

# ERIC F. DOEHNE, PH.D.

## Education

Ph.D. in Geology, 1994, University of California, Davis

M.S. in Geology, 1987, University of California, Davis

B.S. in Geology, 1984, Haverford College, Haverford, Pennsylvania

## Areas of Expertise & Research Interests

### Stone Conservation, Weathering and Change

- Weathering of stone, formation of patinas, and stone conservation
- Salinization, climate change and salt weathering
- Condition of World Heritage sites as an metric for adaptation to climate change

### Art Conservation, Art Forensics & Crime, Materials Science, History of Technology

- Scientific Methods for Authentication of Art; Connecting Forgery, Looting and Tourism
- Science for Preservation: Art, Architecture, Archaeology, and Archives
- Science and history of pigments, glass, ceramics and stone
- Coral Red, Han Purple, Cochineal and Maya Blue

### Computational & Analytical Imaging, Measuring Change, Electron Microscopy

- ESEM-EDS, FIB, EPMA, PLM, Hyperspectral and Time-Lapse Methods
- Low-cost techniques to measure changes to historic materials (3D, RTI)
- Measuring change in world heritage using crowd sourcing

## Contact Information

### Eric Doehne

1689 Walworth Ave  
Pasadena, California 91104  
[Eric@ConservationSciences.org](mailto:Eric@ConservationSciences.org)  
+1.626.755.6705 Mobile

[www.ConservationSciences.org](http://www.ConservationSciences.org)  
<http://www.ScrippsCollege.edu/eric-doehne>  
[Interdisciplinary Courses in Art Conservation](#)  
[EDoehne@ScrippsCollege.edu](mailto:EDoehne@ScrippsCollege.edu)

### Social Media and Dissemination

Profiles on [Mendeley](#) and [Zotero](#)  
Public groups on [Mendeley](#)

Eric Doehne profile at [ResearchGate.net](#),  
[Google Scholar](#), [Academia.edu](#), and [LinkedIn](#)

## Experience

**Principal Consultant and Expert Witness:** Conservation Sciences, Pasadena, California, May 2010 to Present. International consultancy providing materials science applied to art, archaeology, architecture and archives. Clients include: The Alamo, San Antonio, TX; The Huntington Library, Art Collections and Botanic Gardens; The Getty Conservation Institute; English Heritage; Occidental College; Galveston Historical Foundation; American Research Center in Egypt (ARCE); Expert witness-salt damage to stone and concrete; Art Forensics Analysis, and others.

**O'Brien Distinguished Visiting Professor and Lecturer in Art Conservation** at Scripps College, Claremont, CA, January 2011 to Present (ARCN 101, ARCN 115, ARCN 110, ARCN 120, ARCN 125, ARCN 170). First undergraduate art conservation major on the West coast. Developed and now teach six interdisciplinary courses with an emphasis on applied science, material culture and legacy.

**International Chair for Cultural Heritage Conservation, 2011-2012:** PATRIMA: « L'avenir d'un patrimoine vulnérable : détecter, évaluer, prévoir » (*The future of a vulnerable heritage: identify, assess, plan*). University Cergy Pontoise. Invited by the Foundation for Cultural Heritage Science to participate in a new teaching and research program with the Louvre, Versailles, and partners [June 2011, October 2011, and January-June 2012]. Held expert meetings on measuring damage to heritage, climate change and heritage, and taught three short courses for PATRIMA graduate students, and performed research on measuring change.

**Scientist**, The Getty Conservation Institute, The Getty Center, Los Angeles July 1988 to April 2010. Summary: Conservation Scientist responsible for research, teaching and fieldwork in the area of inorganic materials, such as stone, glass, pigments and ceramics, as well as analytical support for the J. Paul Getty Museum. Worked with scientists, engineers and architects to help design laboratory facilities for the Getty Center. Using expertise in electron microscopy, geochemistry, and analytical imaging, characterized a diverse range of heritage materials, including samples from the Sistine Chapel, the Dead Sea scrolls, paintings from Audubon to Van Gogh, The Getty Kouros, Chumash Rock Art, and York Minster. Project work included: Desalination (EC), Magnesian Limestone (EH), Salt Research, Great Sphinx, Maya Initiative, Values of Heritage, First Photo, Poultice Workshop, Laetoli Footprints Preservation of Porous Calcareous Stone, Tomb of Nefertari, Analytical Imaging, and the Athenian Pottery Project.

*1999-2010: Project Manager and PI – Desalination Project, Magnesium Limestone Project, Electron Microscopy Laboratory, Salt Research Project, and others. Field research focused on the preservation of archeological sites, monuments and architecture, including the problems of salt-laden buildings: Howden Minster in Yorkshire; Madame John's Legacy in New Orleans; 19<sup>th</sup> Century masonry buildings in Adelaide, Australia; and the Hieroglyphic Stairway, Copán, Honduras. Laboratory research has focused on characterization and behavior of inorganic materials and the development of innovative techniques such as ESEM, field and laboratory-based time-lapse methods. This body of work has identified the key factors in important damage mechanisms that affect ancient and historic building materials, and has aided efforts in preventive conservation. Research using focused ion beam-STEM and ESEM methods has determined the origin and structure of Coral Red on Ancient Greek vases and the Maya Blue pigment. Multi-spectral imaging was used as a non-destructive method to read obscured inscriptions. Purchased FEI XL30 ESEM-FEG and large area SSD/EDS for materials experiments and nondestructive analysis.*

Undertook collaborative research projects with Dr. Leo Pel, Eindhoven University of Technology (TU/e), The Netherlands; Professor George Scherer, Princeton University; conservator Sarah Pinchin, English Heritage, UK; Professor Rosa Maria Espinosa-Marzal, University of Illinois at Urbana-Champaign. Supervised postdoctoral researcher Paula Lopez-Arce, Getty Interns Tiziana Lombardo, Enrica Balboni and Ph.D. student Carl Grimm, from the University of Delaware.

1992-1998: *Project Scientist* – team member for field projects on the Laetoli Footprints, Tanzania; and the site of Xunantunich, Belize. *Project Manager and PI*: Preservation of Calcareous Materials Project, Electron Microscopy Laboratory. Developed decay studies and technology for analysis of inorganic materials, especially the effect of salts in limestone. Invented new method for X-ray correction in ESEM/EDS and helped develop time-lapse methods for studying decay mechanism kinetics. Created specifications for specialized laboratories at the Getty Center in collaboration with scientists, engineers and architects. Purchased EPMA (modified Cameca SX100 replaces JEOL-733). Collaborations with postdoctoral research fellows Blythe McCarthy, Carlos Rodríguez Navarro and M.S. students Alison Sawdy, Adrian Heritage, and Eric Lange.

1988-1992: *Project Scientist* – team member for the analysis of wall painting pigments, Queen Nefertari's tomb; decay and source of stone sculptures in La Paz and Tiwanaku, Bolivia; Characterization of Paphos Mosaics, characterization of the weathering of ancient surfaces in Greek and Roman marble quarries. *Project Manager and PI*: The Getty Kouros Project, Marble Weathering Project: Collaborations with Stanley V. Margolis, Norman Herz, Don DePaolo, Vincent Barbin and Antony Kozelj on ancient quarry surfaces, patinas and the development of oxalate and calcite crusts, and formation of microtravertine layers. Purchased the fourth Environmental SEM (1989 ElectroScan model E3 ESEM), developed related research program on *in situ* and *in tempo* experiments, and nondestructive analysis.

**Research Assistant**, Nuclear Chemistry Department, Lawrence Livermore National Laboratory, Livermore, California. October 1989 - January 1991 (part time), Developed methods for trace element analyses by inductively coupled plasma mass spectrometry related to K/T boundary geochemistry research.

**Electron Microprobe Specialist**, University of California at Davis, Department of Geology, 1987-1988. Responsible for performing service work with outside clients, routine maintenance & troubleshooting, training of users, teaching a laboratory course in electron microscopy, XRF, and XRD.

**Teaching Assistant**, University of California at Davis, Department of Geology, 1985-1988. Taught classes and laboratories in Geochemistry, Planetary Geology, Sedimentology-Stratigraphy, Sedimentary Petrology, Oceanography and Introduction to Geology. Organized geology field trips.

**Research Assistant** at University of California, Davis Geology Department, 1984-1988. Evaluated the petrology and diagenesis of Cretaceous sediments, using a variety of analytical techniques. Performed SEM, Microprobe, PLM, XRD, XRF, PIXIE, and ICP-MS analysis of archaeological material and weathered stone.

## Teaching Experience

**Visiting Professor and Lecturer, Art Conservation**, Scripps College, Claremont, California. Created and taught six new interdisciplinary semester courses that bring together science and art, history and legacy including ARCN 115 *Art and Crime: Plunder, Fakes, and Forensics* (Fall 2014), ARCN 101 *Intro to Art Conservation* (Spring 2011; Fall 2012), ARCN 110 *Artists' Materials and Technologies—Ancient and Modern* (Fall 2011, Fall 2013), and ARCN 120 *Global Tourism, Climate Change and World Heritage Preservation* (Fall 2011, Fall 2015); ARCN 125 *Preserving Cultural Landscapes* (Spring 2016); and ARCN 170 *Capturing Art: Digital Preservation and Analysis in 100 Objects* (planned for Fall 2016).

Regular **guest lecturer** for USC Conservation Course: Arch 551, *Conservation Methods and Materials*, Masters in Historic Preservation Program.

**Lecturer** for Master-Doctorate Course: *Global Change and Risks to Cultural Heritage*, Centre de Recherche et de Restauration des Musées de France, Palais du Louvre, Paris, 10-14 Sept 2012, EUR-OPA Major Hazards Agreement, UCP, Centro Universitario Europeo per i Beni Culturali.

**Organizer and Lecturer** for Field Course, May 2010. *Poultice Desalination of Porous Building Materials*, New Orleans, sponsored by The Getty Conservation Institute and the European Commission Desalination Project.

**Lecturer** for Luxor Field Course, USAID-American Research Center in Egypt (ARCE). January 2010. Stone conservation, analysis and treatment of salts at Karnak Temple, Luxor

**Lecturer** for *The International Centre for the Study of the Preservation and Restoration of Cultural Property* in Rome (ICCROM-UNESCO). Venice Stone Conservation Course, May 2009 (Salt Weathering and Treatment)

**Guest lecturer** at UCLA for Materials Science course M213: *Deterioration and Conservation of In-Situ Archaeological and Cultural Materials*, Program in Archaeological Objects Conservation.

**Getty Conservation Institute:** 1) Extensive media experience and familiarity communicating on a wide range of levels and topics with visiting journalists, chemists, architects, curators, historians, archeologists, material scientists, engineers, students, interns, and the interested public about, scientific research projects, the Getty and partners in industry, universities and government. 2) Gave regular training seminars to Getty Museum docents about the geology, geography and natural history of the Getty Center and Getty Villa sites. 3) Organized and presented a daylong workshop in the science of imaging and computational photography to GCI professional staff, including scientists, architects and conservators.

**Teaching Assistant**, University of California at Davis, Department of Geology, 1985–1988  
Taught classes and laboratories in Geochemistry, Planetary Geology, Sedimentology-Stratigraphy, Sedimentary Petrology, Oceanography and Introduction to Geology. Responsible for teaching sedimentary petrology, microprobe/geochemistry, and sedimentology labs. Organized geology field trips for undergraduate labs.

## Affiliations and Professional Service

Microbeam Analysis Society/Microscopy Society of America

Presidential Speaker: 1998, 2001

Symposium Organizer: 1999, 2000, and 2005

Geological Society of America

American Geophysical Union

ICOMOS: International Council on Monuments and Sites

ASMOSIA: Association for the Study of Marble and Other Stones used in Antiquity

Association for Preservation Technology, Western Chapter

Reviews in Conservation Journal, Editorial Advisory Board (2000-2004)

Journal *Scanning*, Editorial Board Member (2006-2010)

Symposium Organizer: *Scanning* 2007

Reviewer for: *Journal of Applied Physics*, *Environmental Earth Sciences*, *Applied Geochemistry*, *Microscopy and Microanalysis*, *Micron*, *Journal of the American Institute for Conservation*, *Applied Surface Science*, *Studies in Conservation*, *Journal of Archaeological Science*, *Materials Characterization*, and others.

*International Congress on Deterioration and Conservation of Stone*, 2008-2016, Permanent Scientific Committee, Torun and New York.

*Heritage, Weathering and Conservation Congress*, Scientific Committee [Madrid, 2006]

*International Symposium on Stone Consolidation in Cultural Heritage—Research and Practice*, Scientific Committee [Lisbon, May 2008].

External Examiner, PhD Programs: Eindhoven University of Technology (TU/e), The Netherlands, University of Delaware; University of Technology, Sydney; University of Cergy Pontoise

Verdugo Young Musicians Association (VYMA.org), Board Member (2011-2014), Pasadena/Glendale. Grant writing and coaching professional staff.

*US-Africa Materials Institute*, Princeton University: Advisory Board

## Most Cited Research

Stone Conservation: An Overview of Current Research, 2<sup>nd</sup> Edition (book cited by 286), **Eric Doehne & Clifford Price**, 2010, The Getty Conservation Institute, Los Angeles, CA, November 2010. [PDF](#).

Salt weathering: A selective review (cited by 98), **Doehne, E.** 2002 *Geological Society Special Publication* (205), p. 51-64. [PDF](#).

How does sodium sulfate crystallize? Implications for the decay and testing of building materials (cited by 193), Rodriguez-Navarro, C. and **Doehne, E.** 2000 *Cement and Concrete Research* 30 (10), p. 1527-1534. [PDF](#).

Origins of honeycomb weathering: the role of salts and wind (cited by 52), C. Rodriguez-Navarro, **E. Doehne**, E. Sebastian 1999 *Geological Society of America Bulletin* 111 (8), 1250-1255. [PDF](#).

Salt weathering: Influence of evaporation rate, supersaturation and crystallization pattern (cited by 340), Rodriguez-Navarro, C. & **Doehne, E.** 1999 *Earth Surface Processes and Landforms* 24(2-3), 191-209. [Link](#).

A new correction method for high-resolution energy-dispersive x-ray analyses in the environmental scanning electron microscope (cited by 53), **Doehne, E.** 1997 *Scanning Journal* 19 (2), 75-78. [Link](#).

Carbon and oxygen isotope stratigraphy of the Upper Maastrichtian, Zumaya, Spain: a record of oceanographic and biologic changes at the end of the Cretaceous Period (cited by 48), J.F. Mount, S.V. Margolis, W. Showers, P. Ward, & **E. Doehne**, 1986, *Palaaios* 1(1), 87-92. [Link](#).

## Representative Public Outreach and Media Citations

Featured in the article "*The Artful Science*" Scripps Magazine, Spring 2012 special issue: Small College, Large Canvas : Art at Scripps.

Exhibit: Convergence of Art and Science

Art Conservation: The New Major and the Future of the Past at the Clark Humanities Museum, Scripps College, Oct 3-Nov 4th 2011.

Quoted in the **New York Times** June 24, 2008, in the article entitled, "Microbes Eating Away at Pieces of History"

Appeared as a subject matter expert in the two-hour documentary film "Life After People," which recorded ~8 million viewers when it debuted on the **History Channel** in January 2008, was nominated for three Emmys, and has been made into a 10-part series in 2009. In 2011, appeared as a subject matter expert in the History Channel documentary, *Civilization Lost* and in 2012 for **National Geographic's America's National Treasures**.

Exhibit: Natural Order - Art, Science and The Clarity of Mud, West Dean College, UK, The work of Eric Doehne, Kathleen Fox, Alison Milner & Steve Speller, 28 April - 17 June 2007

Quoted in ScienceMag.org 2005 article, "Salt packs a punch"

Profiled in the Los Angeles Times, March 17, 1997 "Cutting Edge Special: What's the Way a Sphinx Crumbles?"

Author of: Travertine Stone at the Getty Center; a popular look at a famous stone, 1996.

Visual Experiments – Time-lapse and ESEM Clips: Electron Microscopy Project and Salt Research Project, kinetics and behavior: Sodium Chloride deliquescence (ESEM); Sodium Nitrate (ESEM), Sodium Chloride (macro with wind); Sodium Sulfate damage to Bath limestone (20% solution); Sodium Sulfate damage to limestone (detail); Field time-lapse of stone surface loss due to magnesium sulfate crystallization; Special thanks to Tiziana Lombardo and David Carson.

## Management Experience

Principal scientific investigator on a wide range of scientific research projects and components, including applied research into the weathering and conservation of stone, such as the scientific investigation of the deterioration of the Hieroglyphic Stairway, Copán, Honduras. Supervised the activity of up to seven researchers and technicians.

Project Manager for the Preservation of Porous Calcareous Materials project at the Getty (six team members, with two consultants), and the Salt Research Project, with a consultant, research fellow, technician and other staff. Project manager for the GCI's Magnesium Limestone Project, the Desalination Project, and co-organizer for the Desalination Workshop.

Laboratory manager, supporting projects and visiting scientists with microanalytical and imaging tools: Environmental SEM, Electron Microprobe, Polarized Light Microscopy, hyperspectral imaging and RTI.

## Technical Expertise

Environmental SEM, Electron Microprobe, Polarized Light Microscopy, RTI.

Stable Isotope Analysis, Inductively Coupled Plasma-Mass Spectrometry, XRF, XRD, and Digital Image Analysis (DIA). Developed a time-lapse system for dynamic experiments and field use.

Co-developer of a gaseous backscattered electron detector for the Environmental SEM with Ralph Knowles, FEI; beta tester for ESEM *wet-STEM* system, Ellen Baken, FEI; Project member: NIST-MAS-AMAS Roadmap for Variable Pressure Scanning Electron Microscopy/Environmental Scanning Electron Microscopy.

Developer of a new X-ray correction method for energy dispersive X-ray analysis in Environmental SEM (ESEM-EDS). The “Doehne Method” uses X-ray spectra taken at different pressures, extrapolating to a zero pressure spectrum to exclude X-ray events produced by scattered electrons.

## Books

**Eric Doehne** & Clifford Price, 2010, *Stone Conservation: An Overview of Current Research, 2<sup>nd</sup> Edition*, The Getty Conservation Institute, Los Angeles, CA, 175 p. [http://www.getty.edu/conservation/publications\\_resources/books/stone\\_conservation\\_overview\\_current\\_research.html](http://www.getty.edu/conservation/publications_resources/books/stone_conservation_overview_current_research.html)

Eric Doehne (2016) *A Field Guide to the Art and Science of Heritage and Legacy*

## Publications

See [ResearchGate.net](https://www.researchgate.net), [Adademia.edu](https://www.adademia.edu) for DOI and PDFs

1. Wensen Ma., Oliver Cossairt, Xiang Huang, Marc Walton, Greg Bearman, and **Eric Doehne**, 2015, Crowd-sourced Mobile Phone Images for Heritage Conservation Monitoring, Digital Heritage 2015 Conference, Granada, Spain. [Link](#).
2. Marc Walton, Oliver Cossairt, Xiang Huang, Nathan Matsuda, Harriet Stratis, Mary Broadway, Jack Tumblin, Greg Bearman, **Eric Doehne** and Aggelos Katsaggelos, 2015, Surface Shape Studies of the Art of Paul Gauguin, Digital Heritage 2015, Granada, Spain. [Link](#).
3. Marcello Manfredi, Greg Bearman, Greg Williamson, Dale Kronkright, **Eric Doehne**, Megan Jacobs, Emilio Marengo, 2014, A new quantitative method for the non-invasive documentation of morphological damage in paintings using RTI surface normals, *Sensors (Basel, Switzerland)*, 14(7), 12271-12284. [Link](#).
4. Bearman, Gregory, **Eric Doehne**, Dale Kronkright, and Marcello Manfredi. 2014. RTI Surface Normal Calibration with a 3D Printed Spatial Target : Turning Images into Data. Research Report. [Link](#).
5. Marcello Manfredi, Greg Williamson, Dale Kronkright, **Eric Doehne**, Megan Jacobs, Emilio Marengo, Greg Bearman. Measuring Changes in Cultural Heritage Objects with Reflectance Transformation Imaging, Digital Heritage 2013 Conferencer, Oct 28-Nov 1, Marseille, France - IEEE - DOI: 10.1109/DigitalHeritage.2013.6743730 [Link](#).
6. Greg Bearman, **Eric Doehne**, Luther Beegle, William Hug, Ray Reid, Rohit Bhartia, 2013, Remote Detection of Biofilms on Stone. *In* Built Heritage 2013 - Monitoring Conservation Management. Edited by: Lucia Toniolo and Maurizio Boriani. The Center for the Conservation and Promotion of Cultural Heritage Milan: Politecnico di Milano. [Link](#).
7. Gregory Bearman, **Eric Doehne**, Jon Voss, Kim Merrill, Rohitashwa Bagaria,

- 2013, Citizen Science and Mobile Phone Cameras as Tools for Monitoring World Heritage. *In* Built Heritage 2013 -Monitoring Conservation Management. Edited by: Lucia Toniolo and Maurizio Boriani. The Center for the Conservation and Promotion of Cultural Heritage Milan: Politecnico di Milano. [Link](#).
8. Mélanie Denecker, Ronan Hébert, Ann Bourgés, Beatriz Menendez, **Eric Doehne**, 2012, Mirabilite and heptahydrate characterization from infrared microscopy and thermal data, Proceedings, 12th International Congress on the Deterioration and Conservation of Stone, Columbia University, New York, NY. October 22-26, 10 p. [PDF](#).
  9. Hébert R., Angeli M., **Doehne E.** and Dochez S., 2012, Recording of the thermal evolution of limestones undergoing experimental accelerated ageing tests. Proceedings, 12th International Congress on the Deterioration and Conservation of Stone, Columbia University, New York, NY. October 22-26, 11 p. [PDF](#).
  10. Balboni, E., Espinosa-Marzal, R.M., **Doehne, E.**, Scherer, G.W., 2010, Can drying and re-wetting of magnesium sulfate salts lead to damage of stone? *Environmental Earth Sciences*, 63(7-8), 1463-1473, [Link](#).
  11. Walton, M. S., **Doehne, E.**, Trentelman, K., Chiari, G, Maish, J. and Buxbaum, A. 2009. Characterization of coral red slips on Greek Attic pottery. *Archaeometry* 51(3), 383-396. [Link](#).
  12. Lopez-Arce, P., Garcia-Guinea, J., Benavente, D., Tormo, L., and **Doehne, E.**, 2009, Deterioration of dolostone by magnesium sulphate salt: An example of incompatible building materials at Bonaval Monastery, Spain: *Construction and Building Materials*, 23 (2), 846-855. [Link](#).
  13. **Doehne, E.**, Schiro, M., Roby, T., Chiari, G., Lambousy, G., and Knight, H., 2008, Evaluation of poultice desalination process at Madame Johns' Legacy, New Orleans, *in* Lukaszewicz, J., and Niemcewicz, P., eds., Proc. 11th Int. Cong. on Deterioration and Conservation of Stone, Volume 2: Torun, Nicolaus Copernicus University Press, 857-864. [Link](#).
  14. **Doehne, E.**, and Pinchin, S., 2008, Time-lapse macro-imaging in the field: Monitoring rapid flaking of magnesian limestone, *in* Lukaszewicz, J., and Niemcewicz, P., eds., Proc. 11th Int. Cong. on Deterioration and Conservation of Stone, 2008, Volume 1: Torun, Nicolaus Copernicus University Press, 365-372. [Link](#).
  15. Walton, M. S., **Doehne, E.**, Trentelman, K. and Chiari, G. 2008, A preliminary investigation of coral-red glosses found on attic Greek pottery, *In: Papers on special techniques in Athenian vases: proceedings of a symposium held in connection with the exhibition The colors of clay: special techniques in Athenian vases, at the Getty Villa, June 15-17, 2006*, Edited by: Kenneth Lapatin. Los Angeles: J. Paul Getty Museum. 95-104.
  16. Odgers, D., Pinchin, S., Martin, B., Wood, C., Curteis, T., **Doehne, E.**, Chiari, G., Teutonico, J., and Bourges, A., 2008, Investigations into Decay Mechanisms of Magnesian Limestone at the Chapter House, Howden Minster, *in* Lukaszewicz, J., and Niemcewicz, P., eds., Proc. 11th Int. Cong. on Deterioration and Conservation of Stone, 2008, Volume 1: Torun, Nicolaus Copernicus University Press. 211-221. [PDF](#).
  17. Pinchin, S.E., Curteis, T., Odgers, D., and **Doehne, E.**, 2008, Understanding the Decay of 14th Century Magnesian Limestone Carvings in Yorkshire, UK, Art2008: Jerusalem. [www.ndt.net](http://www.ndt.net) [PDF](#).



18. Sikka, S., Selwitz, C., **Doehne, E.**, Chiari, G., and Khanjian, H., 2008, Qualitative and quantitative methods of detection of calcium oxalate deposits on treated limestone and marble. Proceedings of the International Symposium Stone consolidation in cultural heritage research and practice: Lisbon, Portugal. 445-454.
19. Chiari, G., Giustetto, R., Druzik, J., **Doehne, E.**, and Ricchiardi, G., 2008, Pre-Columbian nanotechnology: Reconciling the mysteries of the Maya blue pigment: *Applied Physics A: Materials Science and Processing*, 90, 3-7. [Link](#).
20. Lopez-Arce, P., **Doehne, E.** Hanna, S. Martin, W. and Pinchin S. 2008, Magnesium sulfate salts on historic building materials: Experimental simulation of limestone flaking associated with relative humidity cycling and crystallization of salts, *Materials and Construction*, 58, 125-142. [Link](#).
21. Lopez-Arce, P., **Doehne, E.**, Young, D., Greenshields, J. and Benavente, D. 2008, Historic and current treatment of rising damp and salt decay: The historic masonry buildings in Adelaide, South Australia, *Materials and Structures*, 42(6), 827-848. [PDF](#). [Link](#).
22. GCI (*Eric Doehne-materials and decay mechanism section*), 2006, The hieroglyphic stairway of Copan, Honduras : study results and conservation proposals : a project report Los Angeles; Tegucigalpa: The Getty Conservation Institute; Instituto Hondureño de Antropología e Historia. [Link](#).
23. **Doehne, E.**, Selwitz, C. and Carson, D., 2006, The Damage Mechanism of Sodium Sulfate in Porous Stone. *Proceedings of the ARCCHIP Workshop ARIADNE 13: Problems of Salts in Masonry; "SALTeXPert", Prague, November 2002. ARCCHIP 13, Volume* 5, ITAM, Stefan Simon and Milos Drdacky, eds. 147-166. [PDF](#).
24. Stefan Simon and **Eric Doehne**, 2006 "Summary of Group Discussions" chapter in *Proceedings of the ARCCHIP Workshop ARIADNE 13: Problems of Salts in Masonry; "SALTeXPert", Prague, November 2002. ARCCHIP 13, Volume 5, 9-13*. Co-organized by The Getty Conservation Institute, Los Angeles and ITAM Institute of Theoretical and Applied Mechanics, Prague. [PDF](#).
25. Stefan Simon and **Eric Doehne**, 2002 "Summary of Proceedings" chapter in *Proceedings of the ARCCHIP Workshop ARIADNE 13: Problems of Salts in Masonry; "SALTeXPert", Prague, November 2002. ARCCHIP 13, Volume 5, 15-20*, Co-organized by The Getty Conservation Institute, Los Angeles and ITAM Institute of Theoretical and Applied Mechanics, Prague. [PDF](#).
26. Preusser, F. Maekawa, S., **Doehne, E.** and Selwitz, C. "The GCI/EAO Environmental Monitoring Program at the Great Sphinx of Giza: Results and Interpretation." In *The World of Ancient Egypt. Essays in Honor of Ahmed Abd el-Qader el-Sawi*, p. 217-224. Preface, Zahi Hawass. Edited by Khaled Daoud and Sawsan Abd el-Fatah. Supplément aux Annales du Service des Antiquités de l'Egypte, Cahier no. 35. Cairo: Supreme Council of Antiquities, 2006. [PDF](#).
27. **Doehne, E.** 2006, ESEM Applications: From Cultural Heritage Conservation to Nano-Behaviour, *Microchimica Acta* 155(1-2), 45-50. [Link](#).
28. Lopez-Arce, Paula & **Doehne, Eric** 2006, Kinetics of sodium sulphate as observed by humidity cycling with ESEM. Proceedings of the Heritage, Weathering & Conservation Conference, Madrid, Spain. June 2006, [HWC](#). 220-230. [Link](#).

29. **Eric Doehne**, Stefan Simon, Urs Mueller, David Carson & Alice Ormsbee 2005, Characterization of carved rhyolite tuff–The Hieroglyphic Stairway of Copán, Honduras, *Restoration of Buildings and Monuments*, 11(4), 247-254. [PDF](#).
30. **Doehne, E.** 2005, ESEM Applications: from Cultural Heritage Conservation to Nanobehavior, *in* European Workshop on Modern Developments and Applications in Microbeam Analysis, Tutorials, International Union of Microbeam Analysis Societies, 97-108.
31. Tiziana Lombardo, **Eric Doehne & Stefan Simon**, 2004, The response of NaCl and Umm Ishrin sandstone to humidity cycling: mechanisms of salt weathering, *in* STONE 2004, proceedings of the 10th International Congress on Deterioration and Conservation of Stone, Stockholm, Sweden. 203-210. [Link](#).
32. **Eric Doehne**, Stefan Simon, Urs Mueller, David Carson & Alice Ormsbee, 2004, Characterization of carved rhyolite tuff–The Hieroglyphic Stairway of Copan, Honduras, *in* the proceedings of the 6<sup>th</sup> International Symposium on the Conservation of Monuments in the Mediterranean Basin, Lisbon, Portugal, 243-247. [PDF](#).
33. Hansen, Eric, **Eric Doehne**, John Fidler, John Larson, Bill Martin, Mauro Matteini, Carlos Rodriguez-Navarro, Eduardo Sebastián Pardo, Clifford Price, Alberto de Tagle, Jeanne Marie Teutonico and Norman Weiss, 2003, A review of selected inorganic consolidants and protective treatments for porous calcareous materials: *Reviews in Conservation*, 4, 13-25. [PDF](#).
34. **Doehne, E.**, 2003, Building Material Decay and Salt Weathering: A Selected Bibliography. Supplement to: Natural Stone, Weathering Phenomena, Conservation Strategies and Case Studies. Siegfried Siegesmund, Thomas Norbert Weiss, Axel Vollbrecht, eds., The Geological Society of London, Special Publication 205. [Link](#).
35. **Doehne, E.**, 2002, Salt Weathering: A Selective Review. *In*: Natural Stone, Weathering Phenomena, Conservation Strategies and Case Studies. Siegfried Siegesmund, Thomas Norbert Weiss, Axel Vollbrecht, eds., The Geological Society of London, Special Publication 205, 51-64. [Link](#).
36. Rodriguez-Navarro, C., Linares-Fernandez, L., **Doehne, E.**, and Sebastian, E. 2002, Effects of ferrocyanide ions on NaCl crystallization in porous stone, *Journal of Crystal Growth*, 243, 503-516.
37. Selwitz, C. & **Doehne, E.**, 2002, The evaluation of crystallization modifiers for controlling salt damage to limestone. *Journal of Cultural Heritage*, 3(3), 205-216. [Link](#).
38. Rodríguez Navarro, C., & **Doehne, E.** 2000, How does sodium sulfate crystallize? Implications for the decay and testing of building materials, *Cement and Concrete Research* 30, 1527-1534. [Link](#).
39. Rodríguez Navarro, C., **Doehne, E.**, and Sebastian, E. 2000, Influencing crystallization damage in porous materials through the use of surfactants: Experimental results using Sodium Dodecyl Sulfate and Cetyltrimethylammonium Chloride, *Langmuir* 16, 947-954. [Link](#).
40. Rodríguez Navarro, C., & **Doehne, E.** 1999, Origins of honeycomb weathering, The role of salts and wind, *Geological Society of America Bulletin*, 111, 1250-1255. [Link](#).
41. Rodríguez Navarro, C., & **Doehne, E.** 1999, Salt weathering: Influence of evaporation rate, supersaturation and crystallization pattern, *Earth Surface Processes and Landforms*, 24, 191-209. [Link](#).

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55. Leigh, D., Altman, J., Black, E., Brandt, A., Cosgrove, D., **Doehne, E.**, Esteve-Coll, E., Fiorentini, E., Goodey, B., Grimm, E. C., Krumbein, K., & Michalski, S. 1994, What are the responsibilities for cultural heritage and where do they lie? In *Dahlem Workshop on Durability and Change: The Science,*

- Responsibility, and cost of Sustaining Cultural Heritage, December 6-11, 1992, Eds. W. E. Krumbein, P. Brimblecombe, D. E. Cosgrove & S. Staniforth, 267-286. [Link](#).
56. **E. Doehne** 1994, *Weathering of dolomite marble from Thasos, Greece*, Advisors: Stanley Margolis, Jeffrey Mount. Dissertation, Geology Department, University of California, Davis. 224 p. [Link](#).
57. **Doehne, E.**, Parker, A.E. & Stulik, D.C. 1993, New analytical techniques for use in conservation. *Journal of the American Institute for Conservation*, 33, 171-184. [Link](#).
58. **Doehne, E.** & Bower, N. W. 1993, Empirical evaluation of the electron skirt in the Environmental SEM: Implications for energy dispersive X-ray analysis. *Microbeam Analysis*, 2, S35-S36.
59. **Doehne, E.** & Bower, N. W. 1993, Experimental conditions for semi-quantitative SEM/EDS of painting cross-sections using the Environmental scanning electron microscope. *Microbeam Analysis*, 2, S39-S40.
60. **Doehne, E.**, Podany, J., & Showers, W. 1990, Analysis of weathered dolomitic marble from Thasos, Greece. *Acta Archaeologica Lovaniensia - Monographiae* 4, 213-227; Ancient Stones: Quarrying, Trade and Provenance--Interdisciplinary Studies on Stones and Stone Technology in Europe and the Near East from the Prehistoric to the Early Christian Period; Marc Waelkens, Norman Herz and Luc Moens, editors; Leuven University Press. [Link](#).
61. **Doehne, E.** & Stulik, D.C. 1991, Dynamic studies of materials using the Environmental Scanning Electron Microscope. Vandiver, Pamela B., James Druzik and George Segan Wheeler, Eds. *Materials Issues in Art and Archaeology II, Materials Research Society Symp. Proceedings*, 185, 31-37.
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63. **Doehne, E.** 1991, Evaluation of Tesserae from the Paphos Mosaics, 46-57 in *The Conservation of the Orpheus Mosaic at Paphos, Cyprus*, The J. Paul Getty Trust, Los Angeles. [Link](#).
64. **Coffman, R.L., Selwitz, C., & Doehne, E.** 1990, Adobe mineralogy: Characterization of adobes from around the world. Adobe 90, *Proceedings of the 6th International Conference on the Conservation of Earthen Architecture*, 1: 424-429, Las Cruces, New Mexico. Neville Agnew, Michael Taylor, and Alejandro Alva Balderramma, eds. The Getty Conservation Institute, Los Angeles.
65. **Doehne, E.** & D. C. Stulik 1990, Applications of the Environmental Scanning Electron Microscope to conservation science. *Scanning Microscopy* 4, 275-286. [Link](#).
66. **Scott, D. A. & E. Doehne** 1990, Soldering with gold alloys in ancient South-America - examination of small gold studs from Ecuador. *Archaeometry* 32, 183-190. [Link](#).
67. **Scott, David A. y E. Doehne** 1990, La soldadura con aleaciones de oro en la América Antigua: un análisis de dos pequeños adornos provenientes del Ecuador. 52-61. *El Boletín del Museo del Oro* No. 29 - Oct-Dic: 1990.
68. **Doehne, E.** & Margolis, S.V. 1990, Trace element geochemistry and mineralogy of the Cretaceous/Tertiary

- boundary; Identification of extraterrestrial components, in *Global Catastrophes in Earth History, Conference on Impacts, Volcanism and Mass Mortality*. National Academy of Sciences/Lunar Science Institute. *Proceedings of Second Snowbird Conference* V.L. Sharpton and P. D. Ward (eds.), *Geol. Soc. Am. Special Publication*, 247, 367-382. [Link](#).
69. **Doehne, E.** 1987, *Geochemistry, petrology and diagenesis of Cretaceous/Tertiary boundary sediments from Zumaya, Spain*. Advisors: Stanley Margolis, Jeffrey Mount. M.S. Thesis, University of California, Davis, June, 1987, 158 p. [Link](#).
70. Margolis, S.V., Mount, J.F., **Doehne, E.**, Showers, W. & Ward, P. 1987, Late Cretaceous/Tertiary boundary oxygen and carbon isotope stratigraphy, diagenesis and biotic extinctions at Zumaya, Spain, *Paleoceanography*, 2, 361-377. [Link](#).
71. Mount, J.F., Margolis, S.V. Showers, W., Ward, P. & **Doehne, E.** 1986, Carbon and oxygen isotope stratigraphy of the Upper Maastrichtian, Zumaya, Spain: A record of oceanographic and biologic changes at the end of the Cretaceous Period, *Palaios*, 1, 87-92. [Link](#).
72. **Doehne, E.** 1984, *Regional aspects of cementation and diagenesis, Miocene sediments of Southern Maryland*, Senior Thesis, Geology Dept., Bryn Mawr College, Bryn Mawr, PA, May 4, 1984, 200 p.

## Invited and Contributed Lectures, Seminars, and Workshops 1996-2015

Highlights include invited lectures at Cambridge University, Princeton University, NIST, Eindhoven University of Technology, The J. Paul Getty Museum, USC, UCLA, Scripps College and the Smithsonian. Selected for: Gordon Conference on Concrete, Discussion Leader; Dahlem Workshop on Durability and Change in Berlin. Invited speaker at over 30 international conferences, with 8 keynote/plenary lectures.

1. Invited Lecture: Occidental College, AHVA – *Some Perspectives on Global Tourism, Climate Change and Universal Cultural Heritage*. October 29, 2015, for Nancy Mithlo.
2. Guest Lecture, Pomona College, Geology 20A - Geohazards – *Hazards and Heritage: Under the Volcano*. October 12, 2015, for Jade Star Lackey.
3. Gregory Bearman, **Eric Doehne**, Wensen Ma, & Oliver Cossairt “*Imaging Changes: Smartphone Cameras and Citizen Science Meet Heritage Conservation*” AAAS Annual Meeting, February 14, 2015. [Link](#).
4. D Kronkright, O Cossairt, M Walton, J Tumblin, G Bearman, H Stratis, X Huang, N Matsuda, A Katsaggelos, **E Doehne**, & M Broadway “*Decoding Form, Discovering Process: Imaging Technologies for Surface-Shape Study of the Art of Paul Gauguin*”; AAAS Annual Meeting, February 14, 2015. [Link](#).
5. **Eric Doehne** “*Art Crime and Forensic Science: The Case of the Aphrodite and the Kouros*” Scripps College, Noon Academy Lecture, Nov. 11th, 2014.
6. **Eric Doehne** (Lectures, Workshop and Panel Discussion) American Museum of Ceramic Art – AMOCA - Ceramics Conservation Workshop, Pomona, CA; Feb 22, 2014; <http://www.amoca.org/ceramic-conservation-workshop/>
7. **Eric Doehne** (keynote lecture) “*Measuring Change in Art: The case for citizen science and time-lapse imaging of material cultural heritage*” Built Heritage Conference, 2013, Milan.
8. Greg Bearman, **Eric Doehne**, Luther Beegle, William Hug, Ray Reid & Rohit Bhartia “*Remote Detection of Biofilms on Stone*” Built Heritage Conference, 2013, Milan.
9. Greg Bearman, **Eric Doehne**, Jon Voss, Kim Merrill, & Rohitashwa Bagaria “*Citizen Science and Mobile Phone Cameras as Tools for Monitoring World Heritage*,” Built Heritage Conference, 2013, Milan.
10. Marcello Manfredi, Greg Williamson, Dale Kronkright, **Eric Doehne**, Gregory Bearman, Megan Jacobs & E. Marengo “*Measuring Changes in Cultural Heritage Objects with Reflectance Transform Imaging*,” Digital Heritage 2013, Marseille, 280. [PDF](#).
11. From Documentation to Discovery: Preservation Photographic Imaging Leaps from the Illustrative to the Quantitative, a session at [MCN 2013 | Montreal | Museum Computer Network](#): Greg Bearman, John Delaney, **Eric Doehne**, John French, Dale Kronkright, Marcello Manfredi, Greg Williamson, November 2013.
12. **Eric Doehne**, invited lecture & workshop instructor: “*Salinization and damage to historic materials: New Orleans, Venice and Adelaide*” Oct 25-26, 2013, Rising Damp Symposium, Galveston Historical Foundation & US National Park Service. <http://ncppt.nps.gov/blog/rising-damp-symposium>

13. Denecker, M., Hébert, R., Bourgès, A., Menendez, B., & **Doehne, E.** “*Mirabilite and heptahydrate characterization from infrared microscopy and thermal data,*” 12th International Conference on the Deterioration and Conservation of Stone, 2012, New York. [Link](#)
14. **Doehne, E.** “*Measuring change over time: the use of geotagged photographs to evaluate the weathering of monuments,*” [EGU2012-8300](#), European Geosciences Union, General Assembly 2012, Vienna, Austria.
15. **Doehne, E.** & S. Pinchin, “*Field measurement of erosion rates: time-lapse monitoring of rapid stone flaking at Howden Minster, UK,*” [EGU2012-7688](#) European Geosciences Union, General Assembly 2012, Vienna, Austria.
16. **Doehne, E.** (2011) “*Stone Conservation and Preservation,*” University of Southern California, invited lecture, April 7, 2011.
17. **Doehne, E.** & Pinchin, S. “*Monitoring loss of stone surface using time-lapse and PTM photography: field study of a 14th century monastery in Yorkshire,*” In situ technical imaging for art and archaeology: a symposium in conservation science, July 15, 2010, British Museum.
18. **Doehne, E.** “*Conservation treatments for salt-laden stone in Egypt and Adelaide,*” Invited Plenary Lecture, [ETH CRYSPOM II](#): an International Workshop on Crystallization in Porous Media, Giessbach, Switzerland, June 15-18, 2010.
19. R. M. Espinosa-Marzal, E. Balboni, S. Carl, **E. Doehne**, J. Carmeliet, & G.W. Scherer “*Mechanism of physical damage by sulfate salts*” Symposium on Concrete Modeling, 22-25 June 2010, EPFL, Switzerland.
20. **Doehne, E.** “*Poultice Desalination of Porous Building Materials,*” Organizer and Lecturer for Field Course, May 24-28, 2010, New Orleans, sponsored by The Getty Conservation Institute, Research from the EC Desalination Project (2006-2009).
21. **Doehne, E.** “*Luxor, Laetoli, Rome and Home: Cultural Heritage Conservation in the Field and Lab,*” Scripps College Noon Academy, April 15, 2010, Claremont, California.
22. **Doehne, E.** “*Monitoring Erosion of Stone Surfaces using Time-Lapse and PTM Photography: Field Study of a 14th Century Monastery in Yorkshire*” Eos Trans. AGU 90 (52), American Geophysical Union, Fall Meeting, abstract #EP53D-0647 EP53D-0647, 2009.
23. **Doehne, E.** “*From the nanoscale microstructure of an ancient Greek vase to the field study of rapid stone decay: Recent adventures in analytical imaging for conservation*” Smithsonian Institution, [Topics in Museum Conservation](#) - Lecture Series, Museum Conservation Institute, November 13, 2009. <http://www.si.edu/MCI/downloads/topics/Doehne.pdf>
24. **Doehne, E.**, Buxbaum, A., Walton, M. “*Nanoscale microstructure and mineralogy of a Greek vase: characterization of black and red gloss using FIB/STEM, ESEM/EDS and electron microprobe analysis*” Geological Society of America, Annual Meeting, Portland, Oregon, 18-21 October, 2009. [http://gsa.confex.com/gsa/2009AM/finalprogram/abstract\\_164139.htm](http://gsa.confex.com/gsa/2009AM/finalprogram/abstract_164139.htm)
25. Balboni, E., Espinosa-Marzal, R., **Doehne, E.**, Scherer, G. “*Can drying and re-wetting of magnesium sulphate salts lead to damage of stone?*” Geological Society of America, Annual Meeting, Portland, Oregon, 18-21 October, 2009 (with Princeton University). <http://gsa.confex.com/gsa/>

[2009AM/finalprogram/  
abstract\\_167260.htm](http://2009AM/finalprogram/abstract_167260.htm)

26. **Doehne, E.**, Balboni, E., Pinchin, S. "*Field measurement of erosion rates: time-lapse monitoring of rapid stone flaking in Yorkshire*," Geological Society of America, Annual Meeting, Portland, Oregon, 18-21 October, 2009 (with English Heritage). [http://gsa.confex.com/gsa/2009AM/finalprogram/abstract\\_164698.htm](http://gsa.confex.com/gsa/2009AM/finalprogram/abstract_164698.htm)
27. **Doehne, E.** "*Case Study of Desalination: Madame John's Legacy, New Orleans*," DESALINATION: EU research results on poultice systems: an international colloquium held at the Cologne Institute of Conservation Science, Cologne University of Applied Sciences 28-29 September, 2009, Cologne, Germany.
28. **Doehne, E.** and Price, C. "*Stone Conservation: An Overview of Current Research*," The Getty Conservation Institute lecture series, April 28, 2009.
29. Fulvio Zezza, Rob Van Hees, Vèronique Vergès-Belmin, Leo Pel, Adrian Heritage, & **Eric Doehne.** "*Desalination of masonry structures. Expected results of the EU project Desalination*" CHRESP: 8th European Commission Conference on Sustaining Europe's Cultural Heritage, Ljubljana, Slovenia, 10-12/11/2008, [www.chresp.eu](http://www.chresp.eu)
30. **Doehne, E.** & Pinchin, S. "*Time-lapse macro-imaging in the field: Monitoring rapid flaking of magnesian limestone*," 11th International Congress on Deterioration and Conservation of Stone, 2008, Torun, Poland, September 18<sup>th</sup>, 2008.
31. **Doehne, E.** Member of panel discussion on stone conservation meetings and dissemination at the 11th International Congress on Deterioration and Conservation of Stone, September 19<sup>th</sup>, 2008.
32. Sikka, S., Selwitz, C., **Doehne, E.** Chiari, G., & Khanjian, H. "*Qualitative and quantitative methods of detection of calcium oxalate deposits on treated limestone and marble*," Lecture at the International Symposium on Stone Consolidation in Cultural Heritage Research and Practice: Lisbon, Portugal, May 6, 2008.
33. **Eric Doehne** "*From the oldest home in New Orleans to an abandoned Abby in Yorkshire: Salts, Desalination and Stone Conservation*," The Getty Conservation Institute lecture series, May 1, 2008.
34. **Eric Doehne** "*Epidemiology and Buildings: Treatment of salt decay and the historic masonry of South Australia*," invited plenary lecture to the First International Congress on Salt Damage, Ghent, Belgium May 9-11, 2007.
35. **Eric Doehne** "*ESEM and wet STEM applications to cultural heritage*" Scanning 2007 Meeting, FAMS, Monterey, California, April 10, 2007, and session organizer for "*Scanning Cultural Heritage: Research, Documentation and Preservation for Works of Art, Museum Collections, Architecture and Archaeological Materials*."
36. Walton, M. S., **Doehne, E.**, Trentelman, K., Chiari, G, Maish, J. & Buxbaum, A. "*Characterization of Coral Red Slips on Greek Attic Pottery*," In: Materials Research Society Fall Meeting, Symposium Y: Materials Issues in Art and Archaeology VIII, November 26 - 28, 2007 Edited by: Pamela Vandiver, Francesca Casadio, Blythe McCarthy, Robert H. Tykot, Jose L. Ruvalcaba Sil. Materials Research Society. <http://www.mrs.org/f07-abstract-y/>
37. **Eric Doehne** "*Conservation Research in Inorganic Materials*", The Getty Conservation Institute lecture series, November 21, 2006.



38. **Doehne, Eric & Lopez-Arce, Paula** “Salt Research Down Under: Decay and Treatment of Forts and Gaols, Bungalows and Cathedrals” The Getty Conservation Institute lecture series, May 22, 2006.
39. **Doehne, Eric, Lopez-Arce, Paula, & Lombardo, Tiziana** “Stone Conservation at the GCI: Copan, Salts & Desalination” APT International, Sydney Chapter, April 2006, invited lecture.
40. **Doehne, Eric & Ellen Baken** “An environmental STEM detector for ESEM: New applications for humidity control at high resolution,” Scanning 2006 Conference, April 25–27, 2006 Washington, D.C.
41. Bourgès, A, **Doehne, E.**, Carson, D., Hanna, S., & Martin, W. “GCI-English Heritage Magnesium Limestone Study,” The Cathedral Architects Association meeting, Sept 29<sup>th</sup>-30<sup>th</sup>, 2005, York, UK.
42. **Doehne, E.** “X-rays in ESEM: Correction of X-ray skirt effect in VP-ESEM and X-ray cone performance” Invited lecture, National Institute of Standards & Technology and Microbeam Analysis Society, NIST-MAS, Roadmap Workshop on VP-ESEM, Gaithersburg, Maryland, 2005.
43. **Doehne, E.** “Electron Skirts and X-ray Correction: Evaluating Methods for Rapid Discrimination of Primary versus Secondary X-ray signals in the ESEM” Microscopy & Microanalysis 2005 Meeting, July 31-August 4, 2005, Honolulu, Hawaii. Invited lecture.
44. **Doehne, E.**, Carson, D. & Pasini, A. “Combined ESEM and CT Scan: The process of salt weathering,” Microscopy & Microanalysis 2005 Meeting, July 31-August 4, 2005, Honolulu, Hawaii.
45. **Doehne, E.** “ESEM Applications: from Cultural Heritage Conservation to Nanobehavior,” 3<sup>rd</sup> Meeting of the International Union of Microbeam Analysis Societies, Florence, Italy, May 22-26, 2005. Invited Plenary Lecture.
46. **Doehne, E.** “Salt Weathering and Cultural Heritage: An overview of recent advances,” 32<sup>nd</sup> International Geological Congress, Florence, August 20-28, 2004, invited lecture.
47. **Doehne, E.** “Characterization of carved rhyolite tuff—The Hieroglyphic Stairway of Copán, Honduras,” 6<sup>th</sup> International Symposium: Conservation of Monuments in the Mediterranean Basin, Lisbon, Portugal, April 7–10, 2004.
48. Schwarz, H.-J., Simon, S., **Doehne, E.** Carson, D. “Einfache Experimente zur Beobachtung und Visualisierung von Salzkristallisationen im Porenraum = Simple experiments for monitoring and visualization of salt crystallization in the pore space”- 82. Jahrestagung der Deutschen Mineralogischen Gesellschaft (DMG), Karlsruhe, 19.-22.09, Beihefte zum European Journal of Mineralogy, 16 (1), 2004 = 82nd Annual Meeting of the German Mineralogical Society (DMG) Karlsruhe 19.- 22.9.2004, Supplements to the European Journal of Mineralogy, 16 (1) 2004.
49. **Doehne, E.** “The response of NaCl and Umm Ishrin sandstone to humidity cycling: mechanisms of salt weathering,” 10<sup>th</sup> International Congress on Deterioration and Conservation of Stone, Stockholm, June 27–July 2, 2004.
50. **Doehne, E.** “Salt behavior and quantification of kinetics,” Invited lecture, Department of Physics, Eindhoven University of Technology (TU/e), The Netherlands, 2004.
51. **Doehne, E.** and Lombardo, T. 2004, “In-Situ Characterization of Micro and Nanoscale Kinetics by Variable Pressure Electron Microscopy I:

- Quantifying the Environment*  
Microscopy and Microanalysis, 10(S2):  
1056-1057CD, Annual Meeting,  
Savannah, Georgia, August 1–5, 2004.
52. **Doehne, E.** “*The Impact of ESEM in Conservation Science and Process Characterization*,” Invited lecture at the Eastern Analytical Symposium, New Jersey, November 20, 2003 at a session honoring the inventor of the ESEM.
  53. **Doehne, E.** “*Multispectral Infrared Imaging of the First Photograph*,” Invited lecture, Symposium: At First Light: Niépce and the Dawn of Photography, November 21-23, 2003, Austin, Texas.
  54. **Doehne, E.** “*Crystallization in the ESEM: Kinetics of Salt Behavior in Building Materials*,” Invited lecture at the Materials Institute of Princeton University on November 20, 2003.
  55. **Doehne, E.** “*Imaging Science, Conservation and Technology*” Created and presented a workshop on conservation, imaging and computational photography for Getty Institute professional staff, including scientists, architects and conservators, September 15, 2003, with J. Paul Getty Museum Senior Photographer Anthony Peres.
  56. **Doehne, E.** “*The Importance of Kinetics in the Macro, Micro and Nanoscale Behavior of Sodium Chloride, Sodium Nitrate and Sodium Sulfate in Building Materials*,” Invited keynote lecture, EUROMAT 2003, 8th European Congress and Exhibition on Advanced Materials and Processes, Lausanne, Switzerland, August 31-September 4, 2003.
  57. **Doehne, E.** “*Conservation and Microscopy*.” Invited lecture at the Netherlands Institute for Cultural Heritage (now the Netherlands Cultural Heritage Agency), Amsterdam, 2002.
  58. **Doehne, E. C.** Selwitz, & D. Carson “*The damage mechanism of sodium sulfate in porous stone*,” SALTexpert Meeting, Prague, Czech Republic, November 2002. Joint Getty Conservation Institute and European Commission Expert Meeting. Invited speaker and rapporteur for group discussions.
  59. **Doehne, E.** Gordon Conference on the Chemistry & Physics of Cement-Based Materials, March 3-8 2002, Ventura, California. Invited discussion leader and chair for the session on chemical degradation phenomena. [Link](#).
  60. **Doehne, E.** & D. Carson “*Damage to Building Materials from the Crystallization of Salts: Mechanisms Revealed by ESEM Experiments*,” The 17th Australian Conference on Electron Microscopy, Annual Meeting, Adelaide, Australia, February 4–8, 2002, Program and Abstract Book, p. 96-97.
  61. **Doehne, E.** “*The Role of Microscopy and Microanalysis in Cultural Heritage Preservation*,” Microbeam Analysis Society, Invited Presidential Speaker, Plenary Lecture, Annual Meeting, Microscopy & Microanalysis 2001, Long Beach, California.
  62. **Doehne, E.,** Selwitz, C. & A. de Tagle “*Prevention of Damage to Monuments: ESEM and Time-Lapse Studies*,” Microscopy & Microanalysis 2001 annual meeting, August 5-9, 2001, Long Beach, California, Invited Lecture.
  63. **Doehne, E.** and D. Carson “*Charge Contrast Imaging (CCI) in the Environmental Scanning Electron Microscope: Optimizing Operating Parameters for Calcite*,” Microscopy & Microanalysis 2001, Annual Meeting Long Beach, Invited Lecture.
  64. **Doehne, E.** ESEM ROADMAP-II Workshop, University of Western Australia and FEI/Philips, February 16–19, 2001, NSW, Australia. Invited Participant.

65. **Doehne, E.** Session organizer and discussion leader for panel on: “*ESEM/VP Contrast Mechanisms, Working with ESEM and other Variable Pressure Systems*,” Microscopy & Microanalysis 2000, Annual Meeting, Philadelphia, August 13-17, 2000.
66. **Doehne, E.** “*Environmental SEM Analysis and Damage Simulation with Stone Samples from the Mayan City of Copan, Honduras*.” Materials Research Society; Fall Symposium V, Low-Vacuum SEM/ESEM in Materials Science: Wet SEM-The Liquid Frontier of Microscopy, Nov. 29, 2000.
67. **Doehne, E.** “*Cultural Heritage Research: Some thoughts on old problems, new tools and the millennium*,” National Center for Conservation, Canberra, National Gallery of Australia, Australian Society for Electron Microscopy, Canberra, Australia. February, 1999, Public Lecture.
66. **Doehne, E.** “*Using Time-lapse Photography for Cultural Heritage Research: Things Fall Apart*,” Australian Society for Electron Microscopy, micROZcopy 2000 International Conference, Canberra, Australia, February, 2000, Plenary Lecture.
67. **Doehne, E.** “*Analytical Chemistry and Heritage Conservation*,” National Institute of Standards and Technology, Washington, D.C. Invited lecture, NIST Seminar Series, December 1998.
68. **Doehne, E.** “*Honeycomb weathering and monument conservation*” Department of Earth Sciences, California State University, Northridge. November 1998. Invited Seminar.
69. **Doehne, E.** “*Romancing The Stone: A Microanalyst's view of Geology*,” Microbeam Analysis Society, Annual Meeting, Atlanta, 1998. Invited Presidential Speaker, Plenary Lecture.
70. **Doehne, E.** “*Charge contrast: some ESEM observations of a new/old phenomena*,” Microscopy Society of America, Annual Meeting, Atlanta, Georgia, July 12–16, 1998. Invited Lecture.
71. **Doehne, E. & Mawson, James** “*Travertine Stone at the Getty Center*,” Invited Lecture. The J. Paul Getty Museum at the Getty Center, opening year lecture series, 1998.
72. **Doehne, E.,** “*Environmental SEM and time-lapse applications in cultural heritage conservation*,” Royal Microscopy Society Proceedings, Micro98, London, 1998. Invited Lecture.
73. **Doehne, E.** “*Charge contrast: a new tool for the study of sub-micron crystal growth*,” Cambridge University, Department of Physics, 1998. Invited Departmental Seminar.
74. **Doehne, E. & Rodríguez Navarro, C.** “*Salt damage: New Insights from Time-Lapse Experiments*,” 4<sup>th</sup> International Symposium on the Conservation of Monuments in the Mediterranean Basin, Rhodes, May 6-11, 1997.
75. **Doehne, E.** “*ESEM and video microscopy studies*,” In-Situ Studies in Microscopy III, Microscopy & Microanalysis - 97, Cleveland, Ohio, 1997, Invited Lecture.
76. **Doehne, E. & Rodríguez Navarro, C.** “*Dynamics of deterioration: new advances in conservation from time-lapse video and ESEM microscopy*,” Conservation Science Technical Session, Eastern Analytical Symposium, Somerset, New Jersey, USA, November, 18, 1997. Invited Lecture. <http://cool.conservation-us.org/byform//mailing-lists/cdl/instances/1997/1997-05-15.dst>
77. Kumar, R., **Doehne, E., & Ginell, W. S.** “*A Study of the Pore System of Monumental Limestone from the 10-11th*

*Century Maya Site at Xunantunich, Belize,*” 8<sup>th</sup> International Congress on Deterioration and Conservation of Stone, Berlin, Germany, 1996.

78. **Doehne, E.** “*A new correction method for energy-dispersive spectroscopy analysis under humid conditions,*” Microscopy Society of America, Annual Meeting, Minneapolis, Minnesota, August 11-15, 1996.
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# Contact Information

## ERIC F. DOEHNE

Conservation Sciences  
1689 Walworth Ave  
Pasadena, California 91104

[www.ConservationSciences.org](http://www.ConservationSciences.org)  
[www.ScrippsCollege.edu](http://www.ScrippsCollege.edu)

[Eric@ConservationSciences.org](mailto:Eric@ConservationSciences.org)

+1.626.755.6705 Mobile

Social Media:

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Public Groups on [Mendeley.com](#); [Mendeley.com Profile](#)  
[LinkedIn Profile](#)