

Hawai'i's Mauna Kea is among the best places in the world to study the Moon, but the construction of a new super telescope is about more than astronomy.

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DON'T LOOK UP

One of the largest social movements in recent Hawaiian history took place in the summer of 2019 at the foot of Mauna Kea, a dormant volcano located on the Big Island. Thousands of *kia'i*, or 'protectors', of the mountain braved the cool climate, camping for months on the winding road to the summit. Though the main figures of the movement were *Kānaka Maoli* (Native Hawaiian), it included descendants of migrant workers from Portugal, Japan, the Philippines and Mexico, who had come to work in the sugarcane plantations and cattle ranches generations ago, and who now called the Big Island home. Also present were native and indigenous peoples from the Pacific, mainland United States and Canada.

The *kia'i* opposed the

construction of a new astronomical facility on the summit of Mauna Kea, built to house a cutting-edge instrument called the Thirty Meter Telescope, in reference to the diameter of its primary mirror. Many onlookers, including some of the scientists who used the existing observatories, expressed bewilderment at the protests. Why be against astronomy? Wasn't it a non-polluting activity carried out solely for the benefit of humankind? The *kia'i* must be antiscience, ignorant, irrational. The protesters were surely opportunistic: many observatories had been built on the mountain during the past five decades with no memorable opposition. Why else would they fight astronomy now?

Cook to commerce

Since 2019, I have been working in the archives of the institutions that develop and manage observatories at the summit of Mauna Kea. My research confirms what many old-timers, on both sides of the conflict, told me: that astronomy's foothold on the mountain is intimately linked to the legacy of colonialism; that opposition to summit development started early, when the first large telescope project was announced in the 1970s; and that the reasons why the *kia'i* wish to protect Mauna Kea from further desecration (in their own words) are founded in a long, painful history.

The first foreign astronomer to set foot on the Big Island of Hawai'i was Captain James Cook, during his third voyage in the Pacific. In the 18th century astronomy was closely linked to colonial enterprises: sailors observed the night sky mainly to determine the geographic coordinates of the land they had discovered. In December 1778, as HMS *Resolution* and *Discovery* sailed into Kealahou Bay thousands of Native Hawaiians paddled and swam out to meet them. Two nights later, the captain observed a lunar eclipse from the coast. Measuring the distance between the moon's limbs and two stars, he established the precise coordinates of this addition to the archipelago he had named the 'Sandwich Islands'. A few weeks later, in the same bay, Cook was killed in a fight with Native Hawaiians after he attempted to abduct their leader in reprisal for the theft of a boat.

In 1959 the Territory of Hawai'i became the 50th state of the United States. That same year, the first non-stop jet engine connection with the mainland was established. From a businessman's perspective, the islands were full of economic promise, in large part because of the impending touristic explosion. Yet on the Big Island, prospects were not so rosy. The profits of sugarcane plantations were dwindling. In 1960 a tsunami destroyed part of the business district of Hilo, the most populous town. A member of the Chamber of Commerce named Mitsuo Akiyama looked up at the mountains and wondered: by building a rocket launching facility, or a factory making lava into construction material, or even an astronomical observatory, could they be put to economic use?

Astronomical facilities

The famous Dutch-American astronomer Gerard Kuiper was on the lookout for a high altitude site on which to develop a new generation of infrared telescopes. Invited by Akiyama, Kuiper arrived on the Big Island with his assistant Alike Herring, a master mirror-maker who happened to be from the island, the descendant of missionaries. Mauna Kea's summit was enticing, but it lacked an access road. Hawai'i's governor, John A. Burns, did not need convincing: barely a month later, a dirt road had been bulldozed through the lava.

In the spring of 1964, Herring spent many weeks alone in the polar conditions of the summit with what he

considered to be his finest mirror of all. He was baffled by what he saw. Craters of the Moon and storm formations on Jupiter appeared to him in unprecedented detail. At an inauguration ceremony for the test telescope, Kuiper announced the news to the scientific community:

This mountaintop is probably the best site in the world – I repeat – in the world, from which to study the Moon, the planets, the stars ... To use the words of Mr. Alike Herring, our first observer, 'This mountain is it.' It is a jewel! This is the place where the most advanced and powerful observations from this Earth can be made.

The University of Hawai'i (UH) was interested. As UH astronomer John Jefferies later recalled, the mountain 'could reasonably have been regarded as under Hawai'i's jurisdiction', therefore there was no reason to leave it to outside institutions such as the University of Arizona, which employed Kuiper. UH managed to convince NASA to grant it – and not Kuiper's team – the funding to build a telescope on the mountain. In 1967, Jefferies became the founding director of a new semi-autonomous entity within the university named the Institute for Astronomy. Its main mission was to manage Mauna Kea's summit in order to develop astronomical facilities.

Crown lands

In Hawai'i, a sovereign state unilaterally annexed by the US in 1898 in spite of fierce native opposition, the issue of land

remains highly contentious. Adding to the potential complexity, parts of Mauna Kea's summit and the access road were historically 'Crown lands', areas set aside by Hawaiian monarchs to benefit their subjects. At the end of the 1960s, though, none of this seemed problematic to the burgeoning state government. The Institute for Astronomy was entrusted with the care of the summit lands via a \$1 per annum lease running over 65 years. Jefferies in turn offered similarly priced sub-leases to the astronomical organisations from various countries and universities who were interested in building a telescope on the mountain.

One unresolved issue was the road. In order to attract large projects, the Institute for Astronomy wanted to improve the dirt trail by widening and paving it; Governor Burns protested that a good road would make it too easy for non-scientists to access the summit and jeopardise its quality. At the beginning of the 1970s, he even suggested building a cable car by which to filter access, though the project proved too expensive. A compromise unsatisfactory to all parties was eventually reached: to keep the road in a permanent semi-hazardous state.

Opposition

The consensus among the first proponents of astronomy was that Mauna Kea was a *terra nullius*. Other users of the mountain, including hunters and skiers, disagreed. Environmentalists identified species of flora and fauna, some endemic, which they

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considered to be endangered by the telescopes: the māmane and naio trees, the silversword bush, the palila bird, the wēkiu bug. In 1974, these different constituencies expressed their discontent prior to the ceremony of the first major project, the Canada-France-Hawai'i Telescope.

In the following years, new environmental regulations at federal level gave opponents leverage to slow down new observatory projects. But the astronomers always prevailed, especially during a construction boom in the 1980s and 1990s, when many facilities saw first light, including workhorses of contemporary astronomy such as the Keck, Subaru and Gemini North telescopes.

Mauna Kea has always been an important place for residents of the island with native Hawaiian ancestry, though this was not usually identified by journalists and politicians before the 1990s. Some *kūpuna* (elders) describe the longstanding tradition of burying a newborn baby's umbilical cord on Mauna Kea. With the renewed historical

awareness that marked the last quarter of the 20th century, Hawaiian voices progressively joined the chorus of opponents to further development of the summit.

In 2006, a group lead by Hawaiian cultural practitioner and former telescope employee Kealoha Pisciotta convinced NASA to cancel funding for an extension to the twin Keck telescopes. In October 2014, a new generation of *kia'i* interrupted the ceremony for the Thirty Meter Telescope, sowing the seeds for the movement that would successfully stave off any attempt to build it – until now.

The *kia'i* are neither irrational nor antisience. Astronomy is their target only insofar as it mimics the stance of the US military and other capitalist ventures regarding land use and custody. Mauna Kea has become the focal point for mobilisation against the colonial theft of land and environmental harm resulting from multi-million dollar facilities that offer few economic and cultural benefits to the island's inhabitants.

The historical knowledge of native Hawaiians prompts them to question the conditions in which foreign scientists felt entitled to claim a mountain as their own. Today, many astronomers identify such attitudes as problematic and strive not to reproduce them. However, the injustice borne from two centuries of colonial history will not be easily repaired.

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