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# MARIO PARENTE

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UNIVERSITY OF MASSACHUSETTS, AMHERST  
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## EDUCATION:

STANFORD UNIVERSITY, Stanford, CA

- 2010 PhD in Electrical Engineering. Dissertation: "Unsupervised Unmixing of Hyperspectral Images: Imaging the Martian Surface"
- 2005 M.S. in Electrical Engineering and Statistics

UNIVERSITY FEDERICO II, Naples, Italy

- 2003 M.S. Telecommunication Engineering, (Magna Cum Laude). Thesis: "Integrated Segmentation and Interpretation of Remotely Sensed Images with Gauss Mixture Robust Features in the Markov Random Field Framework"
- 2001 B.Sc. Telecommunications Engineering, (Magna Cum Laude)

## AWARDS:

EUROPEAN COMMUNITY

- 2001-2003 Scholarship for information technology

BEST PAPER IEEE WHISPERS 2009 "Simulation of the image generation process for CRISM spectrometer data"

## CURRENT SUPPORT

Title of Award or Project	Sponsoring Institution	Period of Performance	Budget
Deep Spectroscopic Learning <b>Mario Parente, P.I.</b>	NSF CISE: III: Medium	04/01/16 - 03/31/20	\$804,249 (~\$600,000 for Parente)
Denosing and spectral summarization of CRISM images with elevated detector noise <b>Mario Parente, P.I</b>	NASA PDART	04/01/2016 - 03/31/2019	\$405,600 for Parente
Wavelet-Based Representations for Hyperspectral Data Processing and Interpretation <b>Mario Parente</b> <b>Marco Duarte P.I.'s</b>	NSF CISE: III: small	10/1/2013 - 30/9/2017	\$492,651 (\$246,326 for Parente)
Multi-modal Surface Reflectance retrieval <b>Mario Parente P.I</b>	MIT Lincoln Labs	01/01/2016 - 01/06/2018	\$85,504 for Parente

Seeking Signs of Life in an Ancient Martian Hot Spring <b>John R. Skok P.I.</b>	NASA PSTAR	05/01/2015 - 04/30/2018	\$500,000 (\$ 83,330 for Parente)
Investigating Evidence of Acidic Alteration on Mars: Analyses of Unique Aqueous Outcrops at Valles Marineris, Noctis Labyrinthus and Mawrth Vallis <b>Janice L. Bishop, P.I.</b>	NASA MFR	04/01/2015 - 03/31/2019	\$550,000 (\$ 43,437 for Parente)

### RESEARCH COMMUNITY WORK:

ASSOCIATE EDITOR 2013 – present, IEEE Geoscience and Remote Sensing Letters  
GUEST EDITOR, Geoscience and Remote Sensing Magazine, special issue on hyperspectral imaging 2018

Panel Member for NASA programs 2010 - present

- Mars Fundamental Science Program
- Mars Science Laboratory Participating Science Program
- Mars Data Analysis Program
- Planetary Data Analysis and Restoration Tools Program

Panel Member for NSF programs 2016 – present

- CISE IIS BIGDATA

REVIEWER IEEE WHISPERS (2009 – present)

REVIEWER IEEE IGARSS (2011 – present)

REVIEWER IEEE ICASSP (2014 – present)

REVIEWER for the IEEE Signal Processing Magazine (2013 – present)

REVIEWER for the IEEE Transactions on Image Processing (2012 – present)

REVIEWER for the IEEE Transactions on Geoscience and Remote Sensing (2009 – present)

REVIEWER for the IEEE Geoscience and Remote Sensing Letters (2010 – present)

REVIEWER for the ACM Transactions on Intelligent Systems and Technology (2011 – present)

REVIEWER for the AGU Journal of Geophysical Research (2010 – present)

REVIEWER for ICARUS (2013 – present)

REVIEWER for Planetary and Space Science (2013 – present)

MEMBER of the IEEE GRSS Technical Committee on Data Fusion and Image Analysis (2015 – present)

MEMBER of the IEEE GRSS Technical Committee on Data Standardization and Distribution (2012 – present)

MEMBER of the IEEE GRSS Technical Committee on Geoscience Spaceborne Imaging Spectroscopy (2016-present)

MEMBER of the IEEE IGARSS Technical Program Committee (2015 – present)

MEMBER of the IEEE/ISPRS CVPR Earthvision Workshop Technical Program Committee (2015, 2017 – present)

MEMBER of the IEEE WHISPERS Technical Program Committee (2010 – present).

MEMBER of the Society of Photographic Instrumentation Engineers (SPIE) Imaging Spectrometry Conference Technical Program Committee (2017-present)

CHAIR IEEE WHISPERS (2010) Special session on “Statistical vs. geometric unmixing algorithms for hyperspectral images”.

CHAIR IEEE WHISPERS (2011) Special session on “Advances in unmixing algorithms for hyperspectral images”.

CHAIR IEEE WHISPERS (2013) Special session on “Linear and Nonlinear unmixing algorithms for hyperspectral images”.

CHAIR IEEE WHISPERS (2012, 2014-2016) Special session on “Recent advances in unmixing algorithms for hyperspectral images”.

### **TECHNICAL / SCIENTIFIC SOCIETIES:**

SENIOR MEMBER OF IEEE (Institute of Electrical and Electronics Engineers (2013 – present)

MEMBER OF IEEE (Institute of Electrical and Electronics Engineers (2006 – 2013)

MEMBER OF IEEE Signal Processing Society (2006 – present)

MEMBER OF IEEE Geoscience and Remote Sensing Society (2006 – present)

MEMBER OF IEEE Computer Society (2011 – present)

MEMBER OF IEEE Robotics and Automation Society (2011 – present)

MEMBER OF IEEE Systems, Man and Cybernetics Society (2011 – present)

MEMBER of SPIE International Society for Optical Engineering (2006 – present)

MEMBER of the NASA Astrobiology Institute (2004 – present)

MEMBER of the American Geological Union (2011 – present)

### **PRESS:**

**Big Data: Deep Learning on Mars:** <http://www.umass.edu/researchnext/inpictures/big-data-deep-learning-mars>

ABC6 News July 20, 2011, comments on “*The last day of the Shuttle era*”.

IL DENARO Sept 14, 2009 “*Lo scienziato Mario Parente premiato in Francia*” by G. Santoro (in Italian)

T-BOOK MAGAZINE Sept 18, 2009 “*Un napoletano a caccia di UFO. Intervista a Mario Parente*” by E. Agliardi, [http://www.t-book.unina.it/articolo.php?id\\_cont=143&aff\\_rubri=25](http://www.t-book.unina.it/articolo.php?id_cont=143&aff_rubri=25) (in Italian)

### **RESEARCH EXPERIENCE:**

UNIVERSITY OF MASSACHUSETTS, Dept. of Electrical and Computer Engineering, Amherst, MA  
Assistant Professor 2011 – present

- Image processing of Mars, lunar and terrestrial remote sensing data
- Integration of robotics and hyperspectral sensing for terrestrial and planetary missions
- Machine learning algorithms for hyperspectral image analysis
- Collaborator of the ChemCam science team on the Mars Science Laboratory: produced software for data reduction pipeline for LIBS data to support the ChemCam Science Team.
- Collaborator of the Compact Reconnaissance Imaging Spectrometer for Mars (CRISM) science team: machine learning applied to denoising, atmospheric compensation, classification and unmixing of hyperspectral images.

Grenoble Images Speech Signal and Control (GIPSA-LAB) CNRS /University of Grenoble, France  
Visiting Professor 2014-2015

BROWN UNIVERSITY, Department of Planetary Geosciences, Providence, RI  
Post-doctoral Research Associate 2010 – 2011

- Remote sensing image processing of Mars and lunar data
- Algorithm development for spectral data analysis
- Correlation of textural and spectral properties of Martian and lunar outcrops.

- Instrument calibration and data reduction for spectrometer data
- Member of the Lunar Mineralogy Mapper (M3) team
- Produced software packages officially used in M3 Data Processing Pipeline
  - Image denoising for M3
  - Calibration and data reduction of M3

SETI INSTITUTE, Mountain View, CA

Graduate Research Associate 2003 – 2010

Principal Investigator 2010 - present

- Planetary science
- Hyperspectral image analysis for NASA SSERVI team
- Remote sensing image processing of Mars data
- Spectroscopy
- Member of the Mars Reconnaissance Orbiter CRISM Team (2005 – present)
- Produced software packages officially used in CRISM Data Processing Pipeline
  1. CIRRUS (Compact Iterative Recognition and Removal of Unwanted Spiking)
  2. CRISM SIM (CRISM Image Simulation)
  3. Pipeline Denoising of CRISM artifacts (with F. Seelos, APL)
  4. DiREX (Dimensionality Reduction for Endmember extraction)
  5. Unmixing of Hyperspectral data
  6. Spectral matching of remote sensing signatures to laboratory spectra

APPLIED PHYSICS LAB, Johns Hopkins University, Laurel, MD

Consultant 2008 – present

- Image reconstruction and denoising
- Spectrometer Instrument simulation

JET PROPULSION LAB, Pasadena, CA, machine learning group

Consultant 2010 (March)– present

- machine learning of CRISM images
- Image segmentation and enhancement

STANFORD UNIVERSITY, Stanford, CA

MS, PhD received

2003 – 2010 Department of Electrical Engineering,

Under the supervision of Professor Robert M. Gray in the Signal Compression and Classification Group (information Systems Laboratory).

- Signal and image compression and classification
- Vector Quantization
- Optical and Radar Remote Sensing
- Statistical Signal Processing
- Gaussian Mixtures
- Computer Vision
- Detection and Estimation Theory

2005 – 2010 Under Prof. Robert Tibshirani of the Department of Statistics

- (Machine) Supervised learning
- Supervised and Unsupervised learning
- Multivariate Analysis
- Inference and Hypothesis Testing

2002 -2003 Visiting scholar in the Electrical Engineering Department.

UNIVERSITY FEDERICO II, Naples, IT

2001-2002

Researcher in the Image Processing group in the Department of Telecommunication Engineering at Federico II University of Naples, Italy with the supervision of Professor Giovanni Poggi

- Markov Random Fields and Hidden Markov Models
- Image Segmentation
- TLC Networks
- Computer Networks
- Digital Communications.

### **RESEARCH GROUP AND STUDENTS**

DIRECTOR of Hyperspectral Remote Observers (RHOGROUP), Dept. of Electrical and Computer Engineering, Amherst, MA

PhD STUDENTS:

- Arun Saranathan (2013 – present): Physical models for unmixing. Manifold Learning for unmixing of hyperspectral datasets. PhD Thesis (proposal October 2017)
- Yuki Itoh (2013 – present): Sparse modeling theory, Sparse unmixing, Non-homogeneous Hidden Markov Models for representation of hyperspectral signals, Ground-truthing of hyperspectral imagers. PhD Thesis (proposal October 2017)
- Terry Mullen (2017 – present) Deep Learning for spectroscopic applications on Mars

M.S. STUDENTS:

- Ping Fung (2015 - present): Simulation and retrieval of Multi-Modal Hyperspectral Surface Reflectance Properties. MS Thesis: Inverting radiative transfer models of complex scenes with machine learning (in preparation)
- Alex Nichols (2015-2016): Video-improved Hyperspectral Surface Reflectance Retrieval.
- Neda Rohani (2012 – 2014): graph theory and manifold learning applied to hyperspectral image analysis.
- Keval Patel (2012-2013): Designing embedded software for autonomous robotic navigation on Mars.

VISITING PhD STUDENTS:

- Jakub Bieniarz (Fall 2013) from DLR (German Space Agency): Unmixing-based fusion of Multispectral and Hyperspectral images of Mars.

UNDERGRADUATE STUDENTS:

*Honors theses*

- Mark Wagner (2013), Compression of hyperspectral images with spectral-shape-aware methods (co-advised with Prof. Marco Duarte)
- Timothy Tufts (2014-2015), Identifying Extreme Boundary Points in N-Dimensional Clouds Using Centrality Measures.
- Carl Senecal (2014-2015) Inversion of Hapke radiative transfer models.

### **OTHER MENTORING EXPERIENCE**

MENTOR (PhD), College of Information and Computer Sciences, University of Massachusetts, Amherst

- (2013): C.J. Carey: Metric Learning for End-Member Unmixing in Hyperspectral Images.
- (2016-present) Ian Gemp: Deep learning for spectroscopic applications and Statistical Learning using game-theoretical tools. PhD thesis: Game-theoretic Learning with Vector Fields.

MENTOR (graduate), Department of Electrical and Computer Engineering, University of Massachusetts, Amherst

- (2013-2014): S. Feng (M.Sc.)
- (2014-present): S. Feng (PhD)
- (2015) Dian Mo (M.Sc.)

MENTOR (undergraduate), Department of Electrical and Computer Engineering, University of Massachusetts, Amherst, Senior Design Projects (2012-present)

- 2014 – present, NSF Research Experience for Undergraduates (REU)
- Michael Shlisselberg (2017) Deep Learning architectures for hyperspectral imaging
  - Steven Tate (2016) Processing of Hyperspectral Images of terrestrial and Martian geological surfaces.
  - Carl Senecal and Ping Fung (Summer 2014): semantic representation of hyperspectral data
  - Pedro Henrique Mosquera Santos (Summer 2013): Object detection in rover navigation images
  - Kevin Chieppo (Summer 2013): Simulating rover-based robotic exploration of planetary surfaces

- 2012 – 2013 (co-mentoring with Prof. Rod Grupen) NSF Research Experience for Undergraduates (REU)
- (2013) Plan and design a project for undergraduate research about integrating remote sensing and robotics for planetary exploration. The project involves the integration of hyperspectral images and robotic navigation.
  - (2012) Plan and design a project for undergraduate research about integrating remote sensing and robotics for planetary exploration. The project, called SIMPLE (Surface Investigation Mapper for Planetary Exploration), is hosted at <http://http://rhogroup.org/index.php/research>

MENTOR (undergraduate and graduate), Department of Planetary Geosciences, Brown University, Providence, RI 2010 – 2011

- MENTOR (undergraduate), SETI INSTITUTE, Mountain View, CA  
2007 – 2010 NASA Motivating Undergraduates in Science & Technology (MUST)  
NASA Undergraduate Student Research Program (USRP)  
NSF Research Experience for Undergraduates (REU)  
Hispanic College Fund Special Programs (HCF)  
United Negro College Fund Special Programs (UNCFSP)
- Plan and design projects for undergraduate research
  - Coach participating students through research
  - Responsible for student work, including publications

MENTOR (graduate), SETI INSTITUTE, Mountain View, CA  
2008 – 2010 Heather D. Makarewicz (U. of Kansas MS Mathematics)  
NASA Graduate Student Research Program (GSRP)  
Supervised Heather's MS thesis "Gaussian Modeling of CRISM Spectra"

2008 – 2009 James T. Clark (Stanford University Mechanical Engineering)

TUTOR, UNIVERSITY FEDERICO II, Naples, Italy  
1996-1997 Calculus and Probability

## **TEACHING EXPERIENCE:**

ASSISTANT PROFESSOR, Dept. of Electrical and Computer Engineering, Amherst, MA  
2016-2017 (Fall): ECE597IP/697IP Digital Image Processing  
2015-2017 (Spring): ECE697SP Statistical Image processing  
2014-2015 (Spring): ECE 314 Introduction to Probability (Lecture)  
2012-2014 (Fall): ECE697SP Statistical Image processing  
2012-2013 (Spring): ECE 314 Introduction to Probability (Discussions)  
2011 (Fall): ECE597IP/697IP Image processing for Remote Sensing

LECTURER, Department of Planetary Geosciences, Brown University, Providence, RI  
2010 – 2011 Co-teaching with Prof. John Mustard the graduate level class “Advanced Remote Sensing”

2010 – 2011 invited lecturer for the undergraduate - graduate level class “Introductory Remote Sensing”

SHERIDAN CENTER FOR TEACHING AND LEARNING, Brown University, Providence, RI  
2010 Participate in the lectures and workshops for the “Sheridan Teaching Seminar”

### **OTHER WORK EXPERIENCE:**

NEWIDEA, Naples, Italy  
1999 -2000

WEB DEVELOPER, start up company in the networking services market. Responsible for the design of the client-side user interface for Internet pages and web designer and editor

SMT ELECTRONICS, Naples, Italy  
1998

INSTRUCTOR in Electronics, Personnel instructor for a project on the design and implementation of surface mounting technology circuits

## SELECTED PUBLICATIONS<sup>1</sup>:

### Journals

2017

- A1. Y. Itoh**, M. F. Duarte and M. Parente, (2017) Perfect Recovery Conditions for Non-negative Sparse Modeling, in *IEEE Transactions on Signal Processing*, vol. 65, no. 1, pp. 69-80, Jan.1, 1 2017. doi: 10.1109/TSP.2016.2613067.
- A2.** R. Heylen, M. Parente, P. Scheunders,(2017) "Estimation of the Number of Endmembers in a Hyperspectral Image via the Hubness Phenomenon," in *IEEE Transactions on Geoscience and Remote Sensing* , vol.55, no.4, pp.2191-2220, doi: 10.1109/TGRS.2016.2638541.
- A3. Y. Itoh, S. Feng**, M. F. Duarte and M. Parente (2017) Semi-Supervised Endmember Identification In Nonlinear Spectral Mixtures Via Semantic Representation, *IEEE Transactions on Geoscience and Remote Sensing*, vol. 55, issue 6, pp. 3272-3286, DOI: 10.1109/TGRS.2017.2667226.
- A4. A. Saranathan** and M. Parente (2017), "On clustering and embedding manifolds using a low rank neighborhood approach," arXiv preprint arXiv:1608.06669, submitted to *IEEE Transactions on Geoscience and Remote Sensing*.
- A5. I. Gemp**, I. Durukgar, M. Parente, M.D. Dyar, S. Mahadevan (2017), Inverting Variational Autoencoders for Improved Generative Accuracy, arXiv preprint arXiv:1608.059883 to be *submitted to IEEE Transactions on Geoscience and Remote Sensing*.

2016

- A6. S. Feng, Y. Itoh**, M. Parente and M. F. Duarte, "Hyperspectral Band Selection from Statistical Wavelet Models," in *IEEE Transactions on Geoscience and Remote Sensing*, vol.55, no.4, pp.2111-2123.

2015

- A7. A. M. Saranathan** and M. Parente, "Uniformity-Based Superpixel Segmentation of Hyperspectral Images," in *IEEE Transactions on Geoscience and Remote Sensing*, vol. 54, no. 3, pp. 1419-1430, March 2016. doi: 10.1109/TGRS.2015.248086.

2014

- A8.** R. Heylen, M. Parente and P. Gader (2014). A review of Nonlinear Unmixing methods, *IEEE Journal of Selected Topics in Applied Earth Observations and Remote Sensing*, vol. 7, Issue 6. (**# 4 most cited IEEE JSTARS article (retrieved August 2016)**).

2013

- A9.** J.L. Bishop, D. Loizeau, N.K. McKeown, L. Saper, M.D. Dyar, N. Tosca, D. DesMarais, M. Parente, S.L. Murchie (2013). What the Ancient Phyllosilicates at Mawrth Vallis can tell us about Possible Habitability on Early Mars, *Planetary and Space Science*, vol. 86, pages 130-149, <http://dx.doi.org/10.1016/j.pss.2013.05.006>.
- A10.** J.L. Bishop, D. Tirsch, L. Tornabene, R. Jaumann, A.S. McEwen, P. McGuire, A. Ody, F. Poulet, R. Clark, M Parente and 11 others (2013). Mineralogy and morphology of geologic units at Libya Montes, Mars: Ancient aqueous outcrops, mafic flows, fluvial features and impacts, *Journal of Geophysical Research*, vol. 118, doi:10.1029/2012JE00415.

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<sup>1</sup> In the list of publications, I have indicated in **bold** the names of the students I advise and in **italics bold** the names of the ones I co-advise.



2012

- A11.** J.M. Bioucas-Dias, A. Plaza, N. Dobigeon, M. Parente, Q. Du and P. Gader (2012). Hyperspectral Unmixing Overview: Geometrical, Statistical and Sparse Regression-Based Approaches, *IEEE Journal of Selected Topics in Applied Earth Observations and Remote Sensing*, Volume 5, Issue 2, 354-379, doi:10.1109/JSTARS.2012.2194696. **(top most cited, # 8 most popular IEEE JSTARS article (retrieved August 2016)).**

2011

- A12.** M. Parente, H. Mackarevicz and J. L. Bishop. (2011) Decomposition of mineral absorption bands using nonlinear least squares curve fitting: application to Martian meteorite and CRISM data, *Planetary and Space Science*, 59, pp. 423-442, doi:10.1016/j.pss.2011.01.009.
- A13.** J.L. Bishop, M. Parente, V.E. Hamilton, (2011) Spectral Signatures of Martian Meteorites and What They Can Tell Us About Rocks on Mars, *Meteoritics and Planetary Science Supplement* 74, 5393.
- A14.** N.K. McKeown, J.L. Bishop, J. Cuadros, S. Hillier, E. Amador, H.D. Makarewicz, M. Parente (2011). Interpretation of reflectance spectra of clay mineral-silica mixtures: implications for Martian clay mineralogy at Mawrth Vallis, *Clays and Clay Minerals* 59 (4), 400-415

2010

- A15.** J. R. Michalski, J.-P. Bibring, F. Poulet, D. Loizeau, N. Mangold, E. Noe Dobrea, J. L. Bishop, J. J. Wray, N. K. McKeown, M. Parente, E. Hauber, F. Altieri, F. G. Carrozzo and P. B. Niles, (2010). The Mawrth Vallis region of Mars: a potential landing site for the Mars Science Laboratory (MSL) mission, *Astrobiology*, 10 (7), 687-703.
- A16.** M. Parente, J.T. Clark, A. Brown and J.L. Bishop (2010) End-to-end simulation and analytical of remote sensing systems: application to CRISM, *IEEE Transactions on Geoscience and Remote Sensing*, vol. 48, issue 11, p. 3877-3888.

2009

- A17.** M. Parente, J. L. Bishop and J. F. Bell III, (2009), Spectral unmixing and anomaly detection for mineral identification in Pancam images of Gusev soils, *Icarus*, Vol 203, N. 2, p. 421-436.
- A18.** S Murchie, L. Roach, F. Seelos, R. Milliken, J. Mustard, R. Arvidson, S. Wiseman, K. Lichtenberg, J. Andrews-Hanna, J. Bishop, J-P. Bibring, M. Parente, and R. Morris (2009). Evidence for the Origin of Layered Deposits in Chandor Chasma, Mars, from Mineral Composition and hydrologic modeling. *J. Geophys. Res.*, doi:10.1029/2009JE003343.
- A19.** N.K. McKeown, J. L. Bishop, E. Z. Noe Dobrea, M. Parente, B. L. Ehlmann, J. F. Mustard, S. L. Murchie, J-P. Bibring, E. Silver (2009). Characterization of phyllosilicates observed in the central Mawrth Vallis region, Mars, their potential formational processes, and implications for past climate. *J. Geophys. Res.*, 114, E00D10, doi:10.1029/2008JE003301.
- A20.** J. L. Bishop, M. Parente, C. M. Weitz, E. Z. Noe Dobrea, L. H. Roach, S. L. Murchie, P. C. McGuire, N. K. McKeown, C. M. Rossi, A. J. Brown, W. M. Calvin, R. Milliken, J. F. Mustard, (2009). Mineralogy of Juventae Chasma: Sulfates in the Light-toned Mounds, Mafic Minerals in the Bedrock, and Hydrated Silica and Hydroxylated Ferric Sulfate on the Plateau. *J. Geophys. Res.*, 114, E00D09, doi:10.1029/2009JE003352.
- A21.** P. C. McGuire, J. L. Bishop, A. J. Brown, A. A. Fraeman, G. A. Marzo, M. F. Morgan, S. L. Murchie, J. F. Mustard, M. Parente, S. M. Pelkey, T. L. Roush, F. P. Seelos, M. D. Smith, L. Wendt,

M. J. Wolff (2009). A new volcano-scan algorithm for atmospheric correction of CRISM and OMEGA spectral data. *Planetary and Space Science*, Volume 57, Issue 7, p. 809-815.

2008

- A22.** M. D. Lane, J. L. Bishop, M. Darby Dyar, P. L. King, M. Parente and B.C. Hyde (2008), Mineralogy of the Paso Robles soils on Mars. *American Mineralogist*, Volume 93, pages 728–739, 2008. DOI: 10.2138/am.2008.2757 728.
- A23.** Bishop J. L., Noe Dobrea E. Z., McKeown N. K., Parente M., Ehlmann B. L., Michalski J. R., Milliken R. E., Poulet F., Swayze G. A., Mustard J. F., Murchie S. L., and Bibring J.P. (2008). Phyllosilicate diversity and past aqueous activity revealed at Mawrth Vallis, Mars. *Science* 321, DOI: 10.1126/science.1159699, pp. 830-833.
- A24.** Bishop J.L., McKeown N.K., Parente M., Noe Dobrea E.Z., Bibring J.-., P., Calvin W.M., Ehlmann B.L., Milliken R.E., Mustard J.F., Murchie S.L., Poulet F., Roach L.A., Weitz C.M. & CRISM Team (2008). Characterization of aqueous processes on Mars through identification of phyllosilicates, sulfates and hydrated silica using CRISM hyperspectral images. *Geophysical Research Abstracts*, 10, EGU2008-A-11529.

### ArXiv-only papers

- A25.** S. Feng, Y. Itoh, M. Parente and M.F. Duarte, (2016). Wavelet-Based Semantic Features for Hyperspectral Signature Discrimination, arXiv:1602.03903 [cs:CV].

### Journal articles in preparation

- AP1.** M. Parente and J. Mustard, Planetary Science Applications of Hyperspectral Imaging in *Advances in Hyperspectral Image Analysis*, special issue of the *IEEE GRSS Remote Sensing Magazine* (M. Parente, R. Heylen and J. Kerekes, eds.)
- AP2.** **Y. Itoh** and M. Parente, A Novel Algorithm for Denoising and Atmospheric Compensation of CRISM Hyperspectral Images, in preparation, to be submitted to *Icarus*.

### Invited (peer-reviewed) conference papers

2017

- IC1.** **Y. Itoh** and M. Parente, Sparse unmixing with adaptive background, *2017 IEEE International Geoscience and Remote Sensing Symposium (IGARSS)*, Forth Worth, TX, USA, 2017, (invited presentation for special session on Data Fusion) .
- IC2.** M. Parente, **I. Gemp** and I. Durugkar, Unmixing in the presence of nuisances with deep generative models, *2017 IEEE International Geoscience and Remote Sensing Symposium (IGARSS)*, Forth Worth, TX, USA, 2017 (invited presentation for special session on Deep Learning in Remote Sensing).
- IC3.** R. Heylen, M. Parente, P. Scheunders (2017) Estimation of the Intrinsic Dimensionality in Hyperspectral Imagery via the Hubness Phenomenon. In: P. Tichavský, M. Babaie-Zadeh, O. Michel, N. Thirion-Moreau (eds) *Latent Variable Analysis and Signal Separation. LVA/ICA 2017. Lecture Notes in Computer Science*, vol 10169. Springer.

2016

- IC4.** **Y. Itoh** and M. Parente, (2016), On the performance of sparse unmixing on non-linear mixtures, *2016 IEEE International Geoscience and Remote Sensing Symposium (IGARSS)*, Beijing, 2016, pp. 7042-7045. doi: 10.1109/IGARSS.2016.7730836.
- IC5.** **A.M. Saranathan**, and M. Parente (2016). Unmixing multiple intimate mixtures via a locally low-rank representation, *IEEE 8th WHISPERS (Workshop on hyperspectral image and signal processing: evolution of remote sensing) Conf.* July, UCLA, Los Angeles, USA (invited presentation for special session on “Recent advances in unmixing”), abstr. #

**IC6.** R. Heylen, M. Parente, P. Scheunders, (2016) Estimation of the Number of Endmembers in a Hyperspectral Image via the Hubness Phenomenon, *IEEE 8th WHISPERS (Workshop on hyperspectral image and signal processing: evolution of remote sensing) Conf.* July, UCLA, Los Angeles, USA (invited presentation for special session on "Recent advances in unmixing"), abstr. #

2015

**IC7.** **Y. Itoh**, M. F. Duarte and M. Parente (2015), Performance guarantees for sparse regression-based unmixing, *IEEE 7th WHISPERS (Workshop on hyperspectral image and signal processing: evolution of remote sensing) Conf.* June 3-6, Tokyo, Japan (invited presentation for special session on "Recent advances in unmixing algorithms for hyperspectral images"), abstr. # 149.

**IC8.** **S. Feng**, M. F. Duarte and M. Parente (2015). Universality of Wavelet-Based Non-Homogeneous Hidden Markov Chain Model Features for Hyperspectral Signatures. EARTHVISION workshop 2015, within IEEE Computer Vision and Pattern Recognition (CVPR) Conference, June, 12, 2015, Boston, MA.

2014

**IC9.** **A.M. Saranathan**, and M. Parente (2014). Unmixing multiple intimate mixtures using manifold clustering, *IEEE 6th WHISPERS (Workshop on hyperspectral image and signal processing: evolution of remote sensing) Conf.* June 6-9, Lausanne, Switzerland (invited presentation for special session on "Recent advances in unmixing algorithms for hyperspectral images"), abstr. #184.

**IC10.** **S. Feng, Y. Itoh**, M. Parente and M.F. Duarte (2014), Tailoring non-homogeneous Markov chain wavelet models for hyperspectral signature classification. IEEE International Conference on Image Processing (ICIP), 2014, October 27-30, Paris, France, pp. 5167-5171.

**IC11.** **Y. Itoh**, M. F. Duarte and M. Parente (2014), Hyperspectral unmixing via semantic spectral representations, IEEE Midwest Symposium on Circuits and Systems (MWSCAS). Special session on Multispectral & Hyperspectral Remote Sensing. College Station, TX, August 3-6, 2014.

2013

**IC12.** M. Parente and M. Duarte (2013). A new semantic wavelet-based spectral representation. *Proceedings of 4th IEEE WHISPERS (Workshop on hyperspectral image and signal processing: evolution of remote sensing) Conf* abstr. # 164.

**IC13.** M. Duarte and M. Parente (2013). Non-Homogeneous Hidden Markov Chain Models for Wavelet-Based Hyperspectral Image Processing, *51st Annual Allerton Conference on Communication, Control and Computing*, October 2-4, Allerton Retreat Center, Monticello, IL, pp. 154-159

2011

**IC14.** Parente, M., Mustard, J.F., Murchie, S., and Seelos, F. (2011) Robust unmixing of hyperspectral images: Application to Mars. IEEE Intl. Symp. Geosci. Rem. Sensing, 2011, 1291-1294, July, 27-29, Vancouver, Canada, special session on "Spectral Unmixing".

**IC15.** M. Parente and A. Plaza (2011), Spectral clustering of hyperspectral images as similarity graphs, *IEEE 3rd WHISPERS (Workshop on hyperspectral image and signal processing: evolution of remote sensing) Conf.* June 6-9, Lisbon, Portugal (keynote presentation for special session on "Advances in unmixing algorithms for hyperspectral images").

2010

**IC16.** M. Parente and A. Plaza (2010), Survey of geometric and statistical unmixing algorithms for hyperspectral images, *IEEE 2nd WHISPERS (Workshop on hyperspectral image and signal*

*processing: evolution of remote sensing) Conf.* June 14-16, Reykjavik, Iceland (keynote presentation for special session on “Geometric vs. statistical unmixing algorithms”).

2008

- IC17.** M. Parente, Spectral unmixing using nonnegative basis learning: comparison of geometrical and statistical endmember extraction algorithms. *Space Exploration Technologies*, edited by Wolfgang Fink Proc. of SPIE Vol. 6960, 69600P, (2008). doi: 10.1117/12.777895.

## Keynote talks

- K1.** M. Parente (2017), Hyperspectral imaging in medicine, *32- Annual Engineering & Urology Meeting at the American Urological Association meeting*, Boston, MA, May 12, 2017.
- K2.** M. Parente (2016), Spectral Unmixing in the Wild, *IEEE 7th WHISPERS (Workshop on hyperspectral image and signal processing: evolution of remote sensing) Conf.*, UCLA, Los Angeles, CA, August, 21-24, 2016.
- K3.** M. Parente (2014), Hyperspectral Remote Sensing. X Taller-Escuela de Procesamiento de Imágenes (PI14). CIMAT, Guanajuato, Mexico. Oct 14-16, 2014.
- K4.** M. Parente (2014), Nonlinear Unmixing of Hyperspectral Datasets. X Taller-Escuela de Procesamiento de Imágenes (PI14). CIMAT, Guanajuato, Mexico. Oct 14-16, 2014.

## Invited seminars

- IS1.** M. Parente (2015). VNIR and SWIR Hyperspectral Imaging: the Umass RHOgroup. Headwall Photonics Inc. reseller Conference, Fitchburg, MA, April 15, 2015.
- IS2.** M. Parente (2014). Nonlinear Unmixing of Hyperspectral datasets: physical, statistical and geometrical perspectives. Chester F. Carlson Center for Imaging Science Seminar, Rochester Institute of Technology, Rochester, NY, April 30, 2014
- IS3.** M. Parente (2013). Advanced processing of hyperspectral imaging and 3D scanner data for fine art. Norsk Elektro Optik Technical seminar. Oslo, Norway, May 2013.
- IS4.** M. Parente (2013). The Remote Hyperspectral Observers group. Computer and Engineering Science and Engineering Department, University of Florida Gainesville, September 16, 2013.
- IS5.** M. Parente (2013). The Remote Hyperspectral Observers group: Machine learning for terrestrial and planetary remote sensing. German DLR seminar series in remote sensing, May 2013.
- IS6.** M. Parente (2013). Graphical models in hyperspectral image processing. Department of Electrical Engineering, University of Pavia, Italy, May 2013.
- IS7.** M. Parente (2012), Hyperspectral imaging and robotic navigation, Rochester Institute of Technology Imaging Science Seminars.
- IS8.** M. Parente (2011), Summarization of Hyperspectral Images: application to Mars, Johns Hopkins Applied Physics Laboratory Seminar series, April 14, Laurel, MD.
- IS9.** M. Parente (2011), Use of IDL in the summarization of Hyperspectral Images, ITT Visualize conference 2011, Washington, DC.

**IS10.** M. Parente Exploratory data analysis of planetary datasets – new development, Jet Propulsion Laboratory, Pasadena CA, December 4 2008.

**IS11.** M. Parente Exploratory data analysis of planetary datasets, CSC/SETI Institute Colloquium series, June 18 2008. <http://www.youtube.com/watch?v=diSfC-qJgsY>

## Peer-reviewed conference papers

2017

- C1.** **A.M. Saranathan** and M. Parente (2017) Active classification of neutral spectra for CRISM images, *48th Lunar & Planetary Science Conference*, Texas, March 2017, abstr. # 2866.
- C2.** M. D. Dyar, T.F. Boucher, M. Parente, **T. Mullen**, and **I. Gemp**, Calibration transfer in LIBS and Raman spectroscopy for planetary applications, in *AGU Fall Meeting Abstracts*, December, 2017.
- C3.** **T. Mullen**, M. Parente, **I. Gemp**, and M.D. Dyar, "A deep learning approach to LIBS spectroscopy for planetary applications," in *AGU Fall Meeting Abstracts*, December, 2017.
- C4.** **Y. Itoh** and M. Parente (2017) Image-derived atmospheric transmission for enhancement of volcano-scan correction, *Lunar Planet Science Conf*, XLVIII, abstr. # 2939.
- C5.** **I. Gemp**, I. Durugkar, M. Parente, M.D. Dyar, S. Mahadevan (2017) Deep Learning Models for Spectroscopic Data: Semi-Supervised Generative Models Applied to Laser-Induced Breakdown Spectroscopic Data, *Lunar Planet Science Conf*, XLVIII, abstr. # 1696.

2016

- C6.** **S. Feng**, **Y. Itoh**, M. Parente and M. F. Duarte (2016) Band Selection from Statistical Wavelet Models, *IEEE 8th WHISPERS (Workshop on hyperspectral image and signal processing: evolution of remote sensing) Conf.* July, UCLA, Los Angeles, USA, abstr. #
- C7.** J. L. Bishop, C. Gross, E. B. Rampe, J. J. Wray, M. Parente, B. Horgan, D. Loizeau, C. E. Viviano-Beck, R. N. Clark, F. P. Seelos, B. L. Ehlmann & S. L. Murchie (2016) Mineralogy of layered outcrops at Mawrth Vallis and implications for early aqueous geochemistry on Mars, *Lunar Planet Science Conf*, XLVII, abstr. # 1332.
- C8.** J. Svejkosky, E. Ientilucci, S. Richtsmeier, M. Parente, C. Bachmann (2016) A hyperspectral vehicle BRDF sampling experiment. *Proc. SPIE 9840, Algorithms and Technologies for Multispectral, Hyperspectral, and Ultraspectral Imagery XXII*, 98401D (May 17, 2016); doi:10.1117/12.2225450.
- C9.** J.R. Skok, J.D. Farmer, G Jerman, J Gaskin, N Lindsey, C Munoz-Saez, H Kaasalainen, D Tobler, M Parente, KL Craft (2016) Seeking signs of life in ancient Martian hot springs with Icelandic analogs, *Proceeding of Biosignature Preservation and Detection in Mars Analog Environments*, Proceedings of a conference held May 16-18, 2016 in Lake Tahoe, Nevada. LPI Contribution No. 1912, id.2021

2015

- C10.** M. Parente, **A. M. Saranathan**, M.D. Dyar (2015). A new spectroscopic facility at Umass Amherst, ", *Lunar Planet Science Conf*, XLVI, abstr. # 3019.
- C11.** **A.M. Saranathan** and M. Parente, (2015) Simultaneous clustering and embedding for multiple intimate mixtures, *IEEE International Geoscience and Remote Sensing Symposium (IGARSS)*, Milan, Italy, 26-31 July 2015, abstr. # 8849.
- C12.** S. Giguere, C. Carey, M. D. Dyar, T. F. Boucher, M. Parente, T. J. Tague, Jr., P. Wang, and S. Mahadevan (2015) Baseline removal in LIBS and FTIR spectroscopy: optimization techniques. *Lunar Planet Science Conf*, XLVI, abstr. # 2464
- C13.** S.A. Byrne, M.D. Dyar, E.E. Besset, L.B. Breitenfeld, M.C. Crowley, C.M. Hoff, G.J. Marchand, M.N. Ketley, A.L. Roberts, E.C. Sklute, M. Parente (2015). Pure Mineral Separates for Mixing Experiments to Simulate Planetary Surfaces. *Lunar Planet Science Conf*, XLVI, abstr. # 1499.

2014

- C14.** M. Parente, **A. M. Saranathan**, S. Wiseman, B. L. Ehlmann and L. Pan (2014). Denoising CRISM images: a new look, *Lunar Planet Science Conf*, XLV, abstr. # 2900.

- C15.** **N. Rohani**, M. Parente (2014) Graph Centrality for Hyperspectral Image Unmixing: a New Look, IEEE International Geoscience and Remote Sensing Symposium (IGARSS), Quebec City, Quebec, Canada, 13-18 July 2014, abstr. # 3536.
- C16.** Bishop, J. L., Flahaut, J., Weitz, C. M., Gross, C. Parente, M. Horgan, B. H. N. (2014). Acidic Alteration Environments on Mars and Implications for Habitability. *AGU Fall Meeting, San Francisco, Calif., Abstract P41A-3885*
- C17.** Bishop, J. L., Horgan, B., Wray, J. J., Loizeau, D., Gross, C., McGuire, P. C., Parente, M., Seelos, F., Viviano-Beck, C. and Murchie, S. L. (2014). Composition and Stratigraphy of Acidic Components at Mawrth Vallis, Mars. *European Planetary Science Congress (EPSC), Cascais, Portugal, 7-12 September, Abstract # 694.*

2013

- C18.** **N. Rohani** and M. Parente (2013). Graph-Based Identification of Boundary Points for Unmixing and Anomaly Detection *4th IEEE WHISPERS (Workshop on hyperspectral image and signal processing: evolution of remote sensing) Conf.*, abstr. # 158.
- C19.** **A.M. Saranathan** and M. Parente (2013). Threshold Based Segmentation Method For Hyperspectral Images. *4th IEEE WHISPERS (Workshop on hyperspectral image and signal processing: evolution of remote sensing) Conf*, abstr. # 165.
- C20.** **N. Rohani**, M. Parente, **A.M. Saranathan** (2013) Endmember detection using graph theory. IEEE Geoscience and Remote Sensing Symposium (IGARSS), 2013, pp. 1462-1465, <http://dx.doi.org/10.1109/IGARSS.2013.6723061>
- C21.** **N. Rohani**, M. Parente (2013). Endmember Detection in CRISM Images Using Graphs, *Lunar Planet Science Conf, XLIV*, abstr. # 2894
- C22.** Bishop, JL; Wray, JJ; Ehlmann, BL; Brown, AJ; Parente, M.(2013). Refining Martian Carbonate Chemistries Determined Through CRISM Analyses of Several Carbonate-Bearing Outcrops. *Lunar Planet Science Conf, XLIV*, abstr. # 2555
- C23.** **A.M. Saranathan**, M. Parente (2013). Automatic Extraction of Unique Spectral Signatures from the M<sup>3</sup> Database, *Lunar Planet Science Conf, XLIV*, abstr. # 3056
- C24.** P.C. McGuire, R.E. Arvidson, J.L. Bishop, A.J. Brown, M. Parente and 25 others (2013). Mapping Minerals on Mars with CRISM: Atmospheric and Photometric Correction for MRDR Map Tiles, Version 2, and Comparison to OMEGA, *Lunar Planet Science Conf, XLIV*, abstr. # 1581.

2012

- C25.** J.L. Bishop, R. Beyer, J.J. Wray, M. Parente, D. Loizeau, D. Lowe, L. Saper, N. McKeown (2012). Evidence for Sedimentary Processes at Mawrth Vallis, Mars and Implications for Habitability., *Astrobiology Conference*, abstr # 1352304.
- C26.** J.L. Bishop, Loizeau, D., McKeown, N. K., Saper, L. M., Dyar, M. D., Des Marais, D. J., Parente, M. and Murchie, S. L. (2012) Early Martian Habitability and Phyllosilicates at Mawrth Vallis. *Third Conference on Early Mars: Geologic, Hydrologic, and Climatic Evolution and the Implications for Life*, abs. #7014.

2011

- C27.** M. Parente, J.R. Skok, J.F. Mustard, I. Baarstad, (2011). Simulating a Mars mission for the identification of samples of high mineralogical interest using a portable imaging spectrometer, *AGU Fall meeting*, abstr. # P33D-1784.
- C28.** M. Parente, Mustard, J.F.; Murchie, S.; Seelos, F.; (2011). Robust unmixing of hyperspectral images: Application to Mars," *Geoscience and Remote Sensing Symposium (IGARSS)*, 2011, 1291-1294,2011, IEEE.
- C29.** Parente, M., J.F. Mustard, S. Murchie and F.P. Seelos (2011). Summarizing the spectral variability of CRISM images by endmember extraction, *Lunar Planet Science Conf, XLII*, abstr. # 2622.
- C30.** D. Dhingra, J. F. Mustard, S. Wiseman and M. Parente and C. M. Pieters (2011). Non-Linear Spectral Un-mixing Using Hapke Modeling: Application to Remotely Acquired M3 Spectra of Spinel bearing Lithologies on the Moon. *Lunar Planet Science Conf, XLII*, abstr. # 2431.

- C31.** J.L. Bishop, L. Saper, R. Beyer, D. Lowe, J. Wray, N.K. McKeown and M. Parente (2011). Possible sedimentary features in phyllosilicate-bearing rocks in Mawrth Vallis, Mars. *Lunar Planet Science Conf*, XLII, abstr. # 2374.
- C32.** J. L. Bishop, J. J. Wray, M. Parente, D. Loizeau, R. A. Beyer, D. Lowe, L. Saper, N. K. McKeown (2011). Sedimentary Features in Phyllosilicate-bearing Outcrops of Crater Rims at Mawrth Vallis, Mars. EPSC Abstracts, Vol. 6, abstr. # 1704.

2010

- C33.** Parente, M. and J.L. Bishop, (2010). Extracting endmember spectra from CRISM images: comparison of new Direx image transform technique with MNF, *Lunar Planet Science Conf*, XLI abstr. #2633.
- C34.** J. L. Bishop, N. K. McKeown, M. Parente, J.-P. Bibring, D. Loizeau, N. Mangold, J. R. Michalski, E. Noe Dobrea, F. Poulet, J. J. Wray, D. J. Des Marais, S. L. Murchie and J. F. Mustard (2010). Phyllosilicate-bearing Rocks at Mawrth Vallis, Mars, and Implications for Habitable Environments and Biomarkers. EPSC Abstracts. Vol. 5, EPSC2010-177, 2010, European Planetary Science Congress 2010
- C35.** J.L. Bishop, L.N. Saper, N.K. Mckeown, M. Parente, F. Poulet and J.F. Mustard, (2010). Mineralogy Of Mawth Vallis, Mars, As Determined Through Analyses Of Crism Images, 2010 GSA Denver Annual Meeting, Paper No. 213-10.
- C36.** P.C. McGuire, R.E. Arvidson, J.L. Bishop, A.J. Brown, S. Cull, R.O. Green, C. Gross, C.D. Hash, E. Hauber, D.C. Humm, R. Jaumann, L. Le Deit, E.R. Malaret, T.Z. Martin, G.A.Marzo, M.F. Morgan, S.L. Murchie, J.F. Mustard, G. Neukum, M. Parente, T. Platz, T.L. Roush, F.P. Seelos, K.D. Seelos, M.D. Smith, M. Sowe, D. Tirsch, S. Walter, L. Wendt, S.M. Wiseman, and M.J. Wolff (2010). Mapping Minerals on Mars with CRISM: Atmospheric, Thermal, and Photometric Correction for MRDR Map Tiles and Comparison to OMEGA. EPSC Abstracts Vol. 5, EPSC2010-163, 2010. European Planetary Science Congress 2010
- C37.** Bishop, J.L., H. D. Makarewicz, K. A. Perry, N. K. McKeown, M. Parente, L. L. Tornabene, G. A. Swayze, R. N. Clark, J. F. Mustard, S. L. Murchie and A. S. McEwen (2010). Mineralogy of Libya Montes and the southern Isidis Planitia region: CRISM detection of carbonate, olivine and pyroxene and correlation with HiRISE imagery. *Lunar Planet Science Conf*, XLI abstr. # 2147.
- C38.** McKeown, N.K., J. L. Bishop, E. Amador, J. Cuadros, S. Hillier, H. Makarewicz, M. Parente, E. A. Silver, (2010). Spectral mixtures of clays and their impact on CRISM mineral identifications. , *Lunar Planet Science Conf*, XLI abstr. #2510.

2009

- C39.** Parente M., Clark J.T., Brown A.J., and Bishop J.L.. (2009). Simulation of the image generation process for CRISM spectrometer data. *IEEE WHISPERS (Workshop on hyperspectral image and signal processing: evolution of remote sensing) Conf*. Aug 26-28 Grenoble, France.
- C40.** Makarewicz, H.D., Parente, M., Perry, K.A., McKeown, N.K., & Bishop, J.L. (2009). Characterizing Mafic, Clay, and Carbonate Components found in MRO/CRISM Images in Libya Montes, Mars, using Advances in Automated Gaussian Modeling of Spectral Features. In *AGU Fall Meeting*. San Francisco, CA: Amer Geo Union
- C41.** Bishop J.L., McKeown N.K., Mustard J.F., Buczkowski D.L., Clark R.N., Ehlmann B.L., Marzo G.A., Milliken R.E., Murchie S.L., Noe Dobrea E., Parente M., Roush T.L., Swayze G.A. & Wray J.J. (2009) Distribution and variability of phyllosilicates on Mars observed by MRO/CRISM. International Clay Conference.

- C42.** J. L. Bishop; N. K. McKeown; M. Parente; H. D. Makarewicz; R. L. Mancinelli; D. J. Des Marais; S. L. Murchie; J. F. Mustard Potential for Biomarkers in Phyllosilicate-bearing Rocks at Mawrth Vallis, Mars. In, *AGU Fall Meeting*. San Francisco, CA: Amer Geo Union
- C43.** Parente M. Clark J. T. Bishop J. L. Brown A. J. (2009). Simulating CRISM Images: A Tool for CRISM Images on Mars . *Lunar Planet Science Conf*, XL abstr. # 2487
- C44.** Amador E. A. Bishop J. L. McKeown N. K. Parente M., Clark J. T. (2009). Detection of Kaolinite at Mawrth Vallis, Mars: Analysis of Laboratory Mixtures and Development of Remote Sensing Parameters. *Lunar Planet Science Conf*, XL abstr. #2188
- C45.** Makarewicz, H.D., Parente, M., & Bishop, J.L. (2009). Deconvolution of VNIR Spectra Using Modified Gaussian Modeling (MGM) with Automatic Parameter Initialization (API) Applied to CRISM. *IEEE WHISPERS (Workshop on hyperspectral image and signal processing: evolution of remote sensing) Conf*. Aug 26-28 Grenoble
- C46.** Makarewicz H. D. Parente M. Bishop J. L. (2009), Determining the Composition of Phyllosilicates Using Automated Gaussian Modeling of Spectral Features, *Lunar Planet Science Conf*, XL abstr. #1358
- C47.** Bishop J. L., McKeown N. K., DesMarais D. J. Noe Dobrea E. Z. Parente M. Seelos F. Murchie S. L. Mustard J. F. (2009) The ancient phyllosilicates at Mawrth Vallis and what they can tell us about possible habitable environments on early Mars *Lunar Planet Science Conf*, XL abstr. # 2239
- C48.** Roach L. H., Mustard J. F. Murchie S. L. Bishop J. L. Ehlmann B. L. Milliken R. E. Lichtenberg K. Parente M. (2009) Hydrated Mineral Stratigraphy in Ius Chasma, Valles Marineris *Lunar Planet Science Conf*, XL abstr. # 1834
- C49.** Weitz C. M. \* Noe Dobrea E. Williams R. M. E. Metz J. Quantin C. , Parente M., Grotzinger J. (2009) MRO Observations of Fluvial Features, Sulfates, and Other Landforms in the Melas Chasma Basin. *Lunar Planet Science Conf*, XL abstr. # 1874.
- C50.** Rossi A. P. Pondrelli M. Hauber E. Baliva A. Michael G. Ori G. G. Pompilio L. Parente M. Ivanov A. Neukum G. (2009) Stratigraphic Architecture and Structural Control on Sediment Emplacement in Becquerel Crater (Mars) . *Lunar Planet Science Conf*, XL abstr. # 1588.
- C51.** Roach L. H. Mustard J. F. Murchie S. L. Bishop J. L. Ehlmann B. L. Lichtenberg K. Parente M. and the CRISM Science Team (2009). Sulfate and Hematite Stratigraphy in Capri Chasma, Valles Marineris . *Lunar Planet Science Conf*, XL abstr. # 1826.
- C52.** Lahtela H. Titus T. N. Geissler P. E. Roach L. H. Verba C. A. Mustard J. F. Murchie S. L. Brown A. J. Seelos F. Seelos K. Calvin W. M. Parente M. Cornwall C. (2009). Coordinated HiRISE/CRISM Observation on Gypsum Signature in Martian Polar Dunes. *Lunar Planet Science Conf*, XL abstr. # 2254.

2008

- C53.** M. Parente and J.L. Bishop (2008) A new technique for identification of minerals in hyperspectral images. Application to robust characterization of phyllosilicate deposits at Mawrth Vallis using CRISM images. *Eos Trans. AGU*, 89(53), Fall Meet. Suppl., Abstract P53B-1442
- C54.** Makarewicz, H. D., Parente M. and Bishop J.L. (2008) Characterizing Mafic and Clay Components in Libya Montes, Mars, using Automated Gaussian Modeling of Spectral Features found in MRO/CRISM Images. *Eos Trans. AGU*, 89(53), Fall Meet. Suppl., Abstract P41B-1378.
- C55.** Bishop J.L., Parente, M, Lane, M., Dyar, M D. Bish, D L., Sarrazin, P., King, P., McKeown, N., Milliken, R., Roach, L., Swayze, G., Weitz, C., Murchie, S., Mustard, J F. (2008) Coordinating



CRISM Observations of Sulfates near Valles Marineris with the Subsurface Bright Salty Soils Exposed in Gusev Crater via Lab Experiments. *Eos Trans. AGU*, 89(53), Fall Meet. Suppl., Abstract P43B-1397

- C56.** McKeown, N., Bishop, J. L., Noe Dobrea, E. Z., Parente, M., Ehlmann, B. L., Mustard, J. F., Murchie, S. L., Bibring, J.-P., Silver, E. (2008). Phyllosilicates in Mawrth Vallis: Implications for a Past Aqueous Environment, *Eos Trans. AGU*, 89(53), Fall Meet. Suppl., Abstract P43D-06.
- C57.** Murchie, S., Seelos, F., Roach, L., Mustard, J., Milliken, R., Arvidson, R., Wiseman, S., Lichtenberg, K., Andrews-Hanna, J., Bibring, J., Bishop, J., Parente, M., Morris, R., (2008). New Evidence for the Origin of Layered Deposits in Valles Marineris. *Eos Trans. AGU*, 89(53), Fall Meet. Suppl., Abstract P44A-02.
- C58.** Bishop J. L., Lane M. D., Dyar M. D., Parente M., Roach L. A., Murchie S. L. & Mustard J. F. (2008). Sulfates on Mars: How recent discoveries from CRISM, OMEGA and the MERs are changing our view of the planet. *Goldschmidt Conf.*, abs# 18D\_1678.
- C59.** M. Parente, J.L. Bishop and J. Cuadros (2008) Lab Experiments To Simulate Coatings On Phyllosilicate Rocks And Comparison With CRISM Data Of Mars. *Martian Phyllosilicates: Recorders of Aqueous Processes*. Abstr. # 7039.
- C60.** M. Parente. A new approach to denoising CRISM images. *Lunar Planet Science Conf*, abs 2528
- C61.** Honma, J. L. Bishop, N. McKeown, A. J. Brown, and M. Parente, Constraining phyllosilicate abundances on Mars using CRISM spectra and laboratory mixtures. *Lunar Planet Science Conf*, abs 1457
- C62.** J. T. Clark, J. L. Bishop, M. Parente, A. J. Brown, and N. K. McKeown, Constraining sulfate abundances on Mars using CRISM spectra and laboratory mixtures. *Lunar Planet Science Conf*, abs 1540
- C63.** Bishop J. L., Parente M., Weitz C., Noe Dobrea E. Z., Calvin W. M., Milliken R. E., Roach L. A., Murchie S. L., McKeown N. K., Mustard J. F. & Team, t. C. 2008. Characterization of light-toned sulfate and hydrated silica layers at Juventae Chasma using CRISM, OMEGA, HiRISE and CTX Images *Lunar Planet Science Conf*, abs. #2334.
- C64.** Bishop J. L., Garcia N., Dyar M. D., Parente M., Murad E., Mancinelli R. L., Drief A., and Lane M. D. (2008), Maghemite as an astrobiology indicator on the Martian surface: Reduction of iron oxides by early organic compounds to generate magnetic phases, *Geophysical Research Abstracts*, 10, EGU2008-A-11557.

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- C65.** Parente, M., Bishop, J. L., Noe Dobrea, E., Calvin, W., Roach, L., Murchie, S., (2007) Characterization of Sulfate Minerals in Juventae Chasma from CRISM images *Eos Trans. AGU*, 88(52), Fall Meet. Suppl., Abstract P23A-1091.
- C66.** Zymnis, A.; Kim, S.-J.; Skaf, J.; Parente, M.; Boyd, S. Hyperspectral Image Unmixing via Alternating Projected Subgradients, *Proceedings of the Forty-First Asilomar Conference on Signals, Systems and Computers*, 2007. Page(s): 1164-1168. DOI: 10.1109/ACSSC.2007.4487406
- C67.** M.D. Lane, J. L. Bishop, M. D. Dyar, M. Parente, P. L. King, and B. C. Hyde, (2007), The ferric sulfate and ferric phosphate minerals in trobles rover track soils: a multi-instrument analysis. *Seventh International Conference on Mars*, abstr. # 3331
- C68.** M. Parente, J. L. Bishop and J. F. Bell III. (2007) Automatic Identification Of Dominant Phases And Anomalies In Pancam Images Of Gusev Soils. *Seventh International Conference on Mars*, abstr. # 3390.

- C69.** M.D. Lane, J. L. Bishop, M. D. Dyar, M. Parente, P. L. King, and B. C. Hyde, (2007), Identifying phosphate and ferrous sulfate minerals in the Paso Robles soils (Gusev crater, Mars) using an integrated spectral approach. *Lunar Planet Science Conf*, abs. # 2176
- C70.** M. Parente, J. L., Bishop and J. F. Bell III, (2007) Spectral unmixing for sulfate identification in PanCam images. *Lunar Planet Science Conf*, abs. # 1934
- C71.** Bishop J. L., Catling D. C. & Parente M. 2007. Juventae Chasma as a Potential MSL Landing Site. *2nd MSL Workshop*, [http://marsoweb.nas.nasa.gov/landingsites/msl/workshops/2nd\\_workshop/program.html](http://marsoweb.nas.nasa.gov/landingsites/msl/workshops/2nd_workshop/program.html).

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- C72.** M. Parente, A. Zymnis, J. Skaf, and J. Bishop. Spectral unmixing with nonnegative matrix factorization. , Proc. SPIE 6366, 63660B (2006), DOI:10.1117/12.691830
- C73.** M. D. Lane, J. L. Bishop, M. Parente, M. D. Dyar, P. L. King, and E. Cloutis. (2006). Determining The Chemistry Of The Bright Paso Robles Soils On Mars Using Multispectral Data Sets. .Martian Sulfates as Recorders of Atmospheric-Fluid-Rock Interactions abstr. # 7025
- C74.** J. L. Bishop, A. J. Brown, M. Parente, M. D. Lane, M. D. Dyar, P. Schiffman, E. Murad and E. Cloutis (2006). Vnir Spectra Of Sulfates Formed In Solfataric And Aqueous Acid Sulfate Environments And Applications To Mars. Martian Sulfates as Recorders of Atmospheric-Fluid-Rock Interactions abstr. # 7037
- C75.** J. L. Bishop, M. D. Dyar, M. Parente, A. Drief, R. L. Mancinelli, M. D. Lane and E. Murad Understanding Surface Processes on Mars Through Study of Iron Oxides/Oxyhydroxides: Clues to Surface Alteration and Aqueous Processes. *Lunar Planet. Sci. XXXVII.* , Lunar Planet. Inst., Houston, CD-ROM #1438 (abstr.). (2006)
- C76.** M. Parente and J.L. Bishop Deconvolution of Reflectance Spectra using Nonlinear Least Squares Curve Fitting: Application to Martian Meteorites. *Lunar Planet. Sci. XXXVII.* , Lunar Planet. Inst., Houston, CD-ROM #1535 (abstr.). (2006)
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