



**DEPARTMENT OF BUSINESS,
ECONOMIC DEVELOPMENT & TOURISM**

No. 1 Capitol District Building, 250 South Hotel Street, 5th Floor, Honolulu, Hawaii 96813
Mailing Address: P.O. Box 2359, Honolulu, Hawaii 96804
Web site: www.hawaii.gov/dbedt

NEIL ABERCROMBIE
GOVERNOR

RICHARD C. LIM
DIRECTOR

MARY ALICE EVANS
DEPUTY DIRECTOR

Telephone: (808) 586-2355
Fax: (808) 586-2377

Statement of

RICHARD C. LIM
Director

Department of Business, Economic Development & Tourism
before the

HOUSE COMMITTEE ON ECONOMIC DEVELOPMENT & BUSINESS

Friday, March 21, 2014

9:30 a.m.

State Capitol, Conference Room 312

in consideration of

HCR133 / HR97

**COMMENDING AND SUPPORTING THE PACIFIC INTERNATIONAL SPACE
CENTER FOR EXPLORATION SYSTEMS' COLLABORATIVE WORK WITH THE
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION AND PRIVATE
INDUSTRIES IN THE AREAS OF BASALTIC CONCRETE AND ADDITIVE
MANUFACTURING AND REQUESTING COLLABORATION TO EXPLORE
OPPORTUNITIES FOR APPLICATIONS OF BASALTIC CONCRETE AND
ADDITIVE MANUFACTURING.**

Chair Tsuji, Vice Chair Ward, and members of the Committee. The Department of Business, Economic Development and Tourism **supports the intent** of this resolution requesting the State to collaborate with the Pacific International Space Center for Exploration Systems, county agencies, and private industry to explore opportunities for applications of basaltic concrete and additive manufacturing.

This effort presents a valuable opportunity for Hawaii to leverage our State's unique geology and the resources and capabilities available at PISCES to promote dual-use technologies that can be applied to extend human exploration of space as well as advance applications of basaltic materials that could be used as a sustainable substitute for conventional concrete, almost all of which is currently imported to Hawaii.

Thank you for the opportunity to testify on this resolution.

March 20, 2014

TESTIMONY IN SUPPORT OF HCR 133 / HR 97 –
RELATING TO THE PACIFIC INTERNATIONAL SPACE CENTER FOR EXPLORATION
SYSTEMS (PISCES)

- **COMMENDING THE NASA/PISCES COLLABORATION IN THE AREA OF 3-DIMINSIONAL (3D) ADDITIVE CONSTRUCTION TECHNOLOGY DEVELOPMENT USING VOLCANIC BASALT**

Dear Members of the 27th Hawaii State Legislature,

NASA has collaborated with the Pacific International Space Center for Explorations Systems (PISCES) in the state of Hawaii since 2007, when the first NASA field test for In-Situ Resource Utilization (ISRU) was held on Mauna Kea in the Big Island. The unique volcanic basalt environment of the Hawaiian island chain is conducive to analogous testing for planetary surfaces which in many cases also have a basaltic composition.

NASA Headquarters in Washington DC has expressed recent interest in consideration of funding for developing new technologies for sustainable planetary surface systems in collaboration with the other NASA field centers across the USA and PISCES in the State of Hawaii. The key to “living off the land” in space is to use the local resources in order to achieve independence from the demanding and expensive logistics train for re-supply from Earth. The resources are contained in the soil (called regolith), atmosphere and the energy from the sun. Many of the technologies being developed for sustainable space exploration via ISRU have terrestrial benefits such as water purification, production of renewable and clean energy, building civil infrastructure with basaltic materials and advanced robotics for construction activities.

Just as these technologies will help humanity become a space faring civilization they may also help economic prosperity in Hawaii by reducing the amount of raw materials that have to be imported to Hawaii. Hawaii is rich in solar power and basaltic materials which are the key ingredients for sustainable ISRU construction on planetary surfaces. By collaborating with the space exploration sector, including advanced education training opportunities, it is possible that dual use technologies may be developed that will be highly beneficial to the Hawaiian quality of life and general prosperity of its people.

NASA’s proposed funding and collaboration centers on the in-the-field demonstration of a foundation pad and a 3-diminsional shelter within Hawaii using robotic technologies between PISCES and NASA.

This resolution indicates support from the State of Hawaii in this joint endeavor.

Best Regards,

A handwritten signature in black ink, appearing to read "Robert M. Kelso".

Robert M. Kelso

Executive Director, PISCES

Hilo, Hawaii

Rkelso54@gmail.com

Phone: 832.628.1730

**George R. Ariyoshi
999 Bishop Street, 23rd Floor
Honolulu, HI 96813**

March 20, 2014

TESTIMONY IN SUPPORT OF HCR133 / HR97 - COMMENDING AND SUPPORTING THE PACIFIC INTERNATIONAL SPACE CENTER FOR EXPLORATION SYSTEMS' COLLABORATIVE WORK WITH THE NATIONAL AERONAUTICS AND SPACE ADMINISTRATION AND PRIVATE INDUSTRIES IN THE AREAS OF BASALTIC CONCRETE AND ADDITIVE MANUFACTURING, AND REQUESTING COLLABORATION TO EXPLORE OPPORTUNITIES FOR APPLICATIONS OF BASALTIC CONCRETE AND ADDITIVE MANUFACTURING.

Dear Members of the 27th State Legislature,

I strongly support the intent of this resolution requesting the State to collaborate with the Pacific International Space Center for Exploration Systems, county agencies, and private industry to explore opportunities for applications of basaltic concrete and additive manufacturing.

The focus of this measure is to leverage our State's unique geography and the resources and capabilities available at PISCES to both extend human exploration of space as well as advance applications of basaltic materials that could reduce Hawaii's significant dependence on imported concrete.

NASA Headquarters has contacted PISCES to express their strong interest in the Center's research and performance in this area, and requested that they submit a proposal for federal funding to support 3D basaltic construction in Hawaii. This resolution is designed to emphasize the State's strong interest and potential in basaltic construction in support of this application, as well as to highlight the substantial benefits that this enterprise could bring to our State – especially through the reduction of concrete imports.

As such, I would urge you pass HCR133/SR97, and would be happy to address any questions you may have concerning this recommendation. I may be reached by e-mail at kyahiku@wik.com , by phone at (808) 544-6765, or by fax at (808) 544-8398.

Thank you for the opportunity to testify on this resolution.

Aloha,


George R. Ariyoshi

GRA:khy



BUZZ ALDRIN
Astronaut

03/20/2014

Testimony in strong support of Hawaii State Resolutions:
HCR 133 and HR 97; and SCR 82 and SR 39

Statement of Buzz Aldrin, Apollo XI

To the Members of the 27th Hawaii State Legislature:

I would like to offer my strong endorsement of Hawaii State Resolutions – SCR 82 and SR 39; and, HCR 133 and HR 97, which will build on, and substantially further, the many early successes already demonstrated by your strong support of the Pacific International Space Center for Exploration Systems (PISCES).

I am delighted to see the continued outstanding leadership that you are demonstrating in supporting the development and operation of this truly unique and vitally important capability that will serve Hawaii, the United States, and the international space community, as a premier planetary analog test bed to help prepare for humanity's next bold frontier - the scientific investigation, sustainable exploration, commercial development, and settlement of space.

The importance of this new capability has been widely recognized both nationally by NASA, NOAA, and other federal and state agencies, as well as by the broader international community, which is now coming together to collaborate here on the Big Island to further our mutual goals in space, as is evident by the many memorandums of understanding and agreement which have been signed over the past two years.

In recognition of this leadership, and in anticipation of an important major milestone in human history - the 45th Anniversary of the historic Apollo XI lunar landing that Neil Armstrong and I were privileged to undertake on July 20th, 1969, while our crewmate Mike Collins orbited overhead, I would like to offer my strongest endorsement of State Resolutions SCR 82 and SR 39, to designate July 20th, 2014 as 'Tranquility Base Day', to honor the historical site where man first stepped upon another world.

I would like to further strongly endorse the companion call for the United States to urge the United Nations Educational, Scientific and Cultural Organization to designate Tranquility Base, and its associated hardware and artifacts, as an International World Heritage Site, to preserve this important site for all humanity, and for future explorers, to enjoy and to recognize this remarkable accomplishment for all mankind.

I would also like to strongly endorse State Resolutions HCR 133 and HR 97, which would endorse the planned partnership between PISCES, the National Aeronautics and Space Administration (NASA), other State Agencies, and several private sector industry partners, to collaborate in the research and development of 'basaltic concrete and other additive materials' to exploit the use of basalt, and other indigenous materials, from the Big Island's abundant lava flow fields to produce materials and structures to validate the ability to create similar materials on the moon, and other planetary bodies, that would be created from readily available planetary in situ resources.

The use on in situ resources, a term that NASA and commercial space sector researchers refer to as In Situ Resource Utilization (ISRU) has been identified as one of the most important processes to enable future affordable and sustainable human exploration and settlement of space, as it will make it possible to create needed surfaces, structures, habitats, and other capabilities, to support human activity in space, as compared with the extremely high costs of transporting such structures from the Earth to the moon, or other planetary bodies.

Following the successful demonstration of this research, it is anticipated that it will prove possible to apply this technology to manufacture and fabricate basaltic concrete surfaces, and other structures, that could be applied to many of Hawaii's roads, and other industrial needs, thereby substantially reducing the high cost of importing these materials from the mainland, and other suppliers across the globe to meet these needs.

Therefore, in recognition of the importance of conducting this research for exploration, and subsequently leveraging this capability for the economic benefit of the State of Hawaii, I also strongly endorse the proposal to extend the research phase of this work to address industrial applications here in Hawaii.

I firmly believe that the investment that you are making today in supporting PISCES, and in endorsing this exciting and promising new exploration research and technology, and its eventual application to meeting the needs of the State, will undoubtedly assure Hawaii a unique leadership role in this challenging new frontier, while also contributing substantially to the economic prosperity and well being of the State.

I again, strongly encourage your continued leadership in supporting PISCES - a timely and vitally important asset for not only your State, but also for our Nation, and for the broader international space community, as well as for the State of Hawaii.

Thank you for the opportunity to testify on these resolutions.

A handwritten signature in black ink, appearing to read "Buzz Aldrin", with a horizontal line underneath.

Buzz Aldrin
Apollo XI