

Curriculum Vitae - ALBERTO BEHAR

Jet Propulsion Laboratory, 4800 Oak Grove Drive, Pasadena, CA 91109-8099, 818-687-8627, alberto.behar@jpl.nasa.gov

EXPERIENCE

Over 22 years of experience in planetary flight projects and research and development of extreme environment robotics and instruments for planetary (including Earth) science and engineering applications

NASA - Jet Propulsion Laboratory, Pasadena, CA

Investigation Scientist, Program Manager 1, Senior Researcher

Planetary Chemistry and Astrobiology Group 2010

Mars Rover 2011 (Curiosity) Dynamic Albedo of Neutrons Instrument (DAN), Co-Investigator

Mars Odyssey Gamma Ray Spectrometer, Investigation Scientist

Mars Odyssey Thermal Imaging Spectrometer, Investigation Scientist

Mars Odyssey High Energy Neutron Detector, Investigation Scientist

Mars Exploration Rovers, Rover Driver and System Downlink Analysis Team

Chief Engineer on the Greenland Moulin Explorer Task, Hawaiian Volcano Monitor Task, Deep Sea Hydrothermal Vent Bio-Sampler Task, Tumbleweed Polar Rover Task, Antarctic Ice Probe Task, Microgravity Spiderbot Task

Investigator – Developed many systems of instrumentation for Greenland and Antarctica

Field Tech – 6 deep field deployments to Antarctica and 12 to Greenland

JPL Mission Architect Development Program, Johnson Space Center 2002, NASA Headquarters 2001

Japanese MUSES-C Asteroid Mission, Rover System Engineer 1996-98, Rover Camera Engineer 2000

EDUCATION

University of Southern California, Los Angeles, CA

- Ph.D. in Electrical Engineering with an Astronautics Minor, May 1998
- Thesis: The design, implementation and evaluation of Sub-Kilogram Intelligent Telerobots for Asteroid Exploration (SKIT). I designed 4 robots used to study the relative merits of sending many small robots to perform precursor asteroid exploration missions and the implication of population size and tele-assistance.

University of Southern California, Los Angeles, CA

- M.S. in Computer Science with a specialization in Robotics, December 1994

International Space University, Kitakyushu, Japan

- Summer Session, Robotics, Resources and Manufacturing Department, 1992

Rensselaer Polytechnic Institute, Troy, NY

- M.E. in Electrical, Computer & Systems Engineering, May 1992

University of Florida, Gainesville, FL

- B.S. in Computer and Information Engineering Sciences, June 1990

TEACHING EXPERIENCE

Arizona State University, Tempe, AZ

- SES 100, Introduction to Exploration, Class # 83678, Fall 2011, Tempe PSF123
- GLG 598, Exploration System Design, Spring 2012
- GLG 599, Special Topics, Exploration Instrument Development

HONOR and AWARDS

- NASA Team Honors Award, 2008

PROFESSIONAL ORGANIZATIONS

- Sigma Xi, The Scientific Research Society
- American Geophysical Union (AGU)
- IEEE Autonomous Robotics
- Association of Computing Machinery (ACM)
- Upsilon Pi Epsilon, (UPE) Honor Society
- MENSA
- Society for Hispanic Professional Engineers (SHPE)
- Airplane Owners and Pilot Association (AOPA)
- Experimental Aircraft Association (EAA)

CERTIFICATIONS

- FAA Airline Transport Helicopter Pilot and Certified Flight Instructor, Turbine & Instrument Rated, 2011
- FAA Commercial Multi-Engine Airplane Pilot and Certified Multi-Engine Flight Instructor, 2011
 - Instrument/Complex/High Performance/High Altitude/Tail Dragger Endorsed
- FAA Certified Aircraft and Powerplant Mechanic (A&P), FCC General Radio Operators License, 2010
- AAUS Certified Scientific and PADI Rescue Diver, Certified Nitrox & Cavern Diver, 2009

PROFESSIONAL SERVICE

Scientific Committee on Antarctic Research (SCAR) Expert Group: Advancing TechNological and ENvironmental stewardship for subglacial exploration in Antarctica (ATHENA), since 2010

Peter Doran (University of Illinois at Chicago, USA: Co-chair), Jemma Wadham (University of Bristol, UK: Co-chair), Carlo Barbante (University of Venice, Italy), Christoph Mayer (Bavarian Academy of Sciences and Humanities, Germany), **Alberto Behar** (Arizona State University)

COMMUNITY SERVICE

- Mars Program, Spanish Media Representative, Interviews w/CNN, Discovery, Univision
- JPL Public Speakers Bureau
- Habitat for Humanity International, Los Angeles Construction Committee

STUDENTS

JPL Postdoc Mentoring

- Christina Stam, NASA Fellow
- Moogega Cooper, California Institute of Technology

JPL Student Interns

- Varoujan Sarkissian, Fredrik Bruhn, Henrik Carlsson, Paul Reilly, Cody Wheeland, Anthony Quivers, David Foor, Norman Ahmad, Munir Jojo Verge, Brian Vilnrotter, Mathew King, David Gornizecz, Golam Mostafa, Chris Lesinki, Andres Mora Vargas, Jonas Jonsson, Johanna Cecava, Jaret Matthews, Scot Cozy, Cesar Rivadeneyra, Carlos Obando, Cedric Cocaud, Eric Villard, Edward So, Goran Basic, Daniel Castellanos, Christopher J. Lesinski, Andreea Radulescu, Damian Rodgers, Ericka Briody, Mathew Kwong, Jose Torres, Huan (Henry) Wang, Mika Pegors, Kathleen Klotz, Johanna Cecava, Daniel Ulmes, Kate Boudreau, Sergio Hidalgo, Shane Nazari, Michael Perez, Christian Walter, Andrew Elliot, Anna Camery, Tom Nordheim, Evan Olson, Colin Ho

INSTRUMENT DEVELOPMENT EXPERIENCE

Development of an Autonomous Drone Boat to map changing supraglacial lakes depths across Greenland, Larry Smith, Professor, UCLA Department of Geography, Los Angeles, CA, Dr. Carl J. Legleiter, Department of Geography, University of Wyoming

Development of an Ice Cave and Volcano Monitoring System designed to return volcanic environmental measurements through a microcontroller + satellite modem system that can then send the data through the Iridium Network to N.M. tech where it is processed, Philip R. Kyle, Professor of Geochemistry,

Department of Earth & Environmental Science, New Mexico Institute of Mining and Technology (N.M. Tech).

Development, construction, integration, testing and delivery of GPS-based glacier trackers that report motion via iridium satellite, Dr. Jack Kohler, Norwegian Polar Institute, Fram Centre, Norway

Currently NSP Program Manager and Chief Scientist on the East Greenland WWII Grumman Duck Aircraft Recovery that will recover two USCG officers and the George I Antarctic Repatriation Project that will recover (3) US Navy aircrew from up to 150 feet below the surface of Antarctica's Thurston Island. Lou Sapienza, CEO, North South Polar, Inc.

Development of a system that is able to stream GPS position data (BINEX open format) from a Trimble NetRS to a microcontroller + Iridium modem box that can then send the data through the Iridium Network to the an operations base where it is repackaged to look like the original stream Bjorn Johns, Polar Services Manager, UNAVCO, Boulder, CO.

Glacier Motion Monitoring System using Multiple Remote Expendable High Precision GPS Position Transmitters, Dr. Shad O'Neel, USGS Glaciologist, Alaska Science Center, Anchorage AK

Development and production of a unit that is able to send GPS position through an Iridium phone and deliver that position to an email address. This will allow tracking of remote field parties on a traverse anywhere in the world and enhances safety and monitoring of their activities, Alun Hubbard, Institute of Geography & Earth Sciences, Aberystwyth University, Llandinam Building, Penglais Campus, Aberystwyth, UK

Remote Lake Depth Sensor Return via Iridium Short Burst Data (SBD) Modem, Marco Tedesco, Cryospheric Processes Laboratory, Director, Dept. Earth and Atmospheric Sciences, Asst. Prof. , The Graduate Center, CUNY, Doctoral Faculty

Greenland Outlet Glacier Motion Monitoring System, Andreas Peter Ahlstrøm, Senior Research Scientist, Department of Marine Geology and Glaciology, GEUS - Geological Survey of Denmark and Greenland

Micro-controller-based Iridium link Systems for Greenland Lake Depth & Temperature Profile Data Return, Jason E. Box, PhD, Assoc. Prof., Department of Geography, Byrd Polar Research Center, The Ohio State University, Columbus, Ohio, USA

Glacier Motion Monitoring System using Multiple Remote Disposable GPS Position Transmitters, Ian M. Howat, Assistant Professor, School of Earth Sciences & Byrd Polar Research Center, The Ohio State University, Columbus, Ohio, USA

Micro-controller-based Iridium link for a Trimble netRS GPS receiver for glaciological measurements in harsh environments, Dr. Mark Fahnestock, Complex Systems Research Center, University of New Hampshire, Durham, NH

Development and production of four units that are able to control GPS power switching (Trinble 5700) depending on the time and day of the year. Dr. Jay Zwally, EOS ICESat Project Scientist, Goddard Space Flight Center, National Aeronautics and Space Administration, Greenbelt, MD

Construction, integration, and testing of a Micro-controller-based Iridium link system for a High Resolution GPS receiver used in harsh environments, Eric Rignot, Professor Earth System Science, University of California, Irvine, Department of Earth System Science

Development of a system that is able to relay digital images from a Camera to a microcontroller + Iridium modem system that can then send the data through the Iridium Network to the CRREL operations base

where it is repackaged to look like the original images, David C. Finnegan, Research Physical Scientist, US Army Cold Regions Research & Engineering Lab, Hanover, NH

Development of a Greenland Glacier Run-off Lake Remote Depth Sensor and Health Data Return via Iridium Short Burst Data (SBD) Mode, Larry Smith, Professor, UCLA Department of Geography, Los Angeles, CA

Development of very low-cost, “smart” strong-motion sensors for widespread deployment in seismically active regions with high earthquake risk and limited financial resources. ShakeNet: Mitigating the effects of the next Himalayan mega-earthquake. Dr. Colin Stark, Doherty Associate Research Scientist, LDEO-Marine Geology and Geophysics.

Development of the Balloon Tracking Subsystem for the Hurricane Monitor instrument, Tim Lachenmeier, President, Near Space Corporation, Tillamook, OR

Greenland Remote Weather Station and Image Data Return via Iridium Short Burst Data (SBD) Mode, David Holland, Associate Professor, Math/Dir CAOS, Courant Institute of Math and Science, New York University

Development of the power source of a deep field, autonomous, automatic camera system for remote field imaging. James Balog, Director, Extreme Ice Survey, www.extremeicesurvey.com

Construction, integration, and testing of a Micro-controller-based Iridium link system for a High Resolution GPS receiver used in harsh environments, Professor Koni Steffen, CIRES Director, University of Colorado, Boulder, CO

NASA/JPL TRAINING

- Critical Hardware Handling
- Electrostatic Discharge - ESD Control
- Delegation Skills for Managers and Supervisors
- The JPL Project Element Manager (By Invitation Only)
- Cost and Funds Management Reporting Tool (CFMR)
- The JPL Task Manager (By Invitation Only)
- Small Science and Technology Research Proposal Writing
- JPL Mission and Instruments Proposal Prep. (Invitation Only)
- Medium Technology Proposal Preparation
- Introduction to Space Mission Operations
- Global Leadership Program – GLP 2
- Systems Engineering - NASA SE
- Project Risk Management Workshop
- System Design - NASA SD
- International Project Management - NASA IPM14
- Project Leadership - NASA PL37
- Tools & Techniques - NASA T&T4
- Hands-On Space Mission Design Exercise - NASA
- Radiation Effects in Electronics
- JPL Proposal Preparation
- Introduction to Flight Science Instruments

INVITED PRESENTATIONS (SELECTED)

The Micro Subglacial Lake Exploration Device (MSLED), ASU/SESE Colloquium Talk, August 2011

Technology for autonomous monitoring and investigations of polar environments. Autonomous Polar Observing Systems Workshop, Washington DC. , 2010

PUBLICATIONS

A Behar, Colin Ho, Christian Walter, Chris Gay, Scott Foster, The Micro-Subglacial Lake Exploration Device, (In Process) European Geosciences Union Journal: Geoscientific Instrumentation, Methods and Data Systems, in process 2012

Gomez F, N Walter, R Amils, F Rull, AK Klingelhofer, J Kviderova, P Sarrazin, B Foing, **A Behar**, I Fleischer, V Parro, M Garcia-Villadangos, D Blake, JD Martin Ramos, S Direito, P Mahapatra, C Stam, K Venkateswaran, M Voytek. Multidisciplinary Integrated Field Campaign to an Acidic Martian Earth Analogue with Astrobiological interest: Rio Tinto. Intl. J. Astrobiol.10: 291 – 305. 2011.

Gomez, FG, N Walter, R Amils, **A Behar**, I Fleischer, M Garcia-Villadangos, J Kviderova, G Klingelhofer, V Parro, P Sarrazin, F Rull, C Stam, K Venkateswaran, M Voytek. (Submitted). Earth Analogues with Astrobiological interest: Rio Tinto CAREX Field Campaign. Environ. Microbiol. Reports, 2010

Litvak ML, IG Mitrofanov, YI Barmakov, **A Behar**, A Bitulev, Y Bobrovitsky, EP Bogolubov, WV Boynton, SI Bragin, S Churin, AS Grebennikov, A Konovalov, AS Kozyrev, A Krylov, Kurdumov, Y P Kuznetsov, AV Malakhov, MI Mokrousov, VI Ryzhkov, AB Sanin, VN Shvetsov, GA Smirnov, S Sholeninov, GN Timoshenko, TM Tomilina, DV Tuvakin, VI Tretyakov, VS Troshin, VN Uvarov, A Varenikov, A Vostrukhin, The Dynamic Albedo of Neutrons (DAN) Experiment for NASA 2009 Mars Science Laboratory. Astrobiol. 8: 605 – 612., 2009

Aðalgeirsdóttir G, T Murray, A Smith, M King, K Makinson, K Nicholls, **A Behar**. 2008. Tidal influence on Rutford Ice Stream, West Antarctica: observations of surface flow and basal processes from closely-spaced GPS and passive seismic stations. J. Glaciol. 54: 715 – 724.

CONFERENCE PUBLICATIONS/ ABSTRACTS

Stam CN, AC Neal, S Park, RA Mielke, AS Tsapin, R Bhartia, E Salas, W Hug, **AE Behar**, J Nadeau. *Pseudomonas aeruginosa* biofilm formation and UV/irradiation exposure change surface and chemical structures of Pre-Production Resin Pellets. American Geophysical Union Conference. December 5 – 9, 2011.

Stam CN, AC Neal, **AE Behar**. New Carbon Source From Microbial Degradation of Pre-Production Resin Pellets (PRPs) from the North Pacific Gyre. JPL Postdoc Research Day. September 2011.

Stam CN, M Cooper, **AE Behar**, A Neal. Characterization of the Microbial Community Structures Associated with Ocean Polymers. 5th International Marine Debris Conference. March 20 – 25, 2011.

Cooper M, CN Stam, **AE Behar**, K Venkateswaran. Evaluation of the Molecular Diversity of samples collected using a Hydrothermal Vent Biosampler (HVB). 2010 Ridge 2000 Community Meeting. October 29-31, 2010. Portland, OR, USA.
Behar AE, CN Stam, G Scalzi, S Behncke, F Gomez, K Venkateswaran. Characterization of the Molecular Diversity of Rio Tinto using a novel Hydrothermal Vent Biosampler. AbSciCon, League City, TX. April 26 – 29, 2010.

Behar AE, CN Stam, G Scalzi, S Behncke, F Gomez, K Venkateswaran. Characterization of the Molecular Diversity of Rio Tinto using a novel Hydrothermal Vent Biosampler. AbSciCon, League City, TX. April 26 – 29, 2010.

Results from the Autonomous Triggering of in situ Sensors on Kilauea Volcano, HI, from Eruption Detection by the EO-1 Spacecraft: Design and Operational Scenario. **Alberto Behar**, Ashley Gerard Davies, Joshua R Doubleday, Andres Mora-Vargas, Daniel Q. Tran, Ali Abtahi, David C. Pieri, Kate Boudreau1, Johanna Cecava and the JPL Volcano Sensor Web Team, Fall Meeting, San Francisco. , AGU 2008

JPL NEW TECHNOLOGY REPORTS (NASA Tech Briefs)

Behar AE, RD Smiley, CN Stam. 2011. Detection of only Viable Bacterial Spores using a Live/Dead Indicator in mixed populations. NTR-48259.

Behar AE. 2011. An airborne hyperspectral imaging system for mapping the depths of Greenland's supraglacial lakes. NTR-48141.

Behar AE. 2008. The West Greenland Moulin Explorer. NTR-46514.

PATENTS

Behar AE, NI Marzwell, JN Wall, MD Poole. Aug. 9, 2011. Robot and robot system. Patent No. 7996112.

Behar AE, RD Smiley, CN Stam. 2011. Detection of only Viable Bacterial Spores using a Live/Dead Indicator in mixed populations. CIT-5956-P. JPL/ NASA case No. NPO 48259.

PROPOSALS FUNDED

PI, NSF, OPP, Micro-Submersible Lake Exploration Device (MSLED) - Development of a first generation propelled slim-hole device for subglacial lake aquatic environment exploration. 2011 – 2013, \$300K, Funded.

PENDING PROPOSALS

Behar A E, S Tulaczyk, H Fricker, PI, NSF, Micro-Submersible Lake Exploration Device (MSLED) - Development of first generation propelled slim-hole device for subglacial lake. Oct. 1, 2011. \$528K.

Behar AE, C Youngbull, A Mora. Underwater Wireless Sensor Network. Oct. 31, 2011. \$200K. NSF-EAGER.

Behar A E, S Tulaczyk, SY Schwartz, BC. Christner, Co-PI, NSF, CR: NEEM Biogeophysical Obs: Basal Boundary Conditions for Subglacial Microbial Habitats and Ice Sheet Motion, NEEM Ice Core Drill Site, Greenland. June 6, 2012. \$498K.

A Neal, G Neal, **AE Behar**, I Kanik. Design of a Mega Ocean Manta (MOM). In Progress. \$1M. NSF.

Behar AE, A Mora, S Saripalli, J Chao. Sensors and Sensing Systems (SSS). Sept 2011 – Oct 2011. NSF-Full Proposal.

Behar AE, A Mora. Ocean Sciences Research Initiation Grants. Jan. 13, 2012. \$100K. NSF-Full Proposal.

Behar AE, A Mora, E Shock. Deployment of Bento Boxes. Open. \$300K. NSF-EAGER.

Clark A, **AE Behar**, H Harnett, S Saripalli, A Mora. UAV and BENTO Boxes to build in-situ networked monitoring systems at volcano. Aug., 2011. \$300K. NSF-EAGER.

Behar AE, A Mora, C Youngbull, J Chao. Earth Sciences and water resources. Sept. 30, 2011. \$200K. NASA-ROSES.

Behar AE, A Mora. Bisgrove Post-doctoral Fellowship. Sustainable energy and environment. \$80K. ASU.

Meidrum D, R Johnson, J Chao, C Youngbull, **AE Behar**, S Saripalli. Technologies for SMD Missions. Sept 16, 2011. \$1M. NASA ASTEP.

Meidrum D, R Johnson, J Chao, C Youngbull, **AE Behar**, S Saripalli. Collaborative robots and design. Nov. 3, 2011. \$1.5M. NASA National Robotics Initiative.

Co-I, NASA, ASTEP. Project Narvak: Arctic Lakes & Seasonal Cycles of Habitability. Sept. 16, 2011. Pending.

Co-I, NASA, ASTEP. Subsurface Biomarkers in Layered Ice on Mars and Earth. Sept. 16, 2011. Pending.

PROPOSALS NOT-FUNDED

Co-I, JPL Research and Technology Development Fund 2011, Dual-Use Hard Lander Prototype and Climate Monitoring Station, \$206K

PI, NSF, 2011. Micro-Submersible Lake Exploration Device (MSLED) - Development of first-generation propelled slim-hole device for subglacial lake (& aquatic environments) exploration \$695K.

PI, NSF, 2011. Collaborative Research: NEEM Biogeophysical Observatory: Basal Boundary Conditions for Subglacial Microbial Habitats and Ice Sheet Motion, NEEM Ice Core Drill Site, Greenland \$486k.

Co-I, NSF, 2011. High Resolution Topographic and Spectral Landform Imaging using a Rapid Deployment Science Instrumentation System (RDSIS) Withdrawn \$300k.

Co-I, Los Angeles Department of Water and Power, Airborne Water Sensing Monitor Task Plan, 1.2M, 2010

Co-I, NASA, ASTEP, 2010. Mission to Analyze CHemosynthetic Organisms (MACHO) at Continental Sites of Active Serpentinization.

Co-I, NASA, ASTEP, 2010. Nautilus: An Astrobiological Exploration of Hydrothermal Vents.

Co-I, NASA, ASTEP, 2010. Subsurface Biomarkers in Layered Ice on Mars and Earth (SuBLIME)

Co-I, Caltech Proposal, 2010. Global network of CO₂ and methane in situ sensors with meter vertical resolution from the ground to the stratosphere.

Co-I, NASA, ASTEP, 2010. Tumbleweed: Wind-propelled Habitability Measurements on Earth and Mars.

Co-I, NASA, ASTEP, 2010. The Autonomous Aerobot Planetary EXplorer (A2PEX).

Co-I, NASA, Cryo, 2010. Hyerspectral Imaging of Greenland's Supraglacial Lakes.

Co-I, NASA, Cryo, 2010. Ocean-Ice Interaction beneath the Pine Island Glacier Ice Shelf and its Role in Future Sea Level Change

PI, NASA, ASTID, 2010. **Behar AE**, R Bharita, CN Stam, K Venkateswaran. Submitted 2010. Development of an integrated in-situ biosampler/ detector. \$1.2M. NASA ROSES Astrobiology Science and Technology for Instrument Development. Status: Selectable.

PI, NASA, ASTEP, 2010. **Behar AE**, M Cooper, CN Stam. Submitted 2010. Microbial Diversity of Subseafloor Thermal Habitats. \$1M. NASA ROSES Astrobiology Science and Technology for Exploring Planets.

PI, NSF. Submitted 2010. Microbial Diversity of Subseafloor Thermal Habitats. \$1M. NSF.