

NEW ZEALAND ASTROBIOLOGY NETWORK

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NZAN



SPACEWARD BOUND NEW ZEALAND FOR
YOUTH 2016: AN EDUCATIONAL, FIELD-BASED
PROGRAM WITH SPACE FOR WOMEN & GIRLS
A PILOT EXPEDITION USING A MĀTAURANGA MĀORI APPROACH TO
TEACHING ASTROBIOLOGY IN NEW ZEALAND



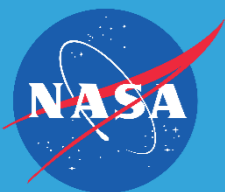
Mount Tarawera – volcanic rift

CURIOUS MINDS

HE HIHIRI I TE MAHARA



- ▶ SBNZ for Youth was developed with funding from the New Zealand Government (MBIE's Unlocking Curious Minds program) in collaboration with the educational arm of the iwi Ngāti Whakaue (one of the guardian tribes from the Te Arawa confederation of the Rotorua region, which hosts geothermal areas and active volcanoes) – Te Taumata o Ngati Whakaue.





ROTORUA IS SITUATED IN A SLUMBERING VOLCANIC CALDERA WITHIN THE TAUPO VOLCANIC ZONE, A REGION REplete WITH HOT SPRINGS, EXTREMOPHILES, HYDROTHERMAL ERUPTIONS AND ACTIVE VOLCANOES. IT IS ALSO HOME OF THE NGATI WHAKAUE PEOPLE.



MĀTAURANGA MĀORI

IS THE MĀORI
(NEW ZEALAND'S
INDIGENOUS PEOPLE)

SYSTEM OF
KNOWLEDGE
& UNDERSTANDING
OF ALL THINGS,
PAST & PRESENT,
PASSED ORALLY FROM
GENERATION TO
GENERATION, AND
WHICH INCLUDES MĀORI
WAYS OF RELATING
TO THE ENVIRONMENT.





Mātauranga Māori

1. CONNECTIONS
2. SHARING
3. GUARDIANSHIP

Te Takinga marae (meeting house)



CONNECTIONS

WHAKAPAPA - GENEALOGIES

- ▶ The teachings of mātauranga Māori are based on the connectedness of knowledge with the environment from which it was derived.
- ▶ Māori trace their ancestry to the Universe itself, the Sun and Planets, which, according to their traditions, were created in a process similar to the modern Big Bang

Te Kore

the nothingness,
the potential:
before the Big Bang

Te Po

the night:
the Universe is
just energy,
first atoms emerge

Te Ao

the Light:
First stars
form

THE CHILDREN OF RANGI AND PAPA (guardians of:)

Tāwhirimātea (the wind),
Tangaroa (the sea),
Tāne-mahuta (the forest),
Tūmatauenga (war and humankind),
Rongo (cultivated foods) and
Haumie (uncultivated foods)

Ranginui
(Sky/Sun Father)
+
Papatuanuku
(Earth Mother)



SHARING



WANAGA – IMMERSIVE HANDS-ON LEARNING

- ▶ Pilot Spaceward Bound for Youth expedition, based on the worldwide and successful NASA program and the philosophy of the Māori educational trust
- ▶ 20 students (10 boys, 10 girls, ages 8-16) & their families were engaged in immersive learning about astrobiology reflected in the ancient unwritten teachings of Mātauranga Māori, in a hands-on experience that traced their origins within the geologically and dynamically active local environment of Rotorua.



November 2016



A FIVE-DAY EXPEDITION – BASED IN FIELD AND ON MARAE

- To **explore extremophile life forms** and **geological processes** relevant to possible settings for the origins of life
- Activities: examining plates of extremophile strains from hot, acidic, and alkaline pools in Rotorua collected a month prior to the expedition by the same group. Field trips to hydrothermal springs and alteration sites, past and present.
- In addition, the students learned about and discussed Māori **Astronomy, stars and the origins** of the Māori people as taught by tribal leaders and tohunga (learned experts).
- An **expedition to Mount Tarawera**, the eruption of which in 1886 destroyed the world-famous Pink and White Terraces (hot springs) and killed ~120 people, was also undertaken to appreciate the relationship among hazards, hot water & volcanism, with parallels drawn to exploration for surface- or groundwater on other planetary bodies.



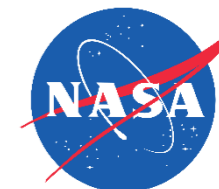
GUARDIANSHIP



Champagne Pool, Wai-O-Tapu geothermal area



BMS



THE STUDENTS PRESENTED THEIR INTEGRATED LEARNING TO A PUBLIC AUDIENCE AT THE MARAE UPON COMPLETION OF THE WANANGA (IMMERSION LEARNING MĀORI WORKSHOP) – AN EXERCISE THAT DYNAMICALLY INCORPORATED THE MĀORI CULTURE IN STEM SUBJECTS, A MAJOR GOAL OF TE TAUMATA O NGATI WHAKAUE.