



BROWN UNIVERSITY *Providence, Rhode Island 02912*

Department of Earth, Environmental and Planetary Sciences
BROWN UNIVERSITY
324 Brook Street
Providence, RI 02912

November 10, 2019

To: Dr. Judith Swift
Director, The Coastal Institute
University of Rhode Island
215 South Ferry Rd.
Narragansett, RI 02882

Re: Desire to enroll in the CESU as a new partner institution/organization

Dear Dr. Swift:

I write to request membership in the North Atlantic Coast Cooperative Ecosystem Studies Unit (NAC CESU) on behalf of the Department of Earth, Environmental and Planetary Sciences (DEEPs) and Department of Ecology and Evolutionary Biology (EEB) at Brown University, as well as other relevant programs at Brown University such as the Institute at Brown for Environment & Society (IBES), Department of Anthropology and Archaeology (DAA), the Joukowsky Institute of Archaeology (JIA) and Haffenreffer Museum of Anthropology (HMA). The administrative office of DEEPs and the allied departments mentioned above can be reached at 324 Brook Street, Providence, RI 02912. If the CESU membership is approved, I expect there will be much additional interest at Brown.

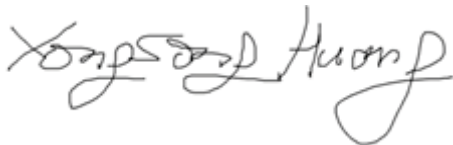
The Office of Sponsored Programs (OSP) mediates outside funding for research at Brown University and has agreed to be the administrative lead, and to accept the 17.5% indirect cost rate on any projects initiated under the CESU agreement. Technical representatives, at least initially, will be the Professor Yongsong Huang in DEEPs and Professor Tyler Kartzinel of EEB.

We collectively offer expertise in earth surface processes (DEEPs), paleoclimatology and paleoecology (DEEPs), geochemistry (DEEPs), ecology and evolution (EEB), terrestrial and aquatic ecosystem management (EEB), geographic information systems (DEEPs and EEB), and conservation expertise in the areas of environment and society (IBES), archaeology and Anthropology (JIA and HMA). We can also contribute the intellectual assets of students and faculty, as well as a large number of analytical facilities (e.g., structural and isotopic mass spectrometers) directed at a broad range of environmental analyses.

Some recent activities relevant to CESU goals (and supported in part by NPS, internal Brown University grants and NSF) include the 3-year ongoing research grant P18AC00556 (2020 Shared Beringian Heritage Program), "Tracing the Ice Age Beringian Standstill using microfossils and lipid biomarkers in exceptionally long sedimentary records from Seward Peninsula, Alaska" directed by Professor Yongsong Huang and Dr. Jonathan O'Donnell at NPS headquarters, Anchorage, Alaska. Professor Tyler Kartzinel also has ongoing collaborative research with Drs. PJ White (Chief, Wildlife and Aquatic Resources), Chris Geremia (Bison Ecology and Management Office), and Heidi Anderson (Park Botanist) in Yellowstone National Park. The collaborative research between Prof. Huang and NPS has recently yielded the first publication (<https://doi.org/10.1016/j.orggeochem.2019.103924>) documenting the discovery of a distinct class of long chain alkenones in the maar lakes on the Seward Peninsula, Alaska. Successful field expeditions in July 2018 and April 2019 have yielded new sediment cores from White Fish Lake and Imuruk Lake which have undergone extensive characterizations at this time. Prof. Kartzinel has reported on analyses of wildlife diets to the Bison Ecology and Management Office at Yellowstone National Park, based on collaborative research conducted together with Brown University students; these preliminary results form the basis of Cooperative Agreements between Brown and Yellowstone NP (drafted) and competitive external proposals (invited proposal for an NSF EPSCoR award).

Please find below some of the websites of Brown University departments and institutions concerned.

Sincerely yours,

A handwritten signature in black ink that reads "Yongsong Huang". The signature is fluid and cursive, with the first name "Yongsong" and the last name "Huang" clearly legible.

Yongsong Huang
Professor of Department of Earth, Environmental and Planetary Sciences

<https://www.brown.edu/academics/earth-environmental-planetary-sciences/>
<https://www.brown.edu/academics/ecology-and-evolutionary-biology/>
<https://www.brown.edu/academics/institute-environment-society/>
<https://www.brown.edu/academics/archaeology/>
<https://www.brown.edu/academics/anthropology/archaeological-and-historical>
<https://www.brown.edu/research/facilities/haffenreffer-museum/>

2. Institutional Statement of Agreement

Brown University has read the 2019 – 2024 CESU agreement and agrees to support the CESU mission and goals and fulfill the roles and responsibilities of a nonfederal partner, as described in the CESU agreement to the extent such activities are and remain consistent with Brown's institutional policies.

Patrice A. Carroll Digitally signed by Patrice A. Carroll
Date: 2019.11.27 11:30:20 -05'00'

Patrice A. Carroll
Director, Office of Sponsored Projects
Brown University
Box 1929
Providence, RI, USA 02912
Tel (401) 863-3141 / (401) 863-2777

3. Description of the institution/organization, its mission, and the primary focus of collaborative activities to be supported through the CESU in the context of the CESU mission.

We collectively offer expertise in geochemistry of natural waters and sediments (DEEPs), paleoclimatology (DEEPs), paleoecology (such as study of past fires) and paleoenvironmental studies (DEEPs and EEB), remote sensing and geographic information system (DEEPs and EEB), genomics (DEEPs and EEB), ecology and evolutionary biology (EEB), terrestrial and aquatic ecosystems (EEB), and anthropology (DAAJIA, HMA). We also offer major research facilities and expertise in organic and trace element geochemistry, stable isotope analysis, and genomic analyses. Faculty and graduate students perform a broad range of research on many central issues relevant to the mission of the NAC-CESU, including interdisciplinary research on the past and future of climate change, mechanisms controlling ecosystem responses to climate change, climate change impacts on society, organismal and genetic biodiversity, and early human migration to the Americas. Undergraduate students at Brown are also contributing members of research labs, collaborating with faculty and graduate students as well as conducting their own research for honors theses. Currently, we plan to collaborate with scientists and staff at NPS on projects documenting the underlying mechanisms controlling arctic temperature change, ecosystem response to climate change, biological and habitat diversity. Many research labs are enthusiastic about collaborating with partners to conduct research, train professionals, and provide internships for students.

4. Description or list of the primary programs, departments, or other institutional divisions of relevance to federal land management, environmental, and research agencies that will likely be engaged in CESU activities. Include website addresses for further information, as appropriate.

The Department of Earth, Environmental and Planetary Sciences (DEEPs) at Brown University and allied departments and institutions will be the primary departments engaged in CESU activities at the outset of this proposed partnership. DEEPs' allied institutions include the Department of Ecology and Evolutionary Biology (EEB), Institute at Brown for Environment and Society (IBES), Departments of Anthropology and Archaeology (DAA), Haffenreffer Museum of Anthropology (HMA).

Brown University's authorized Institutional Official (i.e., the institution) would be signing the agreement, thereby allowing other departments, schools, and programs within Brown University to engage in CESU activities. Other departments, programs, and groups within the University with aligned activities include, but are not limited to: Department of Earth, Environmental and Planetary Sciences (DEEPs), Department of Ecology and Evolutionary Biology (EEB), Institute at Brown for Environment and Society (IBES), Departments of Anthropology and Archaeology (DAA), Haffenreffer Museum of Anthropology (HMA).

Selected Websites:

DEEPs	https://www.brown.edu/academics/earth-environmental-planetary-sciences/
EEB	https://www.brown.edu/academics/ecology-and-evolutionary-biology/
IBES	https://www.brown.edu/academics/institute-environment-society/
DAA	https://www.brown.edu/academics/archaeology/
	https://www.brown.edu/academics/anthropology/archaeological-and-historical

5. A list of and brief description of the staff or faculty with expertise in disciplines and subject areas of relevance to federal land management, environmental, and research agencies (selected faculty of many)

Meredith Hastings

Associate Professor, Earth, Environmental and Planetary Sciences and Environment and Society

Prof. Hastings' research focuses on understanding the impacts humans have had on the composition of the atmosphere, the biosphere and climate. The primary focus of recent research has been on the reactive nitrogen cycle, including compounds such as nitrogen oxides, nitrous oxide, nitrate, ammonium, and organic nitrates. Hastings' research group utilizes isotopic analysis of samples from a range of environments (urban air, coastal air, wildfire smoke plumes, the open ocean, and ice cores) to characterize the emission sources of reactive nitrogen compounds, chemical transformations of these compounds in the atmosphere and their ultimate impact upon deposition to land and water bodies. This connects to topics such as urban air quality, acid deposition, oxidizing efficiency of the atmosphere, and the biogeochemical cycling of nitrogen in the earth system.

Yongsong Huang

Professor, Earth, Environmental and Planetary Sciences

Prof. Huang's research centers on the development of lipid biomarker and their isotopic ratios as quantitative proxies for paleoclimate and paleoenvironmental studies and subsequent application of these proxies to study mechanisms controlling climate change and environmental response to climate change at a variety of time scales. He employs and improves upon a full suite of advanced organic and isotopic analytical approaches to study lipid biomarkers and other complex organic molecules in geological samples, including samples from lake and ocean sediment core. He takes advantage of latest genomic approaches to characterize organisms producing important lipid biomarkers (such as haptophyte algae). His research group also engages in reconstruction of past ecosystem fire activities using charcoal and polycyclic aromatic hydrocarbons preserved in lake sediments.

James Russell

Professor, Earth, Environmental and Planetary Sciences

Prof. Russell seeks to understand the patterns and causes of natural climate variability using paleoclimate records. His work involves the generation of high-resolution paleoclimate reconstructions using lake sediments (tropics and north America), and synthesizing those records into regionally-coherent datasets to test against climate models. Tropical regions are a significant source of global atmospheric variability at annual to millennial time-scales, but are poorly understood in terms of their natural range of variability, as well as their sensitivity to global climate forcing. His group applies a variety of paleolimnological tools, including sedimentological, microfossil, and stable isotopic techniques. These tools may also be applied to

lake sediments to investigate human impacts on lakes, biogeochemical processes, and a range of other phenomena.

Laurence Smith

Professor, Environmental Studies

Prof. Smith is the John Atwater and Diana Nelson University Professor of Environmental Studies and Professor of Earth, Environmental and Planetary Sciences at Brown University. Previously, he was Professor of Geography at UCLA where he served as Department Chair from 2013-2017. His research interests include the Arctic, water resources, and satellite remote sensing technologies. He has published over 100 peer-reviewed journal articles, essays and books including in the journals Science, Nature, and PNAS, and won more than \$9M in research funding from the National Science Foundation and NASA. In 2006-2007 he was named a Guggenheim Fellow by the John S. Guggenheim Foundation and in 2007 and 2014 his work appeared prominently in 4th and 5th Assessment Reports of the United Nations' Intergovernmental Panel on Climate Change (IPCC). He has assisted the National Academy of Sciences with a major report on abrupt climate changes, NASA with a new satellite mission to monitor global water resources, and the World Economic Forum with issues of Arctic development. In 2015, he was elected Fellow of the American Geophysical Union (AGU). He frequently gives keynote speeches and in 2012, 2014, 2016 was an invited speaker at the World Economic Forum in Davos.

John Mustard

Professor, Earth, Environmental and Planetary Sciences

Prof. Mustard's research focuses on the applications of remote sensing technologies. These have been integral to the Department's interdisciplinary work with Environmental Sciences, the Environmental Change Initiative.

Tyler Kartzinel

Assistant Professor, Ecology and Evolutionary Biology

Prof. Kartzinel is a conservation biologist who combines ecological field experiments and surveys with molecular laboratory approaches to better understand where species live, who they interact with, and what conservation challenges they face. The overarching goal of this research is to identify policy relevant solutions for the protection of biodiversity and the environment in a changing world.

Rebecca Kartzinel

Assistant Professor (Research), Ecology and Evolutionary Biology

Director, Brown University Herbarium

Prof. Kartzinel's research focuses on understanding the factors that influence diversity in natural populations. I combine genomic tools with field and greenhouse experiments to explore how population history, environment, and life-history traits impact genetic, epigenetic, and phenotypic variation. Kartzinel is the Director of the Brown University Herbarium.

Jon Witman

Professor, Ecology and Evolutionary Biology

Prof. Witman's research focuses on large-scale marine ecology, and has been based at Brown University since 1994. Witman is deeply committed to training the next generation of ecologists and to developing the best marine conservation science. Ecological research on community ecology and conservation has taken place in six out of seven oceans of the world.

Dov Sax

Professor, Ecology and Evolutionary Biology

Prof. Sax's interest in conservation biology focuses on the impacts of species invasions on biodiversity at local and global scales. Sax's research is aimed at understanding species extinction dynamics, species responses to climate change, and climate adaptation strategies that can conserve natural resources.

James Kellner

Assistant Professor, Ecology and Evolutionary Biology

Prof. Kellner's research program is focused on two problems: (1) quantifying how populations and ecosystems are responding to variation in the environment across large spatial gradients, and (2) reducing or eliminating biological sources of uncertainty in the global carbon cycle. Kellner focuses on the development and application of remote sensing technologies that allow us to explore questions at scales of space, time and biological organization that are beyond the grasp of existing tools to examine.

Stephen Porder

Professor, Ecology and Evolutionary Biology

Prof. Porder's work is focused on the interdisciplinary investigation of terrestrial ecosystems. Porder combines ecology, biogeochemistry, and geology to ask how our living planet works, what humans are doing to alter those functions, and what the consequences will be for us, and for the ecosystems upon which we depend.

Kevin Smith

Deputy Director / Chief Curator, Haffenreffer Museum of Anthropology

Dr. Smith is responsible for the supervision its staff members, oversees daily museum operations, coordinates collections access, research, and co-directs exhibition projects (including *Kayak, Umiak, Canoe; Warp Speeds*, and *Believing Africa*). As an adjunct lecturer in Brown University's Department of Anthropology, he team-teaches courses in its Master's program in Museum Studies and guest lectures, frequently, for several departments and institutes at Brown and RISD. Kevin is an archaeologist interested in complex societies, state formation, law, and human ecology who has worked extensively in Alaska and on the Viking age and Early Medieval periods in Iceland, as well as on the archaeology of mobile hunter-gatherers in Scotland and throughout the continental United States. His Icelandic research has included work on Viking period iron-production, early medieval farming, and a subterranean Viking Age site interpreted variously as an outlaw shelter or ritual complex. He is currently doing research in western Iceland, focusing on a district surrounding the historically important farm of Gilsbakki, a

Viking Age chieftain's center that has been occupied continuously for 1100 years. His publications include numerous articles on the archaeology of early historic northern Atlantic societies and on inter-relationships between indigenous texts, oral history, and archaeological data.

6. Description of student demographics and the institution's status as a minority-serving institution

The Office of the Provost at Brown University maintains detailed demographic information for both enrollment and degrees conferred. This publically available information can be found at:

Enrollment:

<https://www.brown.edu/about/administration/institutional-research/factbook/enrollment>

Degrees Conferred:

<https://www.brown.edu/about/administration/institutional-research/factbook/degrees-and-completions>

The University has several programs aimed at minority recruitment and retention. Programs that directly benefit the Department of Earth, Environmental and Planetary Sciences at Brown University (the primary department for this CESU application) are:

Undergraduate Minority Recruitment Program

<https://www.brown.edu/about/administration/institutional-diversity/pathways/community-input/admissions>

Diversity resources at Brown

<https://www.brown.edu/academics/college/orientation/exploring-diversity-brown/diversity-resources-brown>

7. Description or list of facilities, equipment, centers, or institutes that would provide support to the research, technical assistance, or educational activities of relevance to federal land management, environmental, and research agencies that will be engaged in CESU activities.

A number of Brown facilities would provide outstanding research support to the NAC-CESU. The stable isotope and organic geochemistry laboratories at DEEPs house state-of-the-art mass spectrometer systems that allow measurements of carbon, hydrogen, oxygen, nitrogen isotopic ratios of inorganic, organic and carbonate species in natural waters, plants and sediments. These facilities also include the capability to measure compound-specific isotopes for lipid biomarkers in sediments and plant samples. Major gas/liquid chromatography and mass spectrometer systems are available for analyses of lipid biomarkers of plants, algae and microbes in natural samples. DEEPs also houses ICP MS and ICP ES for trace element analysis from natural water samples, as well as a multi-cup ICPMS for measurements of stable isotopic ratios of heavy elements such as uranium and thorium isotopes.

The Multidisciplinary Teaching Laboratories (MDL) are a core support facility of the Division of Biology and Medicine. The MDL's primary mission is to provide technical support to the faculty who teach laboratory courses in the Program in Biology, Alpert Medical School, and Brown Summer Session. The staff provides the necessary solutions, media, supplies, scientific instrumentation and technical expertise for student experiments and investigations. This core facility has enabled course-based undergraduate research experiences in collaboration with National Park scientists at Yellowstone National Park—students have used next-generation DNA sequencing technologies to conduct wildlife dietary analyses and report results to the management teams at Yellowstone National Park.

Two major plant research centers at Brown include The Plant Environmental Center and the Brown Herbarium. The Plant Environmental Center consists of six environmentally controlled research greenhouses, a Conservatory, 2 laboratories and a classroom. The research greenhouses total approximately 5,000 square feet for research experiments, as well as various plant collections used to support biological science classes. In addition, this roof top space includes an 1800 square foot conservatory open year around. The Herbarium hosts a collection of approximately 100,000 plant specimens, with emphasis on Rhode Island and New England collections. The Herbarium currently adds around 2,000 specimens each year to the collection, including collections made by faculty and students at Brown in addition to gifts from other herbaria. Both of these plant research facilities are being used in current and proposed research activities related to the CESU via research in National Parks.

IBES promotes collaborative research and education about the environment and its interactions with human society by bringing together students and researchers from many disciplines, including chemistry, earth and planetary sciences, engineering and applied sciences, biology, public health. DEEPs has an ongoing NSF funded REU program (2019-2022): Dynamic Earth in the 21st Century: Undergraduate research on the evolution of Earth's interior, surface and climate. This program is a research internship summer program that will bring undergraduate students to Brown University to work with faculty in the Department of Earth, Environmental and Planetary Sciences. The students also engage in career development activities through the Leadership Alliance, which is a national consortium comprised of 36 PhD-granting Institutions, Minority-Serving Institutions and private industry dedicated to training and mentoring students from diverse cultural and academic backgrounds for competitive graduate programs and professional research-based careers. A primary goal of this REU Site is to recruit eight students, primarily from underrepresented minority groups, to engage in research in Earth and environmental science. The program supports a different group of students for nine weeks in each of three summers. Research projects include work on the record and consequences of climate change, the physics of volcanic eruptions, the structure of the Earth's interior inferred from seismic waves, and other fundamental topics in the Earth and environmental sciences. This research experience helps the students to develop skills with critical thinking, research methodologies, scientific writing and oral presentations. Through their research and a range of other activities, students also gain insight on possible pathways through graduate school and research careers. These activities include a weekly study group, the Leadership Alliance National Symposium, participation in a national science meeting, as well as other professional development and networking events. This project is jointly funded by the Earth Sciences REU program and the Established Program to Stimulate Competitive Research (EPSCoR).

Collection of Haffenreffer Museum of Anthropology: When Brown University received Rudolf Haffenreffer's private museum from his family in 1955, its collections included 60,000 objects from the Native cultures of the Americas. Under Brown's stewardship, the collections have grown in breadth and depth through fieldwork, donations, and strategic acquisitions to reflect research interests of Brown faculty and students. The Haffenreffer Museum's permanent collection now includes over 150,000 ethnographic and archaeological objects from all over the world, and forms the basis for research, exhibitions, and community outreach. The Museum collection illustrates and documents human cultures and societies worldwide. The collection is strong in the indigenous arts of the Americas, Africa, and Southeast Asia, along with smaller collections from other parts of the world. An online catalogue of collection can be found at: <https://www.brown.edu/research/facilities/haffenreffer-museum/collection>.

8. Description or list of past research, technical assistance, and educational services supported through federal financial assistance awards that are of relevance to federal land management, environmental, and research agencies that will be engaged in CESU activities.

Some recent activities relevant to CESU goals (and supported in part by NPS) include the ongoing 3-year project (2018 to 2021) project "Tracing the Ice Age Beringian Standstill using microfossils and lipid biomarkers in exceptionally long sedimentary records from Seward Peninsula, Alaska", directed by Professor Yongsong Huang at DEEPs. This project aims to reconstruct high resolution spring temperature changes using alkenones in sediments of White Fish lake for the past 2000 years, and better understand how the regional temperature has changed under natural and anthropogenic forcings. Another objective is to study the Imuruk Lake sediment cores (successfully retrieved in April, 2019) to obtain the longest climate record for Alaska, probably as long as 200,000 years. The study will provide important new insights to factors controlling the tundra ecosystem fires and the timing of first migration of people to the Americas from eastern Asia.

This All Taxa Biotic Inventory (ATBI) recorded and identified nearly 2000 species of arthropods from this New England coastal area and provides high-resolution images of these species online that are of use for identification. Nearly all included species are widespread throughout this CESU area and therefore this one resource provides information not otherwise readily available for identifying arthropods in the region. The inventory produced three senior theses and multiple research papers as well. More recently, Professor Farrell has received funding from NPS to assist in developing a nationwide Taxonomists-in-Parks program; to support ongoing biodiversity discovery efforts at Boston Harbor Islands npa, Acadia NP, and George Washington Birthplace NM; and to collaborate with the Encyclopedia of Life to develop biodiversity-focused educational tools.

9. Description or list of current formal agreements and informal relationships with federal agencies that are of relevance to federal land management, environmental, and research agencies that will be engaged in CESU activities.

3-year ongoing research grant P18AC00556 (2020 Shared Beringian Heritage Program), "Tracing the Ice Age Beringian Standstill using microfossils and lipid biomarkers in exceptionally long sedimentary records from Seward Peninsula, Alaska" is directed by Professor Yongsong Huang, in collaboration with NPS scientist Jonathan O'Donnell. The total award is \$226,646.

The laboratory of Tyler Kartzinel has an informal relationship with the National Park Service at Yellowstone National Park, as well as a draft Cooperative Agreement and collaborative proposals for external funding. These research activities focus on documenting botanical diversity in the Greater Yellowstone Ecosystem and using genomic technologies to elucidate the diets of herbivores that occur in the system. With CESU membership, these agreements and proposals will be more viable and sustainable.

10. CESU overhead recovery cap, and Brown's willingness to accept the 17.5% rate.

The Office of Sponsored Programs (OSP) negotiates outside funding for research at Brown University and has agreed to be the administrative lead, and to accept the 17.5% indirect cost rate on any projects initiated under the CESU agreement. The 17.5% overhead rate is less than the federally negotiated rate for each school within the University. Overhead recovery at Brown University offsets the **administrative** costs, including department, school, and central administration, and **facilities** costs, including building and equipment depreciation, interest, operations and maintenance, and library costs incurred by maintaining a research program at the institution.



United States Department of the Interior

NATIONAL PARK SERVICE
NORTH ATLANTIC COAST COOPERATIVE ECOSYSTEM STUDIES UNIT
University of Rhode Island
Narragansett Bay Campus
Narragansett, RI 02882

November 11, 2019

Dr. Judith Swift
Director, Coastal Institute and
Director, North Atlantic Coast CESU
University of Rhode Island
South Ferry Rd.
Narragansett, RI 02882

Dear Judith:

On behalf of the National Park Service, it is with pleasure that I submit this letter in support of *Brown University's* application to be affiliated with the North Atlantic Coast Cooperative Ecosystem Studies Unit (CESU). The National Park Service has established several research projects with faculty members at DEEPs and EEB. For example, both Professor Yongsong Huang at DEEPs and Tyler Kartzinell at EEB have ongoing research collaborations with NPS scientists. We anticipate there will be more collaborative efforts after our membership is approved.

Through Brown's membership in the CESU Network we look forward to continuing these collaborations and enhancing our interaction with those at Brown with an expertise in geochemistry, stable isotopes, ecology and evolutionary biology, anthropology, archeology, history, and other disciplines of immediate relevance to protecting and understanding some of our nation's most outstanding natural and cultural resources.

Brown University will be a welcomed member of the North Atlantic Coast CESU and the National CESU Network. I expect there to be many opportunities for Brown scientists to collaborate with the National Park Service and with the other federal agencies affiliated with the CESU program.

Respectfully submitted,

Charles T. Roman, Ph.D.
Research Coordinator, North Atlantic Coast CESU

and
Coastal Ecologist, Northeast Region
401-874-6886
charles_roman@nps.gov

cc. Professor Yongsong Huang
DEEPs, Brown University

Professor Tyler Kartzinel
EEB, IBES, Brown University

11. Brown University's technical representative to serve on the CESU steering committee, participate in CESU annual/semi-annual partner meetings, and facilitate internal and external communication, promotion, and response to CESU correspondence and administrative actions (e.g., announcements, new member applications, processing agreements/amendments, five-year reviews).

Dr. Yongsong Huang

Title: Professor of Earth, Environmental and Planetary Sciences

Address: 324 Brook Street
Providence
Rhode Island 02912

Phone: 401-863-3822

Fax: 401-863-2058

Email: Yongsong_Huang@brown.edu

12. Agreement to relay agency-specific research, technical assistance, and educational needs and associated funding opportunities to other institutional/organizational members (e.g., faculty, students).

The Department of Earth, Environmental and Planetary Sciences (DEEPs) at Brown (the primary department for this CESU application) with the technical representative proposed for this submission will relay, to the best of our ability, agency-specific research, technical assistance, and educational needs and associated funding opportunities to other departments, faculty, students, and schools within the University where appropriate. DEEPs will work with the Office of Sponsored Research to broadcast opportunities within the University, in order to best target and reach the most appropriate departments and individuals.

13. Signature (or endorsement) from an appropriate official, with authority to commit institutional resources in a binding multi-year federal cooperative and joint venture agreement

Patrice A. Carroll

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Carroll
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14. Letter(s) of support from one or more CESU federal agency partners sponsoring the new partner's application, including a description of successful past collaborative work supported through federal financial assistance awards.

Please see attached letter from Jonathan O'Donnell, National Park Service, Arctic Newwork, Anchorage, Alaska, Dr. Chris Geremia (Bison Ecology and Management Office), in Yellowstone National Park.