UH Managed lands – Project Proposal

for projects anticipated to be classified as having "Minimal Impact"

Name: Stephen Archer

Project Name: Global Airborne Microbiome Project

- Brief Description of the Project

  Collection of air (into purified water using three units run for six hours 1000-1600 for two days) and soil (six 2 fl oz (50mL) samples around a 100 ft2 (10 m2) plot). The collected samples will add to a global survey dataset that will determine microorganism ecosystem connectivity. Equipment will be brought to site, set up on a standard camera tripods and run then dismantled each day with no observable evidence left behind.

- Identified Land Use (see HAR § 13-5-22 through 13-5-25)

  HAR § 13-5-22, P-1 DATA COLLECTION

  (A-1) Basic data collection, research, education, and resource evaluation that is temporary (less than thirty days) and results in negligible ground disturbance (small gages or monitoring devices).

  Or possibly (B-1) Basic data collection, research, education, and resource evaluation that results in a minor disturbance to natural resources or land (e.g., corings, excavations, etc.).

- Identify the existing CDUP this proposal alters or affects, if any

  HA-1515 1983 James Clerk Maxwell Telescope (JCMT Observatory)

- Identify University of Hawai'i exemption per HAR § 11-200-8(a), if any

  5 – Basic data collection, research, experimental management, and resource evaluation activities which do not result in a serious or major disturbance to an environmental resource;

- Tax Map Key(s): 4-4-015:009 – Mauna Kea Science Reserve (por.)
- Proposed Commencement Date: 13 June 2019
- Proposed Completion Date: 30 December 2019 (project duration is only two days within this timeframe
- Estimated Project Cost: $0
- Total size / area of proposed use: 100 ft2 (10 m2)

Project Purpose and Need

- This is a critical location to a global survey of biological aerosols to answer fundamental questions about the distribution of microorganisms worldwide. The findings from this

data will be important to understanding ecosystem resilience and provide baseline data important to airborne microbial modelling.

- Project is jointly funded by Yale-NUS (National University of Singapore) and Auckland University of Technology (New Zealand) with international collaborators involved worldwide.
- Permission already granted by Jessica Dempsey, Deputy Director of JCMT for access to and use of sublease area for sampling.
- The microbial communities will vary around the summit and for this study to be consistent with the rest of the global samplings the investigator needs to collect from directly around where the air sampling is done.
- The methods of storage, DNA extraction, sequencing and numerous other factors in the data generation would be different making confident comparisons with data from previous research collections difficult if not impossible.
- Specimens (cinder) not consumed in analysis or needed for archival documentation will be returned as permissible under import/export laws.

Existing Conditions at Project Site(s)

- Geology, Climate, & Hazards

Sampling would be conducted adjacent to existing facilities minimizing hazards. The high altitude, geographically isolated and low biological life at this site makes it perfect to gain a background air sample not contaminated by human influences.

- Flora, Fauna, Ecology, Water Resources

Very little disruption will be caused to the ecology of the area with the removal of a small amount (a total of approximately 12 fl oz) of soil samples. The site is previously disturbed through the construction of the JCMT facility.

- Cultural Resources

The nearest Historic Property SIHP #16164, an upright (shrine) slightly more than 700' away. This project is limited to the observatory site and no impacts are expected.

- Recreation

There is no recreation at the site. This project will have no impact on recreation.

- Built Infrastructure

The study site will be located adjacent to the JCMT facility and parking area. We intend to set up temporary sampling equipment adjacent to one of the buildings, with additional guidance from Jessica Dempsey, Deputy Director of JCMT or other representative, using camera tripods leaving no long-term evidence of our sampling.

- Landscaping & Visual Conditions

This project will have no long-term effect on the visual conditions at the site and sampling will be conducted six hours per day for two days only.

Description of the Project

- Describe the process of completing the project.

  Three Coriolis samplers (https://www.bertin-instruments.com/product/air-samplers/coriolis-micro-air-sampler/) will be temporarily set up on camera tripods using power from one of the observatory facilities from 1000-1600 on the 13-15 of June 2019. Meteorological conditions, particle counts and biological activity will be determined with handheld meters. The total space taken up by all sampling units will be approximately 100ft2 (10m2). The tripods holding the sampling units are approximately 5ft (1.5m) high. Additionally, six 2 fl oz (50mL) soil samples will be collected from within this area. Once sampling is completed all equipment will be removed and care will be taken to ensure no long time evidence of our sampling has taken place.

- Location

  Temporary sampling equipment will be set up adjacent to the JCMT facility, using camera tripods leaving no long-term evidence of the sampling.

  Samples will be collected within the blue box outlined in the figure below.

- Who will do the work?

  Two scientists (Dr Stephen Archer and Dr Kevin Lee) from Auckland University of Technology (New Zealand) will set up the equipment and collect the samples. They both have significant field experience in sensitive environments worldwide.

The scientists are coordinating with investigators who conducted the soil microbial work completed with past permafrost research to minimize collection needs and maximize research results and benefits.

- Equipment & Transportation

  The equipment fits into two passenger suitcases and will be transported in a standard vehicle using existing roads to the Mauna Kea Observatory. The equipment uses standard motors that emit limited sound, similar to the sound of running a vacuum cleaner). They will be run only during the day.

Measures to protect the environment and/or mitigate impacts

Protective Measures

- Equipment will be set up in an area out of the way of staff at the Mauna Kea Observatories in consultation with JCMT staff. Activities will be carried out as specified during the day with no long term impacts to the environment.
- Notify OMKM in writing at least 5 days prior, and no more than 14 days prior, to beginning field work on UH managed lands (Halepōhaku, Road Corridor, Maunakea Science Reserve, or Astronomy Precinct).
- All project participants must attend a Maunakea orientation prior to participating in field work.
- Use of 4-wheel drive vehicles, with 4-wheel drive engaged, when traveling above Halepōhaku is required.
- Allow OMKM Rangers to visit and monitor activities.
- Comply with all actions and measures described in the proposal, including (community) benefits, CMP compliance list, and mitigation measures.
- Ensure that loose tools or equipment are not left unattended and are properly stored at the end of each day.
- In preparation for high wind conditions protocols must include measures to ensure debris and equipment are not blown from the job site. Projects occurring in the summit region must verify that temporary and permanent infrastructure can sustain 120mph winds.
- All improvements shall be designed and installed to withstand the severe weather conditions on the mountain.
- Remove and properly dispose of all waste material. All perishable items including food, food wrappers and containers, etc. shall be removed from the site at the end of each day and properly disposed.

- Use of lighting from sunset to sunrise is prohibited unless otherwise stated in the project proposal and approved.
- Employ invasive species prevention best practices, including inspections of materials by a DLNR-approved biologist, as identified in the Maunakea Invasive Species Management Plan prior to entering UH managed lands. Every inspection request submitted to OMKM shall include correspondence with the observatory representative(s) identified in the initial notification. Inspections shall not occur on UH managed lands on Maunakea, at State or County parks, along public roadsides, or on Department of Hawaiian Home Lands.
- Motorized equipment, when stationary, must have a drain-pan in place suitable for catching fuel or fluid leaks. To allow for expansion with reduced atmospheric pressure, fuel tanks should not be more than 3/4 full prior to transport to the summit (unless used as the fuel source for transport to the summit).
- When closed to the public yet open to Observatories, vehicle access to the Maunakea Summit Access Road above the Halepōhaku Mid-Level Support Facility area is limited to expressly marked Observatory, MKSS, OMKM, Federal, or State of Hawai'i vehicles when operated by their approved employees or representatives on official business and possessing requisite orientation, training, safety, and self-rescue supplies.
- Nēnē (Branta sandvicensis) may be present. If a nēnē appears within 100 feet (30.5 meters) of ongoing work, all activity shall be temporarily suspended until the animal leaves the area of its own accord. Feeding of nēnē is prohibited.
- The project approval/permit may not be transferred or assigned. A copy of the approval/permit must be present on-site and available for review at all times while are working on University-managed lands.
- Unless otherwise stated in the proposal, upon project completion copies of all data, field notes, photos, log books, collected specimens, and other forms of documentation will be shared with OMKM for future, unrestricted, use by OMKM or its designee. All geospatial data, metadata or applications must be in a format compatible with OMKM GIS software or other industry standard identified in advance.
- Collected specimens that are not consumed in analysis will be returned to OMKM unless otherwise specified.
- No use of mechanized equipment is allowed unless authorized by this permit.
- Identify and comply with other permit requirements, such as County of Hawaii building permits or Department of Land & Natural Resources (see both any applicable DLNR permit and HAR §13-5-42 Standard conditions).
- Placement of permanent: markers, monuments, mag nails, survey pins, etc. is not allowed without explicit prior approval from OMKM (and the State if required) for this purpose. ALL surveyors work must be shared with OMKM in digital format (i.e. CAD file as well as PDF) with coordinate info stored in and using a common, transferrable

coordinate reference system such as "State Plane Coordinates (NAD83), Hawaii Zone 1".

- Use of cell-phones, other than in airplane mode, is prohibited except in case of emergency.
- Use of real-time GPS during any surveying or equipment operation requires advance written approval from OMKM and the Institute for Astronomy. Written approval should be requested at least 4 weeks prior to the proposed activity.
- Electronic and paper copies of all publications resulting from the work will be provided to OMKM.
- When applicable, a brief, approximately 1-page, non-technical summary suitable for public outreach (school groups, community meetings, newsletter articles, etc.) must be provided to OMKM within 90 days of project completion or publication. Photos and illustrations are encouraged.
- Notify OMKM in writing when field activity associated with the project is completed. This notification must list all steps identified in the "notice to proceed" and explicitly communicate the status of completion.
- The project must be completed within the time frame specified in the proposal and (when applicable) DLNR approval. Projects not completed within this timeframe are not allowed to continue (or commence) without explicit, prior, written approval from OMKM.

Compliance with Lease, Sublease, or Comprehensive Management Plan (CMP)

The proposed project addresses Management Action NR-17.

NATURAL RESOURCES		Subplans	Comments
Inventory, Monitoring and Research			
NR-17	Conduct research to fill knowledge gaps that cannot be addressed through inventory and monitoring.	NRMP 4.1.2.3	This study will fill an existing knowledge gap regarding microbial diversity in the region.

- Identify other required or associated permits

  Importation permit to New Zealand has been gained.

- Five Year Outlook

  Not identified in five year outlook, this is a 3rd party research proposal.

Community Benefits

- Benefits to other Maunakea entities and/or global astronomy community

  This is a project related to microbial distribution by air globally and not of direct relevance to the astronomy community but rather the general scientific community. All data will be made available for those interested and integrated into a global dataset putting this location into a global context and increasing its profile to new scientific communities.

- Benefits to the Hawaii Island community

  This study will increase the profile and appreciation of local beauty by international community through research reports and ongoing coverage of the survey. The researchers involved in this study will stay and spend money towards the local economy while in Hawaii. The study will highlight the significance and importance of including Hawaii to airborne microbiology encouraging further researchers to visit, spending money in the local economy. All findings will be made publicly available providing data previously unavailable in the region.

- Will data, publications, or other products be free and available to the public?

  Yes. Data will be placed unprocessed on public servers for all to use and the data will be analyzed as part of a global dataset to be published and made publicly available.

DLNR Evaluation Criteria

After approval by the Maunakea Management Board, the Department of Land & Natural Resources or Board of Land & Natural Resources will evaluate the merits and approve the project based on the following eight criteria (§13-5-30). See http://dlnr.hawaii.gov/occl/files/2013/08/13-5-2013.pdf

1. The purpose of the Conservation District is to conserve, protect, and preserve the important natural and cultural resources of the State through appropriate management and use to promote their long-term sustainability and the public health, safety, and welfare. (ref §13-5-1) How is the proposed land use consistent with the purpose of the conservation district?

   The project will help protect native biota, limit risk of introducing non-native biota, and educate

   all users.

2. How is the proposed use consistent with the objectives of the Resource subzone of the land on which the land use will occur? (§13-5-13 The objective of this subzone is to ensure, with proper management, the sustainable use of the natural resources of those areas. This subzone shall encompass: lands necessary for providing future parkland and lands presently used for national, state, county, or private parks. Land suitable for outdoor recreational uses such as hunting, fishing, hiking, camping, and picnicking. [And other lands not applicable to Maunakea.])

   The project will increase our understanding of local resources in a global context. No permanent impacts will occur.

3. Describe how the proposed land use complies with the provisions and guidelines contained in chapter 205A, HRS, entitled "Coastal Zone Management".

   The project is not near nor is there a direct hydrological connection to the coastal zone.

4. Describe how the proposed land use will not cause substantial adverse impact to existing natural resources within the surrounding area, community or region.

   The project is temporary and will occur only in existing improved areas. Cinder samples are approximately 12 fl oz total. The principal investigators are openly collaborating with previous researchers who have worked on this topic to minimize impacts while maximizing benefits.

5. Describe how the proposed land use, including buildings, structures and facilities, is compatible with the locality and surrounding areas, appropriate to the physical conditions and capabilities of the specific parcel or parcels.

   The project is temporary and will occur only in existing improved areas.

6. Describe how the existing physical and environmental aspects of the land, such as natural beauty and open space characteristics, will be preserved or improved upon.

The project is temporary and will occur only in existing improved areas. Cinder samples are approximately 12 fl oz total. The principal investigators are openly collaborating with previous researchers who have worked on this topic to minimize impacts while maximizing benefits.

7. If applicable, describe how subdivision of land will not be utilized to increase the intensity of land uses in the Conservation District.

   No subdivision of land will occur.

8. Describe how the proposed land use will not be materially detrimental to the public health, safety and welfare.

   The project is of limited duration, will be supervised on-site, and will sample microbial communities in the air and soil; which will potentially be a benefit to public health, safety, and welfare.