, Goldschmidt, 2008.
- *Reviewer*: For Astrobiology, Icarus, EPSL, GRL, JGR

PEER-REVIEWED PUBLICATIONS

- Broz, P., **Oehler, D.** Mazzini, A., Hauber, E., Komatsu, G., Etiope, G., Curin, V. (2023). An overview of sedimentary volcanism on Mars. *Earth Surf. Dynam.* 11, 633-661. <https://doi.org/10.5194/esurf-11-633-2023>.
- Oehler, D. Z.**, Etiope, G. (2021). “Methane on Mars: Subsurface sourcing and conflicting atmospheric measurements,” Chapter 7 in *Mars Geological Enigmas: From the late Noachian Epoch to the Present-Day*, (eds. R. Soare, S. Conway, J.-P. Williams, D.Z. Oehler), Elsevier, pp. 149-174.
- Thornton, B. B., Etiope, G., Schwietzke, S., Milkov, A.V., Klusman, R.W., Judd, A., **Oehler, D. Z.** (2021). Conflicting estimates of natural geologic methane emissions. *Elementa Science of the Anthropocene* 9 (1): <https://doi.org/10.1525/elementa.2021.00031>.
- Etiope, G., **Oehler, D. Z.** (2019). Methane spikes, background seasonality and non-detections on Mars: A geological perspective. *Planetary and Space Science* 168, 52-61.
- Giuranna, M., S. Viscardy, F. Daerden, L. Neary, G. Etiope, **D. Oehler**, V. Formisano, A. Aronica, P. Wolkenberg, S. Aoki, A. Cardesín-Moinelo, J. Marín-Yaseli de la Parra, D. Merritt, M. Amoroso (2019). Independent confirmation of a methane spike on Mars and a source region east of Gale crater. *Nature Geoscience* 12, 326-332.
- Kozawa, T., Sugitani, K., **Oehler, D. Z.**, House, C. H., Saito I., Watanabe, T., Gotoh, T. (2018). [Early Archean planktonic mode of life: Implications from fluid dynamics of lenticular microfossils.](#) *Geobiology* 2018, 1-14.
- Soare, R. J., **Oehler, D. Z.**, Mischna, M. (2018). Prologue: Mariners’ Way: Beyond the Future to the Past. **In:** *Dynamic Mars: Recent and Current Landscape Evolution of the Red Planet*. R. Soare, S. J. Conway, S. M. Clifford (eds.), Elsevier.
- Yung, Y., L., Chen, P., Nealson, K., Atreya, S., Beckett, P., Blank, J., Ehlmann, B., Eiler, J., Etiope, G., G. Ferry, J. G., Forget, F., Gao, P., Hu, R., Kleinböhl, A., Klusman, R., Lefèvre, F., Miller, C., Mischna, M., Mumma, M., Newman, S., **Oehler, D.**, Okumura, M., Oremland, R., Orphan, V., Popa, R., Russell, M., Shen, L., Sherwood Lollar, B., Staehle, R., Stamenković, V., Templeton, A., C. Vandaale, A. C., Viscardy, S., Webster, C., Wennberg, P. O., Wong, M., Worden, J. (2018). Methane on Mars and Habitability: Challenges and Responses, *Astrobiology* 18 (10), doi: 0.1089/ast.2018.1917.
- Oehler, D. Z.**, Etiope, G. (2017). Methane Seepage on Mars: Where to look and why. *Astrobiology* 17 (12), 1233-1264.
- Oehler, D. Z.**, M. M. Walsh, K. Sugitani, M.-C. Liu, C. H. House (2017). Large and robust lenticular microorganisms on the young Earth. *Precambrian Research* 296, 112-119.

- Fairen, A. et al. (**D. Z. Oehler**, co-author). (2016). The Argyre Region as a Prime Target for in situ Astrobiological Exploration of Mars. *Astrobiology* 16 (2), 143-158.
- Oehler, D. Z.** et al. (2016). Origin and significance of decameter-scale polygons in the Lower Peace Vallis Fan of Gale Crater, Mars. *Icarus* 277, 56-72. (Periglacial features in Gale).
- Rubin, D. M. et al. (**D. Z. Oehler**, co-author). (2016). Fluidized sediment pipes in Gale crater, mars, and possible analogs in the middle Jurassic of Utah. *Geology*, doi:10.1130/G383391.
- Wiens, R. C. et al. (**D. Z. Oehler**, co-author). (2017). Centimeter to decimeter hollow concretions and voids in Gale Crater sediments, Mars. *Icarus* 289, 144-156.
- Grotzinger, J. P. et al. (**D. Z. Oehler**, co-author). (2014). Habitable Fluvio-Lacustrine Environment at Yellowknife Bay, Gale Crater, Mars. *Science* 343 (6169), doi: 10.1126/science.1242777.
- Nachon, M. et al., (**D. Z. Oehler**, co-author). (2014). Calcium sulfate veins characterized by ChemCam/Curiosity at Gale crater, Mars. *Journal Geophysical Research, Planets* 119 (9), 1991-2016.
- Oehler, D. Z.**, Cady, S. (2014). Biogenicity and Syngeneity of Organic Matter in Ancient Sedimentary Rocks: Recent advances in the search for evidence of past life. *Challenges* 5 (Special Issue: Challenges in Astrobiology), 260-283.
- Oehler, D. Z.** (2014). Giant Polygons (Mars). *Encyclopedia of Planetary Landforms*, Springer, 9 pp. DOI: 10.1007/978-1-4614-9213-9_173-1.
- Stack, K. M. et al., (**Oehler**, co-author). (2014). The Diagenetic Origin of Nodules and Hollow Nodules of the Sheepbed Member, Yellowknife Bay Formation, Gale Crater, Mars. *Journal Geophysical Research, Planets* 119 (7), 1637-1664.
- Allen, C. C., **Oehler, D. Z.**, Etiope, G., Van Rensbergen, P., Baciú, C., Feyzullayev, A., Martinelli, G., Tanaka, K., Van Rooij, D. (2013). Fluid expulsion in terrestrial sedimentary basins: A process providing potential analogs for giant polygons and mounds in the martian lowlands. *Icarus* 224, 424-432.
- House, C. H., **Oehler, D. Z.**, Sugitani, K., Mimura, K. (2013). Carbon isotopic analyses of ca. 3.0 Ga microstructures imply planktonic autotrophs inhabited Earth's early oceans. *Geology* 41, 651-654.
- Oehler, D. Z.** (2013). The enigmatic polygons of Mars. *The Planetary Report* 33 (3), 8-12.
- Oehler, D. Z.**, Allen, C. C. (2012). Focusing the Search for Biosignatures on Mars: Facies Prediction with an example from Acidalia Planitia. *SEPM Sp. Vol. 102, Sedimentary Geology of Mars*, 183-194.

- Oehler, D. Z.,** Allen, C. C. (2012). Giant polygons and mounds in the lowlands of Mars: Signatures of an ancient ocean? *Astrobiology* 12 (6), 601-615.
- Etiope, G., **Oehler, D. Z.,** Allen, C. C. (2011). Methane emissions from Earth's degassing: Implications for Mars. *Planetary and Space Science* 59, 182-195.
- Oehler, D. Z.,** Allen, C. C. (2010). Evidence for pervasive mud volcanism in Acidalia Planitia, Mars. *Icarus* 208 (2), 636-657.
- Oehler, D. Z.,** Robert, F. Walter, M. R., Sugitani, K., Meibom, A., Mostefaoui, S., Gibson, E. (2010). Diversity in the Archaean Biosphere: New Insights from NanoSIMS. *Astrobiology* 10, 413-424.
- Allen, C. C., **Oehler, D. Z.** (2008). A case for ancient springs in Arabia Terra, Mars. *Astrobiology* 8 (6), 1093-1112.
- Oehler, D. Z.,** et al. (2008). NanoSIMS Open a New Window for Deciphering Remnants of Ancient Organic Matter in Terrestrial & Extraterrestrial Samples, *in From Fossils to Astrobiology: Chap. 12*, (eds. Seckbach, Walsh), Springer, p. 3-23.
- Oehler, D. Z.,** Robert, F., Mostefaoui, S., Meibom, A., Selo, M., McKay, D. S. (2006). Chemical mapping of Proterozoic organic matter at sub-micron spatial resolution. *Astrobiology* 6, 838-850.
- Marshall, C. P., Mackenzie, K. L., Chen, J., **Oehler, D. Z.,** Logan, G. A., Walter, M. R. (2004). Microbes, Organic Matter and Ore Deposits, *Microbiology Australia* 25 (1): 36-38.
- Oehler, D. Z.,** Sternberg, B. K. (1984). Seepage-induced anomalies, "false" anomalies, and implications for electrical prospecting. *Amer. Assoc. Petrol. Geol. Bull.* 68, 1121-1145.
- Oehler, D. Z.,** Oehler, J. H., Stewart, A. J. (1979). Algal fossils from a late Precambrian, hypersaline lagoon. *Science* 205, 388-390.
- Oehler, D. Z.** (1978). Microflora of the middle Proterozoic Balbirini Dolomite (McArthur Group) of Australia. *Alcheringa* 2 (3), 269-309.
- Oehler, D. Z.** (1977). Pyrenoid-like structures in late Precambrian algae from the Bitter Springs Formation of Australia. *J. Paleontol.* 51, 885-901.
- Oehler, D. Z.,** Smith, J. W. (1977). Isotopic composition of reduced and oxidized carbon in early Archaean rocks from Isua, Greenland. *Precambrian Res.* 5, 221-228.
- Oehler, D. Z.** (1976). Transmission electron microscopy of organic microfossils from the late Precambrian Bitter Springs Formation of Australia: Techniques and survey of preserved ultrastructure. *J. Paleontol.* 50, 90-106.

Oehler, J. H., **Oehler, D. Z.**, Muir, M. D. (1976). On the significance of tetrahedral tetrads of Precambrian algal cells. *Origins of Life* 7, 259-267.

Walter, M. R., Oehler, J. H., **Oehler, D. Z.** (1976). Megascopic algae 1300 million years old from the Belt Supergroup, Montana: A reinterpretation of Walcott's Helminthoidichnites. *J. Paleontol.* 50, 872-881.

Oehler, D. Z., Schopf, J. W., Kvenvolden, K. A. (1972). Carbon isotopic studies of organic matter in Precambrian rocks. *Science* 175, 1246-1248.

SELECTED ABSTRACTS

Oehler, D. Z., Salvatore, M., Etiope, G., Allen, C. C. (2021). Focusing the search for organic biosignatures on Mars. *52nd LPSC, Abs. #1353*.

Boles, H. O., Williams, A. J., **Oehler, D.** (2021). Organics detection in ancient cratonic rocks with TMAH wet chemistry. *52nd LPSC, Abs. #1777*.

Oehler, D. Z., Allen, C. C., Osinski, G. R. (2020). Potential hot spring deposits in Vernal Crater, Mars: Exceptional candidates for future exploration. *51st LPSC, Abs. #1563*.

Oehler, D. Z., Etiope, G. (2019) (*Invited*). THE MARTIAN UNDERGROUND: Sites of potential methane generation, accumulation, and release. *AGU Annual Meeting, San Francisco. Abs. #512053*.

Viscardy, S., Daerden, F., Neary, L., Giuranna, M., Etiope, G., **Oehler, D. Z.** (2019). Searching for the most probable source locations of the methane detected by Curiosity and PFS in mid-June 2013. *9th International Conference on Mars. Abs. #6162*.

Oehler, D. Z., Etiope, G. (2018). Late Mars Methane. *Late Mars Workshop 2018, Abs. #5024*.

Viscardy, S., Daerden, F., Neary, L., Giuranna, M., Etiope, G., **Oehler, D. Z.** (2018). LOOKING FOR THE SOURCES OF METHANE ON MARS: statistical analysis of GCM simulations. *European Planetary Science Conference 2018, Berlin, Germany, EPSC Abstracts 12, EPSC2018-689, 2018*.

Rodriguez, J. A. P., Zarroca, M., Linares, R., Komatsu, G., **Oehler, D.**, Davila, A., Baker, V., Berman, D., Miyamoto, H. (2017). Detecting astrobiologically significant ocean floor sediments in the tsunami-battered coasts of Early Mars. *4th Conference on Early Mars: Geologic, Hydrologic, and Climatic Evolution and the Implications for Life, Abs. #3032*.

Oehler, D. Z., Fairén, A. G., Mangold, N., Hallet, B., Le Deit, L., Williams, A., Sletten, R., Martínez-Frías. (2016). Evidence for an ancient periglacial climate in Gale crater, Mars. *AGU Annual Meeting. San Francisco*.

Wiens, R. C. et al. (**Oehler**, co-author) (2015). Centimeter to Decimeter size spherical and cylindrical features in Gale crater sediments. *46th LPSC, Abs. #1249*.

Nachon, M. et al. (**Oehler**, co-author) (2015). Diagenetic features analyzed by ChemCam/Curiosity at Pahrump Hills, Gale crater, Mars. *46th LPSC, Abs. #1524*.

Oehler, D. Z., Walsh, M., Sugitani, K., House, C. H. (2014). SPINDLE-SHAPED MICROSTRUCTURES: Models for planktonic life forms on other worlds. *45th LPSC, Abs. #1254*.

Oehler, D. Z., Allen, C. C. (2014). MARTIAN OCEANS: Old Debate - New Insights. *8th Intl. Conference on Mars, Abs. #1139*.

Oehler, D. Z. (2013) (*Invited*). EXPLORATION OF MARS: Past, Present, and Future. *83rd Annual Meeting, Society of Exploration Geologists, Abs. #1463*.

Oehler, D. Z. (2013). A periglacial analog for landforms in Gale crater, Mars. *44th LPSC, Abs. #1322*.

Oehler, D. Z., Allen, C.C. (2013). New Support for hypotheses of an ancient ocean on Mars. *44th LPSC, Abs. #1162*.

Oehler, D. Z., Allen, C.C. (2012). Fluid expulsion, habitability, and the search for life on Mars. *43rd LPSC, Abs. #1044*.

Oehler, D. Z., Allen, C.C. (2011). Habitability of a large ghost crater in Chryse Planitia, Mars. *Exploring Mars Habitability, Lisbon, Portugal*.

Oehler, D. Z., Allen, C. C. (2011). THE SEARCH FOR BIOSIGNATURES ON MARS: Using predictive geology to optimize exploration targets. *42st LPSC, Abs. #1178*.

Oehler, D. Z., Allen, C. C. (2010) (*Invited*). SEDIMENT PREDICTION THROUGH BASIN ANALYSIS: An example from Acidalia Planitia. *1st Intl. Conf. Mars Sedimentol. & Stratigraph. Abs. #6069*.

Oehler, D. Z., Robert, F., Walter, M. R., Sugitani, K., Meibom, A., Mostefaoui, S., Gibson, E. K. (2010). DIVERSIFICATION IN THE ARCHEAN BIOSPHERE: Insights from NanoSIMS of microstructures in the Farrel Quartzite of Australia. *AbSciCon, Abs.#5002*.

Oehler, D. Z., Robert, F. Walter, M. R., Sugitani, K., Meibom, A., Mostefaoui, S., Gibson, E. et al. (2010). Biological diversity in the Archean: New results from NanoSIMS. *Goldschmidt Conference*.

Oehler, D. Z., Allen, C. C. (2010). Evidence for basinwide mud volcanism in Acidalia Planitia, Mars. *41st LPSC, Abs. # 1009*.

Oehler, D. Z., Allen, C. C. (2009). Mud volcanoes in the martian lowlands: Potential windows to fluid-rich samples from depth. *40th LPSC, Abs. #1034*.

Oehler, D. Z., Robert, F., Chaussidon, M., Gibson, E. K. (2008) (*Invited KEYNOTE*). Bona fide biosignatures: Insights from combined NanoSIMS-SIMS. *Goldschmidt Conference*.

Oehler, D. Z., Robert, F., Meibom, A., Mostefaoui, S., Selo, M., Walter, M. R., Sugitani, K., Allwood, A., Gibson, E. K. (2008). NanoSIMS sheds light on the origin and significance of early Archean organic microstructures from the Pilbara of Australia. *AbSciCon*.

Oehler, D. Z., Robert, F., Meibom, A., Mostefaoui, S., Selo, M., Walter, M.R., Sugitani, K., Allwood, A., Mimura, K., Gibson, E. K. (2008). Nano-scale biosignatures and the search for extraterrestrial life. *39th LPSC, Abs. #1303*.

Oehler, D. Z., Mostefaoui, S., Meibom, A., Selo, M., McKay, D. S., Robert, R. (2006). NanoSIMS reveals new structural & elemental signatures of early life. *AbSciCon [Astrobiology 6 (1): 222-223]*.

Oehler, D. Z., Walter, M. R. (2004). Proterozoic microfossils and their implications for recognizing life on Mars. *35th LPSC, Abs. # 1018*.