Facility Project Proposal for the UH-Managed Lands

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

Proposals due by the 15th monthly

Please mark all that apply to your project

_X_ Project was reviewed in a 3-Year Plan
_X_ Project is a CMP, lease, or sublease compliance measure (e.g., keeps the site in safe working order)
___ Project involves heavy machinery
___ Project requires ground disturbance such as digging or trenching
___ Project will result in a change to the facility footprint

Facility Name

Subaru Telescope

Brief Descriptive Title of Project

Subaru Telescope Air Quality Monitors

Project Description

Subaru will install two sulfur dioxide (SO_2) sensors and one particulate/dust sensor to its outer wall. The sensors will be in protective housing with associated wiring. The dust sensor will also have a small, air intake hose.

Proposed Commencement Date

As soon as approved

Proposed Completion Date

Within one month from commencing installation

Estimated Project Cost

$1,000

Total size / area of proposed use

Less than 1 m^2

Project Purpose and Need

Volcanoes are constantly active in Hawai'i. The sulfur dioxide (SO2) in volcanic gases is chemically active and can pose a health hazard to those who inhale it. In addition, fine dust particles in the atmosphere can act as catalysts for chemical reactions between volcanic gases and the high-precision mirror coating when they accrete on the surface of the mirror, resulting in degradation of mirror reflectance. Therefore, the objective of this project is to monitor the concentration of SO2 in the atmosphere and the amount of dust around the mirror to ensure that the scientific value of the telescope is not compromised and that no health hazard occurs to the people working at the summit facility day or night.

Has professional peer-review occurred

No.

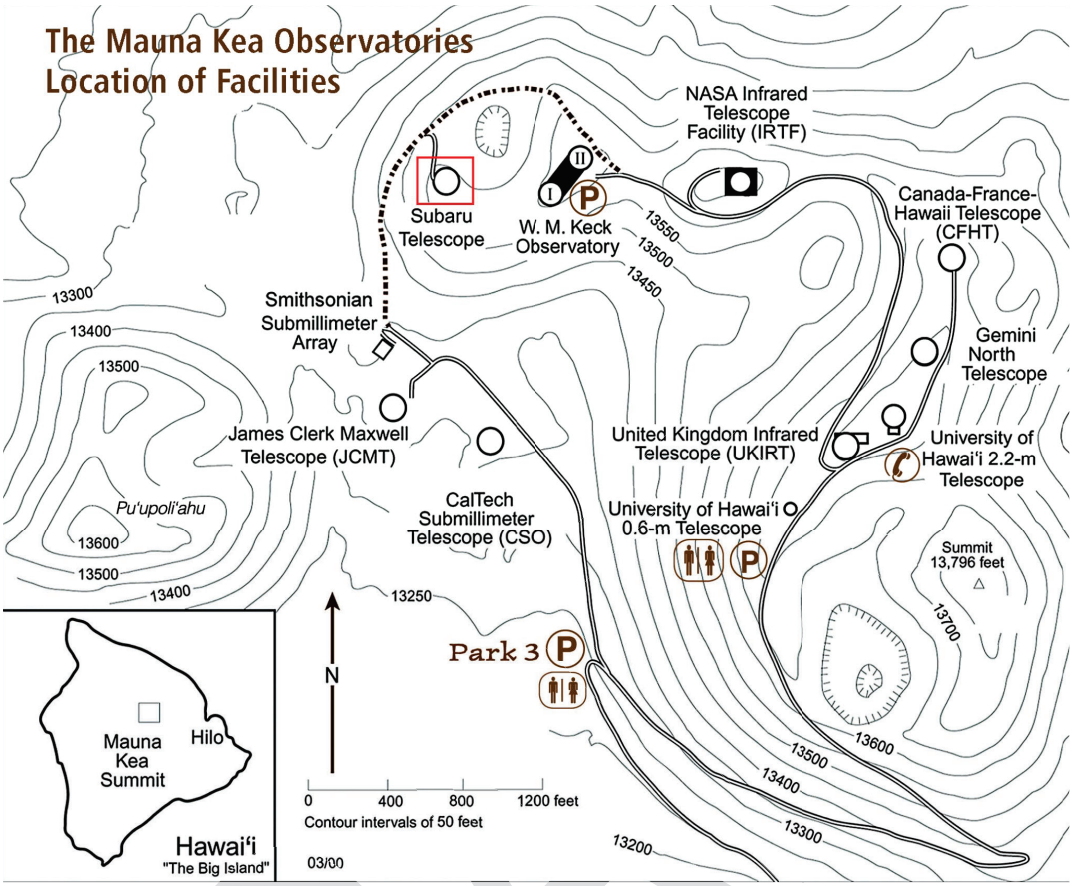
Are there any related ongoing, pending, or planned projects associated with this submission?

No.

Description of the Project

Location

The sensors will be installed on the exterior of the Subaru control building and the exterior of the elevator tower at the Subaru Telescope Summit Facility. The location of the Subaru Telescope Summit Facility is denoted on the following image by a red box.



A single enclosure containing a Rasp-PI sulfur dioxide (SO_2) sensor, a particulate matter sensor, and the necessary supporting electronics will be installed on the exterior of the elevator tower at the Subaru Telescope Summit Facility. The placement of this device on the elevator tower is noted on the following image (A). In addition, we install an extremely high accuracy SO_2 meter ("NOAA SO_2 Meter") to the control building. We send the outside air to the instrument by a ¼" Teflon hose with a heater line. These lines are covered by 1.5inch heat protection form tube. The proposed path is shown in the same image (B).

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Description of the process of completing the project

[A] The elevator tower sulfur dioxide (SO_2) and particulate matter sensor, along with supporting electronics, are installed within a weatherproof enclosure box with dimensions of 213 mm W x 293 mm H x 130 mm D. The enclosure has a mass of approximately 2kg and is a discrete, beige color. The network cable enters the bottom of the enclosure via a cable gland and will be directed to the existing hole in the elevator tower (see photo in previous response). After physical installation is complete, the network cable simply needs to be plugged into the nearest network switch and we will automatically start collecting data from the attached sensors.
[B] A professional grade SO_2 meter ("NOAA SO_2 Meter") is provided by the Air Resources Laboratory (ARL), Oceanic and Atmospheric Research (OAR) Division, the National Oceanic and Atmospheric Administration (NOAA). It is already installed inside the control building. We send the outside air to the instrument by a ¼" Teflon hose with a heater line. These lines are covered by 1.5 inch heat protection form tube, and then it is sent through the ceiling of the building.

Who will do the work?

Several in-house employees will complete the installation.

Equipment & Transportation

No heavy equipment nor oversized vehicles will be required for this project.

Measures to protect the environment and/or mitigate impacts

Impacts

No impact to environment.

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

Yes, to maintain safe operations.

Identify other required or associated permits

N/A

Community Benefits

Benefits to other Maunakea entities and/or global astronomy community

We will make the measurement data available to public, including all the MKO facilities. As the sensors are utilized to help protect workers' health and sensitive optics, all observatories may benefit from having this information.

Benefits to the Hawaii Island community

As a home of two active volcanoes (Kilauea and Mauna Loa) which emit toxic SO2 gas, this knowledge of atmospheric composition is a high interest of our local community. Increasing the accuracy of the SO2 gas forecast is crucial for keeping the community healthy. Pairing the measurements of SO2 at Maunakea with the estimated emissions of SO2 from the Kilauea and Mauna Loa volcanoes will allow for the evaluation of Hybrid Single-Particle Lagrangian Trajectory (HYSPLIT) transport and dispersion model, providing a direct benefit to the Hawai'i community.

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

Yes, via the Association of Research Libraries (ARL) web portal, Subaru telemetry portal, and the Maunakea Weather Center website.

For internal use only by CMS

Review checklist
_X__ Staff review and report
_N/A_ Outside agency review or approval required
___ Environment committee, if environmental impacts are anticipated
_N/A_ Kahu Ku Mauna, if cultural impacts are anticipated and KKM requested consultation, or the project was not included in a 5YP or 3YP
___ Maunakea Management Board