



EXPLORE

Astrobiology Highlight

Dr. Mary A. Voytek
Senior Scientist Astrobiology
NASA Headquarters
June 22, 2023

Astrobiology Program Goals

Research
Funding

Research
Coordination

Missions

Communication
/Education

Future
Workforce

Primary Purpose is to enable world-class interdisciplinary research in AB.

X

X

x

X

Catalyze and coordinate AB research across science disciplines and organizations.

X

X

Provide scientific and technical input on the AB aspects of NASA missions.

X

X

Recruit and support astrobiologists to be involved in mission planning, development, and implementation.

x

X

x

X

Participate in training students at the college and graduate levels

X

Provide information to the general public (public outreach).

X

Develop content for education (*coordinated through the Education lead, SMD SciAct, and OSTEM*).

X

Organize community input for research direction, facility and technology needs, communication, and workforce recruitment.

X

X

X

X

X

SPACE
FOR
ALL

AB GRAD CON 23

La Jolla, California
May 22nd - 25th
abgradcon.org
#abgradcon



Submit abstracts by March 15th



Fieldwork Ethics

PSD Programs (SSW, Astrobiology Program)

- Support field research in areas that have value to other users
- Value such as: sensitive ecosystems or historic properties of religious, cultural, or scientific significance
- Already policies and practices in place to address and protect some of these valued sites (e.g. environmentally sensitive, desert varnish)
- *Next presentation-focus on a particular group – Tribes and Indigenous communities*





Beyond Permits and Codes of Conduct...Toward Relationships: Expanding Geoethics and Approaches For Field Research

Daniella Scalice

Mary Voytek, PhD

Melissa Kirven-Brooks, PhD

Aaron Gronstal, PhD

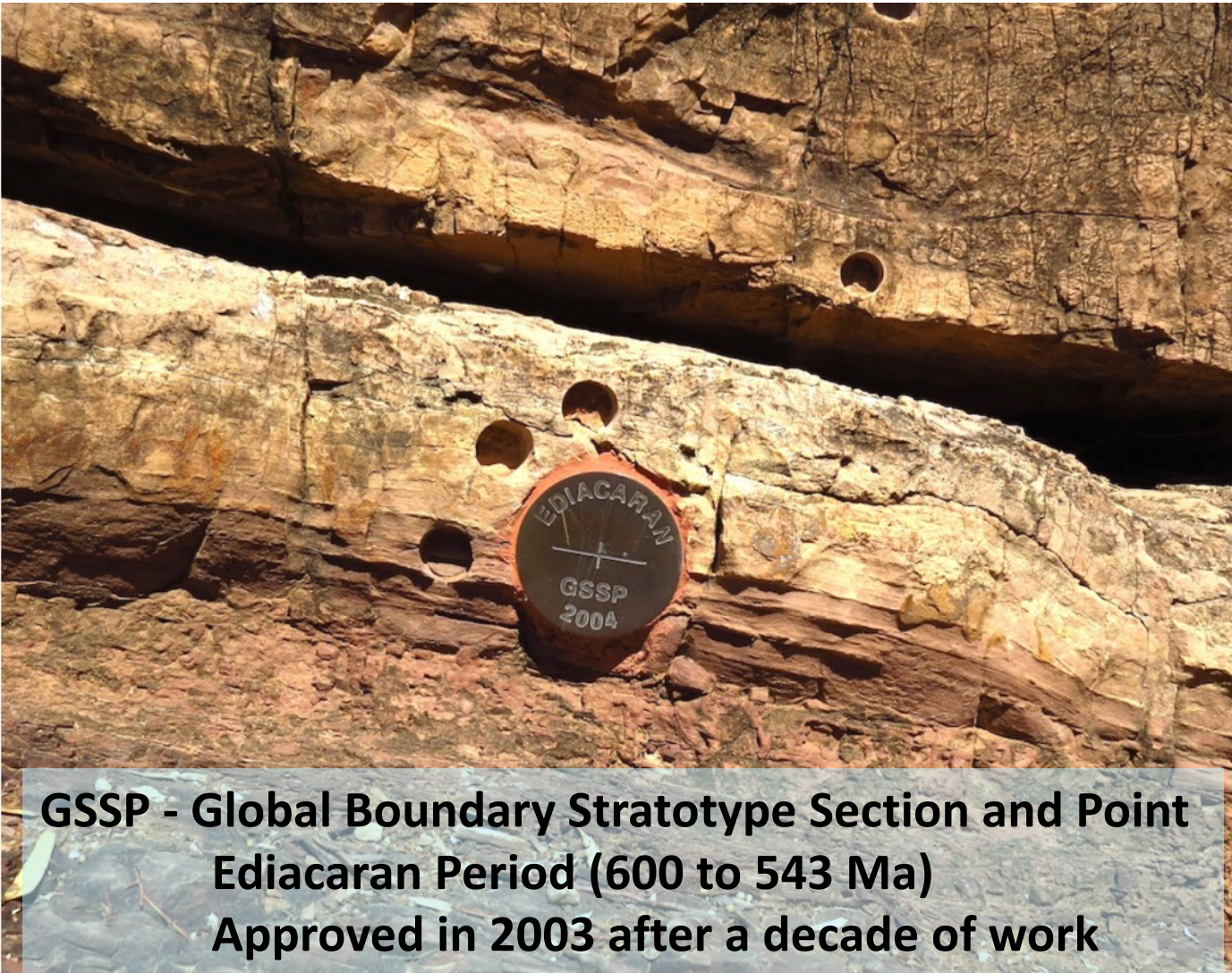
NASA Astrobiology Program

Planetary Science Advisory Committee Meeting

22 June 2023

Continuing to address a long-standing problem...

The Australian, October 2003



**GSSP - Global Boundary Stratotype Section and Point
Ediacaran Period (600 to 543 Ma)
Approved in 2003 after a decade of work**

Credit: Phil Schmidt and George Williams

Leigh Dayton
• Science writer

ONE of the most important hunks of rock in the study of life on Earth has been vandalised — by scientists.

By drilling samples from the rock — located at Enorama Creek in the Flinders Ranges of South Australia — unnamed overseas researchers have put under threat the formal ratification of the first new chapter in geological history in 120 years.

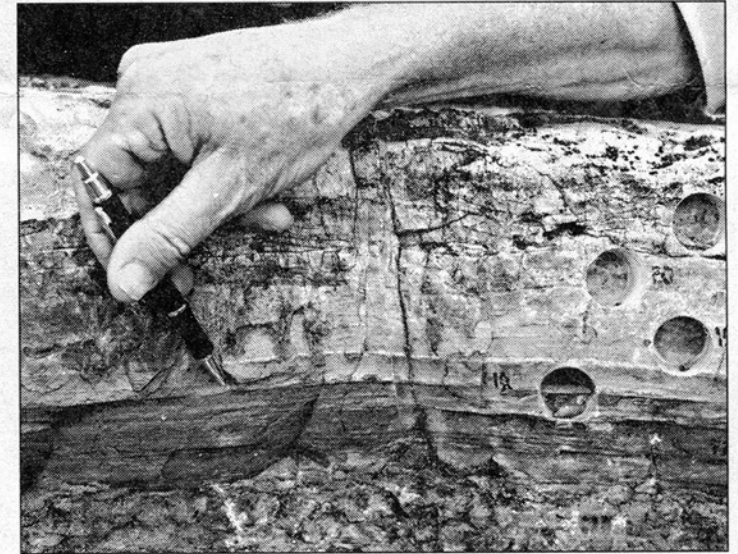
“It’s stupid and irresponsible,” said Malcolm Walter yesterday when told by *The Australian* of the damage.

Professor Walter heads Macquarie University’s Australian Centre for Astrobiology in Sydney.

Along with Andy Knoll of the Botanical Museum of Harvard University in Cambridge, Massachusetts, he led the International Union of Geological Sciences (IUGS) subcommittee that established the new period.

As reported last Thursday in *The Australian*, the Ediacaran Period was approved after more than a decade’s work. It stretches from 600 million to 543 million years ago and contains evidence of the earliest complex animals known, including the newly announced fossil of the oldest known ancestor of backboned animals.

According to Professor Walter, the scientific vandalism weakens the subcommittee’s decision to establish the Ediacaran Period, in part



because the defining criteria are “highly controversial”.

That is, instead of linking the new period to the fossils it contains, the subcommittee chose key characteristics of the rocks themselves.

Professor Walter feared conservatives now had an excuse to vote down the new period at next year’s International Geological Congress in Florence, Italy.

Moreover, Professor Walter claimed that even if the period was endorsed, the all important Global Stratotype Section and Point (GSSP) for the period could be shifted to similar rocks in another country, ones without unsightly drill holes.

The GSSP is the benchmark against which all other rocks are compared.

One of the arguments for sighting the GSSP in the Flin-

ders Ranges is that it falls within a national park with special conservation procedures.

“We’re just at a critical moment in having this site selected and it seems someone has jumped the gun,” said Professor Walter.

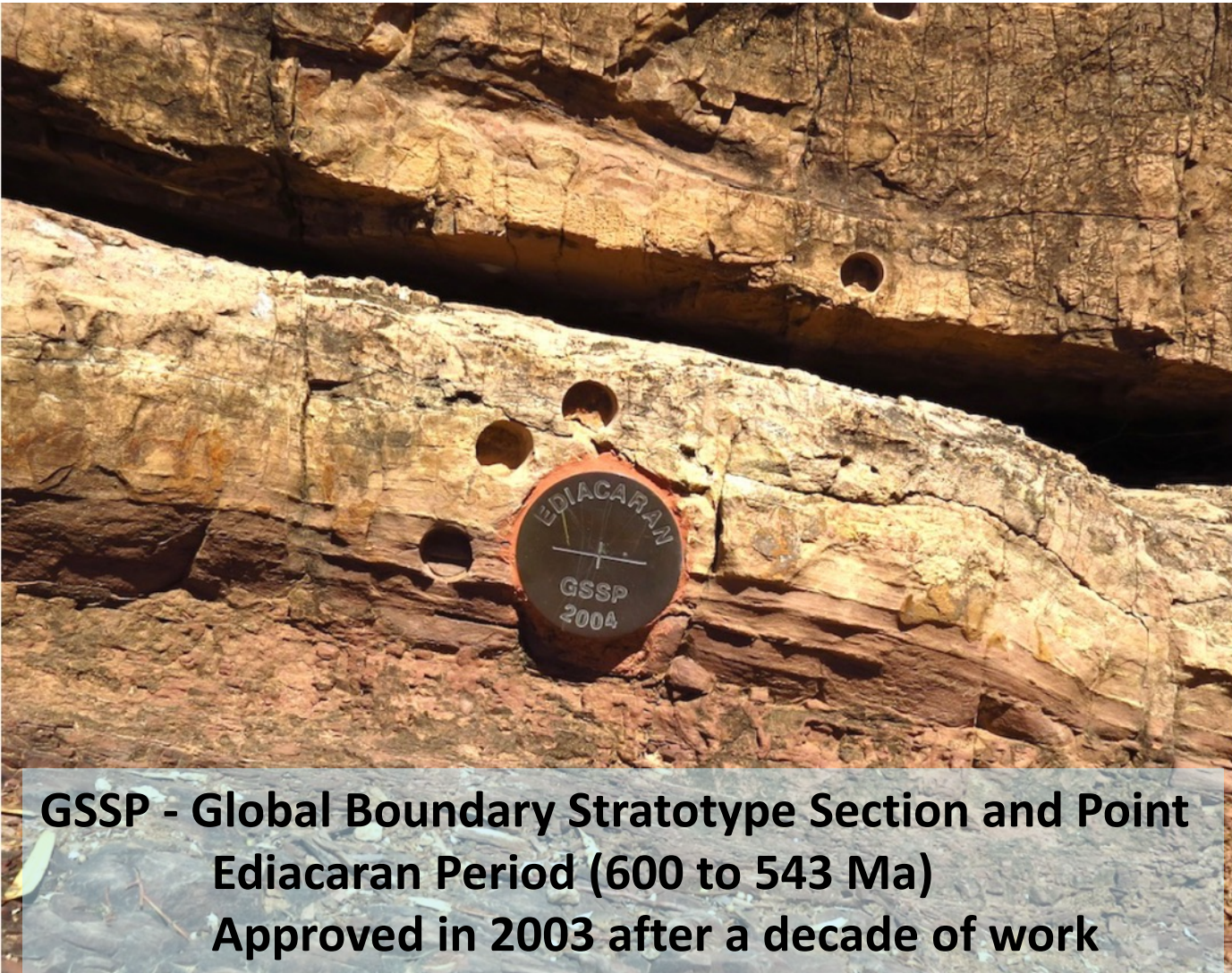
According to Jim Gehling, a palaeontologist with the South Australian Museum in Adelaide, the offending researchers drilled holes in the wrong place, but for the right reason.

He said such samples must be taken to determine the palaeomagnetic properties of the site, a necessary step in differentiating Ediacaran rocks from those of the previous Neoproterozoic Period.

“This is now the holy, holy grail of geology,” Dr Gehling said.

Continuing to address a long-standing problem...

The Australian, October 2003



**GSSP - Global Boundary Stratotype Section and Point
Ediacaran Period (600 to 543 Ma)
Approved in 2003 after a decade of work**

Credit: Phil Schmidt and George Williams

Leigh Dayton
• Science writer

ONE of the most important hunks of rock in the study of life on Earth has been vandalised — by scientists.

By drilling samples from the rock — located at Enorama Creek in the Flinders Ranges of South Australia — unnamed overseas researchers have put under threat the formal ratification of the first new chapter in geological history in 120 years.

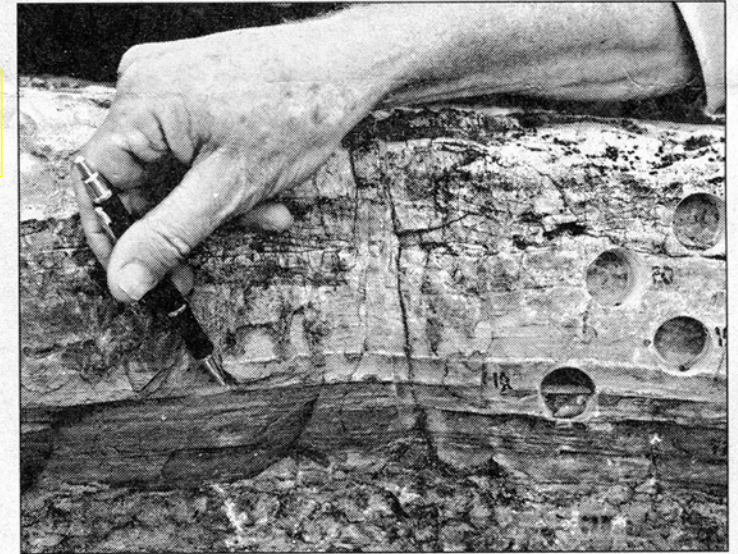
“It’s stupid and irresponsible,” said Malcolm Walter yesterday when told by *The Australian* of the damage.

Professor Walter heads Macquarie University’s Australian Centre for Astrobiology in Sydney.

Along with Andy Knoll of the Botanical Museum of Harvard University in Cambridge, Massachusetts, he led the International Union of Geological Sciences (IUGS) subcommittee that established the new period.

As reported last Wednesday in *The Australian*, the Ediacaran Period was approved after more than a decade’s work. It stretches from 600 million to 543 million years ago and contains evidence of the earliest complex animals known, including the newly announced fossil of the oldest known ancestor of backboned animals.

According to Professor Walter, the scientific vandalism weakens the subcommittee’s decision to establish the Ediacaran Period, in part



because the defining criteria are “highly controversial”.

That is, instead of linking the new period to the fossils it contains, the subcommittee chose key characteristics of the rocks themselves.

“One of the most important hunks of rocks in the study of life on Earth has been vandalised — by scientists.”

Moreover, Professor Walter claimed that even if the period was endorsed, the all important Global Stratotype Section and Point (GSSP) of the period could be shifted to similar rocks in another country, ones without unsightly drill holes.

The GSSP is the benchmark against which all other rocks are compared.

One of the arguments for sighting the GSSP in the Flin-

ders Ranges is that it falls within a national park with special conservation procedures.

“We’re just at a critical moment in having this site selected and it seems someone pulled the gun,” said Professor Walter.

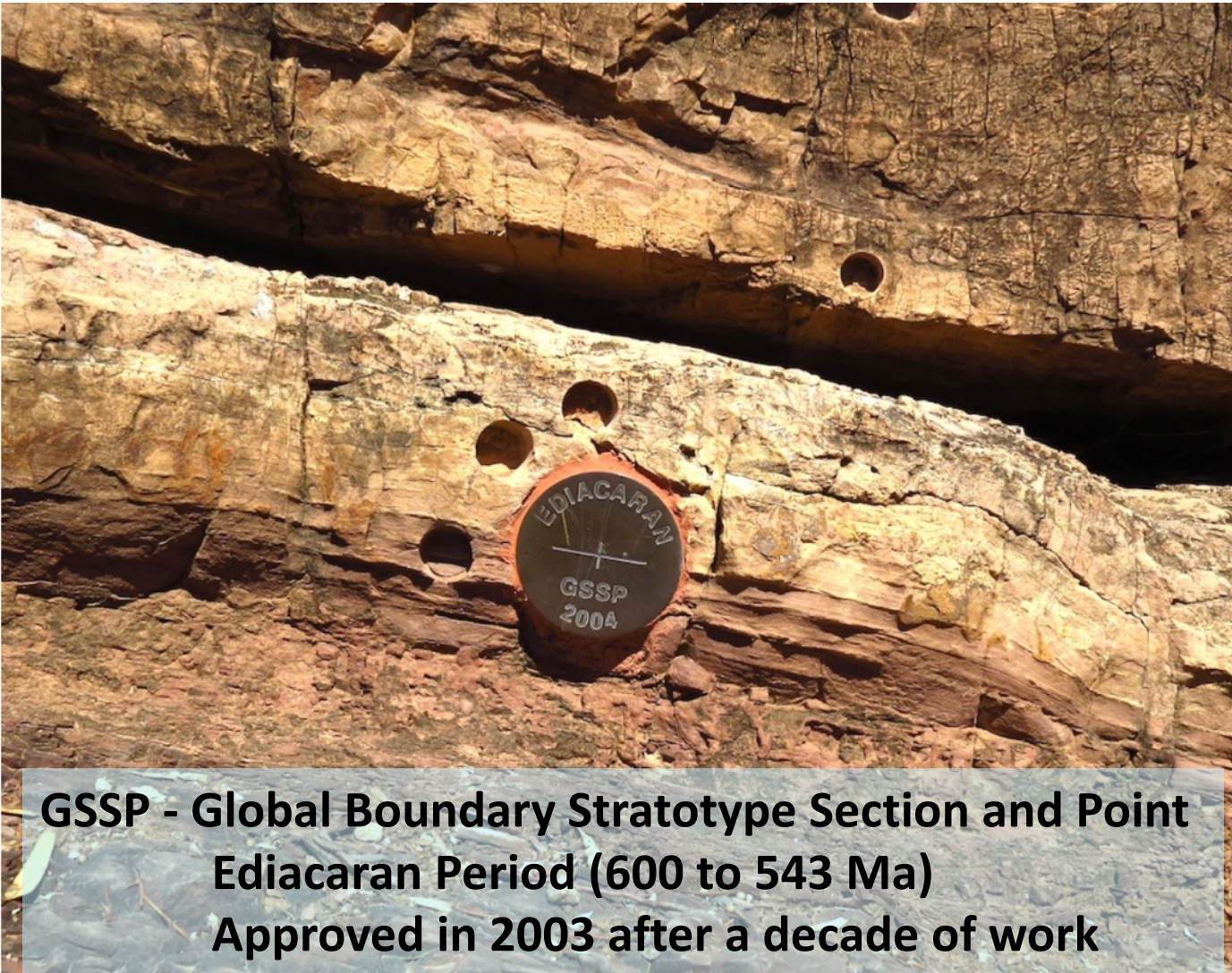
According to Jim Gehling, a palaeontologist with the South Australian Museum in Adelaide, the offending researchers drilled holes in the wrong place, but for the right reason.

He said such samples must be taken to determine the palaeomagnetic properties of the site, a necessary step in differentiating Ediacaran rocks from those of the previous Neoproterozoic Period.

“This is now the holy, holy grail of geology,” Dr Gehling said.

Continuing to address a long-standing problem...

The Australian, October 2003



**GSSP - Global Boundary Stratotype Section and Point
Ediacaran Period (600 to 543 Ma)
Approved in 2003 after a decade of work**

Credit: Phil Schmidt and George Williams

Leigh Dayton
• Science writer

ONE of the most important hunks of rock in the study of life on Earth has been vandalised — by scientists.

By drilling samples from the rock — located at Enorama Creek in the Flinders Ranges of South Australia — unnamed overseas researchers have put under threat the formal ratification of the first new chapter in geological history in 120 years.

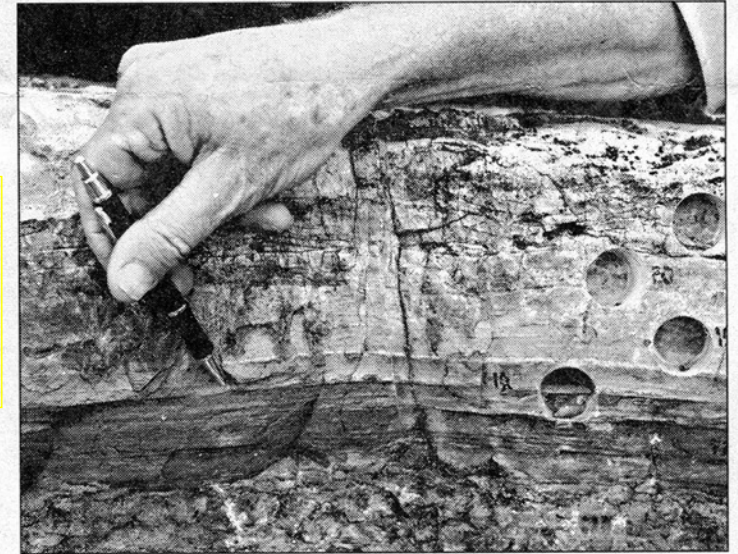
“It’s stupid and irresponsible,” said Malcolm Walter yesterday when told by *The Australian* of the damage.

Professor Walter heads Macquarie University’s Australian Centre for Astrobiology in Sydney.

Along with Andy Knoll of the Botanical Museum of Harvard University in Cambridge, Massachusetts, he led the International Union of Geological Sciences’ subcommittee that established the new period.

As reported last Tuesday in *The Australian*, the Ediacaran Period was approved after more than a decade of work. It stretches from 600 million to 543 million years ago and marks the time of the earliest complex animals known, including the newly announced discovery of a known ancestor of backboned animals.

According to Professor Walter, the scientific vandalism weakens the subcommittee’s decision to establish the Ediacaran Period, in part



because the defining criteria are “highly controversial”.

That is, instead of linking the new period to the fossils it contains, the subcommittee chose key characteristics of the rocks themselves.

Conservatives now had an excuse to vote down the new period. “It’s a bit of a mess,” said Professor Walter.

According to Jim Gehling, a palaeontologist with the South Australian Museum in Adelaide, the “offending” holes in the rock are in the wrong place, but for the right reason. “Such samples must be taken to determine the paleomagnetic properties of the site, a necessary step in differentiating Ediacaran rocks from those of the previous Neoproterozoic Period.

“This is now the holy grail of geology,” Dr Gehling said.

One of the arguments for sighting the GSSP in the Flin-

“By drilling samples from the rock... unnamed overseas researchers have put under threat the formal ratification of the first new chapter in geological history in 120 years.”

July, 2021



Los Angeles Times

CLIMATE & ENVIRONMENT



Unauthorized drilling of core samples by a Caltech professor left dozens of 1-inch-diameter holes at the petroglyph site in the Volcanic Tablelands. (image, David Lee)

TER *Unauthorized drilling of core samples by a Caltech professor left dozens of 1-inch-diameter holes at the petroglyph site in the Volcanic Tablelands. (image, David Lee)*

Los Angeles Times

A Caltech scientist has apologized for damaging a sacred site. Is it enough?

A Late-Breaking Town Hall at 2021 AGU Fall Meeting

Joint AGU and GSA

December 2021

- **Town Hall Session** TH53J was held on Friday 17 December 2021
 - **Daniel Wildcat** - *Haskell Indian Nations University*
 - **Marjorie Chan** - *University of Utah*
 - **Daniella Scalice** - *NASA Astrobiology Program*
 - **Juliet Ryan-Davis** - *California Institute of Technology*

January 2022

- Formation of **working group** and three main actions to be led in 2022
 - Publish an article summarizing the ideas presented in the Town Hall
 - Survey the community broadly to understand the current culture and ethics of geological sampling
 - Produce a workshop on ethics in fieldwork and sample collection at the 2022 AGU Fall Meeting

Article Summarizing the Town Hall

Co-authored by **Juliet Ryan-Davis & Daniella Scalice**

Article published in AGU Advances and highlighted in Eos

Main area of focus:

- **Broadening geoeitics to center Indigenous perspectives,** knowledges, and relationship to the lands, waters, and skies of would-be field sites
 - **Building relationships and collaborations** between scientists and Tribes/Indigenous communities

Other foci:

- **Education for geoscientists** to understand the ethics of sampling and their responsibilities
- **Managing sample collections** and finding new ways to share samples vs. re-sampling
- Devising **new systems for proposing and reviewing studies** to evolve practice and increase accountability

AGU Advances

Commentary | [Open Access](#) |    

Co-Creating Ethical Practices and Approaches for Fieldwork

Juliet Ryan-Davis  Daniella Scalice

First published: 07 December 2022 | <https://doi.org/10.1029/2022AV000762>

Eos

[ABOUT](#) [SPECIAL REPORTS](#) [TOPICS](#) [PROJECTS](#) [NEWSLETTER](#) [SUBMIT TO EOS](#) 

How Can We Sample More Ethically?

Ryan-Davis and Scalice describe a path towards sampling more ethically, going beyond legal permitting requirements to engagement of Indigenous expertise and respect of peoples' relationship to place.

By Susan Trumbore 9 January 2023



An aerial photograph of a river delta, showing a complex network of blue water channels branching out from a larger body of water on the left. The surrounding land is a mix of green and brown, indicating a mix of vegetation and possibly agricultural or developed areas. The text is overlaid on the image in white.

Many field research policies and protocols are already in place...

Environmental protections for field sites

Anti-harassment codes of conduct to ensure race- and gender-based safety while in the field

All this is good!

Scientific field research is a privilege, not a right or an entitlement.

In general, our community recognizes and respects this privilege...



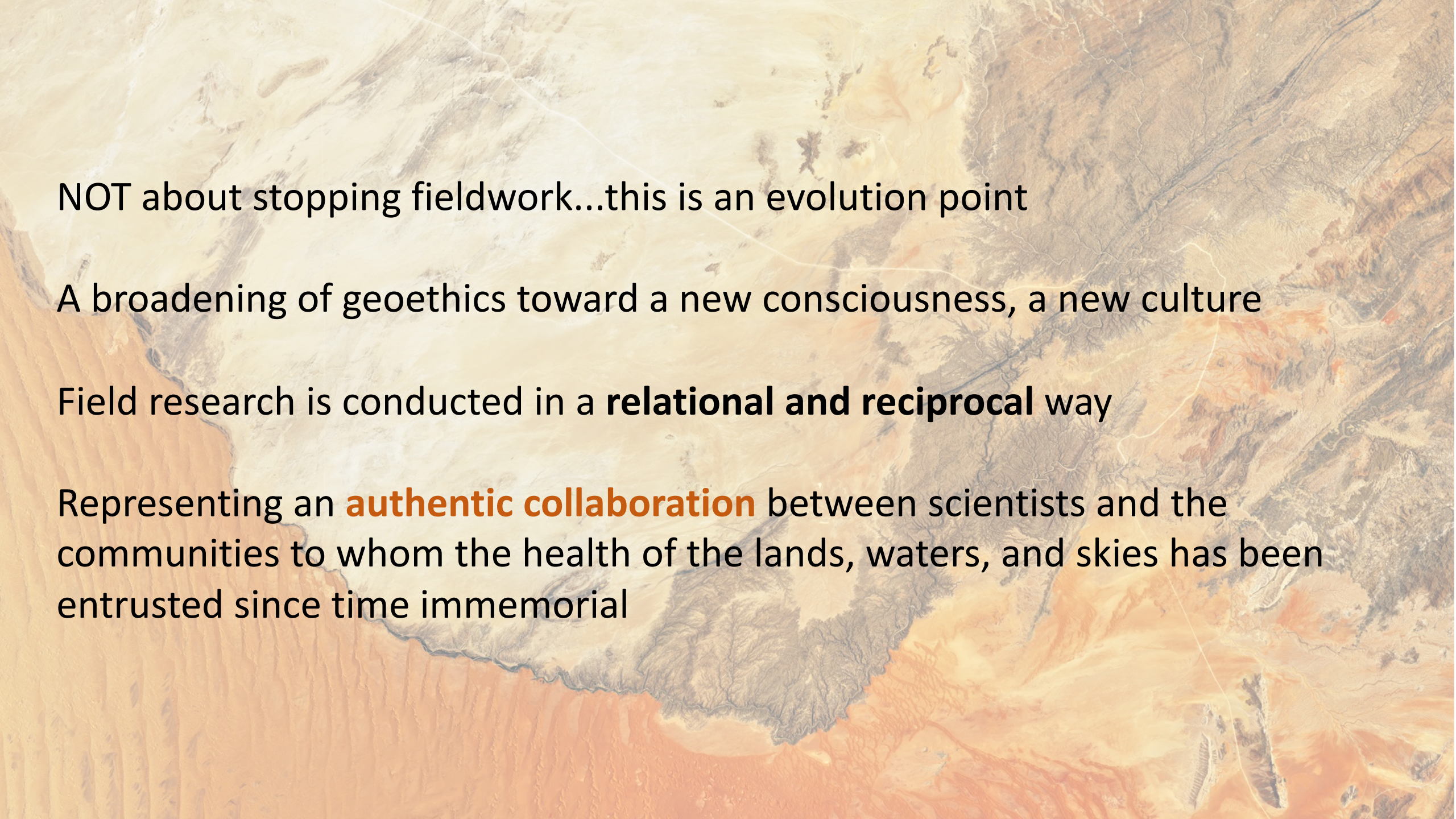
...and shares the desire to care for and protect the sites we work in with other entities, including Tribes and Indigenous communities.

This is common ground to build on!

Even with the most thorough of permitting processes, there is a difference between legal permission to obtain samples in field research...and ethical conduct with respect to the land.

At an absolute bare minimum, our ethical conduct must ensure that Tribes and Indigenous communities are afforded **free, prior, and informed consent** to all that happens on their lands, waters, and skies.

This is ethical...*regardless* of whether or not the Tribe has “legal” ownership of them, and *regardless* of what permitting processes to conduct field work entail.




NOT about stopping fieldwork...this is an evolution point

A broadening of geoethics toward a new consciousness, a new culture

Field research is conducted in a **relational and reciprocal** way

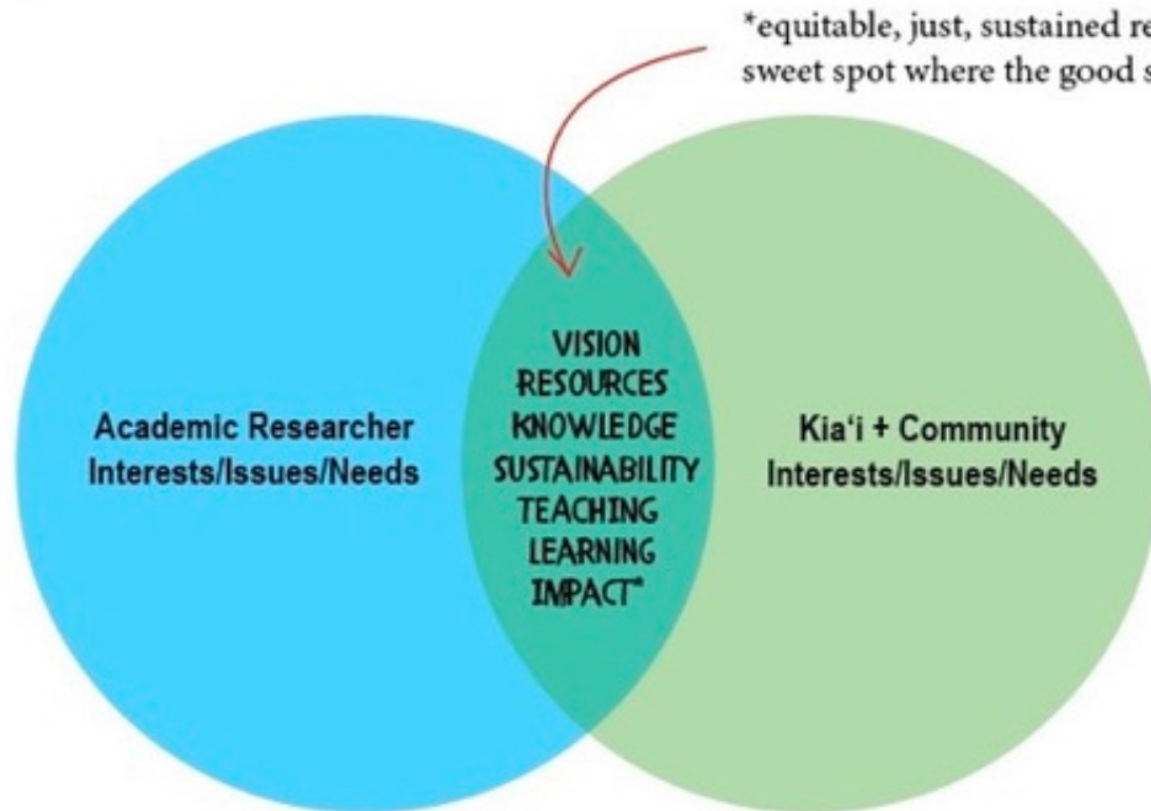
Representing an **authentic collaboration** between scientists and the communities to whom the health of the lands, waters, and skies has been entrusted since time immemorial

An aerial photograph of a river winding through a forest. The river is a dark blue line that curves through the landscape. The forest floor is covered in tree stumps, each showing distinct concentric growth rings in shades of brown and tan. The overall scene is a mix of natural textures and colors, from the deep blue of the water to the various browns of the wood and soil.

How can we build relationships
with Tribes and Indigenous
communities and their
places/spaces in which we
desire to do our science?

Ethical Space

Figure: Miwa Tamanaha

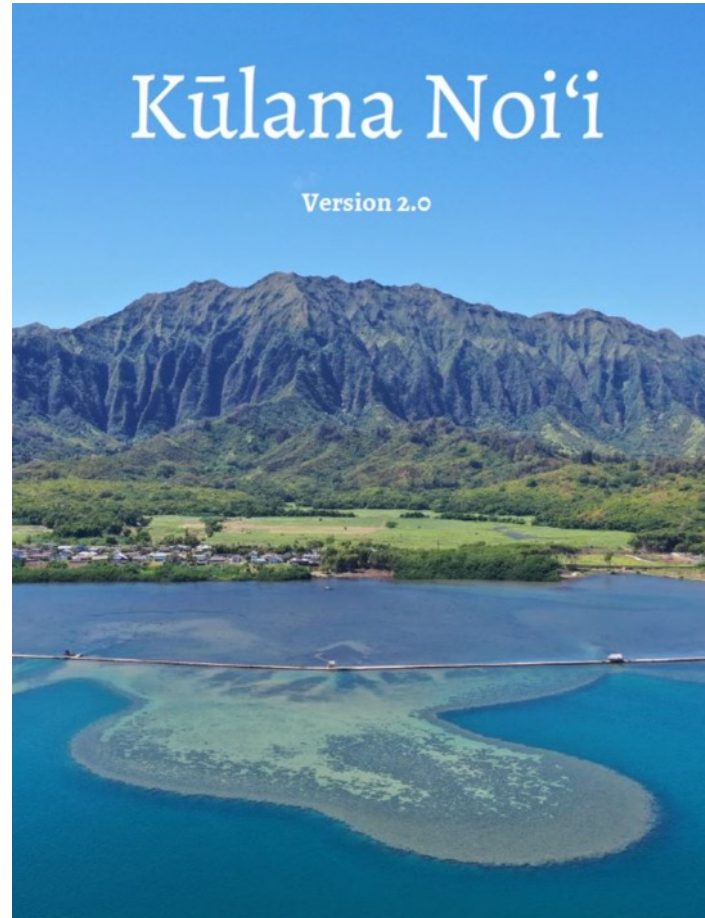


*equitable, just, sustained relationships = the sweet spot where the good stuff happens.

"An ethical space is formed when two societies, with disparate worldviews, are poised to engage each other. It is the thought about diverse societies and the space in between them that contributes to the development of a framework for dialogue between human communities. Engagement at the ethical space triggers a dialogue that begins to set the parameters for an agreement to interact modeled on appropriate, ethical, and human principles. Dialogue is concerned with providing space for exploring fields of thought and attention is given to understanding how thought functions in governing our behaviors." (Ermine 2007)

Guidelines from the Community:

Supporting partnerships between science teams and Tribes and Indigenous communities



seagrant.soest.hawaii.edu/kulana-noii/

An aerial photograph of a volcanic landscape. In the center, a dark crater is visible, with a thick plume of white smoke or ash rising from it. The surrounding terrain is a mix of dark, rocky ground and patches of green vegetation. The lighting is dramatic, with strong shadows and highlights, suggesting a low sun position.

Building and Nurturing Pilina (Relationship)

Respect

Reciprocity

Self-Awareness and Capacity

Communication

A'ō aku, a'ō mai/Aloha aku, aloha mai

(Knowledge given, knowledge received / Love given, love received)

Maintain a Long-Term Focus

Community Engagement and Co-Review

Knowledge Stewardship

Accountability

“Whether you come from a place or not, if you want to do research in the area, you need to listen to the story that ‘āina has to tell. Introduce yourself to ‘āina; make a connection to have a relationship and kuleana. Spend time in ‘āina so you can listen to what is needed.”

PARTICIPANT

*2017 HEEIA SCIENCE TO
MANAGEMENT SYMPOSIUM*

“A lot of the relationship building happens through having the same values. We recognize that they are busy but it means a lot when they come. Working side by side helps us to understand their question a little better.”

KANALOA BISHOP

“Getting dirty, physically being there, listening to voices, sitting and working alongside - it’s not always built into people’s schedules in the academic world. But you need to force it and sit and listen to understand the issues.”

PARTICIPANT

*2017 HEEIA SCIENCE TO
MANAGEMENT SYMPOSIUM*

“The normal trajectory is that researchers develop the questions first and then say ‘I want to do my research here.’ We want to move towards questions that come from community and research done in collaboration with community.”

DR. ROB TOONEN

“Every place requires a certain way of acting. For community, everything is guided by the place. The research questions are guided by place.”

DR. MEHANA VAUGHAN

“Often times we think of research as an external thing but we do research ourselves. I want to encourage that. Research doesn’t need to be only from the outside.”

H’ILEI KAWELO

“All we are asking for really is to build a good relationship and clean up after yourself.”

KEAHI P’IOHI’A

International Policies: Vision MāTauranga

Unlocking the Innovation Potential of Māori Knowledge, Resources and People

A policy framework that provides strategic direction for research of relevance to Māori, funded through Vote Research, Science and Technology

Four Research Themes:

Indigenous Innovation: Contributing to Economic Growth through Distinctive R&D

Taiao: Achieving Environmental Sustainability through Iwi and Hapū Relationships with Land and Sea

Hauora/Oranga: Improving Health and Social Wellbeing

Mātauranga: Exploring Indigenous Knowledge and RS&T

MINISTRY OF
RESEARCH
SCIENCE +
TECHNOLOGY

M R S T
TE MANATO PŌTAIAO

A Guide to Vision MāTauranga

Lessons Learned from Māori Voices in the New Zealand Science Sector

EMPOWER MĀORI KNOWLEDGE

EMPOWER MĀORI PEOPLE

EMPOWER MĀORI RESOURCES

Academic aspirations alone

Academic publication the most important goal

IP benefit retention by academic institutions

Only Western scientific measures of excellence, impact and success

Māori & academic aspirations

Publication & benefit for Māori people

IP benefit sharing or Māori ownership

Māori worldview of excellence, impact and success is included

Domestic Guidance:

Federal Guidance for Departments and Agencies on Indigenous Knowledge




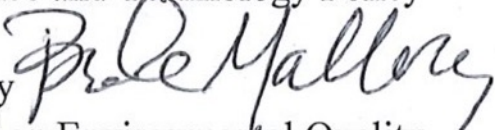
EXECUTIVE OFFICE OF THE PRESIDENT
OFFICE OF SCIENCE AND TECHNOLOGY POLICY
COUNCIL ON ENVIRONMENTAL QUALITY
WASHINGTON, D.C.



November 30, 2022

MEMORANDUM FOR HEADS OF FEDERAL DEPARTMENTS AND AGENCIES

FROM: Arati Prabhakar, Ph.D. 
Assistant to the President and Director
Office of Science and Technology Policy

Brenda Mallory 
Chair, Council on Environmental Quality

SUBJECT: Guidance for Federal Departments and Agencies on Indigenous Knowledge

Domestic Guidance:

Federal Guidance for Departments and Agencies on Indigenous Knowledge

The White House Office of Science and Technology Policy (OST) and the Council on Environmental Quality (CEQ) issue this guidance to assist Agencies in:

- (1) understanding Indigenous knowledge,
- (2) growing and maintaining the mutually beneficial relationships with Tribal Nations and Indigenous Peoples needed to appropriately include Indigenous Knowledge, and
- (3) considering, including, and applying Indigenous Knowledge in Federal research, policies, and decision making.

Domestic Guidance:

Federal Guidance for Departments and Agencies on Indigenous Knowledge

Overall, the Guidance:

- Validates IK as a valid form of evidence for inclusion in federal policy
- Acknowledges multiple ways of knowing can improve research outcomes
- Encourages agencies to consider IK as an aspect of the best available science
- Acknowledges the racism and imperialism of Western science systems
- Encourages agencies to develop relationships with Tribes and Indigenous communities, especially outside of the formal consultation process, and provide resources for sustained engagements
- Encourages agencies to co-manage resources and co-produce knowledge with Tribes
Encourages agencies to support Tribes to build capacity and fully participate in and lead research
- Gives practical ideas for agencies to develop systemic approaches to applying IK within their missions

NASA Policy:

Federal Guidance for Departments and Agencies on Indigenous Knowledge

***3.15 Fieldwork**

Proposers conducting field research must include a description of their use of field site(s) that demonstrates:

- Respect for the values of other users of the site by considering the impact that their work will have on the environment (e.g., sensitive ecosystems or historic properties of religious, cultural, or scientific significance)*
- A research plan that reduces impact to the site (if any)*
- The intention to obtain relevant permits and follow their guidelines*

Moreover, to help create an environment that is free of harassment and discrimination, proposers must cite a specific policy, code of conduct, or ground rules provided to participants in advance of the fieldwork. This information will be provided by proposers in response to an NSPIRES cover page question.

Potential questions for proposers to consider as they address the proposal requirement:

- Do alternative sites exist where the impacts of your work would be lessened?
- Are there sample libraries in which comparable samples already exist?
- Does the site require a permit?
- Do you know the cultural provenance of the site?
- What Indigenous people or Tribal Nations hold history in that land?
- Does the site have history as a place of scientific research?
- Are there special considerations needed to protect the long-term scientific value of the site)?
- Are you making efforts to protect the rights and interests of the people who value the site (for historical, cultural, scientific value, etc.)?
- Does the site have any considerations in terms of environmental fragility?
- Are you making efforts to protect the rights of research participants (workload, liability, anti-harassment, etc.)?

What questions should reviewers consider?

- Does the proposal discuss whether or not permits are required? Does the team have the permits or a process for acquiring permits?
- Does the proposal mention the provenance of the research site (for example: cultural heritage, scientific heritage, etc.)?
- Does the proposal discuss environmental impact/preservation (is there an environmental impact report (EIR))?
- Does the proposal present or discuss a Code of Conduct?
- Does the proposal present or discuss an Inclusion Plan?
- Does the proposal discuss alternative research sites or an argument for why the selected research site is the optimal choice?

Resources:

GIFT: Goddard Instrument Field Team (templates for Field Code of Conduct, Field Bill of Rights, Field Safety Plans)

<https://ssed.gsfc.nasa.gov/MajorRandAThemes/GIFT/index.html>

Guidance for Federal Departments and Agencies on Indigenous Knowledge

<https://www.whitehouse.gov/wp-content/uploads/2022/12/OSTP-CEQ-IK-Guidance.pdf>

Webinar from Jan, 2023 to present this Guidance

<https://www.youtube.com/watch?v=ScmwWR3PKT8>

Executive Order on Further Advancing Racial Equity and Support for Underserved Communities Through The Federal Government

<https://www.whitehouse.gov/briefing-room/presidential-actions/2023/02/16/executive-order-on-further-advancing-racial-equity-and-support-for-underserved-communities-through-the-federal-government/>

Kūlana Noi'i Working Group. 2021. Kūlana Noi'i v. 2. University of Hawai'i Sea Grant College Program, Honolulu, Hawai'i.

https://seagrant.soest.hawaii.edu/wp-content/uploads/2021/09/Kulana-Noii-2.0_LowRes.pdf

Principles for Conducting Research in the Arctic (NSF)

<https://www.nsf.gov/geo/opp/arctic/conduct.jsp>

NSF U.S. Antarctic Environmental Stewardship

<https://www.nsf.gov/geo/opp/antarct/eas/start.jsp>

Vision Mātauranga: Unlocking the Innovation Potential of Māori Knowledge, Resources and People

<https://www.mbie.govt.nz/assets/9916d28d7b/vision-matauranga-booklet.pdf>

National Inuit Strategy on Research

https://www.itk.ca/wp-content/uploads/2018/04/ITK_NISR-Report_English_low_res.pdf

Co-Creating Ethical Practices and Approaches for Fieldwork

<https://agupubs.onlinelibrary.wiley.com/doi/10.1029/2022AV000762>

University of Arizona - Native American Advancement, Initiatives, and Research

<https://naair.arizona.edu/resources>

The Ethical Space of Engagement

<https://indigenoulanguagelearning.ca/wp-content/uploads/2017/11/Ermine-2007.pdf>

NASA Guidelines for Promoting Scientific and Research Integrity

https://www.nasa.gov/sites/default/files/atoms/files/nasa_guidelines_for_promoting_scientific_and_research_integrity-july_2018.pdf

Questions?
Discussion?

