



# 2010 JUSTSAP Symposium

## *The Next Giant Leap: Building Sustainable Settlements Beyond Low-Earth Orbit*

*Fairmont Orchid  
Kohala Coast, Island of Hawaii  
November 14-18, 2010*

<b>Date</b>	<b>Time</b>	<b>Event</b>
<b>Nov. 14</b> (Sunday)		<b><u>Pre-Symposium Activities</u></b>
	2:30 - 7:00	Delegate Registration <i>Paniolo Hospitality Room</i>
	3:30 - 5:30	<b>Steering Committee Meeting I</b> <i>Promenade Ballroom I</i>
	6:30 - 8:00	<b>Delegate Reception</b> <i>Turtle Point (Weather B/U: Plaza I and II)</i>
<b>Nov. 15</b> (Monday)	7:00 - 3:00	Delegate Registration <i>(in front of Promenade Ballroom)</i>
	7:30 - 8:30	<b>Continental Breakfast</b> <i>Brown's Beach House (Weather B/U: Kilohana)</i>
		<b><u>OPENING PLENARY SESSION</u></b> <i>Amphitheater</i>
	8:30 - 9:00	<b>Welcome</b>  Jim Crisafulli <i>Director, Hawaii Office of Aerospace Development Executive Director, JUSTSAP Secretariat</i>  Ted Liu <i>Director, Dept. of Business, Economic Development &amp; Tourism State of Hawaii</i>  Senator Will Espero <i>Hawaii State Legislature</i>  Chancellor Donald Straney <i>University of Hawaii at Hilo</i>
	9:00 - 9:15	<b>Expanding JUSTSAP's Role in Space Exploration</b>  The Honorable George Ariyoshi <i>Former Governor, State of Hawaii U.S. Advisor, JUSTSAP</i>

<b>Date</b>	<b>Time</b>	<b>Event</b>
Nov.15	9:15 - 9:30	<b>Symposium Overview: Purpose and Goals</b> Stephen Day <i>Chairman - JUSTSAP</i>
	9:30 - 10:00	<b>Keynote Presentation:</b> <b>Building Sustainable Settlements Beyond LEO</b> Gary Martin <i>Director, New Ventures &amp; Communications Directorate NASA Ames Research Center</i>
	10:00 - 10:30	<b>Refreshment Break and Group Photo</b> <i>Wailana Gardens</i>
	10:30 - 12:00	<b><u>PLENARY SESSION II</u></b> <i>Promenade Ballrooms I, II &amp; III</i>  <b>Panel Presentation:</b> <b>Prospects for Sustainable Settlements beyond LEO</b> <i>What are the options and anticipated benefits for establishing long-term robotic and human settlements beyond LEO?</i>  <i>Moderator:</i> Stephen Day <i>Chairman, JUSTSAP</i>  <i>Panelists:</i> Osamu Odawara <i>Japan Vice Chair, JUSTSAP Professor, IEM - Tokyo Institute of Technology</i>  Charles Miller <i>Senior Advisor for Commercial Space NASA Headquarters</i>  Masahiro Takayanagi <i>Director, ISS Science Project Office Japan Aerospace Exploration Agency</i>  Dan Rasky <i>Director, Space Portal - NASA Research Park Director, Emerging Commercial Space Office - NASA ARC</i>  <i>Panel Topics:</i>  <i>Where we might settle, how, and by when; operational options for a lunar settlement, including an Earth/Sun/NEO observation station, deep space astronomy, commercial development opportunities, space education and training, and analog outposts on Earth.</i>
	12:00 - 1:30	<b>Lunch</b> <i>Plaza Ballroom</i>  Guest Speaker: Charles Miller <i>Senior Advisor for Commercial Space - NASA Headquarters</i>  Topic: <i>An International Authority as the Foundation for Lunar Commerce and Settlement?</i>

<b>Date</b>	<b>Time</b>	<b>Event</b>
Nov.15		<b>PLENARY SESSION III</b> <i>Promenade Ballrooms I, II &amp; III</i>
	1:30 - 3:30	<b>Panel Presentation:</b> <b><i>Establishing a Multinational Lunar R&amp;D Park and University as a Sustainable Robotic/Human Settlement Beyond LEO</i></b> <i>What would comprise a workable model for an LRDP/U, and what could be the associated scientific, commercial and educational benefits?</i>
		<i>Moderator: Michael Marlaire</i> <i>Director, NASA Research Park</i>
		<i>Panelists: Greg Schmidt</i> <i>Deputy Director, NASA Lunar Science Institute</i> <i>NASA Ames Research Center</i>
		<i>Mitsuru Ohnishi</i> <i>Senior Researcher, Aerospace R&amp;D Directorate - JAXA</i>
		<i>Bob Richards</i> <i>CEO, Moon Express Inc.</i> <i>Co-Founder, International Space University</i>
		<i>Robert Mueller</i> <i>Chief, Surface Systems Office</i> <i>NASA Kennedy Space Center</i>
		<i>Kazunori Ohta</i> <i>Associate Senior Engineer, Space Exploration Center - JAXA</i>
		<i>Eric Reiners</i> <i>Manager, Automation Systems - Caterpillar</i>
		<i>Hideichi Tamegaya</i> <i>Professor, Joshibi University of Art &amp; Design - Japan</i>
		<i>Gerald Sanders</i> <i>ISRU Lead, Lunar Surface Systems</i> <i>NASA Johnson Space Center</i>
		<i>Carl Kuehnel</i> <i>Senior Project Manager, Astrium North America Inc.</i>
		<i>Panel Topics:</i> <i>Precursor robotics/ISRU; a lunar Earth/Sun/NEO/Deep Space Observing Station; lunar-based R&amp;D, education and training; lunar commerce.</i>
	3:30 - 3:45	<b>Refreshment Break</b> ( <i>Wailana Gardens</i> )

<b>Date</b>	<b>Time</b>	<b>Event</b>
Nov.15	3:45 - 5:45	<p><b>Panel Presentation:</b> <b><i>Bringing Space Settlements Down to Earth</i></b> <i>What near and long-term issues/challenges need to be addressed, and by whom, to establish a multinational LRDP/U?</i></p> <p><b>Co-Moderators:</b> Osamu Odawara - <i>Japan Vice Chair/JUSTSAP</i> Frank Schowengerdt - <i>U.S. Vice Chair/JUSTSAP</i></p> <p><b>Panelists:</b> Chris Pestak <i>Manager, NASA Programs - Battelle Memorial Institute</i></p> <p>Tetsuji Yoshida <i>President, CSP Japan Inc.</i></p> <p>Fred Bourgeois <i>CEO, Team FREDNET - The Google Lunar X-Prize</i></p> <p>John Hines <i>Chief Technologist, NASA Ames Research Center</i></p> <p>Dan Bland <i>President, JAMSS America</i></p> <p>Susumu Yoshitomi <i>Special Counselor, Japan Space Forum</i></p> <p>Robert Kelso <i>Manager, Commercial Lunar Services</i> <i>NASA Johnson Space Center</i></p> <p>Ben Bussey <i>PI, NLSI Polar Team - Johns Hopkins Applied Physics Lab</i></p> <p>Bill Larson <i>ISRU Technology Development Mgr. - NASA Kennedy Space Center</i></p> <p>Bruce Pittman <i>Director, Flight Projects - Space Portal/NASA Ames Research Center</i></p> <p>Kim Binsted <i>Co-Investigator, NASA-UH Astrobiology Institute</i></p> <p><b>Panel Topics:</b> <i>Technological/scientific challenges; legal/regulatory concerns; international collaboration; commercial opportunities/incentives; cost/funding options; precursor terrestrial analog facilities in Hawaii; lessons learned from Intelsat/ISS/Antarctica/PISCES.</i></p>
	6:30 - 9:00	<p><b>Networking Reception/Dinner - U.S. Night</b> <i>Plaza Ballroom</i></p> <p><b>Guest Speaker:</b> Henk Rogers <i>CEO, Blue Planet Software</i> <i>Founder, Blue Planet Foundation</i></p> <p><b>Topic:</b> <i>Virtual Space Colonization</i></p>

<b>Date</b>	<b>Time</b>	<b>Event</b>
<b>Nov. 16</b> (Tuesday)	7:30 - 8:30	<b>Continental Breakfast</b> <i>Brown's Beach House (Weather B/U: Kilohana)</i>
		<b><u>PLENARY SESSION IV</u></b> <i>Promenade Ballrooms I, II &amp; III</i>
	8:30 – 10:00	<b>Panel Presentation:</b> <b><i>Use of Authorities for Development of Settlements Beyond LEO</i></b> <i>What historical models would apply, and how could an authority be structured to expedite the development and implementation of the LRDP/U?</i>
		<i>Moderator:</i> Charles Miller <i>Senior Advisor for Commercial Space</i> <i>NASA Headquarters</i>
		<i>Panelists:</i> Stephen Day <i>Chairman, JUSTSAP</i> <i>President/CEO, International Ventures</i>
		Declan O'Donnell <i>President, Intl. Space Development Authority Corporation</i> <i>President, World Space Bar Association</i>
		Hugh Welsh <i>Former Deputy General Counsel</i> <i>Port Authorities of New York &amp; New Jersey</i>
	10:00 - 10:30	<b>Refreshment Break</b> ( <i>Wailana Gardens</i> )
	10:30 - 12:00	<b>Lunar R&amp;D Park/University (LRDP/U) Conceptualization</b> <i>Articulating goals and specific issues for Discussion Groups, leading to the formulation of LRDP/U Project Teams</i>
		<i>Discussion Leads:</i> Stephen Day, JUSTSAP Chairman <i>Frank Schowengerdt, U.S. Co-Chair</i> <i>Osamu Odawara, Japan Co-Chair</i> <i>Jim Crisafulli, JUSTSAP Secretariat</i>
		<i>Topics:</i>
		★ Summary of discussions in plenary panels
		★ Overview of process for developing the LRDP/U concept
		★ Key questions for discussion groups
		★ Expected output from discussion groups
		★ Next steps for implementation
	12:00 - 1:30	<b>Lunch</b> <i>Plaza Ballroom</i>
		<i>Guest Speaker:</i> Eric Reiners <i>Manager, Automation Systems - Caterpillar</i>
		<i>Topic:</i> <i>Terrestrial Analogs for Lunar Mining</i>

Date	Time	Event
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Nov. 16      1:30 - 3:00

**DISCUSSION GROUP SESSIONS**

*The goal for each group is to discuss and develop a brief written response to each of the key questions posed during their breakout sessions (see below). These responses will subsequently be integrated into a draft concept for a sustainable lunar settlement (in the form of a multinational R&D park/university) to guide further discussion on this topic throughout the coming year.*

**DG Breakout Session 1**

**DG1: Developing a Multinational Lunar Settlement**

*Promenade Ballroom I*

Discussion Group Facilitators:

Stephen Day, Dan Bland, Dan Rasky, Shu Usuba

Key Questions:

- *What would be the primary benefits (e.g., scientific, educational, humanistic, commercial) for developing a multinational lunar base?*
- *How might a lunar settlement optimally be developed (including timeline), structured, operated and regulated, and by whom/what?*
- *What are the viable approaches (scientific, technological, legal, political, financial) to realizing this vision, and how could these be implemented?*
- *What terrestrial precedents/ongoing efforts could help inform and support the development of a sustainable lunar settlement?*
- *How could this effort be made “participatory” – i.e., inclusive of both professionals and the general public worldwide?*

**DG2: Lunar-based R&D, Education and Training**

*Orchid Room*

Discussion Group Facilitators:

Frank Schowengerdt, Greg Schmidt, Beth McKnight, Susumu Yoshitomi

Key Questions:

- *What are the principal advantages and opportunities for lunar-based R&D (including technology T&E), education and training?*
- *How could these activities complement/support/synergize with related activities on Earth, aboard the ISS, and elsewhere?*
- *How might these activities optimally be developed (including timeline), structured, operated and regulated, and by whom/what?*
- *What are the viable approaches (scientific, technological, legal, political, financial) to realizing this vision, and how could these be implemented?*
- *How could these efforts be made “participatory” – i.e., inclusive of both professionals and the general public worldwide?*

<b>Date</b>	<b>Time</b>	<b>Event</b>
Nov. 16	1:30 - 3:00	<b>DG Breakout Session 1</b> <i>(Continued)</i>  <b>DG3: Lunar Resource Utilization (LRU) and Commerce</b> <i>Hibiscus Ballroom</i>  Discussion Group Facilitators: Robert Kelso, Bill Larson, Jerry Sanders, Tetsuji Yoshida  <u>Key Questions:</u> <ul style="list-style-type: none"><li>• <i>What are the principal opportunities for utilizing lunar resources to both enable sustainable settlements and promote space commerce?</i></li><li>• <i>What milestones are required (scientific, technological, legal, political, financial) to enable LRU/commerce, and how can these be achieved?</i></li><li>• <i>How could public-private partnerships facilitate LRU/commerce, and what is needed (short/medium/long-term) to “make the case”?</i></li><li>• <i>How could multinational alliances facilitate LRU/commerce, and what is needed (short/medium/long-term) to seed their development?</i></li><li>• <i>How can we prepare for lunar commerce on Earth, especially by reducing risks and maximizing incentives for entrepreneurs?</i></li></ul>
	3:00 - 6:30	<b>Open Time with Informal/Optional Recreational Activities</b> <i>(includes special teleconference with U.S. Mainland delegates - see below)</i>
	3:30 - 5:30	<b>Teleconference with Government/Industry/University Reps</b> <i>Orchid Room</i>  <i>Prospects and Challenges for Sustainable Space Settlements</i>  <i>Discussants:</i>  Paul Masson - <i>Managing Director, STARNET LLC</i> Alex Ignatiev - <i>Director, Center for Advanced Materials/U. of Houston</i> Mark Nall - <i>Lunar Mapping Project Manager, NASA MSFC</i> Rob Landis - <i>Engineer, Mission Operations Directorate – NASA JSC</i> Joe Pelton - <i>Former Dean, International Space University</i> Larry Clark - <i>Senior Manager, Spacecraft Technology/LMCO</i> Andrew Chaikin - <i>Space Author and Journalist</i> Rick Tumlinson - <i>Co-Founder, Space Frontier Foundation</i> John Spencer - <i>President, Space Tourism Society</i> Lynn Harper - <i>Lead, Integrative Studies/NASA Space Portal</i> Jim Muncy - <i>President, PoliSpace</i> Elliot Pulham - <i>President and CEO, The Space Foundation</i>
	6:30 - 9:00	<b>Networking Reception/Dinner</b> <i>Plaza Ballroom</i>  Guest Speaker: Pascal Lee <i>Chairman - The Mars Institute</i>  Topic: <i>Developing Terrestrial Analogs for Settlements Beyond LEO</i>

<b>Date</b>	<b>Time</b>	<b>Event</b>
<b>Nov. 17</b> (Wednesday)	7:30 - 8:30	<b>Continental Breakfast</b> <i>Brown's Beach House (Weather B/U: Kilohana)</i>
		<b><u>DISCUSSION GROUP SESSIONS</u></b> <i>(continued)</i>
	8:30 - 10:00	<b>DG Breakout Session 2</b> DG1: Developing a Multinational Lunar Settlement ( <i>Promenade</i> ) DG2: Lunar-based R&D, Education and Training ( <i>Orchid</i> ) DG3: Lunar Resource Utilization & Commerce ( <i>Hibiscus</i> )
	10:00 - 10:15	<i>Refreshment Break (Wailana Gardens)</i>
	10:15 - 12:00	<b>DG Breakout Session 3</b> DG1: Developing a Multinational Lunar Settlement ( <i>Promenade</i> ) DG2: Lunar-based R&D, Education and Training ( <i>Orchid</i> ) DG3: Lunar Resource Utilization & Commerce ( <i>Hibiscus</i> )
	12:00 - 1:30	<b>Lunch</b> <i>Plaza Ballroom</i>  Guest Speaker: Yoshiyuki Fujino <i>Senior Researcher</i> <i>National Institute of Information &amp; Communications Technology</i>  Topic: <i>Satellite and Terrestrial Integrated Communications Systems</i> <i>Applicable for Settlements beyond LEO</i>
	1:30 - 3:00	<b>DG Breakout Session 4</b> DG1: Developing a Multinational Lunar Settlement ( <i>Promenade</i> ) DG2: Lunar-based R&D, Education and Training ( <i>Orchid</i> ) DG3: Lunar Resource Utilization & Commerce ( <i>Hibiscus</i> )
	3:00 - 6:00	<i>Open Time with Informal/Optional Recreational Activities</i>
	6:00 - 7:00	<b>Networking Reception</b> <i>(featuring Avatar Reality V/R demonstration)</i> <i>Plaza Ballroom</i>  <i>Creative Academies – an organization that offers classes, museum exhibitions, and other approaches to learning using cutting-edge digital media – is currently working with students at a public charter school in Hawaii to create an original 3-D simulation in virtual reality to explore the planet Mars and to learn how this planet might be colonized. Please join us to experience this photorealistic, immersive simulation during the conference dinner reception.</i>
	7:00 - 9:00	<b>Dinner - Japan Night</b> <i>Plaza Ballroom</i>  Guest Speaker: Junichi Yamazaki <i>Director, System Engineering Div., – NHK Engineering Services</i>  Topic: <i>The Kaguya Mission – Present and Future</i>

<b>Date</b>	<b>Time</b>	<b>Event</b>
<b>Nov. 18</b> (Thursday)	7:30 - 8:30	<b>Continental Breakfast</b> <i>Wailana Gardens</i>
		<b><u>PLENARY SESSION V</u></b> <i>Promenade Ballrooms I, II &amp; III</i>
	8:30 - 10:00	<b>Integration of Discussion Group LRDP Scenarios</b> <i>Reports from Discussion Group facilitators on individual group sessions, followed by an open discussion to consolidate the recommendations from all discussion groups into a conceptual model for the LRDP/U and critical path for implementation.</i>  Co-Moderators: Osamu Odawara <i>Japan Vice-Chair, JUSTSAP</i>  Frank Schowengerdt <i>U.S. Vice-Chair, JUSTSAP</i>
	10:00 - 10:15	<b>Refreshment Break</b> ( <i>Wailana Gardens</i> )
	10:15 – 12:00	<b>Steering Committee Meeting II</b> <i>Orchid Room</i>
	12:00 - 1:30	<b>Lunch</b> <i>Plaza Ballroom</i>  Guest Speaker: Dan Rasky <i>Director, Space Portal - NASA Research Park</i> <i>Director, Emerging Commercial Space Office</i> <i>NASA Ames Research Center</i>  Topic: <i>Commercial Opportunities for Settlements Beyond LEO</i>
		<b><u>CLOSING PLENARY SESSION</u></b> <i>Promenade Ballrooms I, II &amp; III</i>
	1:30 - 2:00	<b>Steering Committee Report/Discussion</b>  Stephen Day, <i>JUSTSAP Chairman</i>
	2:00 - 3:00	<b>Future of JUSTSAP and Next Steps toward Building a Sustainable Settlement beyond Low-Earth Orbit</b> <i>Open Delegate Discussion</i>  Discussion Leads: Stephen Day, <i>JUSTSAP Chairman</i>  Osamu Odawara <i>Japan Vice-Chair, JUSTSAP</i>  Frank Schowengerdt <i>U.S. Vice-Chair, JUSTSAP</i>

<b>Date</b>	<b>Time</b>	<b>Event</b>
<b>Nov. 18</b>	3:00 - 5:00	<i>Open Time</i>
	5:00 - 9:30	<b>Waikoloa Sunset Dinner</b> <i>Hilton Waikoloa Village</i>  <i>Delegates will depart from Main Lobby by bus to the Hilton Waikoloa Village for a Mai Tai reception and a three-course dinner at Donatoni's Lanai, followed by a Tahitian cultural presentation and fire dance at the Lagoon Tower Lanai.</i>
		<i>Symposium Concludes</i>