

PUNCH Outreach – Abstract AGU 2021

This Hidden slide was NOT included in the AGU presentation but is provided in this PDF version of the slides.

The PUNCH Outreach Program – A New Pathway for NASA Mission-Embedded Outreach

Cherilynn Ann Morrow, Southwest Research Institute, Consultant, Boulder, CO
Craig DeForest, Southwest Research Institute, Boulder, CO

These slides have been modified from the original AGU presentation to clarify our intention to describe why and how PUNCH developed a plan for mission-embedded outreach (MEO) that complements and extends the work of NASA Communications and other NASA STEM-related efforts. **The slides do *not* speak for NASA nor for the NASA Heliophysics Division.**

Abstract Text:

The NASA PUNCH mission will be uniquely capable of tracking space weather features from the Sun's outermost atmosphere all the way to Earth orbit. The NASA Heliophysics Division approved the 5-year PUNCH Outreach Program (POP) for funding in January 2021, referring to it publicly as a new exemplar for mission-embedded outreach. The POP engages PUNCH scientists in partnership with five planetariums and science centers plus other multi-cultural partners to activate an Ancient & Modern Sun Watching theme designed to engage historically marginalized populations.

Shortly after NASA selected PUNCH to become a NASA Small Explorer mission, PI Dr. Craig DeForest hired Dr. Cherilynn Morrow as a consultant charged with building an outreach team and developing a plan for an outreach program that would be considered for funding via an augmentation to the mission budget. There were no specific NASA guidelines. The PI's charge was two-fold: 1) "to leverage the mission to inspire diverse youth in the US Southwest", and 2) "to complement and extend whatever else NASA is doing in this domain."

Former NASA policy *required* Principal Investigators of NASA space science missions to allocate 1-2% of mission costs for a program of education and public outreach (EPO). This policy was supported by contemporary Decadal Survey recommendations from the National Academy. However, the "mandate" approach to EPO was not fully successful and was eventually discontinued. Understandably, some considered the 1-2% policy a "tax" on their time and funds in an unfamiliar domain that distracted them from primary science objectives. The current approach by the Heliophysics Division and by the PUNCH project deliberately assuage these concerns to demonstrate effective embedding of an ambitious outreach program within a NASA mission.

This talk will share the **8 Guiding Principles** of the POP that are enabling PUNCH to **realize the unique benefits** of an outreach program being closely associated with a NASA space science mission while **addressing lessons learned from past efforts** and **seizing new opportunities** afforded by the present landscape of NASA public engagement. These Principles may be of broader value to other scientific leaders and outreach professionals considering whether to pursue support for mission-embedded outreach programs.

Polarimeter to UNify the Corona and Heliosphere (PUNCH)

The PUNCH Outreach Program: A New Pathway for NASA Mission-Embedded Outreach



Cherilynn Morrow
PUNCH Outreach Director
Consultant, Southwest Research Institute



Craig DeForest
PUNCH Principal Investigator
Southwest Research Institute

AGU Meeting
13 December 2021

Session ED033. Sharing Best Practices for Space Science Outreach and Engagement



<https://punch.space.swri.edu>





PUNCH Outreach Logo and Motto



Outreach
for the
NASA
PUNCH
mission

PUNCH Outreach Logo



PUNCH Outreach Motto

Shining a Light on Diverse
Views of the Sun with our
Ancient & Modern
Sun Watching Theme

The complex block contains the PUNCH Outreach Logo and the PUNCH Outreach Motto. The logo is a large oval emblem with the word "PUNCH" at the top, a sun with rays in the center, and a starry background. The motto is a square image showing a sun partially obscured by a dark circular object, with rays of light shining through the opening. The text "PUNCH Outreach Motto" and the motto itself are displayed to the right of the image.

PUNCH Outreach is Strongly Connected to Chaco Canyon



Chaco Canyon is in the remote high desert of northwestern New Mexico. It is a World Heritage site and International Dark Sky Park. 21 Indigenous tribes are affiliated.



The PUNCH Outreach Director, Dr. Cherilynn Morrow, has served as a volunteer in Chaco Canyon for interpretation and cultural astronomy research for more than a decade.

Chaco is a World Heritage Site and an International Dark Sky Park in remote northwestern New Mexico with an extraordinary collection of evidence for ancient Sun watching.

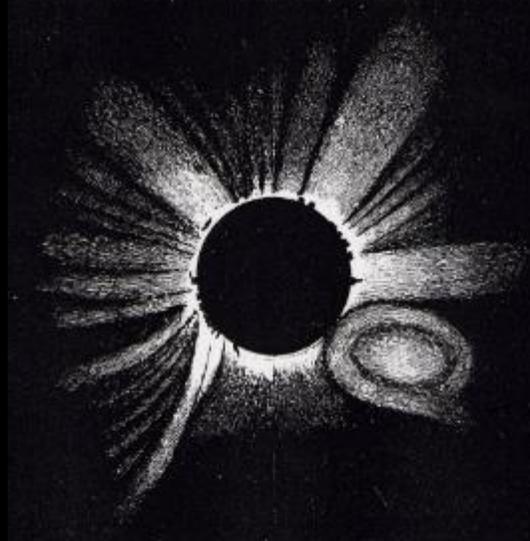
A Chaco Canyon Petroglyph is a Conceptual Portal for the Ancient & Modern Sun Watching Theme of PUNCH Outreach



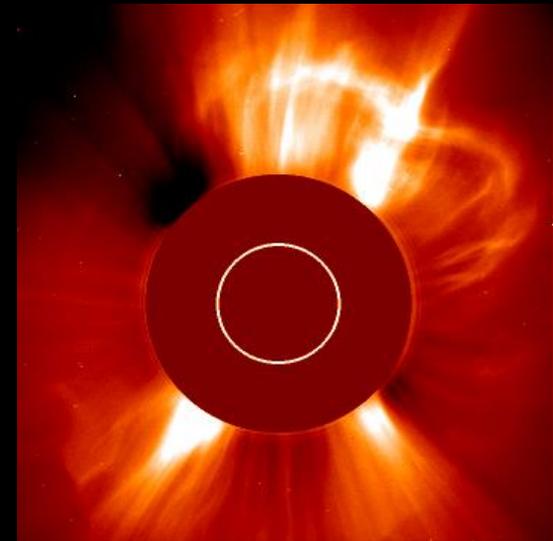
Venus?
?



Ancestral Puebloan petroglyph in Chaco. Is it an active solar corona during the **1097** total solar eclipse? **1098** is estimated solar maximum.



1860 hand drawings of a total solar eclipse with possible CME. Current NASA videos say: "first record of an active solar corona"



2005 coronagraph image from NASA SOHO with CME. This sort of image can be used in Chaco interpretive programs.

Vaquero & Malville, 2014
2017 CU Press Release by K. Malville
Scientific American & Smithsonian

PUNCH Outreach will also collaborate to develop a tactile object rendering of this story.

In preparation for the 2024 total solar eclipse (also at a time of high solar activity) PUNCH Outreach will work with our Native American partners and the NASA Heliophysics Communications group to **amend the Western narrative to include the possibility that the Chaco residents recorded an active corona as rock art ~700 years earlier.**



Outreach
for the
NASA
PUNCH
mission

PUNCH Outreach

Outline of Presentation



- 1. What is the PUNCH Mission Science and why should we care?**
2. *Our Ancient & Modern Sun Watching theme*
3. What is “New” about our approach to Mission-Embedded Outreach?
4. How is PUNCH MEO related to other NASA STEM efforts?
5. Eight Guiding Principles for the PUNCH Outreach Program

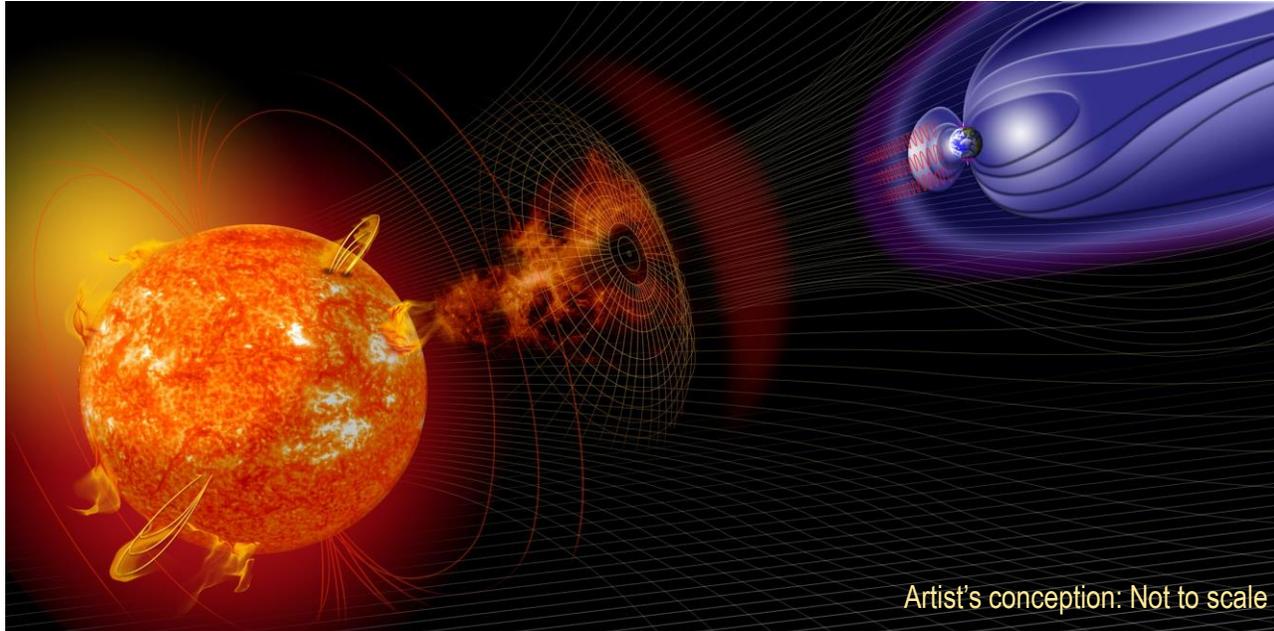


The PUNCH mission is focused on the *inner* heliosphere between Sun and Earth



Artist's conception: Not to scale

Four “suitcase-sized” spacecraft in low Earth orbit.



Artist's conception: Not to scale

PUNCH will provide:

- A global view of the Sun's corona and *solar wind*, as parts of a unified system.
- 3D imagery of *solar wind* structures and their evolution with unprecedented quality & continuity.
- Pioneering capacity for *solar storm* tracking & *space weather* monitoring



Four PUNCH cameras can observe the entire *inner* heliosphere between the outer solar corona and Earth orbit.

PUNCH is currently scheduled for launch in October 2024*, during a period of high solar activity.

* Launch date is subject to change



Outreach
for the
NASA
PUNCH
mission

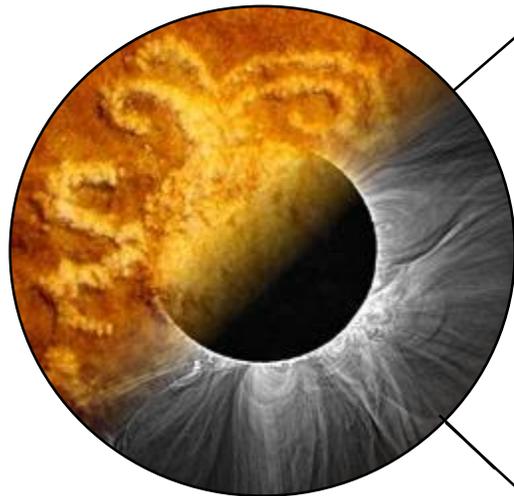
PUNCH Outreach

Outline of Presentation



1. What is the PUNCH Mission Science and why should we care?
2. **Our *Ancient & Modern Sun Watching* theme**
3. What is “New” about our approach to Mission-Embedded Outreach?
4. How is PUNCH MEO related to other NASA STEM efforts?
5. Eight Guiding Principles for the PUNCH Outreach Program

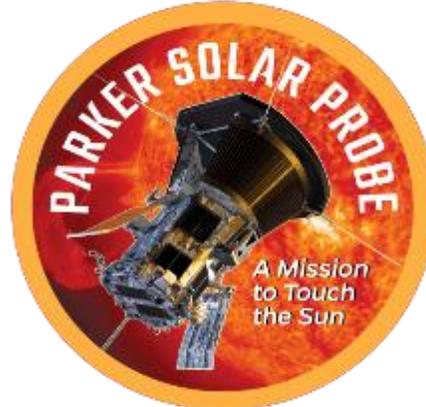
Elements of the PUNCH Outreach Ancient & Modern Sun Watching Theme



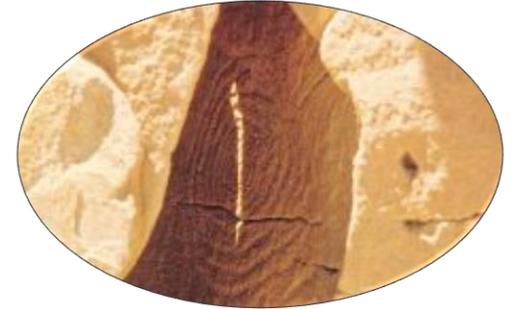
NASA Heliophysics Missions

Ancient Sun Watching in Chaco Culture NHP

Personal Sun Watching in modern times



NASA Exploration of the Sun is a natural extension of age-old human practice of observation of the Sun rhythms and mysteries.



Modern Sun Watching includes contemporary people being present for sunrise, sunset, light & shadow effects, and eclipses.



Our outreach theme makes NASA Sun science relevant to **diverse learners** via **personal & cultural connections to Sun-watching.**



Personal & Cultural Connections with the Sun as a portal to NASA Sun Science

“I greatly appreciate the Ancient and Modern Sun watching theme you have chosen and that you will be encouraging children to observe the sunrise and sunset. The Dine’ people honor the Sun (Johonnaa)

I see using the context of “a NASA mission to explore the Sun” interwoven with cultural traditions as beneficial...”



Verna Tallsalt, Low Mountain, AZ
Navajo Culture & Language Consultant
Member, PUNCH Outreach Advisory Board

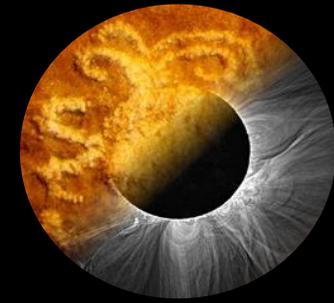


Shining a Light on
Diverse Views
of the Sun
with an
*Ancient & Modern
Sun Watching
Theme*

PUNCH Outreach is founded on authentic needs & opportunities among the populations we intend to benefit and learn from.



Joe Aragon is raising his PUNCH mug at a recent meeting of the PUNCH Science Team



*“I am interested in the **overlap of cultural significance and NASA science learning** that is possible, including potential links to **our ancestral connection to Chaco...**”*

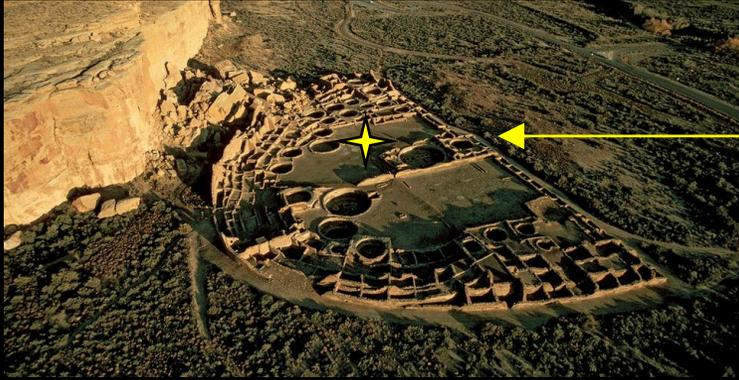
Joe Aragon
STEM Educator (retired), Acoma Pueblo, NM
PUNCH Outreach Cross-cultural consultant

There are >20 tribes in the 4-Corners region who have ancestral and historical ties to Chaco. Chaco is also connected to the history of Hispanic people via the indigenous cultures of Mexico.

Mr. Joe Aragon speaking to students about their **ancestral connection to Chaco Canyon at the Pueblo Bonito overlook.** Photo by GB Cornucopia

Annular Eclipse Events in Chaco's Pueblo Bonito

20 May 2012 and 14 October 2023



The yellow star marks the location of the activity depicted below.



The 2023 annular eclipse occurs on the last day of world-famous Albuquerque balloon festival. PUNCH Outreach will also collect photography at this event.



Photo by GB Cornucopia

Chaco volunteer, Dr. Cherilynn Morrow, leads an activity about lunar phases with an Apache family in the plaza of Pueblo Bonito during the 20 May 2012 annular eclipse. PUNCH Outreach plans to document a similar event for the Oct 2023 Annular Eclipse



On 20 May 2012, after the “ring of fire” effect of annularity, the Sun set partially eclipsed as viewed from Chaco Canyon, NM



Outreach
for the
NASA
PUNCH
mission

PUNCH Outreach

Outline of Presentation



1. What is the PUNCH Mission Science and why should we care?
2. Our *Ancient & Modern Sun Watching* outreach theme
3. What is “New” about our approach to **Mission-Embedded Outreach?**
4. How is **PUNCH MEO** related to other **NASA STEM** efforts?
5. Eight Guiding Principles for the PUNCH Outreach Program

Modification to
original AGU slide





Outreach
for the
NASA
PUNCH
mission

Mission-Embedded Outreach: The PUNCH Pathway – Draft v8c

* NOTE: This table was developed & modified by the authors based on lived experience and does *not* speak officially for NASA

Mission-embedded Outreach programs	OLD Pathway – Space Science	NEW Pathway for PUNCH
1. Policy Guideline	Obligation – forced via mandate	Option/Opportunity – invited via interest
2. Timing of Development	BEFORE Mission Selection	AFTER Mission Selection (Plan development in Phase B)
3. Review process	Plan reviewed as part of selection	Proposal reviewed apart from the mission selection process
4. Budget Guideline	1-2% of PI-controlled costs (“tax”)	1-2% of PI-controlled costs (supplement to budget)
5. Mission Leadership Attitude	Promote my mission. My team can contribute if asked.	Leverage my mission for societal benefit “I encourage my team to get involved!”
6. Scientist Engagement	Yes (but less encouraged by mission leadership & more focused on public talks)	Yes (Outreach leader works with mission leaders to poll the mission team regarding their interests & experience in contributing to Outreach)
7. Outreach Leadership	Variance in professionalism across missions (but positive progress)	Strong experience & expertise in outreach professionalism (Knows science & how diverse people learn. Strongly networked)
8. Professional Evaluation	Inconsistent across missions (but there was positive progress toward requiring)	Strong evaluation professionalism (considered essential for documenting & reporting outcomes of an Outreach plan’s logic model)
9. Formal Education included?	Yes (EPO = Education & Public Outreach)	No (but Outreach in beneficial relationships with other STEM efforts)
10. News Media included?	No (little to no contact between NASA Public Affairs & Mission-embedded EPO)	No (but strong coordination between a funded NASA Communications Plan and Mission-embedded Outreach)
11. Student Collaboration included?	No, Student Collaboration is separate	No (included in the original mission proposal as part of selection. Student Collaborators are interested to contribute to Outreach)

Modifications to
original AGU slide



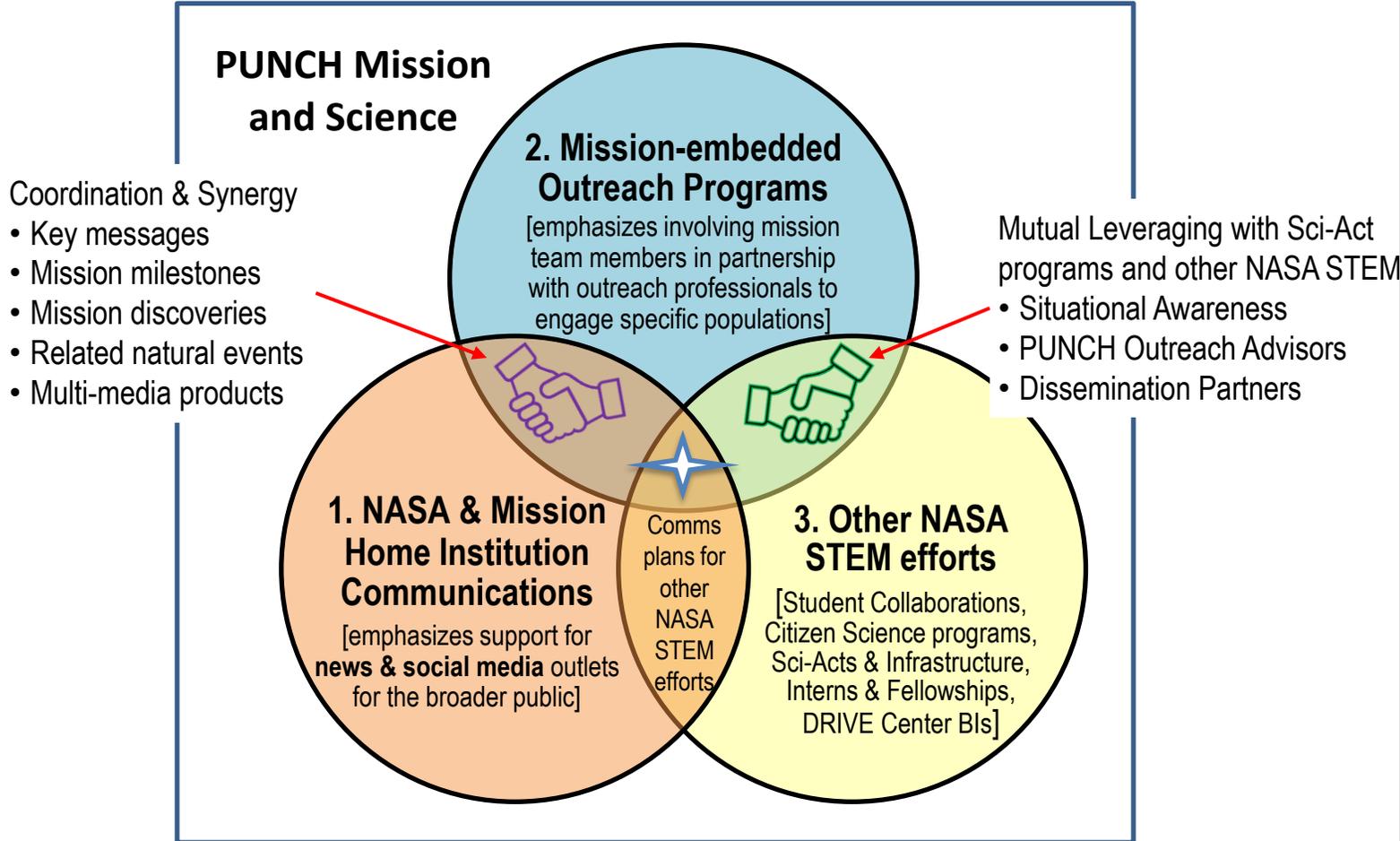


PUNCH Outreach is Synergistic and Complementary with Comms & Other STEM Efforts

Modifications to original AGU slide



ALL NASA STEM-related efforts intend to excite interest and inspire broader participation in STEM



This slide does not speak officially for NASA*

- This Venn diagram was created according to the process described in the caption in order to identify and communicate an appropriate niche for PUNCH mission-embedded outreach in the current NASA STEM landscape.
- The diagram is an expression of *situational awareness*, exemplifying rigor in the implementation of PUNCH Outreach that builds on prior work & leverages partnerships.
- As the diagram demonstrates, PUNCH outreach can offer exceptional access to the mission while complementing, extending, and synergizing with other NASA STEM elements.
- Additional feedback and conversation is welcomed and encouraged!

* Slide modified for PDF version of AGU slides on 18 Feb 2022

C. Morrow developed the 1st draft of the Venn and presented it to PUNCH scientists at a Meeting in Aug 2021. Since then, it has been reviewed and revised through a series of conversations with T. Cline, L. Bartolone, and A. Pearl. Additional reviews by C. DeForest, N. Viall, S. Frazier, and D. Hill



PUNCH Outreach is Synergistic and Complementary with Comms & Other NASA STEM Efforts

WHAT IS THE SAME? Where do NASA Comms and our Mission-Embedded Outreach program overlap?

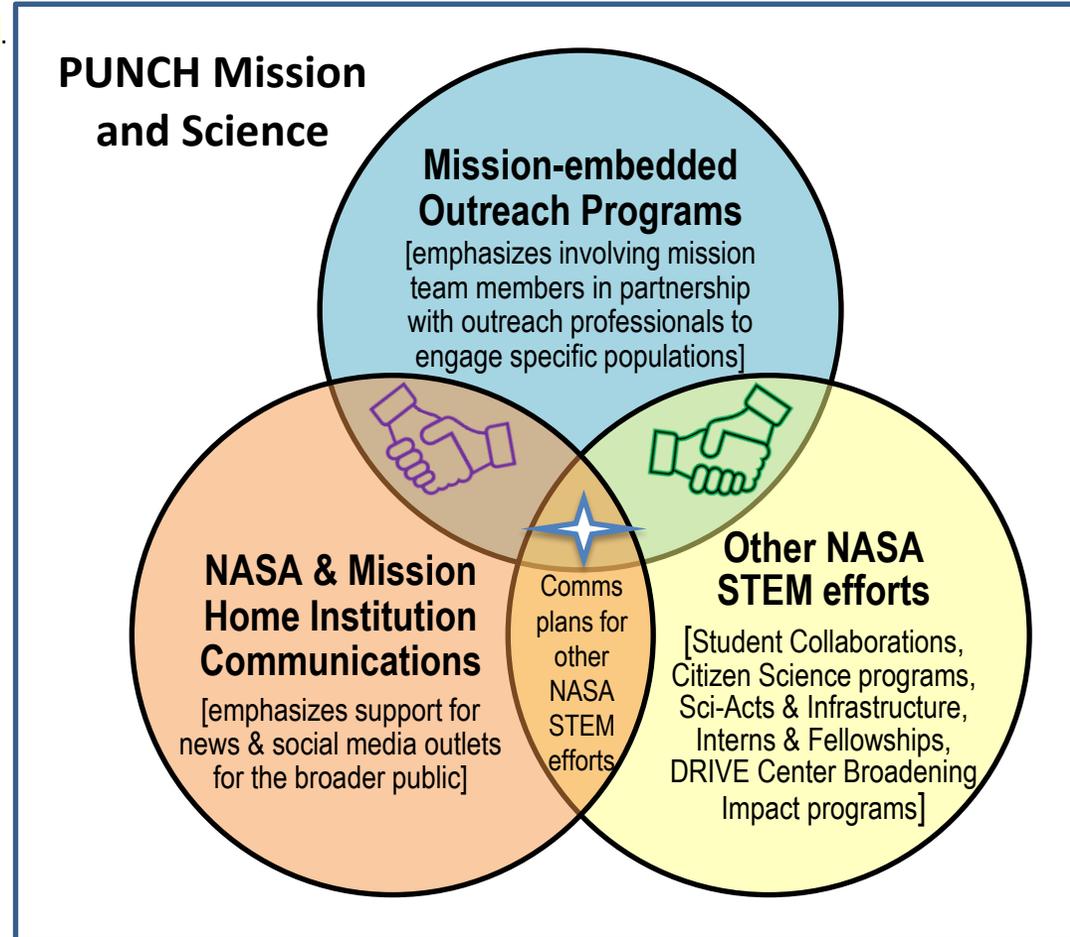
1. **Use of multi-media tools, mission milestones & discoveries to generate excitement and inspire public interest.**
2. Development and use of key scientific messages
3. Committed to excellence in science communication
4. Offering support for scientists in science communication
5. Interested in a thematic approach to communication
6. Use and development of AV Resources/Visualizations
7. Occasions when outreach is newsworthy of a press release
8. Interest in reaching a broad and diverse population

This Hidden slide was NOT included in the AGU presentation but is provided in this PDF version of the slides.

WHAT IS DIFFERENT? How do our Mission-Embedded Outreach & NASA Comms complement one another?

1. **Comms provides wide breadth of awareness via news & social media. Outreach takes the engagement a step deeper, bringing scientists into collaboration with outreach professionals to create products & events that inspire broader participation in STEM.** Outreach specializes more deeply than Comms in strategies for inclusion (IDEA).
2. Comms is a NASA-funded *obligation* for every approved mission. Mission-embedded outreach is an *opportunity* for supplementation of mission funds that requires submission of a proposal for NASA approval.
3. Outreach events can serve as a bridge between NASA Comms & other NASA STEM-related efforts.
4. Mission-embedded Outreach puts more emphasis on “scientist as a human being and role model” and creates opportunities for greater contact between mission scientists and diverse populations
5. Websites & social media developed by Mission Home Institutions emphasize support for mission research and outreach. They complement and coordinate with those developed by NASA Comms.
6. Outreach outlets are different than NASA Comms outlets (e.g., events at planetariums, science centers, National Parks, and other public venues)
7. Outreach creates experiences and opportunities designed to inspire curiosity and to engage diverse people in community dialogue that explores alternative possibilities or perspectives related to STEM.
8. Outreach specializes more deeply than Comms on how people encounter, receive, retain, and/or relate to STEM behaviors, attitudes, skills, interests, and content. Outreach emphasizes increasing [STEM identity](#).

NOTE: PUNCH Outreach began rhythmic communication with both NASA Heliophysics Communications and with NASA NSSEC/HEAT months *prior* to submission of our proposal.



C. Morrow developed the 1st draft of the Venn diagram and presented it to PUNCH scientists at a Science Team Meeting in Aug 2021. Since then, this slide has been reviewed and revised through a series of conversations with **T. Cline**, **L. Bartolone**, and **A. Pearl**. Additional reviews have been provided by **C. DeForest**, **N. Viall**, **S. Frazier**, and **D. Hill**



Outreach
for the
NASA
PUNCH
mission

PUNCH Outreach

Outline of Presentation



1. What is the PUNCH Mission Science and why should we care?
2. Our *Ancient & Modern Sun Watching* outreach theme
3. What is “New” about our approach to Mission-Embedded Outreach?
4. How is PUNCH MEO related to other NASA STEM efforts?
5. **Eight Guiding Principles for the PUNCH Outreach Program**



Eight Guiding Principles for the PUNCH Outreach Plan

1. Engaging outreach expertise in collaboration with mission leadership
(Strong outreach professionalism – Choosing your Outreach Lead with the same care as for your Project Scientist. 1. Knows NASA STEM world, 2. knows nature of scientific inquiry and interacts confidently with scientists, 4. applies research on how diverse people learn, 5. is well-networked nationally & can identify partners, including an evaluator.)
2. Synergizing the Science, Outreach, and Communication* Teams (* formerly Public Affairs)
(Requires the support and expressed expectation of mission leadership + an outreach-friendly science team)
3. **Coordinating & synergizing with allied NASA groups & missions (Venn Diagram)**
4. **Enacting a thematic approach to broaden participation (to make personal and cross-cultural connections to NASA science that are vital to minority learners)**
5. Aligning mission attributes with outreach participants, partners, and products
6. Leveraging strengths & partnerships among multiple institutions (making “Stone Soup”)
7. Learning from those we intend to benefit from the start (“audiences” as active collaborators)
8. Using evidence-based practices & integrating evaluative processes (use of logic model)

PUNCH Outreach is aligned with research that has demonstrated the importance of making STEM both personally and culturally relevant in order to increase the *STEM Identity* of diverse learners

Modification to
original AGU slide





Eight Guiding Principles for the PUNCH Outreach Plan

- 1. Engaging outreach expertise in collaboration with mission leadership (Strong outreach professionalism** – Choosing your Outreach Lead with the same care as for your Project Scientist. 1. Knows NASA STEM world, 2. knows nature of scientific inquiry and interacts confidently with scientists, 4. applies research on how diverse people learn, 5. is well-networked nationally & can identify partners, including an evaluator.)
2. Synergizing the Science, Outreach, and Communication* Teams (* formerly Public Affairs)
(Requires the support and expressed expectation of mission leadership + an outreach-friendly science team)
3. Coordinating & synergizing with allied NASA groups & missions (Venn Diagram)
4. Enacting a thematic approach to broaden participation
(to make personal and cross-cultural connections to NASA science that are vital to minority learners)
5. Aligning mission attributes with outreach participants, partners, and products
6. Leveraging strengths & partnerships among multiple institutions (making “Stone Soup”)
7. Learning from those we intend to benefit from the start (“audiences” as active collaborators)
8. Using evidence-based practices & integrating evaluative processes (use of logic model)

The PUNCH Outreach Lead and the Project Scientist both report directly to the PI

Modification to
original AGU slide





Eight Guiding Principles for the PUNCH Outreach Plan

- 1. Engaging outreach expertise in collaboration with mission leadership**
(**Strong outreach professionalism** – Choosing your Outreach Lead with the same care as for your Project Scientist.
1. Knows NASA STEM world, 2. knows nature of scientific inquiry and interacts confidently with scientists, 4. applies research on how diverse people learn, 5. is well-networked nationally & can identify partners, including an evaluator.)
2. Synergizing the Science, Outreach, and Communication* Teams (* formerly Public Affairs)
(Requires the support and expressed expectation of mission leadership + an outreach-friendly science team)
3. Coordinating & synergizing with allied NASA groups & missions (Venn Diagram)
4. Enacting a thematic approach to broaden participation
(to make personal and cross-cultural connections to NASA science that are vital to minority learners)
5. **Aligning mission attributes with outreach participants, partners, and products**
6. **Leveraging strengths & partnerships among multiple institutions (making “Stone Soup”)**
7. **Learning from those we intend to benefit from the start (“audiences” as active collaborators)**
8. **Using evidence-based practices & integrating evaluative processes (use of logic model)**

The PUNCH Outreach Team has the experience & expertise needed to enact all eight of these principles

Modification to
original AGU slide

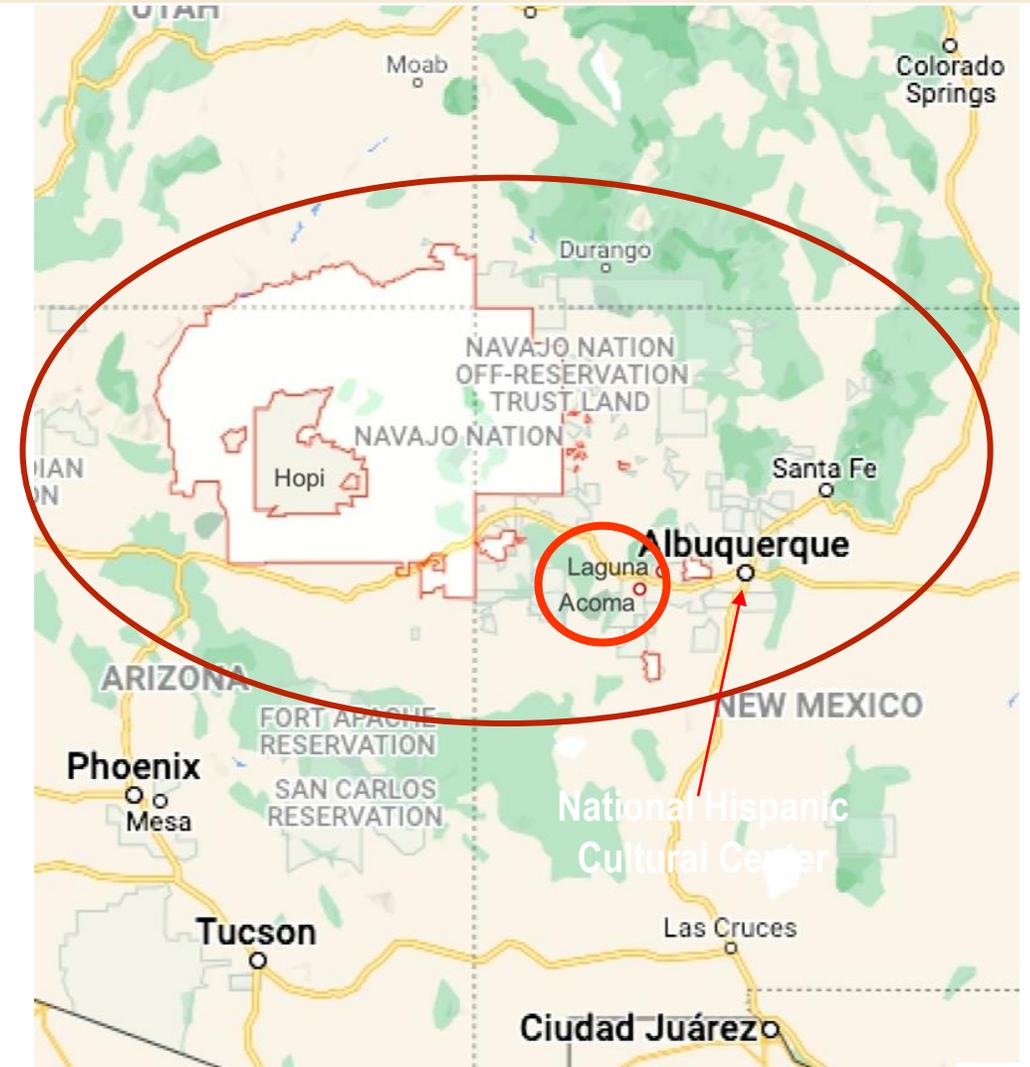


PUNCH Outreach is enacting a “Stone Soup” model of collaboration.



We are partnered with collaborators from the populations we aim to benefit in order to facilitate appropriate...

- ...outreach TO youth and families, AND ALSO
- ...outreach FROM the cultures to the broader population



This Hidden slide was NOT included in the AGU presentation but is provided in this PDF version of the slides.

Some Friends and Members of the PUNCH Outreach Team

Annual Team Retreat 2021



PUNCH Outreach Participants, Partners, Products & Events are inspired by PUNCH science & mission team

- Native American & Latinx youth & families
- National Park Visitors (Chaco)
- Blind & Visually Impaired
- Girls in STEM

Our efforts to be more inclusive are leading us to more enriching, multi-cultural, multi-sensory outreach products and events for all!

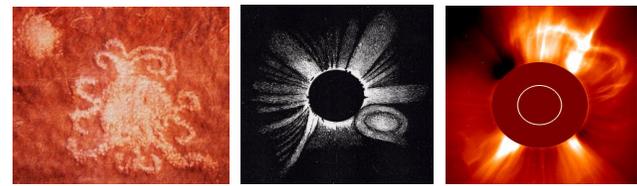


Community STEAM Events
 Emphasis on broadening participation of Native & Latinx youth & families

Live-Interaction Planetarium Shows
 Interactive & embodied options for ALL learners

Solar Observing Tactiles & Events for the Visually Impaired
 Emphasis on learners at B/VI Schools

PUNCH "Bowl" of Outreach Event Resources
 Arts & STEM integration
 Access to PUNCH scientists
 Direct & indirect solar observing
 Multi-sensory activities (audio, visual, tactile, kinesthetic)
 Up-to-date mission information
 Pathways to other NASA efforts



Preliminary Design for a Girl Scout Patch



Girls Scouts and Out-of-School Time Patches & Events
 Girls in STEM
 Native & Hispanic youth

~ 25% of PUNCH Science Team members are women

Chaco Interpretive Materials & Events
 Emphasis on visits by regional youth groups

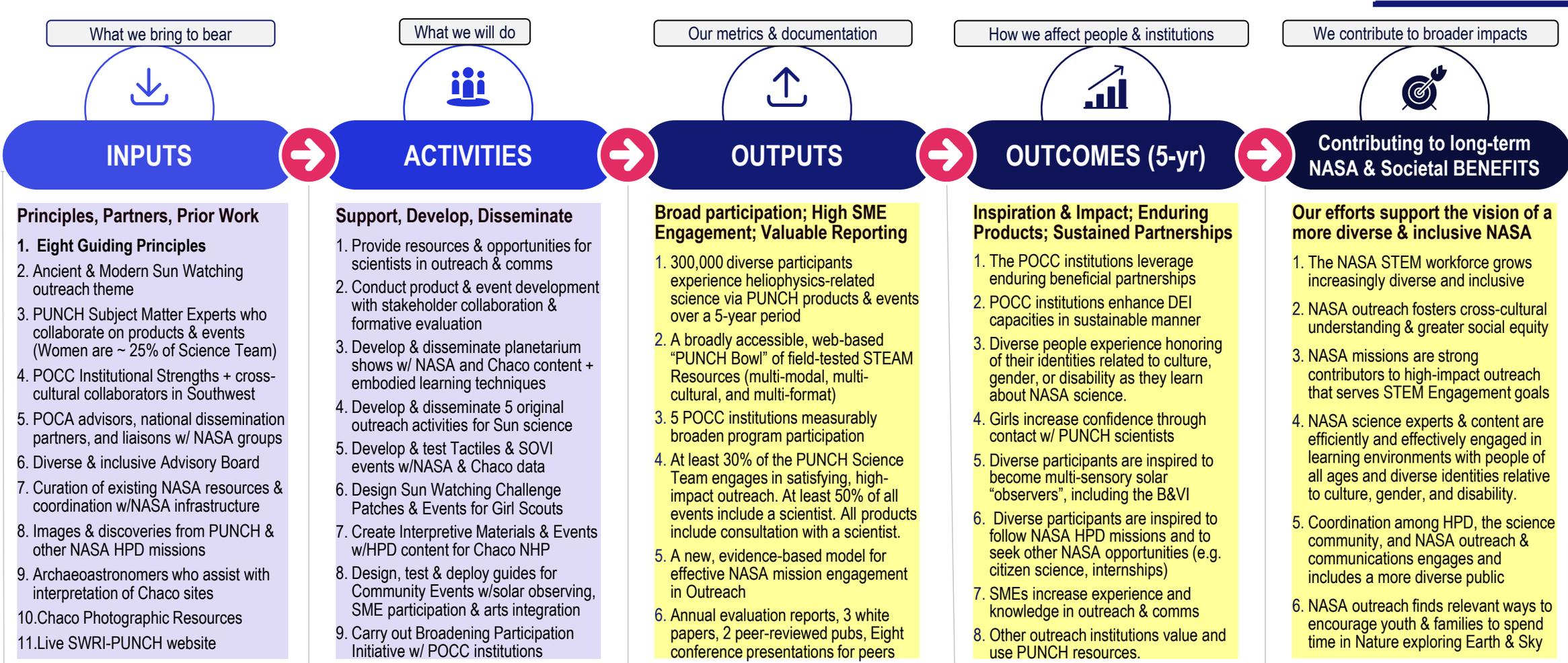


"It's not rocket science, it's harder." - Pinky Nelson, solar physicist, NASA astronaut, and STEM educator

PUNCH Outreach Logic Model

Enhancing Diverse Public Engagement in NASA Heliophysics

PUNCH Outreach: Shining a Light on Diverse Views of the Sun with an Ancient & Modern Sun Watching Theme



Planned Work

Intended Results



The Logic Model for Outreach is Similar the Traceability Matrix used for Mission Design



*The **Logic Model** for the PUNCH Outreach Program is similar to the **Traceability Matrix** we use in mission design.*

Both of them allow us to relate cleanly our large-scale goals to the details of implementation. Thus our outreach design echoes the rigor applied to design of the mission itself.

Craig DeForest, PhD

PUNCH Principal Investigator
Southwest Research Institute
Boulder, Colorado





Outreach
for the
NASA
PUNCH
mission

PUNCH Outreach aims to make a beneficial and *enduring* contribution

This Hidden slide was NOT included in the AGU presentation but is provided in this PDF version of the slides.

PUNCH Outreach will positively affect **hundreds of thousands** of people in the **5-year period** of PUNCH funding...

... and **vastly more people** as our enduring products and event **planning guides** are used for **heliophysics outreach** by our partner organizations and other institutions all over the nation ...

....even after the eclipses and the PUNCH mission are complete.



Shining a Light on
Diverse Views
of the Sun
with an
*Ancient & Modern
Sun Watching
Theme*

PUNCH Outreach will leave a legacy of products, event planning guides, and partnerships that endure!



Eight Guiding Principles for the PUNCH Outreach Plan

1. Engaging outreach expertise in collaboration with mission leadership
(**Strong outreach professionalism** – Choosing your Outreach Lead with the same care as for your Project Scientist.
1. Knows NASA STEM world, 2. knows nature of scientific inquiry and interacts confidently with scientists, 4. applies research on how diverse people learn, 5. is well-networked nationally & can identify partners, including an evaluator.)
2. **Synergizing the Science, Outreach, and Communication* Teams** (* formerly Public Affairs)
(Requires an outreach-friendly science team + the support and expressed expectation of mission leadership)
3. Coordinating & synergizing with allied NASA groups & missions (situational awareness)
4. Enacting a thematic approach to broaden participation
(to make personal and cross-cultural connections to NASA science that are vital to minority learners)
5. Aligning mission attributes with outreach participants, partners, and products
6. Leveraging strengths & partnerships among multiple institutions (making “Stone Soup”)
7. Learning from those we intend to benefit from the start (“audiences” as active collaborators)
8. Using evidence-based practices & integrating evaluative processes (use of logic model)

Both the PUNCH PI and Project Scientist are strong advocates for synergizing the PUNCH mission’s Science, Outreach, and Communications Teams.

Modification to
original AGU slide



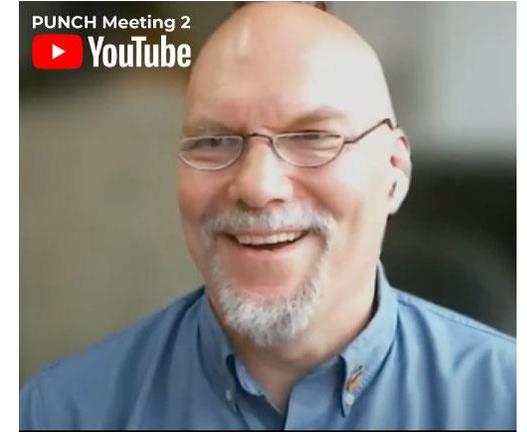


The PI and Project Scientist are very supportive of PUNCH Outreach



I am so pleased with the capability of our outreach team and the inclusivity of our mission-embedded outreach program. I strongly encourage PUNCH scientists to GET INVOLVED.

Craig DeForest, PhD
PUNCH Principal Investigator
Southwest Research Institute
Boulder, Colorado



Our science team is really excited about contributing to the outreach effort.

*We have a **high percentage of women scientists compared to other NASA missions** and this makes us a great source of role models to support our STEM collaborations with Girl Scout Councils.*

Sarah Gibson, PhD
PUNCH Project Scientist
High Altitude Observatory
Boulder, Colorado

Preliminary Design for
a Girl Scout Patch





The PUNCH Science Team is Enthusiastic about Outreach

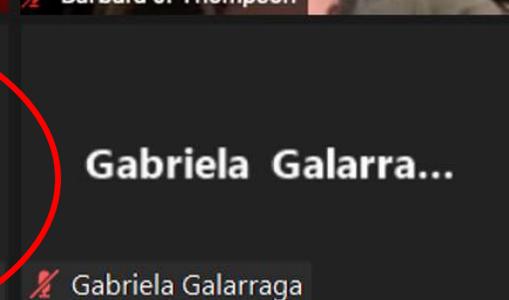
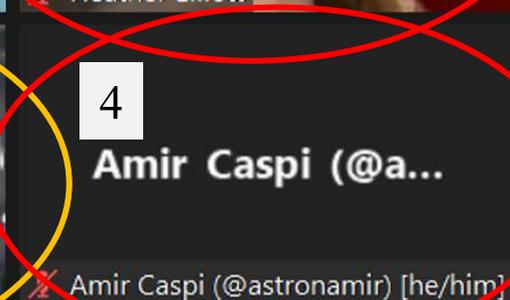
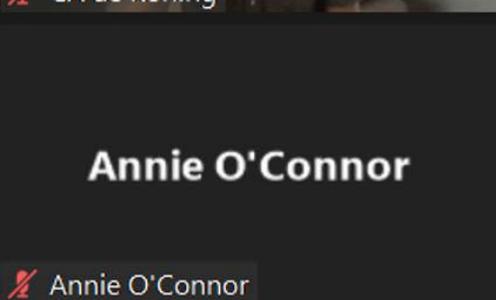
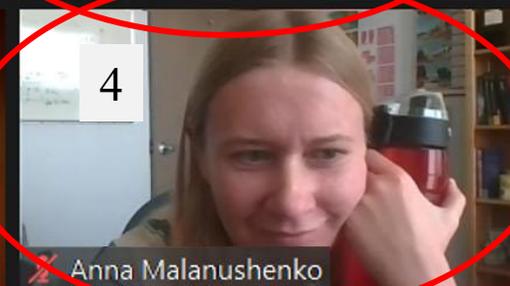
This Hidden slide was NOT included in the AGU presentation but is provided in this PDF version of the slides.

Survey of the <u>PUNCH Science Team</u> (N=30) 1-3 June 2020	I love to teach	I love to communicate my science to diverse audiences	I enjoy being a resource for the news media
% who "Agree" or "Strongly Agree"	> 60%	> 85%	> 65%



PUNCH leadership and the science team are providing an environment where an integrated program of outreach can THRIVE!

The PUNCH Science team is an outreach-aware group of leading-edge researchers (~half the team pictured below)





Outreach
for the
NASA
PUNCH
mission

What is PUNCH learning about the advantages of a mission-embedded outreach program?

OUTREACH TEAM HAS CLOSER CONTACT & GREATER FAMILIARITY with the **SCIENCE TEAM** and with **NASA COMMUNICATIONS** associated with the mission.

This Hidden slide was NOT included in the AGU presentation but is provided in this PDF version of the slides.

1. More opportunity for ongoing dialogue and **mutual learning & professional development**. Science team learns more about effective outreach. Outreach partners learn more NASA science and missions.
2. Diverse opportunities for **more scientists to participate in enjoyable outreach roles** that are aligned with their interests and experience (according to poll data).
3. More opportunity for **contact between scientists and diverse learners**, including scientists as broader human beings and role models.
4. **Enhanced scientific accuracy and currency** for outreach products and events
5. Easier **awareness of (and access to) scientific data & simulations** that are valuable to outreach products & events.
6. **Greater opportunity** to collaborate & synergize with NASA Communications on videos & visualizations for news & social media that mark mission milestones & discoveries.



See also:
<https://ui.adsabs.harvard.edu/abs/2004AGUFMED41B0251M/abstract>

The research & evaluation plan for PUNCH Outreach is designed to observe and study the PUNCH example of mission-embedded outreach.

QUESTION: *Can mission-embedded outreach enhance the opportunity to optimize the value of NASA assets (people, missions, data, discoveries) for meeting the needs & opportunities of specific communities vis-à-vis science learning & inspiration?*



The PI's leadership is essential to beneficial coordination



*I must insist on full intra-team coordination among **Science, Outreach, and Communications** about how our mission is represented to the public. We must present as a united mission, especially moving forward into the next phases. [Email]*

Craig DeForest, PhD
PUNCH Principal Investigator
Southwest Research Institute
Boulder, Colorado



Our PI's leadership is essential to beneficial coordination among Science, Outreach, and NASA Communications

First National PUNCH Outreach Presentation to the NASA Night Sky Network

This talk was prepared collaboratively among PUNCH Science, Outreach, and Communications Teams and was a “home run”!

This outreach presentation...

1. ... is **consistent with Key Messages** in the NASA Communications Plan and **adapted for audience** interests and level of science expertise
2. ... starts with the familiar & concrete as bridge to the abstract & unfamiliar and is **sensitive to common misunderstandings**
3. Is *not* full of research paper graphics with unfamiliar units and without adequate time to explain
4. ...**conveys the personal enthusiasm and broader humanity** of the presenter
5. ...**provides inspiration & pathways** to PUNCH Outreach & other NASA resources



Polarimeter to UNify the Corona and Heliosphere (PUNCH)

Dr. Nicholeen Viall
Research Astrophysicist/PUNCH Mission Scientist
NASA Goddard Space Flight Center



PI: Dr. C. DeForest; PS: Dr. S. Gibson;
Outreach Lead: Dr. C. Morrow

Outreach is fully integrated into the primary PUNCH mission website

Our website is an example of collaboration and coordination among the Science, Outreach, and Communications teams

PUNCH Polarimeter to UNify the Corona and Heliosphere

Home About Science Media **Outreach**

- Outreach Overview
- What Is Heliophysics?
- Outreach Team
- Support for Scientists
- Outreach Products
- Publications/Presentations

WHAT IS PUNCH?

PUNCH is a NASA Small Explorer (SMEX) mission to better understand how the mass and energy of the Sun's corona become the solar wind that fills the solar system. Four suitcase-sized satellites will work together to produce images of the entire inner solar system around the clock.

WHY PUNCH?

Every second, over 300,000 tons of solar material streak outward into space in the solar system, in the form of the solar wind, aurora, and northern lights. It also powers our power grids, satellites, and climate. PUNCH will track the solar wind and help us better understand its effects on humanity.

NEWS

<https://punch.space.swri.edu/>

- PUNCH 2 Science Meeting talks on Youtube 2021-10-12
- PUNCH Outreach Seeks Input on Common Misunderstandings about Sun-related Science 2021-08-25
- SwRI-led NASA mission announces novel outreach program 2021-08-09

THE MISSION

Fast Facts About PUNCH and its Instruments

THE SCIENCE

A New View of the Corona and Heliosphere

GET INVOLVED

USE THE DATA

Our website...

1.reflects respect for **Outreach professionalism** on par with mission Science
2. ...represents outreach team members, products, and presentations in parallel with the Science team.
3. ...contains Heliophysics content for non-specialists directly linked to each of the mission science objectives
4. **includes News about Outreach achievements** alongside other Mission-related news. SwRI Press Release on NASA approval of PUNCH Outreach.



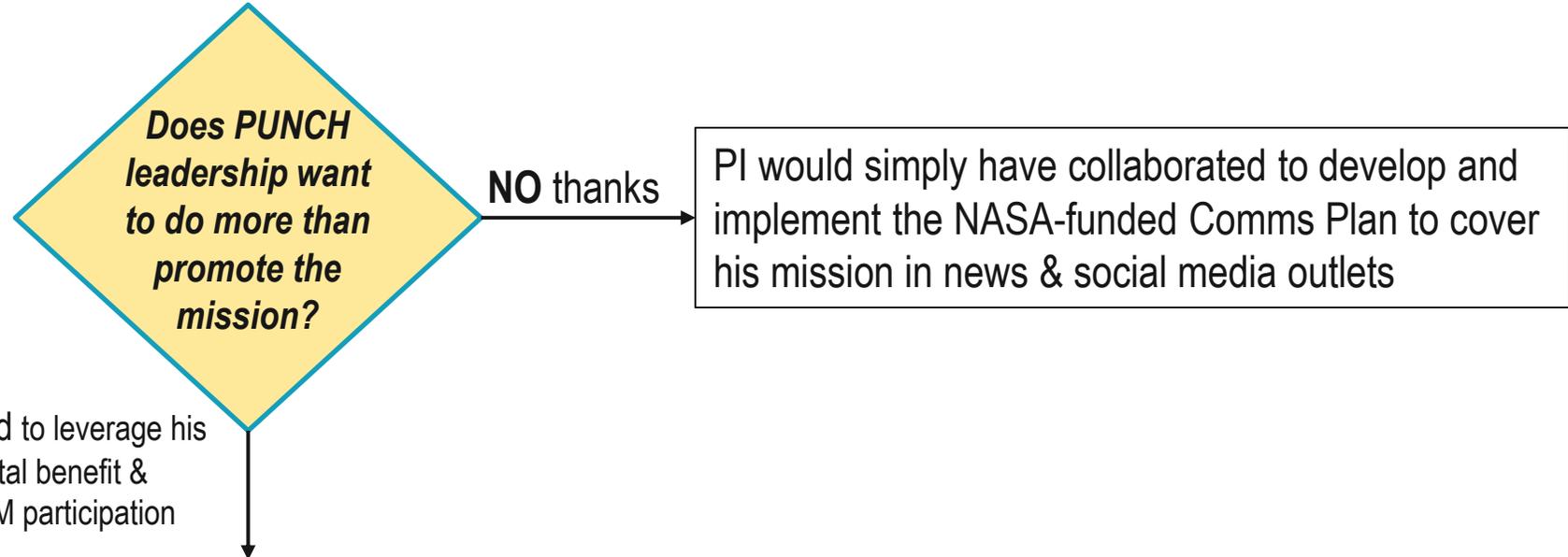
Outreach
for the
NASA
PUNCH
mission

Modification to
original AGU slide



YES, PI wanted to leverage his
mission for societal benefit &
broadening STEM participation

Outreach-Related Decisions and Actions Enacted in Phase B of the PUNCH Mission



1. Identified, hired, and supported an Outreach Lead with strong professionalism (soon after mission selection)
2. Collaborated with the Outreach Lead to develop and submit a proposal for an Outreach Plan (8 Guiding Principles)
3. Welcomed the Outreach team to the Mission Team and integrated their participation
4. Insisted on strong coordination among Science, Outreach, and Communications.
 - a. Included Outreach program updates in Science team meetings and Science updates in Outreach team meetings
 - b. Encouraged and supported our science & mission teams to be Outreach collaborators and contributors (conducted poll)
 - c. Involved the Outreach Lead in developing a mission website that integrates (rather than just tags on) an Outreach dimension
 - d. Involved the Outreach Lead in Comms telecons & collaboration to develop the Comms Plan for news & social media outlets

This is what PUNCH has done (and is doing) to realize the fullest benefits of Mission-Embedded Outreach

FIN

Thank you for your time and attention!