

# **41st International Conference on Environmental Systems 2011**

**Portland, Oregon, USA  
17-21 July 2011**

**Volume 1 of 4**

**ISBN: 978-1-61839-332-6**

**Printed from e-media with permission by:**

Curran Associates, Inc.  
57 Morehouse Lane  
Red Hook, NY 12571



**Some format issues inherent in the e-media version may also appear in this print version.**

The contents of this work are copyrighted and additional reproduction in whole or in part are expressly prohibited without the prior written permission of the Publisher or copyright holder. The resale of the entire proceeding as received from CURRAN is permitted.

For reprint permission, please contact AIAA's Business Manager, Technical Papers. Contact by phone at 703-264-7500; fax at 703-264-7551 or by mail at 1801 Alexander Bell Drive, Reston, VA 20191, USA.

# TABLE OF CONTENTS

## VOLUME 1

<b>2011-5000 Exploration Architecture Options - ECLSS, EVA, TCS Implications .....</b>	1
<i>J. Chambliss</i>	
<b>2011-5001 Overview of the Altair Lunar Lander Thermal Control System Design and the Impacts of Global Access .....</b>	21
<i>R. Stephan</i>	
<b>2011-5002 Design and Modeling of a Radiator with Digital Turn-Down Capability under Variable Heat Rejection Requirements .....</b>	34
<i>J. Miller, E. Sunada, G. Birur, G. Ganapathi, D. Berisford, R. Stephan</i>	
<b>2011-5003 Fluid Line Evacuation and Freezing Experiments for Digital Radiator Concept .....</b>	43
<i>D. Berisford, G. Birur, J. Miller, E. Sunada, G. Ganapathi, R. Stephan</i>	
<b>2011-5004 Columbus Payloads Mass Flow Anomalies .....</b>	56
<i>A. Quaranta, G. Bufano, S. De Palo, J. Holt, Z. Szigetvari, S. Palumberi, S. Hinderer</i>	
<b>2011-5005 Updates on HRF Payloads Operations in Columbus ATCS .....</b>	69
<i>S. De Palo, D. Pietrafesa, S. Challis, G. Miller, R. Lake, B. Wright, R. Braeken, R. Davenport</i>	
<b>2011-5006 International Space Station (ISS) Internal Active Thermal Control System (IATCS) New Biocide Selection, Qualification and Implementation.....</b>	79
<i>M. Wilson, H. Cole, T. Rector, J. Steele, J. Varsik</i>	
<b>2011-5007 BepiColombo MOSIF 10 SC Solar Simulation Test .....</b>	92
<i>J. Schilke, F. Tessarin, D. Battaglia</i>	
<b>2011-5008 SATS: Solar Array Thermal Simulator Thermal Testing Hardware for BepiColombo .....</b>	104
<i>B. Benthem</i>	
<b>2011-5009 James Webb Space Telescope Integrated Scientific Instrument Module: Design, Optimization, and Calibration of High-Accuracy Instrumentation to Measure Heat Flow in Cryogenic Testing .....</b>	111
<i>B. Comber, S. Glazer, P. Cleveland</i>	
<b>2011-5010 Thermal Test Verification of the Performance of LISA Pathfinder.....</b>	131
<i>S. Barracough, K. Smith, N. Fishwick</i>	
<b>2011-5011 Launch and Entry Glove Development: Creating an Improved Glove for Post Shuttle Operations.....</b>	143
<i>M. Doherty, S. Macleod</i>	
<b>2011-5012 Development and Testing of Advanced Pressure Suit Technologies and Analogues for Earth-Based Simulations.....</b>	152
<i>M. Di Capua, D. Akin, K. Davis, J. Brannan</i>	
<b>2011-5013 NDX-2: Development of an Advanced Planetary Space Suit Demonstrator System for the Lunar Environment.....</b>	165
<i>P. De Leon, G. Harris</i>	
<b>2011-5014 Development of CO<sub>2</sub> Reduction System for Closed-loop Air Revitalization.....</b>	176
<i>A. Shima, K. Usuku, M. Sakurai, S. Yoshihara, M. Ohnishi, S. Toda</i>	
<b>2011-5015 A Novel Approach to Maximize Waste Recovery in a Life Support System .....</b>	182
<i>M. McKellar, L. Mulloth, B. Luna</i>	
<b>2011-5016 Demonstration of a Stand-alone Solid Oxide Electrolysis Stack with Embedded Sabatier Reactors for 100% Oxygen Regeneration.....</b>	198
<i>C. Iacomini</i>	
<b>2011-5017 HDU Pressurized Excursion Module (PEM) Prototype Systems Integration.....</b>	211
<i>T. Gill, A. Howe, K. Kennedy, T. Tri, L. Toups</i>	
<b>2011-5018 Habitat Water Wall for Water, Solids, and Atmosphere Recycle and Reuse .....</b>	223
<i>F. Michael, S. Gormly, M. Hammoudeh, H. Shaw, A. Polonsky</i>	
<b>2011-5019 Planning and Logistics for the In-Field Demonstration of NASA's Habitat Demonstration Unit (HDU) Pressurized Excursion Module (PEM) at Desert RATS 2010 .....</b>	238
<i>T. Tri, E. Walsh, R. Gambrell, C. Chapman, M. Anderson, T. Smith, V. Yancy, K. Kennedy, T. Gill, A. Howe, L. Toups</i>	

<b>2011-5020 Habitat Demonstration Unit Project - Deep Space Habitat Overview</b>	251
<i>K. Kennedy</i>	
<b>2011-5021 Smart Sensor Systems for Spacecraft Fire Detection and Air Quality Monitoring</b>	267
<i>G. Hunter, J. Xu, A. Biaggi-Labiosa, B. Ward, D. Makel, P. Dutta, C. Liu</i>	
<b>2011-5022 Material Control Impacts and Criticality with Respect to Material Offgassing Toxicity</b>	
<b>NASA-STD-6001 Test 7</b>	281
<i>S. Harper, T. Handley, J. James</i>	
<b>2011-5023 Hardware Odor Containment Validation Methodology Development Using Gas Analysis and Human Odor Evaluation Methods</b>	290
<i>T. Handley</i>	
<b>2011-5024 Operational Air Quality Monitor: Scientific Studies in Preparation for Flight</b>	315
<i>T. Limerio, E. Reese, P. Cheng, J. Jones, W. Wallace</i>	
<b>2011-5025 Impact of Ice during Launcher's Ascent</b>	321
<i>C. Wendt, S. Strom, S. Girard</i>	
<b>2011-5026 Ice Accretion on Cryogenic Launchers at Launch Pad</b>	334
<i>L. Cheriaux, D. Fraioli</i>	
<b>2011-5027 A New Test Bench for Spacecraft Thermal Vacuum Tests - Presentation and First Uses</b>	349
<i>I. Perrin, H. Hustaix, F. Cherit</i>	
<b>2011-5028 O/OREOS and PharmaSat - Thermal Lessons Learned on Small Class D Spacecraft</b>	362
<i>M. Diaz-Aguado, S. Ghassemieh, C. Beasley, A. Schooley</i>	
<b>2011-5029 Enhanced Planetary Surface EVA Mobility For Space Colonization</b>	372
<i>J. Kaderka, J. Hoffman, D. Newman</i>	
<b>2011-5030 Follow-On Development of the Demonstrator Suit for Post-Shuttle Operations</b>	379
<i>S. Jacobs, D. Tufts</i>	
<b>2011-5031 The Elastic Space Suit: Its Time Has Come</b>	395
<i>P. Webb, C. Cole, A. Hargens</i>	
<b>2011-5032 Enhancing Capability in Launch, Entry, and Abort Style Spacesuits For ISS and Commercial Use</b>	405
<i>G. Lee, D. Graziosi, K. Splawn</i>	
<b>2011-5033 Compact and Lightweight Sabatier Reactor for Carbon Dioxide Reduction</b>	414
<i>C. Junaedi, K. Hawley, D. Walsh, S. Roychoudhury, M. Abney, J. Perry</i>	
<b>2011-5034 Water Requirements and Exhaust Products of Solid Oxide Electrolysis Systems with Embedded Sabatier Reactors for 100% Oxygen Regeneration</b>	424
<i>C. Iacomini</i>	
<b>2011-5035 Influence of Oxygenated Compounds on Reaction Products in a Microwave Plasma Methane Pyrolysis Assembly for Post-Processing of Sabatier Methane</b>	437
<i>J. Mansell, M. Abney</i>	
<b>2011-5036 Non Thermal Plasma Recovery of Hydrogen from Sabatier Waste Methane</b>	450
<i>P. Spence, A. Balasubramanian, M. Abney, J. Perry</i>	
<b>2011-5037 Mission Design Drivers for Life Support</b>	459
<i>H. Jones</i>	
<b>2011-5038 Dynamic Life Support System Simulations with the Virtual Habitat</b>	475
<i>M. Czupalla, A. Zhukov, M. Deiml, M. Beck, A. Mecsaci</i>	
<b>2011-5039 Parametric Analysis of Life Support Systems for Future Space Exploration Missions</b>	488
<i>M. Swickrath, M. Anderson, R. Bagdian</i>	
<b>2011-5040 An Investigation into Life Support Systems for a Lunar Habitat</b>	501
<i>T. Filburn, R. Malla, J. Smith, K. Brown, A. Clark, J. Genovese</i>	
<b>2011-5041 Development of a Planning, Architectural and Stylistic Vocabulary for Commercial Spaceport Projects</b>	515
<i>C. Lauer, M. Onuki</i>	
<b>2011-5042 A Shape Grammar for Space Architecture - A Shape Grammar for Space Architecture - Part II. 3D Graph Grammar Approach</b>	526
<i>V. Stavrev</i>	
<b>2011-5043 Consideration of Commercial Orbital Facilities from the View Point of Color Psychology</b>	537
<i>M. Onuki</i>	
<b>2011-5044 Design, Development, and Testing of an Inflatable Habitat Element for NASA Lunar Analogue Studies</b>	545
<i>M. Di Capua, D. Akin, K. Davis, J. Brannan</i>	

<b>2011-5045 U.S. Navy Sodium Chlorate Oxygen Candle Safety.....</b>	565
<i>A. McCarrick</i>	
<b>2011-5046 Analytical and Computational Particulate Load Models in Planetary Surface Spacecraft Cabins.....</b>	580
<i>J. Agui, C. Ericson, J. Perry</i>	
<b>2011-5047 Crew Health and Performance Improvements with Reduced Carbon Dioxide Levels and the Resource Impact to Accomplish Those Reductions .....</b>	592
<i>J. James, C. Matty</i>	
<b>2011-5048 CO Oxidation for Post-Fire Cleanup .....</b>	599
<i>C. Eldridge, T. Nalette, J. Graf, G. Alptekin</i>	
<b>2011-5049 Performance and Characterization of a Fine Water Mist Portable Extinguisher for Spacecraft Environments .....</b>	615
<i>J. Butz, T. Carriere, A. Abbud-Madrid</i>	
<b>2011-5050 Towards the Development of a Specification for a Portable Fine Water Mist Fire Extinguisher for Spacecraft Applications.....</b>	627
<i>D. Dietrich, G. Ruff, J. Easton, A. Abbott, J. Graf, D. Gianettino, C. Sager</i>	
<b>2011-5051 Advanced Fire Blankets for Spacecraft Use .....</b>	635
<i>S. Olson, F. Takahashi</i>	
<b>2011-5052 Towards the Identification of Chemical Markers for Spacecraft Post-fire Cleanup .....</b>	641
<i>G. Ruff, P. Greenberg, P. Mudgett, S. Hornung, J. Pilgrim, A. Vakhtin</i>	
<b>2011-5053 Testing Injury Potential of Suited Occupants During Dynamic Spacecraft Flight Phases.....</b>	657
<i>S. McFarland</i>	
<b>2011-5054 Space Suit Helmet CFD Analysis Results utilizing a Sinusoidal Breathing Model .....</b>	674
<i>T. Ball, J. Straus</i>	
<b>2011-5055 Thermal protection from Cold Water Immersion in a Spacecraft Launch Entry and Abort Suit .....</b>	712
<i>N. Mayer</i>	
<b>2011-5056 Next Generation Launch and Entry Suit Cooling Water and Breathing Gas Flow Modeling.....</b>	724
<i>D. Cudd, T. Durrant</i>	
<b>2011-5057 Evaluation of Sorbents for Acetylene Separation in Atmosphere Revitalization Loop Closure.....</b>	736
<i>M. Abney, L. Miller</i>	
<b>2011-5058 Development Testing of High-Pressure Cathode Feed Water Electrolysis Cell Stacks for Microgravity Environments.....</b>	747
<i>E. Schmitt, T. Norman, R. Roy, B. Murach, K. Ogle</i>	
<b>2011-5059 Evaluation of Bosch-Based Systems Using Non-Traditional Catalysts at Reduced Temperatures .....</b>	764
<i>M. Abney, J. Mansell</i>	
<b>2011-5060 Cleanser, Detergent, Personal Care Product Evaluation for Water Recovery Applications .....</b>	778
<i>N. Adam</i>	
<b>2011-5061 Analytical Design of Hybrid Piezoelectric Hybrid PZT-PVDF Pump .....</b>	804
<i>F. Sager, B. Hargrave, P. Campbell</i>	
<b>2011-5062 Viral Design: Conceptual Contributions to Architectural Attributes of Space Station Design .....</b>	830
<i>M. Fox</i>	
<b>2011-5063 A Lunar Base with Astronomical Observatory.....</b>	846
<i>O. Doule, E. Detsis, A. Ebrahimi</i>	
<b>2011-5064 A Dual-Chamber Hybrid Inflatable Suitlock (DCIS) for Planetary Surfaces or Deep Space .....</b>	871
<i>A. Howe, K. Kennedy, P. Guirgis, R. Trevino, R. Boyle, T. Tri, L. Toups, T. Gill</i>	
<b>2011-5065 Mobility Spectrometer Studies on Hydrazine and Ammonia Detection .....</b>	883
<i>H. Niu, G. Eiceman</i>	
<b>2011-5066 Tailoring of Hydrophilic to Hydrophobic Coating Properties for Space Exploration Contamination Control .....</b>	890
<i>R. Pirich, J. Weir, D. Leyble</i>	
<b>2011-5067 Selected Parametric Effects on Materials Flammability Limits .....</b>	897
<i>D. Hirsch, F. Juarez, S. Motto, S. Harper, S. Olson</i>	

<b>2011-5068 Geometry Considerations in Evaluating 0g Materials Flammability Limits for Comparison with NASA Test 1 Limits .....</b>	906
<i>S. Olson, D. Hirsch</i>	

## VOLUME 2

<b>2011-5069 Lessons Learned from the Evolution of the Thermal Design for the Global Precipitation Measurement Mission .....</b>	915
<i>H. Peabody, C. Cottingham, M. Garrison, G. Greer, B. Matonak, L. Ottenstein, C. Peters, D. Powers, J. Rodriguez-Ruiz</i>	
<b>2011-5070 Preliminary Evaluation of Passive Thermal Control for the Soil Moisture Active &amp; Passive (SMAP) Radiometer .....</b>	927
<i>A. Mastropietro, E. Kwack, R. Mikhaylov, M. Spencer, P. Hoffman, D. Dawson, J. Piepmeier, D. Hudson, J. Medeiros</i>	
<b>2011-5071 Thermal design of the EarthCARE MSI-VNS instrument .....</b>	943
<i>J. Doornink, M. Coesel, M. Lemmen, A. van't Hof</i>	
<b>2011-5072 Thermal Design Considerations of the Robotic Refueling Mission (RRM) .....</b>	954
<i>T. Gregory, M. Newman</i>	
<b>2011-5073 The Performance of the System for Water Recovery from Humidity Condensate (SRV-K) On Russian Segment of the International Space Station, ISS Missions 1 Through 26.....</b>	966
<i>L. Bobe, N. Samsonov, A. Kochetkov, P. Andreychuk, A. Zleznyakov, J. Sinyak</i>	
<b>2011-5074 Nonhazardous Urine Pretreatment Method for Future Exploration Systems .....</b>	976
<i>T. Williams, J. Akse, N. Hadley, R. Dahl, D. Glock</i>	
<b>2011-5075 International Space Station Urine Monitoring System Functional Integration and Science Testing .....</b>	994
<i>B. Rodriguez, J. Broyan</i>	
<b>2011-5076 Design Status of the Advanced Closed Loop System ACLS for Accommodation on the ISS.....</b>	1005
<i>K. Bockstahler, J. Lucas, J. Witt</i>	
<b>2011-5077 Employing a Modified Diffuser Momentum Model to Simulate Ventilation in the Orion Crew Exploration Vehicle .....</b>	1018
<i>J. Straus, T. Ball, W. O'Hara</i>	
<b>2011-5078 Propagation of CO<sub>2</sub> Field after Fire Extinguisher Discharge: A Numerical Study.....</b>	1032
<i>C. Son, N. Ivanov, D. Telnov, E. Smirnov</i>	
<b>2011-5079 Integrated Ventilation Modeling for Crew Quarter AirflowC. Son, The Boeing Company, Houston, TX .....</b>	1040
<i>N. Ivanov, D. Telnov, E. Smirnov</i>	
<b>2011-5080 An Evaluation of Advanced Material Modified with Amine for Environmental Control Systems .....</b>	1051
<i>A. Homma, H. Matsumoto, H. Murase, A. Yasutake, Y. Fujioka, K. Yogo</i>	
<b>2011-5081 Flow-Through Radiator Development for Orion Crew Vehicle .....</b>	1057
<i>J. Ambrose, J. Wang, S. Bhakta, T. Haregot</i>	
<b>2011-5082 Evaluating the Applicability of Heritage Flight Hardware in Orion Environmental Control and Life Support Systems .....</b>	1069
<i>C. Cross, J. Lewis, R. Barido, G. Rains, R. Carrasquillo</i>	
<b>2011-5083 Dynamic Simulation of Human Thermoregulation and Heat Transfer for Spaceflight Applications.....</b>	1076
<i>T. Miller, D. Nelson, G. Bue, L. Kuznetz</i>	
<b>2011-5084 Crew Exploration Vehicle Environmental Control and Life Support Development Status.....</b>	1090
<i>J. Lewis</i>	
<b>2011-5085 Effects of EVA Glove on Hand Performance .....</b>	1094
<i>S. Appendino, F. Chen, A. Favetto, M. Mousavi, E. Ambrosio, F. Pescarmona, D. Manfredi</i>	
<b>2011-5086 Phase VI Glove Durability Testing.....</b>	1103
<i>K. Mitchell</i>	
<b>2011-5087 Bio-Contamination Control for Space Suit Garments - A Preliminary Study .....</b>	1118
<i>R. Rhodes, F. Korona, E. Orndoff, M. Ott, D. Poritz</i>	

<b>2011-5088 Prevention of Orthostatic Intolerance for Post-Shuttle Operations: A Comparison of Active and Passive Garments.....</b>	1136
<i>S. Jacobs, M. Doherty</i>	
<b>2011-5089 Case Study: Analysis of Reported Contaminated Air Events at One Major U.S. Airline in 2009-10.....</b>	1147
<i>J. Murawski</i>	
<b>2011-5090 Survey of Sensor Technology for Aircraft Cabin Environment Sensing .....</b>	1158
<i>D. Klein, S. Loo, J. Hall, M. Pook, J. Kiepert</i>	
<b>2011-5091 Principal Component Analysis (PCA) Application to FTIR Spectroscopy Data of CO/CO<sub>2</sub> Contaminants of Air .....</b>	1170
<i>R. Haney, N. Siddiqui, J. Andress, J. Fergus, R. Overfelt, B. Prorok</i>	
<b>2011-5092 Electrochemical Sensing System for Detection of Tricresyl-phosphate .....</b>	1182
<i>X. Yang, R. Overfelt, A. Simonian</i>	
<b>2011-5093 Planetary Protection as a Cross-Cutting Consideration in Human Missions and Technologies Beyond Low Earth Orbit .....</b>	1187
<i>M. Race, C. Conley</i>	
<b>2011-5094 The Reliability-Mass Trade-Off in Multi-Criteria Life Support Technology Selection .....</b>	1193
<i>H. Jones</i>	
<b>2011-5095 Life Support and Habitation Systems: Crew Support and Protection for Human Exploration Missions Beyond Low Earth Orbit.....</b>	1205
<i>D. Barta, J. McQuillan</i>	
<b>2011-5096 An Early Lunar Outpost for Lunar Development.....</b>	1214
<i>G. Woodcock</i>	
<b>2011-5097 Lunar Reconnaissance Orbiter (LRO) Thermal On-Orbit PerformanceC. Baker, NASA Goddard Space Flight Center, Greenbelt, MD.....</b>	1233
<i>C. Cottingham, S. Peabody</i>	
<b>2011-5098 Swift BAT Loop Heat Pipe #0 Temperature Droop Problem and Solution after Its Primary Heater Controller Failure .....</b>	1244
<i>M. Choi</i>	
<b>2011-5099 Carbon Dioxide Reduction System Trade Studies .....</b>	1257
<i>H. Jones</i>	
<b>2011-5100 UV-C Photocatalytic System for VOC's Removal .....</b>	1269
<i>L. Grizzaffi, A. Saverino, C. Lobascio, G. Boscheri, A. Pandi, D. Perrachon, I. Locantore</i>	
<b>2011-5101 Ammonia Offgassing from SA9T .....</b>	1279
<i>O. Monje, S. Nolek</i>	
<b>2011-5102 Detailed Modeling of Distillation Technologies for Closed-Loop Water Recovery Systems .....</b>	1288
<i>R. Allada, K. Lange, M. Anderson</i>	
<b>2011-5103 Acoustic Noise Prediction of the Amine Swingbed ISS EXPRESS Rack Payload .....</b>	1301
<i>D. Welsh, S. Wang, H. Smith</i>	
<b>2011-5104 A Range of Motion Study and Human-Suit Correlation Analysis Supporting the Morphing Spacesuit Concept.....</b>	1313
<i>H. Bradshaw, D. Akin, J. Humbert</i>	
<b>2011-5105 Robotic Joint Torque Testing: A Critical Tool in the Development of Pressure Suit Mobility Elements.....</b>	1337
<i>F. Meyen, B. Holschuh, R. Kobrick, S. Jacobs, D. Newman</i>	
<b>2011-5106 The Demonstrator Suit: Evaluating a Full Pressure Suit through Manned and Unmanned Testing .....</b>	1347
<i>S. Macleod, T. Rippis, J. Garcia</i>	
<b>2011-5107 Next Generation Space Suit Injury Assessment .....</b>	1365
<i>T. Radford</i>	
<b>2011-5108 Wireless Sensor Network for Aircraft Cabin Environment Sensing.....</b>	1380
<i>J. Kiepert, S. Loo, D. Klein, J. Hall, M. Pook</i>	
<b>2011-5109 Monitoring of Potential Bleed Air Gas Contaminants with FTIR Spectroscopy .....</b>	1388
<i>R. Haney, A. Neer, N. Siddiqui, J. Fergus, R. Overfelt, B. Prorok</i>	
<b>2011-5110 Preliminary Investigation into Thermal Degradation Behavior of Mobil Jet Oil II .....</b>	1398
<i>A. Neer, J. Andress, R. Haney, R. Overfelt, B. Prorok, J. Fergus, L. Mathison</i>	
<b>2011-5111 Thermal Analysis for Weight Reduction and Improved Safety of Wiring Bundles Designs .....</b>	1405
<i>R. Benthem, W. Grave, F. Doctor, K. Nuyten, S. Taylor, P-A. Dit Routier</i>	

<b>2011-5112 Spacecraft Cabin Acoustic Modeling and Validation with Mockups</b>	1422
<i>S. Chu, C. Allen</i>	
<b>2011-5113 Altair Lander Life Support: Design Analysis Cycles 4 and 5</b>	1448
<i>M. Anderson, S. Curley, H. Rotter, E. Yagoda</i>	
<b>2011-5114 Structural Design of Frame-Membrane Habitat Concepts Considering Life Support Requirements for Lunar Colonization</b>	1455
<i>R. Malla, K. Brown, T. Filburn</i>	
<b>2011-5115 Field Analogue Simulations Investigating EVA/Robotic Collaboration in Lunar Exploration</b>	1468
<i>D. Akin, S. Saripalli, M. Di Capua, K. Hodges</i>	
<b>2011-5116 Mars Science Laboratory Launch Pad Thermal Control</b>	1479
<i>P. Bhandari</i>	
<b>2011-5117 Thermal Control of the Mars Science Laboratory Spacecraft Propellant Lines—Design Architecture and Analytical Modeling</b>	1489
<i>A. Paris, B. Dudik, M. Fisher, F. Kelly, J. Kempenaar, R. Krylo, P. Bhandari, J. Lyra</i>	
<b>2011-5118 Design and Test of Exomars Thermal Breadboard</b>	1501
<i>V. Perotto, M. Gottero, S. Mannu, R. Martino, S. Tavera</i>	
<b>2011-5119 CO<sub>2</sub> Insulation for Thermal Control of the Mars Science Laboratory Rover</b>	1513
<i>P. Bhandari, K. Anderson</i>	
<b>2011-5120 Variable Conductance Heat Pipe for a Lunar Variable Thermal Link</b>	1529
<i>C. Peters, J. Hartenstein, W. Anderson, J. Farmer</i>	
<b>2011-5121 Low power and Low Temperature LHP for thermal control of Rovers</b>	1542
<i>D. Mishkinis, C. Gregori, D. Nistal, A. Torres</i>	
<b>2011-5122 Loop Heat Pipe Operation Using Heat Source Temperature for Set Point Control</b>	1554
<i>J. Ku, K. Paiva</i>	
<b>2011-5123 Mock Up Definition and Test Plan for a Two-Phase Mechanically Pumped Loop (2FMPL) to Manage the Thermal Dissipation of an Active Antenna</b>	1567
<i>A. Merino, H. Julien, R. Nicolas</i>	
<b>2011-5124 Microwave-Assisted Pyrolysis of Solid Waste</b>	1580
<i>M. Serio, J. Cosgrove, M. Wojtowicz, K. Wignarajah, J. Fisher</i>	
<b>2011-5125 Testing of an High Efficiency High Output Plastic Melt Waste Compactor Prototype</b>	1600
<i>J. Johnson</i>	
<b>2011-5126 Characterization of Volume F Trash from Four Recent STS Missions: Weights, Categorization, Water Content</b>	1611
<i>R. Strayer, M. Hummerick, J. Richards, L. McCoy, R. Wheeler</i>	
<b>2011-5127 Modeling of a Closed-loop, Forced-convection, Heat-pump Drying System for Space Operations</b>	1624
<i>J. Arquiza, J. Hunter, R. Morrow, R. Remiker</i>	
<b>2011-5128 International Space Station Acoustics - A Status Report</b>	1636
<i>C. Allen, S. Denham</i>	
<b>2011-5129 Hardware Design Improvements to the Major Constituent Analyzer</b>	1657
<i>B. Gardner, S. Thoresen, J. Granahan, P. Belcher, C. Matty</i>	
<b>2011-5130 Variable Gravity Laboratory for Deep-Space Crewed Missions Research and Demonstration</b>	1664
<i>G. Noyes</i>	
<b>2011-5131 Food Preparation Alternatives And Food Acceptability Under Short Term Mars Analogue Mission Conditions</b>	1670
<i>J. Hunter, K. Binsted, K. Hunter, E. Mendez</i>	
<b>2011-5132 Performance of a TRL 5 Bioreactor for Pretreatment of an Extended Habitation Wastestream</b>	1686
<i>W. Jackson, A. Morse, J. Garland</i>	
<b>2011-5133 Bio-regenerative Life Support Systems for Space Surface Applications</b>	1693
<i>P. Sadler, R. Patterson, G. Boscheri, M. Kacira, R. Furfaro, C. Lobascio, M. Lamantea, M. Pirolli, S. Rossignoli, S. DePascale, G. Giacomelli</i>	
<b>2011-5134 High Altitude Free Fall: Theoretical Analysis of G-Forces Impacting Human Subjects</b>	1702
<i>V. Rygalov, J. Jurist, S. Ford</i>	
<b>2011-5135 Modeling and Analyzing Distributed Autonomy for Spaceflight Teams</b>	1712
<i>B. Caldwell, J. Onken</i>	

<b>2011-5136 Pressure Seal Design for a Sample Return Canister from ISS: Considerations, Trade Studies and Testing.....</b>	1720
<i>J. Leidich, J. Harrell, S. Chiesi, M. Murbach, K. Boronowsky, J. Benton</i>	
<b>2011-5137 Analysis of Noise Exposure Measurements Acquired Onboard the International Space Station.....</b>	1734
<i>J. Limardo, C. Allen</i>	
<b>2011-5138 Gas Phase Pressure Effects on the Apparent Thermal Conductivity of JSC-1A Lunar Regolith Simulant .....</b>	1750
<i>Z. Yuan, J. Kleinhenz</i>	
<b>2011-5139 Performance Measurements and Modeling of a Silicon Two-Phase Heat Spreader.....</b>	1758
<i>J. Miller, K. Yee, E. Sunada, G. Ganapathi, Y. Bae, D. Berisford</i>	
<b>2011-5140 Visualization of Internal Fluid Behavior in a Miniature Loop Heat Pipe using Neutron Radiography.....</b>	1769
<i>R. Hatakenaka, A. Okamoto, Y. Mase, M. Murakami</i>	
<b>2011-5141 Ground Test Loop for Interfacial Behaviors and Heat Transfer Characteristics in Boiling Two Phase Flow (JEM-TPF) .....</b>	1780
<i>H. Kawasaki, K. Fujii, H. Ohta</i>	
<b>2011-5142 Development of Flat Plate Heat Pipe and the Project of On-orbit Experiment .....</b>	1789
<i>M. Maeda, A. Okamoto, H. Kawasaki, H. Sugita</i>	
<b>2011-5143 Brine pH Change Resulting from Urea Hydrolysis and Implication to Brine Dewatering .....</b>	1797
<i>L. Delzeit, A. Polonsky, J. Fisher</i>	
<b>2011-5144 Biological and Physical Polishing of a Space Based Waste Stream .....</b>	1808
<i>T. Vercellino</i>	

## VOLUME 3

<b>2011-5145 Sustainability Base Graywater Recycling System.....</b>	1820
<i>F. Michael, S. Gormly, T. Richardson, H. Shaw, M. Hammoudeh, K. Howard</i>	
<b>2011-5146 Biological Pre-Treatment of a Space Based Waste Stream to Improve Distillation Treatment Efficiency .....</b>	1832
<i>A. Morse</i>	
<b>2011-5147 Spacesuits and EVA Gloves Evolution and Future Trends of Extravehicular Activity Gloves .....</b>	1840
<i>M. Mousavi, A. Favetto, F. Chen, E. Ambrosio, S. Appendino, D. Manfredi, F. Pescarmona, A. Soma</i>	
<b>2011-5148 Pressure Suit Design Considerations for Crew Extraction &amp; Recovery .....</b>	1850
<i>S. Macleod, J. Garcia, T. Rippa</i>	
<b>2011-5149 Trending of Overboard Leakage of ISS Cabin Atmosphere.....</b>	1861
<i>R. Schaezler, A. Ghariani, A. Cook</i>	
<b>2011-5150 International Space Station Water Balance Operations.....</b>	1873
<i>B. Tobias, J. Garr, M. Erne</i>	
<b>2011-5151 Development and Integration of the Flight Sabatier Assembly on the ISSD .....</b>	1883
<i>Darren J. Samplatsky, K. Grohs, M. Edeen, J. Crusan</i>	
<b>2011-5152 Chemical Analysis Results for Potable Water from ISS Expeditions 21 through 25 .....</b>	1892
<i>J. Straub, D. Plumlee, J. Schultz, J. McCoy</i>	
<b>2011-5153 The Story Behind the Numbers: Lessons Learned from the Integration of Monitoring Resources in Addressing an ISS Water Quality Anomaly.....</b>	1938
<i>J. McCoy, J. Straub</i>	
<b>2011-5154 Discovery and Identification of Dimethylsilanediol as a Contaminant in ISS Potable Water.....</b>	1945
<i>J. Schultz, J. Rutz, C. Kuo, H. Cole, S. Manuel, M. Curtis, P. Jones, O. Sparkman, J. McCoy</i>	
<b>2011-5155 In-flight Water Quality Monitoring on the International Space Station (ISS): Measuring Biocide Concentrations with Colorimetric Solid Phase Extraction .....</b>	1956
<i>D. Gazda, J. Schultz, L. Siperko, M. Porter, R. Lipert, S. Carrizales-Flint, T. McCoy</i>	
<b>2011-5156 The Effect Of Predicted Vehicle Displacement on Ground Crew Task Performance and Hardware Design .....</b>	1964
<i>L. Atencio, D. Reynolds, B. Robertson</i>	

<b>2011-5157 A Dynamics-Based Fidelity Assessment of Partial Gravity Gait Simulation Using Underwater Body-Segment Ballasting .....</b>	1976
<i>A. Mirvis, D. Akin</i>	
<b>2011-5158 Development and Application of Spaceflight Performance Shaping Factors for Human Reliability Analysis .....</b>	1995
<i>J. Mindock, D. Klaus</i>	
<b>2011-5159 ESATAN2SS tool translator: from ESATAN thermal networks to Space State realization .....</b>	2010
<i>S. De Palo, D. Pietrafesa, A. Ferrero, F. Cometto</i>	
<b>2011-5160 Advances in Application of Linear Control Methods for Satellite Thermal Analysis .....</b>	2019
<i>M. Altenburg, J. Burkhardt</i>	
<b>2011-5161 A Lunar Surface Environment Model for the Thermal Moon Simulator (TherMoS) .....</b>	2033
<i>P. Hager</i>	
<b>2011-5162 Thermal Design and Test of the Gravity Recovery and Interior Laboratory (GRAIL) Ka-Band Ranging (KBR) Payload .....</b>	2048
<i>C. Phillips, M. Etters, A. Smith, C. May</i>	
<b>2011-5163 Satellite Thermal Engineering - Lessons from ICES .....</b>	2058
<i>B. Shaughnessy</i>	
<b>2011-5164 Coupled Radiator East West (CREW) Experiment Flight Data .....</b>	2067
<i>J. Garcia, J. Pastor, J. Alvarez, B. Miguel, A. Torres</i>	
<b>2011-5165 GMES Sentinel 1: Thermal Design and Verification Approach of the Thermal Control Subsystem .....</b>	2080
<i>D. Selci, A. Panetti, S. Dolce</i>	
<b>2011-5166 Advanced Greenhouse Modules for use within Planetary Habitats .....</b>	2094
<i>D. Schubert, D. Quantius</i>	
<b>2011-5167 Modeling, Design and Simulation of a Reconfigurable Aquatic Habitat for Bioregenerative Life Support Control Research .....</b>	2112
<i>G. Drayer, A. Howard</i>	
<b>2011-5168 Material Turnover Modifications in Artificial Closed Ecosystems for Functional Similarity Maintenance between Ecosystems of Different Size .....</b>	2120
<i>Y. Holubnyak, V. Rygalov</i>	
<b>2011-5169 Response of Radish to Light and Oxygen at Reduced Atmospheric Pressure .....</b>	2127
<i>C. Wehkamp, M. Stasiak, M. Dixon</i>	
<b>2011-5170 Brine Dewatering using Ultrasonic Nebulization .....</b>	2135
<i>J. Akse, R. Wheeler, J. Holtsnider, J. Fisher</i>	
<b>2011-5171 Development of the BRIC Concept for Recovering Water From Wastewater Brines .....</b>	2145
<i>M. Callahan, M. Casteel, D. Glock, K. Pickering</i>	
<b>2011-5172 Phase Composition of Dried Brine Solids via X-ray Diffraction .....</b>	2156
<i>N. Coppa, A. Milani, D. Fardig</i>	
<b>2011-5173 Reduction of Brine To Dry Solids Using Nanopowder Drying Agents .....</b>	2165
<i>N. Coppa, A. Milani, D. Fardig</i>	
<b>2011-5174 Social Innovation Concepts at NASA: Integrating International Development Challenges and Hands-On Prototyping with Spacecraft Design Training .....</b>	2173
<i>L. Yowell, E. Thomas</i>	
<b>2011-5175 Yuri's Night: Linking the World Together with an International Space Celebration .....</b>	2180
<i>R. Kobrick, R. Russ, T. Bailey</i>	
<b>2011-5176 Extravehicular Activity Systems Education and Public Outreach in Support of NASA's STEM initiatives .....</b>	2191
<i>H. Paul</i>	
<b>2011-5177 Rocket Propulsion Techniques for Science Technology Engineering and Mathematics .....</b>	2199
<i>T. Treichel</i>	
<b>2011-5178 Evolutionary Development of Exploration EVA Systems Design and Operations Through Analog Field Tests: Lessons from the NASA Haughton-Mars Project, 2008-2010 .....</b>	2206
<i>E. Hodgson, P. Lee, T. Chase, A. Overbeeke, M. Satienpoch, R. Sidgreaves, K. Thomas, T. Glazier</i>	
<b>2011-5179 Extravehicular Activity (EVA) Technology Development Status and Forecast .....</b>	2223
<i>C. Chullen, D. Westheimer</i>	
<b>2011-5180 Equivalent System Mass Analysis for Space Suit Thermal Control .....</b>	2249
<i>J. Metts, D. Klaus</i>	

<b>2011-5181 Evaluation of a Surface Exploration Traverse Analysis and Navigation Tool</b>	2257
<i>A. Gilkey, R. Kobrick, A. Johnson, J. Hoffman, D. Newman</i>	
<b>2011-5182 Evaluation of Lunar Dust Mitigation Strategies for Thermal Control Surfaces</b>	2266
<i>J. Gaier, D. Waters, B. Banks, K. Journey, S. Christopher</i>	
<b>2011-5183 Evaluation of Surface Modification as a Lunar Dust Mitigation Strategy for Thermal Control Surfaces</b>	2278
<i>J. Gaier, D. Waters, B. Banks, M. Crowder</i>	
<b>2011-5184 Project MoonDust: Characterization and Mitigation of Lunar Dust</b>	2290
<i>R. Kruzelecky, B. Aïssa, B. Wong, E. Haddad, W. Jamroz, E. Cloutis, I. Rosca, S. Hoa, D. Therriault, A. Ellery, S. Martel, X. Jiang, S. Loranger</i>	
<b>2011-5185 Air Filtration With Nano and Micron Sized Titania Silicate Fibers</b>	2309
<i>A. Biswas, H. Park, W. Sigmund, N. Afshar-Mohajer, C. Wu</i>	
<b>2011-5186 Overview of NASA's Thermal Control Technology Development Project</b>	2316
<i>R. Stephan</i>	
<b>2011-5187 Experimental Investigation of Transient Sublimator Performance</b>	2325
<i>R. Sheth, R. Stephan, T. Leimkuehler</i>	
<b>2011-5188 An Integrated Sublimator Driven Coldplate</b>	2338
<i>T. Leimkuehler, S. Kennedy</i>	
<b>2011-5189 BepiColombo/MMO Thermal Test Model Testing</b>	2360
<i>H. Ogawa, T. Yamazaki, A. Okamoto, N. Iwata, S. Okazaki, T. Irikado, F. Fukuyoshi</i>	
<b>2011-5190 AMS-02 Thermal Vacuum and Thermal Balance Test in the LSS at ESTEC</b>	2374
<i>M. Molina, P. Ruzza, C. Vettore, S. Borsini, E. Laudi</i>	
<b>2011-5191 AMS-02 Thermal Model Validation</b>	2394
<i>M. Molina, P. Ruzza</i>	
<b>2011-5192 Solar Orbiter Thermal Design Drivers and Verification Approach</b>	2410
<i>S. Barracough, O. Merrill</i>	
<b>2011-5193 Dual-Phase Flow Micro-Gravity Photobioreactor - Principles and an Experimental Module Design</b>	2423
<i>V. Stavrev</i>	
<b>2011-5194 Silica-Titania Composite (STC)'s Performance in the Photocatalytic Oxidation of Polar VOCs</b>	2436
<i>L. Levine, J. Richards, J. Coutts, D. Mazyck</i>	
<b>2011-5195 Combinatorial Development of Advanced Aqueous Phase Oxidation Catalysts</b>	2448
<i>J. Akse, R. Wheeler, J. Holtsnider, L. Carter</i>	
<b>2011-5196 Lattice-Boltzmann Model Development For Capillary Pressure Gradient Gas/Liquid Phase Separation in Microgravity</b>	2463
<i>J. Parker, G. Jovanovic, R. Wheeler, W. Duval</i>	
<b>2011-5197 Development and Evaluation of Ordered Mesoporous Carbons for Resorcinol Removal</b>	2484
<i>D. Gang</i>	
<b>2011-5198 Expedition Mars: A Mars Analogue Program Dedicated to Advancing Competency in Human Planetary Surface Exploration</b>	2494
<i>L. Mulugeta, M. Battler, R. Persaud, R. Kobrick, J. Thaler, R. Shelaga</i>	
<b>2011-5199 U.S. Spacesuit Knowledge Capture</b>	2505
<i>C. Chullen, K. Thomas, J. McMann, K. Dolan, R. Bitterly, C. Lewis</i>	
<b>2011-5200 Learning to be a Real Engineer: Service Learning Engagement and STEM Education in Space Grant Programs</b>	2532
<i>D. Whittaker, B. Caldwell</i>	
<b>2011-5201 Efficiency Evaluation of an Electrostatic Lunar Dust Collector</b>	2540
<i>N. Afshar-Mohajer, B. Damit, C. Wu, N. Sorloaica-Hickman</i>	
<b>2011-5202 Testing of Regeneration Filtration Concepts for Future Spacecraft Applications</b>	2554
<i>J. Agui, J. Mackey, R. Vijayakumar, M. Rana, C. Ericson</i>	
<b>2011-5203 Development of Electrospray Technology for the Removal of Lunar Dust from Habitable Space Atmospheres</b>	2569
<i>E. Hodgson, J. Bango, J. Gaier, M. Dzekian, B. Murach</i>	
<b>2011-5204 Dust Mitigation using Noncontact Field Induced Forces</b>	2587
<i>S. Wanis, I. Lee</i>	

<b>2011-5205 Performance Characterization of a Microchannel Liquid/Liquid Heat Exchanger Throughout an Extended Duration Life Test</b>	2597
<i>R. Sheth, R. Stephan, P. Humble, R. Wegeng</i>	
<b>2011-5206 Advances in the Lightweight Air-Liquid Composite Heat Exchanger Development for Space Exploration Applications</b>	2604
<i>E. Shin, J. Johnston, D. Haas</i>	
<b>2011-5207 Testing and Failure Mechanisms of Ice Phase Change Material Heat Exchangers</b>	2620
<i>T. Leimkuehler, R. Stephan, E. Hawkins-Reynolds</i>	
<b>2011-5208 A Review Of The Experimental And Modeling Development Of A Water Phase Change Heat Exchanger For Future Exploration Support Vehicles</b>	2637
<i>T. Cognata, T. Leimkuehler, B. Ramaswamy, V. Nayagam, M. Hasan, R. Stephan</i>	
<b>2011-5209 Geoscience Laser Altimetry System (GLAS) Loop Heat Pipe Anomaly and on Orbit Testing</b>	2656
<i>C. Baker, C. Butler, P. Jester</i>	
<b>2011-5210 Developing and Testing a Spacecraft Phase Change Material Container for Water Ice Using Resilient Compressible Foam</b>	2666
<i>J. Leidich, T. Leimkuehler, S. Chiesi, M. Murbach</i>	
<b>2011-5211 Status Report on ANITA2 - The European Programme on High Performance Air Monitoring of ISS Trace Gas Contamination and Gas Concentration Dynamics</b>	2681
<i>T. Stuffler, D. Kampf, S. Gutruf, K. Kaspersen, N. Henn, C. Lasseur, P. Rebeyre, A. Honne</i>	
<b>2011-5212 Status of the Correlation Process of the V-HAB Simulation with ANITA ISS Data</b>	2689
<i>A. Zhukov, M. Czupalla, T. Stuffler</i>	
<b>2011-5213 Laser Spectroscopic Gas Analyzer for Combustion Product Monitoring in Spacecrafts</b>	2702
<i>B. Scherer, H. Hamid, S. Forouhar, M. Homer</i>	

## VOLUME 4

<b>2011-5214 Measurements of the International Space Station Cabin Air Using the Vehicle Cabin Atmosphere Monitor</b>	2711
<i>M. Darrach, A. Chutjian, B. Bornstein, A. Croonquist, V. Garkanian, V. Haemmerle, W. Heinrichs, J. Hofman, D. Karmon, J. Kenny, R. Kidd, S. Lee, J. MacAskill, S. Madzunkov, L. Mandrake, R. Schaefer, J. Thomas, N. Toomarian</i>	
<b>2011-5215 Microlith-based Structured Sorbent for Carbon Dioxide, Humidity, and Trace Contaminant Control in Manned Space Habitats</b>	2726
<i>C. Junaedi, S. Roychoudhury, D. Howard, J. Perry, J. Knox</i>	
<b>2011-5216 Safety Analysis of Carbon Dioxide Reduction Technologies</b>	2736
<i>H. Jones</i>	
<b>2011-5217 Development and Testing of a Sorbent-Based Atmosphere Revitalization System 2010/2011</b>	2752
<i>L. Miller, J. Knox</i>	
<b>2011-5218 Performance Evaluation of Engineered Structured Sorbents for Atmosphere Revitalization Systems on board Crewed Space Vehicles and Habitats</b>	2771
<i>J. Perry, J. Knox, D. Howard, S. Roychoudhury, C. Junaedi</i>	
<b>2011-5219 Spectroscopic Determination of Trace Contaminants in High Purity Oxygen</b>	2782
<i>S. Hornung</i>	
<b>2011-5220 Exploration Extravehicular Activity Purge Flow Assessment</b>	2789
<i>M. Navarro, B. Conger, C. Campbell</i>	
<b>2011-5221 Design and Development of a Regenerative Blower for Space Suit Ventilation</b>	2800
<i>M. Izenson, W. Chen, H. Paul</i>	
<b>2011-5222 Testing and Oxygen Assessment Results for a Next Generation Extravehicular Activity Portable Life Support System Fan</b>	2818
<i>H. Paul, M. Jennings, F. Rivera, D. Martin</i>	
<b>2011-5223 Status of ISS Water Management and Recovery</b>	2839
<i>D. Carter</i>	
<b>2011-5224 Microbial Challenge Testing of Single Liquid Cathode Feed Water Electrolysis Cells for the International Space Station (ISS) Oxygen Generator Assembly (OGA)</b>	2851
<i>R. Roy, G. Diderich, J. Steele, S. Van Keuren, M. Wilson</i>	

<b>2011-5225 A Cabin Air Separator for EVA Oxygen.....</b>	2872
<i>J. Graf</i>	
<b>2011-5226 Current Design Status of the Nitrogen Oxygen Recharge System.....</b>	2890
<i>B. Dick</i>	
<b>2011-5227 Custom Scratch Tips for Evaluation of Two-Body Abrasion on Lunar Surface Spacecraft Materials.....</b>	2904
<i>R. Kobrick, K. Street, D. Klaus</i>	
<b>2011-5228 Human Exploration of the Moon: Multi-stage lunar Dust Removal System.....</b>	2914
<i>M. Belluco, R. Destefanis, B. Bonelli, P. Maggiore, E. Manis, F. Freyria, C. Cazzolato, S. Costa, L. Derosa</i>	
<b>2011-5229 Phase Change Material Trade Study: A Comparison Between Wax and Water for Manned Spacecraft.....</b>	2927
<i>G. Quinn, E. Hodgson, R. Stephan</i>	
<b>2011-5230 Braze Development of Graphite Fiber for Use in Phase Change Material Heat Sinks.....</b>	2941
<i>G. Quinn, D. Beringer, B. Gleason, R. Stephan</i>	
<b>2011-5231 Loop Heat Pipe with Thermal Control Valve for Variable Thermal Conductance .....</b>	2951
<i>J. Hartenstine, K. Walker, W. Anderson</i>	
<b>2011-5232 Pressure Controlled Heat Pipes.....</b>	2964
<i>W. Anderson, J. Hartenstine, C. Tarau, D. Sarraf, K. Walker</i>	
<b>2011-5233 A Logistics Analysis and Control of Distributed Life Support Systems for High-Mobility Exploration.....</b>	2980
<i>H. Miyajima</i>	
<b>2011-5234 A FAM-based Switched Control Approach for the Automation of Bioregenerative Life Support Systems .....</b>	2991
<i>G. Drayer, A. Howard</i>	
<b>2011-5235 Applying Autonomous Control method for Material Circulation to Advanced Life Support System.....</b>	2999
<i>M. Nakane, R. Ohta, Y. Ishikawa, H. Miyajima</i>	
<b>2011-5236 Performance Testing of a Photocatalytic Oxidation Module for Spacecraft Cabin Atmosphere Revitalization.....</b>	3005
<i>J. Perry, K. Frederick, J. Scott, M. Kaiser</i>	
<b>2011-5237 A Comparison of Photocatalytic Oxidation Reactor Performance for Spacecraft Cabin Trace Contaminant Control Applications .....</b>	3016
<i>J. Perry, K. Frederick, J. Scott</i>	
<b>2011-5238 Influence of a Temperature Gradient on the Behavior of Near-Critical Water in Microgravity .....</b>	3025
<i>U. Hegde, M. Hicks, C. Lecoutre, Y. Garrabos</i>	
<b>2011-5239 Commercial Crew Development Environmental Control and Life Support System Status.....</b>	3039
<i>D. Williams</i>	
<b>2011-5240 Requirements Development and Test Results of High Aspect Ratio Trace Contaminant Control, Vehicle Level Post Fire Recovery and Reactive Plastic Carbon Dioxide Control Systems .....</b>	3044
<i>D. Zuniga, B. Finger</i>	
<b>2011-5241 Incremental Development, Verification &amp; Integration of the Excalibur Almaz ECLSS .....</b>	3068
<i>B. Selvy, N. Hahn, J. Zelon</i>	
<b>2011-5242 SpaceX Dragon Air Circulation System .....</b>	3079
<i>B. Hernandez, M. Prina, S. Piatrovich</i>	
<b>2011-5243 Simulation and Analysis of Vacuum Swing Adsorption Units for Spacesuit Carbon Dioxide and Humidity Control .....</b>	3095
<i>M. Swickrath, M. Anderson, S. McMillin, C. Broerman</i>	
<b>2011-5244 Testing and Results of Vacuum Swing Adsorption Units for Spacesuit Carbon Dioxide and Humidity Control .....</b>	3110
<i>S. McMillin, C. Broerman, M. Swickrath, M. Anderson</i>	
<b>2011-5245 Sorbent, Sublimation, and Icing Modeling Methods: Experimental Validation and Application to an Integrated MTSA Subassembly Thermal Model .....</b>	3128
<i>C. Bower, S. Padilla, C. Iacomini, H. Paul</i>	
<b>2011-5246 Carbon Dioxide Control System for a Mars Space Suit Life Support System .....</b>	3148
<i>G. Alptekin, A. Jayaraman, R. Copeland, A. Parker, H. Paul</i>	
<b>2011-5247 Low Cost Space Demonstration for a Single-Person Spacecraft .....</b>	3159
<i>B. Griffin, C. Dischinger</i>	

<b>2011-5248 A Survey of Quantitative Team Performance Metrics For Human-Robot Collaboration</b>	3168
<i>S. Singer, D. Akin</i>	
<b>2011-5249 Human Hand: Kinematics, Statics, and Dynamics</b>	3187
<i>F. Chen, A. Favetto, M. Mousavi, E. Ambrosio, S. Appendino, D. Manfredi, F. Pescarmona, G. Calafiore, B. Bona</i>	
<b>2011-5250 Correlation of ISS Liulin/TEPC Measurements with HZETRN Simulation</b>	3197
<i>F. Badavi</i>	
<b>2011-5251 Analytical Derivation of Abrasion-Ablation Model With Corrections to the First Order Eikonal Expansions</b>	3224
<i>S. Bhatt, L. Townsend, S. Sriprisan, M. PourArsalan</i>	
<b>2011-5252 Estimates of Carrington-Class Solar Particle Event Radiation Exposures on Mars behind Polyethylene Shielding</b>	3233
<i>L. Townsend, A. Adamczyk, C. Werneth, M. PourArsalan, J. Anderson, P. Tsai</i>	
<b>2011-5253 Spectral Analyses and Radiation Exposures from Several Ground-Level Enhancement (GLE) Solar Proton Events: A Comparison of Methodologies</b>	3240
<i>W. Atwell, A. Tylka, W. Dietrich, F. Badavi, K. Rojdev</i>	
<b>2011-5254 Monitoring Thermo-optical Properties of Multilayer Tuneable Emittance Coatings, for Smart Thermal Control in Space Applications</b>	3257
<i>E. Haddad, M. BenKahoul, R. Kruzelecky, B. Wong, W. Jamroz, M. Soltani, A. Hendaoui, M. Chaker, P. Poinas</i>	
<b>2011-5255 Thermal Control of Satellites by Polymer-based Electro-Emissive Device in Infrared Spectra: Component Design and Ground Thermal Testing</b>	3271
<i>J. Dudon, J. Crouzet, A. Teissier, P. Aubert, F. Vidal, C. Chevrot, S. Remaury</i>	
<b>2011-5256 MEMS-based Active Control of Thermal Radiation Using the Near-field Effect</b>	3282
<i>A. Ueno, Y. Suzuki</i>	
<b>2011-5257 Performance Evaluation of New Thermal Insulation System with Polyimide Foams</b>	3290
<i>S. Tachikawa, R. Takagi, Y. Mizutani, Y. Hiasa, A. Ohnishi</i>	
<b>2011-5258 Humidifier Development and Applicability to the Next Generation Portable Life Support System</b>	3300
<i>H. Paul, B. Conger, R. Sompayrac, B. Barnes</i>	
<b>2011-5259 Hollow Fiber Flight Prototype Spacesuit Water Membrane Evaporator Design and Testing</b>	3315
<i>G. Bue, J. Mäkinen, M. Vogel, G. Tsiontos</i>	
<b>2011-5260 Nonventing Thermal and Humidity Control for EVA Suits</b>	3330
<i>M. Izenson, W. Chen, G. Bue</i>	
<b>2011-5261 Cold Stowage Flight Systems</b>	3349
<i>S. Campana</i>	
<b>2011-5262 Operational Evaluation of VEGGIE Food Production System in the Habitat Demonstration Unit</b>	3357
<i>G. Stutte, R. Wheeler, R. Morrow, G. Newsham</i>	
<b>2011-5263 Concept for Sustained Plant Production on ISS Using VEGGIE Capillary Mat Rooting System</b>	3371
<i>G. Stutte, R. Wheeler, R. Morrow, G. Newsham</i>	
<b>2011-5264 Sustainable Oxygen: A Low Power Approach for Providing Emergency Medical Oxygen for Spacecraft and Hospitals in Developing Countries</b>	3388
<i>A. Huff, E. Rhead, Z. Zumr, E. Thomas</i>	
<b>2011-5265 Post-Flight Analyses of Columbus HEPA Filter</b>	3397
<i>L. Grizzaffi, C. Lobascio, A. Saverino, P. Parodi, I. Locantore, D. Perrachon, S. Sampo, D. Giacosa</i>	
<b>2011-5266 Microbiological Lessons Learned From the Space Shuttle</b>	3412
<i>D. Pierson, R. Bruce, C. Ott, V. Castro</i>	
<b>2011-5267 Characterization of Volume F Trash from Four Recent STS Missions: Microbial Occurrence, Numbers, and Identifications</b>	3423
<i>R. Strayer, M. Hummerick, J. Richards, L. McCoy, R. Wheeler</i>	
<b>2011-5268 JPL Thermal Design Modeling Philosophy and NASA-STD-7009 Standard for Models and Simulations - A Case Study</b>	3435
<i>A. Avila</i>	
<b>2011-5269 Reliability of Solder Materials and Surface Mounted Electronic Packages For NASA's Deep Space Missions to Enhance Mission Assurance</b>	3448
<i>R. Ramesham</i>	
<b>2011-5270 Lifetime Testing of ECLSS Electronics Using the Arrhenius Model - Case Study</b>	3466
<i>T. Treichel</i>	

<b>2011-5271 Reliability Analysis of Carbon Dioxide Reduction Systems.....</b>	3473
<i>H. Jones</i>	
<b>2011-5272 Freezable Radiator Model Correlation Improvements and Fluids Study .....</b>	3483
<i>S. Lillibridge, M. Navarro</i>	
<b>2011-5273 Full Scale Demonstration and Modeling of a Quick Recovery Stagnating Radiator .....</b>	3499
<i>E. Bannon, C. Iacomini</i>	
<b>2011-5274 Performance of the Extravehicular Mobility Unit (EMU) Airlock Coolant Loop Recovery (A/L CLR) Hardware – Final .....</b>	3514
<i>J. Steele, T. Rector, D. Gazda, J. Lewis</i>	
<b>2011-5275 H-II Transfer Vehicle (HTV) and the Operations Concept for Extravehicular Activity (EVA) Hardware.....</b>	3526
<i>C. Chullen</i>	
<b>2011-5276 Disinfection of Spacecraft Potable Water Systems by Photocatalytic Oxidation Using UV-A Light Emitting Diodes .....</b>	3536
<i>M. Birmeli, J. O'Neal, M. Roberts</i>	
<b>2011-5277 A Hazard Analysis Critical Control Point Plan applied to the Lada Vegetable Production Units (VPU) to Ensure the Safety of Space Grown Vegetables.....</b>	3544
<i>M. Hummerick, J. Garland, G. Bingham, S. Topham, V. Sychev, I. Podolsky</i>	
<b>2011-5278 Disinfection of Spacecraft Potable Water Systems by Passivation with Ionic Silver .....</b>	3557
<i>M. Birmeli, M. Roberts</i>	
<b>2011-5279 Adaptation of the ELISSA Simulation Tool for Reliability Analysis .....</b>	3565
<i>G. Domingo, B. Ganzer, E. Messerschmid</i>	
<b>Author Index</b>	