

MARJORIE A. CHAN

PRESENT ADDRESS:

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ACADEMIC POSITION (all at University of Utah, Dept. of Geology and Geophysics):

July 2019 to present – Distinguished Professor
July 1995 to present - Professor (Dept. Chair from 2002 to 2009)
July 1988 to June 1995 Assoc. Professor
July 1982 to June 1988 Asst. Professor
July 2019 to present – Assoc. Dean for External Relations, College of Mines and Earth Sciences

EDUCATION:

Ph.D. Geology, Dec 1982, University of Wisconsin-Madison Advisor: Dr. R. H. Dott, Jr.
B.S. Geology, June 1977, University of California-Davis

SUMMARY: Over her 38-year career at the University of Utah, Chan has had an active research program bringing national and international recognition to Utah geology. Her work has spanned the Precambrian up to the Pleistocene with recent research that applies terrestrial geology examples to better understand Martian geology. The breadth of her research also extends from basic sedimentology - stratigraphy and diagenesis, to geoconservation and geoheritage. She is a highly visible sedimentary scientist spotlighted in many research features as well as National Geographic and Discovery Channel documentary films. She was the 2014 Geological Society of America's Distinguished International Lecturer where she gave 53 lectures in 6 countries spanning India, New Zealand, Australia, China, Japan, and S. Korea. She still receives many invitations for guest lectures and keynote addresses around the world.

Her NASA science and outreach activities include: Endeavor 2016 “Dynamic Mars Webinars for K-12 teachers, Mars for Earthlings webinars and short courses, and development of teaching modules for higher ed instructors 2012-2016, and HiRISE field trip leader 2010, 2011, 2013.

Chan initiated and led major programs for women and diversity (e.g., GSA's highly successful “On to the Future” program), and participates in many other STEM outreach events and venues.

MAJOR CHAIR ACCOMPLISHMENTS: Departmental oversight for LEED-certified, award-winning Geology & Geophysics building (Sutton building), with educational high-impact visual displays. Many hail this as one of the most spectacular Earth science buildings in the country.

SELECT AWARDS/HONORS:

- **Geological Society of America (GSA)**
 - 2020 GSA Distinguished Service Award
 - 2019 GSA Sedimentary Division Sloss Award for lifetime achievements in sedimentary geology
 - 2016-2020 GSA Elected Councilor
 - 2014 GSA Distinguished International Lecturer (53 lectures in 6 countries)

- 2014-2015 GSA Sedimentary Division Chair
- 2011 GSA Bulletin Exceptional Reviewer
- 1997 GSA Elected Fellow
- **Utah Geological Association**
 - 2018 Hintze Award for Outstanding Contributions to Utah Geology
- **The National Academies-** U.S. National Committee for the International Union of Geological Sciences, 2017-2020 committee member
- **University of Utah**
 - 2019 Distinguished Professor
 - 2019. University of Utah – Celebrate U honoree for extraordinary faculty achievements (Marriott Library and Vice President for Research) for Utah Geology: from Earth to Mars
 - 2017 Beacon of Excellence Award for transformative undergraduate experiences (Sutton Building Award, for building & displays under Chan’s leadership)
 - 2006, 1995 Dept. Geology & Geophysics Outstanding Faculty Research Awards
 - 1994 Dept. Geology & Geophysics Outstanding Faculty Teaching Award
- **Invited Keynote Meeting Speaker:** (recent examples)
 - 2019 Society for Sedimentary Geology (SEPM) speaker- GSA NE Section meeting, ME
 - 2018 Argentine Meeting of Sedimentology Plenary speaker, General Roca, Río Negro
 - 2018 Society for Sedimentary Geology (SEPM) speaker- AAPG meeting, UT
 - 2014 International Sedimentology Congress Plenary speaker, Geneva, Switzerland
- **Center for Advanced Studies** 2018 Visiting Fellow, **University of Munich**, Germany
- **Tokyo Institute of Technology** Earth-Life Science Institute 2017 EON Visiting Researcher
- **University of Wisconsin** Geosciences Dept. Distinguished Alumni Award 2010
- **Quaternary Research** journal for the "Most Cited Article 2005 to 2010": Godsey, H.S., Currey, D. R. and Chan, M.A., 2005, on Pleistocene Lake Bonneville, Utah"
- **YWCA** 2009 Outstanding Achievement Award
- Sedimentary Geology, Time, Environment, Paleontology, Paleoclimatology, Energy (**STEPPE**) 2015 highlighted researcher
- **Society Sedimentary Geology (SEPM)**
 - 1991 SEPM Excellence of Presentation Award
 - 1981 SEPM Excellence of Presentation Award
- **NSF EarthCube** Leadership Council 2014-2016 (elected leader)
- **NSF-sponsored, award-winning video** 1997: "Women Who Walk Through Time"

SELECT RESEARCH RELATED FEATURES:

Participation and research features in Films/documentaries:

National Public Radio – Science Friday with Ira Flatow (2013)

National Geographic (4 features: 2007-2010), Discovery Channel (2 features: 1999, 2004)

Grand Staircase – Escalante National Monument “Ask the Experts” 2004

AAPG Search and Discovery live video June 2005

Inside Space Sci Fi Channel (episode #9506) “Water Planet Earth” 1995

KUED-Utah Now, 2009 Heidi Redd “My Ground” (Nature Conservancy land preservation)

Numerous research related news & internet/web articles

SELECT PROFESSIONAL PUBLICATIONS:

Career to date: 145 Professional Peer Review Publications, 2 Edited Professional Volumes

Career to date: 261 published abstracts, 2 outreach/educational videos (NSF funded)

- Chan**, M.A., Hasiotis, S.T., and Parrish, J.T., 2020, Hierarchical scales of soft-sediment deformation in erg deposits, Lower Jurassic Navajo Sandstone, Moab Area, Utah U.S.A.: *Journal of Sedimentary Research*, v. 90 p. 1068-1093. DOI: 10.2110/jsr.2020.57
- Wheatley*, D., *Hollingworth*, S. *Steele*, P., and **Chan**, M., 2020, Sedimentology, diagenesis, and reservoir characterization of the Permian White Rim Sandstone, southern Utah: Implications for carbon capture and sequestration potential: *AAPG Bull.* V. 106, p. 1357-1373.
- Parrish, J.T., Rasbury, E.T., **Chan**, M.A., and Hasiotis, S.T., 2019: Earliest Jurassic U-Pb ages from carbonate deposits in the lower part of the Navajo Sandstone, Southeastern Utah: *Geology* v. 47, p. 1015-1019; DOI: [10.1130/G46338.1](https://doi.org/10.1130/G46338.1)
- Chan**, M. A., Hinman, N. W., Potter-Mcintyre, S. L., Schubert, K. E., Gillams, R. J., Awramik, S. M., Boston, P. J., Bower, D. M., Des Marais, D. J., Farmer, J., Jia, T. Z., King, P. L., Hazen, R. M., Léveillé, R. J., Papineau, D., Rempfert, K. R., Sánchez-Román, M., Spear, J. R., Southam, G., Stern, J.C., and Cleaves, H. J., 2019, Deciphering Biosignatures in Planetary Contexts: *Astrobiology*, 19(9), p. 1075-1102. <https://doi.org/10.1089/ast.2018.1903>
- Wheatley*, D. F., **Chan**, M.A., and Okubo, C., 2019, Clastic Pipes and Mud Volcanism across Mars: Terrestrial Analog Evidence of Past Martian Groundwater and Subsurface Fluid Mobilization: *Icarus* v. 328. <https://doi.org/10.1016/j.icarus.2019.02.002>
- Parrish, J.T., Hyland, E.G., **Chan**, M.A., and Hasiotis, S.T., 2018, Stable and clumped isotopes in desert carbonate spring and lake deposits reveal palaeohydrology: A case study of the Lower Jurassic Navajo Sandstone, south-western USA: *Sedimentology* (21 p.). <https://doi.org/10.1111/sed.12540>
- Chan**, M.A., Hasiotis, S.T., and Parrish, J.T., 2019, Enigmatic clastic pipe swarms and implications for fluidization dynamics in eolian deposits: *Sedimentology* v. 66 p. 513-535. <https://doi.org/10.1111/sed.12491>
- Wheatley*, D. F., and **Chan**, M.A., 2018, Clastic pipes and soft-sediment deformation of the Jurassic Carmel Formation, Southern Utah U.S.A.: Implications for pipe formation mechanisms and host-rock controls: *Journal of Sedimentary Research* v. 88, p. 1076-1095. <https://doi.org/10.2110/jsr.2018.45>
- Chan**, M.A., and Kamola, D.L., 2017, Classic geologic outcrops: Preservation and future accessibility: *GSA Today*, v. 27, p. 4-5. DOI: 10.1130/GSATG343GW.1
- Parrish, J.T., Hasiotis, S.T., and **Chan**, M.A., 2017, Carbonate deposits in the Lower Jurassic Navajo Sandstone, Southern Utah and Northern Arizona: *Journal of Sedimentary Research* v. 87, p. 740-762. DOI: [dx.doi.org/10.2110/jsr.2017.42](https://doi.org/10.2110/jsr.2017.42)
- Young*, B.W., and **Chan**, M.A., 2017, Gypsum veins in Triassic Moenkopi mudrocks of southern Utah: Analogs to calcium sulfate veins on Mars: *Journal of Geophysical Research: Planets*: v. 122, p.150–171 DOI: 10.1002/2016JE005118
- Wiens, R., Rubin, D., Goetz, W., Fairen, A., Schwenzer, S., Johnson, J., Clark, B., Mangold, N., Milliken, R., Stack, K., Oehler, D., Rowland, S., **Chan**, M., Vaniman, D., Maurice, S., Gasnault, O., Rapin, W., Schroeder, S., Clegg, S., Forni, O., Blaney, D., Cousin, A., Payre, V., Fabre, C., Nachon, M., LeMouelic, S., Sautter, V., Johnstone, S., Calef, F., Vasavada, A., and Grotzinger, J., 2017, Centimeter to decimeter hollow concretions and voids in Gale crater sediments, Mars: *Icarus* v. 289, p. 144-156.
- Wheatley*, D. F., **Chan**, M.A., and Sprinkel, D., 2016, Clastic pipe characteristics and distributions throughout the Colorado Plateau: Implications for paleoenvironment and paleoseismic controls, *Sedimentary Geology Special Volume*, Elsevier. <http://dx.doi.org/10.1016/j.sedgeo.2016.03.027>

- Sato, T.*, and **Chan, M.A.**, 2015, Fluvial facies architecture and sequence stratigraphy of the Tertiary Duchesne River Formation, Uinta Basin, Utah, U.S.A.: *Journal Sedimentary Research*, v. 85, p. 1438-1454.
- Chan, M.A.**, 2015, The martian lake chronicles: Curiosity reveals evidence for ancient lakes on Mars: *Science* v. 350, p. 167.
- Gorenc, M.*, and **Chan, M.A.**, 2015, Hydrocarbon-induced diagenetic alteration of the Permian White Rim Sandstone; Elaterite Basin, Southeast Utah: *AAPG Bulletin* v. 99, p. 807-829.
- Reiners, P.W., **Chan, M.A.**, Evenson, N.S., 2014, (U-Th)/He geochronology and chemical compositions of diagenetic cement, concretions, and fracture-filling oxide minerals in Mesozoic sandstones of the Colorado Plateau: *GSA Bulletin* v. 126, p. 1363-1383.
- Chan, M.A.**, and Bruhn, R., 2014, Dynamic liquefaction of Jurassic sand dunes: Processes, origins, and implications: *Earth Surface Landforms and Processes*, v. 39, p. 1478-1491.
- Potter, S.L.*, Allen, J.L., Lee, S.Y, Han, W.S., **Chan, M.A.**, and McPherson, B.J., 2013, Iron precipitation in a natural CO₂ reservoir: Jurassic Navajo Sandstone in the northern San Rafael Swell, UT, USA: *Geofluids* v 13, p. 82-92.
- Chan, M.A.**, *Potter, S.L.*, Bowen, B.B., Petersen, E.U., Parry, W. T., Bowman, J.R., *Barge, L.*, and *Seiler, W.*, 2012, Characteristics of terrestrial ferric oxide concretions and implications for Mars, in Grotzinger, J. and Milliken, R., *Sedimentary geology of Mars: SEPM Special Publication 102*, p. 253-270.
- Potter, S.L.*, and **Chan, M.A.**, 2011, Iron mass transfer and fluid flow patterns in Jurassic Navajo Sandstone, southern Utah, U.S.A., *Geofluids* v. 11, p. 184-198.
- Potter, S. L.*, **Chan, M.A.**, Petersen, E.U., Dyar, M. D. and Sklute, E., 2011, Characterization of Navajo Sandstone concretions: Mars comparison and criteria for distinguishing diagenetic origins: *Earth and Planetary Science Letters* 301 p. 444-456. DOI: 10.1016/j.epsl.2010.11.027
- Chan, M.A.**, 2010, Innovations in the built environment for Earth Sciences: *GSA Today*, Groundwork article v. 20 p. 52-53.
- Chan, M.A.**, Ormo, J., Murchie, S., Okubo, C.H., Komatsu, G., Wray, J.J., McGuire, P., McGovern, J.A., and HiRISE team, 2010, Geomorphic knobs of Candor Chasma, Mars: New Mars Reconnaissance Orbiter data and comparisons to terrestrial analogs: *Icarus (Special Issue MRO/HiRISE Studies of Mars)* v. 205, p 138-153.
- Okubo, C.H., Schultz, R.A., **Chan, M.A.**, Komatsu, G., and HiRISE team, 2009, Deformation band clusters on Mars and Implications for Subsurface Fluid Flow: *Geological Society of America Bulletin* v. 121 no. 3-4 p. 474-482. DOI: 10.1130/B26421.1
- Chan, M. A.**, Yonkee, A., Netoff, D. I., *Seiler, W. M.*, and Ford, R. L., 2008, Polygonal cracks in bedrock on Earth and Mars: Implications for weathering: *Icarus*, v 194, p. 65-71. doi:10.1016/j.icarus.2007.09.026.
- Chan, M. A.**, Johnson, C. M., Beard, B.L., Bowman, J.R., and Parry, W.T., 2006, Iron isotopes constrain the pathways and formation mechanisms of terrestrial oxide concretions: A tool for tracing iron cycling on Mars?: *Geosphere*, v. 2, Issue 7p. 324-332.
- Beitler, B.*, Parry, W.T., and **Chan, M.A.**, 2005, Fingerprints of fluid flow: Chemical diagenetic history of the Jurassic Navajo Sandstone, southern Utah, USA: *Journal of Sedimentary Research*, v. 75, p. 545-559.
- Chan, M. A.**, *Beitler Bowen, B.*, Parry, W. T., Ormö, J. and Komatsu, G., 2005, Red Rock and Red Planet Diagenesis: Comparisons of Earth and Mars Concretions: *GSA Today* v. 15 n. 8, p. 4-10 (cover photo and feature article).
- Chan, M. A.**, Moser, K., *Davis, J.M.*, Southam, G., *Hughes, K.*, and Graham, T., 2005, Desert potholes: Ephemeral aquatic microsystems: *Aquatic geochemistry*, v. 11, p. 279-302.

- Godsey, H.S., Currey, D. R. and Chan, M.A., 2005, New evidence for an extended occupation of the Provo shoreline and implications for regional climate change, Pleistocene Lake Bonneville, Utah, USA: Quaternary Research v. 63, p. 212-223.*
- Chan, M. A., Beitle, B., Parry, W. T, Ormö, J. and Komatsu, G., 2004, A possible terrestrial analogue for hematite concretions on Mars: Nature v. 429, p. 731-734.**
- Chan, M. A., Parry, W. T., and Bowman, J. R., 2000, Diagenetic hematite and manganese oxides and fault-related fluid flow in Jurassic sandstones, southeastern Utah: American Association of Petroleum Geologists Bulletin, v. 84, p. 1281-1310.**
- Chan, M. A., and Archer, A. W., 1999, Spectral analysis of eolian foreset periodicities: Implications for Jurassic decadal-scale paleoclimatic oscillators: Palaeoclimates, v. 3(4) p. 239-255.**
- Alvarez, W., *Staley, E., O'Connor, D., and Chan, M.A., 1998, Synsedimentary deformation in the Jurassic of southeastern Utah — A case of impact shaking?: Geology v. 26, p. 579-582.*
- Sonett, C. P., Kvale, E. P., Zakharian, A., and **Chan, M. A., 1996, Late Proterozoic and Paleozoic tides, retreat of the moon, and rotation of the earth: Science v. 273, p. 100-104.**

PROFESSIONAL/HONORARY SOCIETIES:

Geological Society of America (Elected Fellow) American Geophysical Union
Society for Sedimentary Geology Utah Geological Association
International Association of Sedimentologists American Association of Petroleum Geologists

RECENT GRANTS: NSF, NASA, DOE - Dept of Energy, and many others

INVITED LECTURES/SPEAKING ENGAGEMENTS:

Nearly 200 over career, national and internationally

NUMEROUS SOCIETY/COMMITTEE SERVICE AND PROFESSIONAL ACTIVITIES

Includes many activities with multiple organizations/groups (GSA, U.S. National Academies of Sciences, SEPM, AAPG, NASA, NSF- Earth Cube, SACNAS, EGU, AWG, UGS, others), and university/department committee reviews, multiple subdiscipline journal reviews, proposal reviews, etc.

Many University of Utah committees, College of Mines & Earth Sciences committees, and Dept. of Geology & Geophysics committees.

Student committees, Global Change and Sustainability Center (GCSC) and Undergraduate Research Opportunities Program

TEACHING

Many introductory and majors/core classes (sedimentary geology) and advanced/graduate courses