OF MICE AND MEN

A SUMMER OF HABITAT RESEARCH

SOPHIE ORR

OVERVIEW

- **Anacapa Sciences Internship:** HERA analog audio/video Journal Analysis
- **NASA Ames Internship:** Rodent Habitat Research
- **GRA Project:** Exercise and Human Performance Module for the UND Inflatable Lunar/Mars Habitat

ANACAPA SCIENCES INTERNSHIP: HERA Analog Audio/Video Journal Analysis

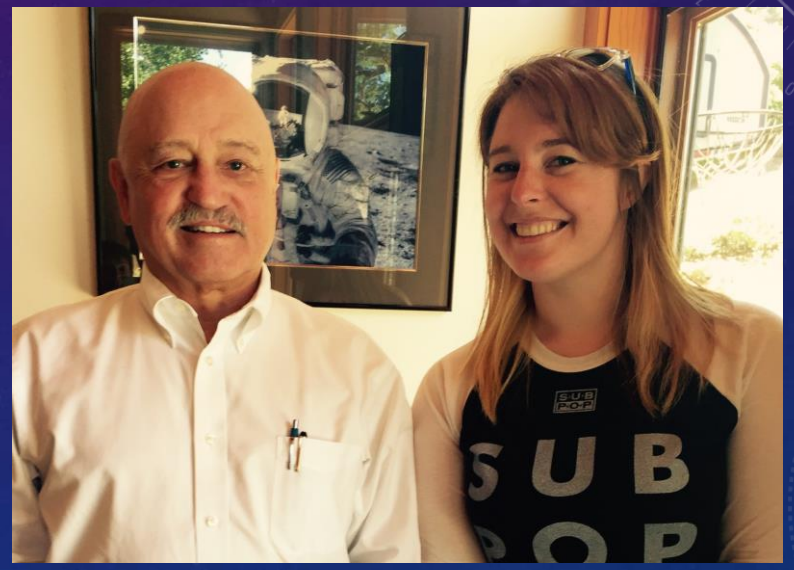
ANACAPA SCIENCES INTERNSHIP:
HERA Analog Audio/Video Journal Analysis

Dr. Jack Stuster

- Anthropologist
- Writer
  - Bold Endeavors
- President of Anacapa Sciences

Anacapa Sciences

  - Behavior, ergonomics, task analysis
  - Government, Military and Private clients



ANACAPA SCIENCES INTERNSHIP:
HERA Analog Audio/Video Journal Analysis

My task is to transcribe, code and parse journal entries from several of NASA's Human Exploration Research Analog (HERA) missions.

The HERA Missions:

- HERA facility located at JSC, Houston
- 4 missions included in the study
- 30 days each
- 4 crew members
- Analog missions designed for scientific testing,

  and mission analysis

ANACAPA SCIENCES INTERNSHIP:
HERA Analog Audio/Video Journal Analysis

Categorization:

- Topic
- Positive, negative or neutral comment

Future Use:

- Determine areas for growth or adjustment
  - Protocol improvement
- Psychological Analysis
  - ¾ effect
  - Crew dynamics & selection
- Apply to UND Inflatable Lunar Habitat

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HERA Analog Audio/Video Journal Analysis

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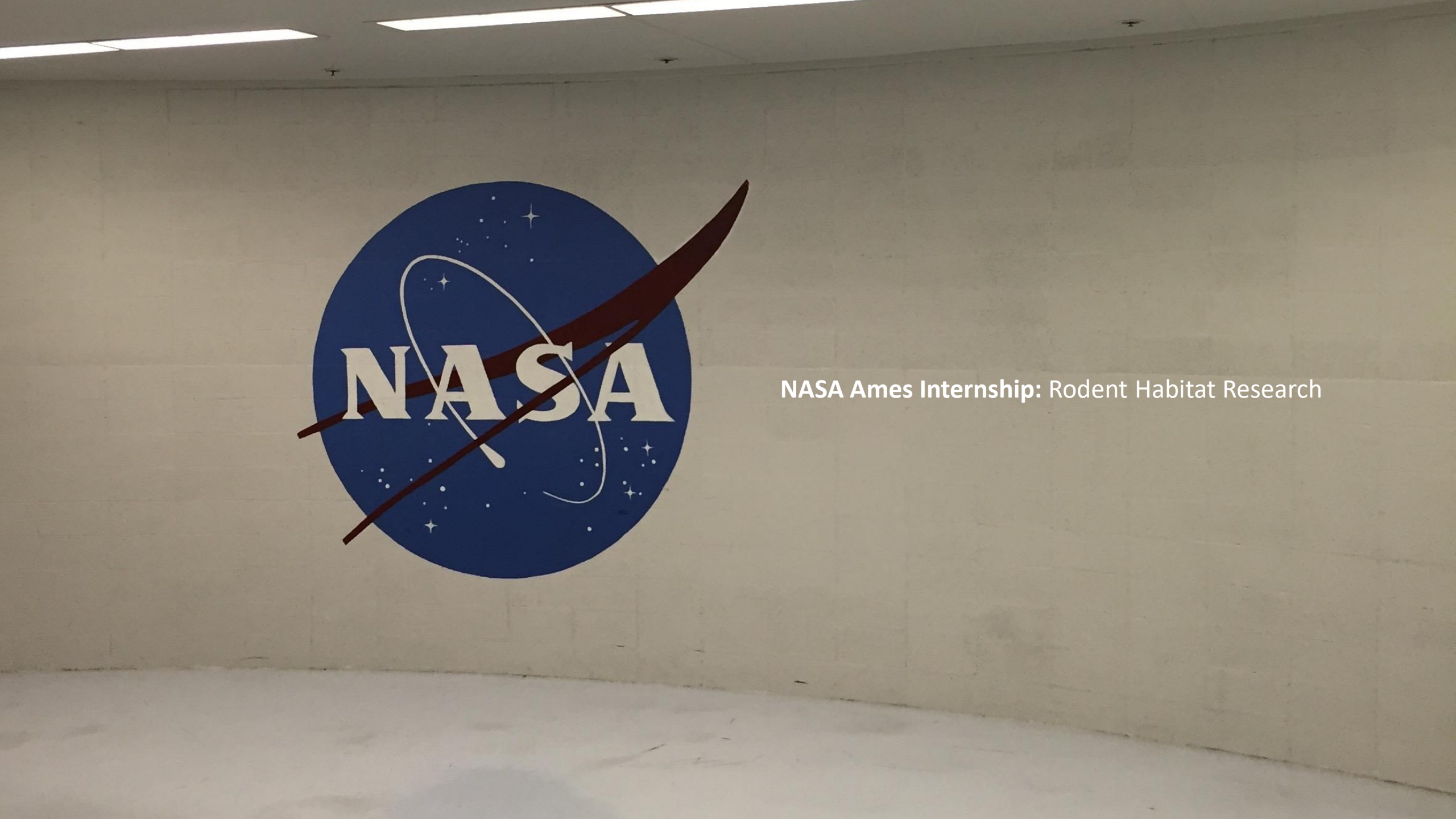


NASA Ames Internship: Rodent Habitat Research

NASA AMES INTERNSHIP: Rodent Habitat Research

- Advanced Modifications in the Rodent Habitat System to Improve Rodent Health During Space Flight Summer Intern at NASA Ames Research Center, June 6 - August 12, 2016
- Goals:
  - Create Habitat modifications for NASA's International Space Station Rodent Habitat Hardware System
  - Test Modifications
  - Write a scientific paper for a peer-reviewed journal

NASA AMES INTERNSHIP: Rodent Habitat Research

Justifications

- Rodent reactions to microgravity environment
- Stress reduction eliminates variables

(video)

NASA AMES INTERNSHIP: Rodent Habitat Research

Methods

- ISS Video analysis
- Literature review
- Rodent Research hardware assessment
- Equipment research

NASA AMES INTERNSHIP: Rodent Habitat Research

Environmental Enrichment

The incorporation of complexity into a habitat that benefits the organisms inside based on their behavior and other genetic factors

Increases…

- Control of Environment
- Interaction with environment
- Occurrence of natural behaviors & homeostasis
- Benefits to all strains of mice

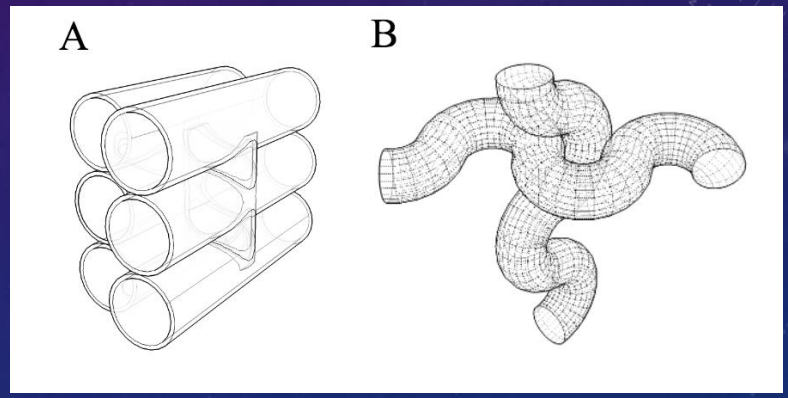
Decreases…

- Occurrence of stereotypies
- Boredom
- Handling anxiety
- Stress

NASA AMES INTERNSHIP: Rodent Habitat Research

Proposed Tubing System

- Allows placement of medical monitoring equipment
- Mice can use entire volume of the habitat with increased surface area
- Eliminates competition that reduces access to food/water
- Maintains visibility of filtration, airflow and video monitoring systems
- Facilitate transition of animals between Rodent Habitat Hardware System units



NASA AMES INTERNSHIP: Rodent Habitat Research

Non-Invasive Medical Data Solutions

Current ISS Rodent handling protocol:

- Man hour intensive
- Mice must be removed form their habitat
- Potential for altering data due to unnecessary rodent stress

Non-invasive electrocardiogram (ECG) equipment

- Captures the real time ECG data during spaceflight
- Minimal to no human involvement
- No restraints or anesthesia required
- Reduction in mouse stress

NASA AMES INTERNSHIP: Rodent Habitat Research

ECG Electrode Configurations

Currently utilized electrode designs

- 3 limbs touch separate electrodes
- Raised stand that fits one mouse
- On a horizontal plane

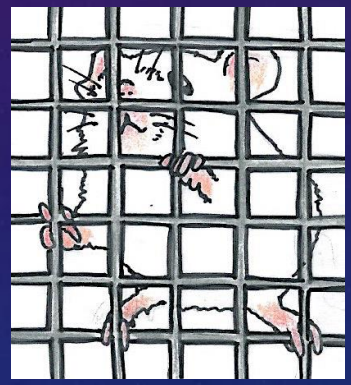
Cylindrical design

- Allows for more contact points
- Applicable for space research
- Creates breaks in light for rodents

Grid Implementation design

- Reduces slick surface contact
- Doesn't interfere with air and waste filtration
- Uses surfaces mice already voluntarily touch in space

Current Electrode Designs



Grid Implementation Designs

Cylindrical Design

NASA AMES INTERNSHIP: Rodent Habitat Research Conclusions

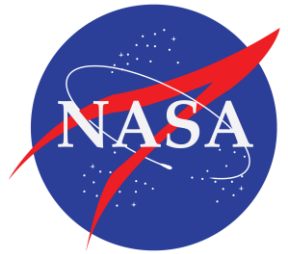
- Problem:
  - Rodent stress in space from novel conditions
  - Skewed data caused by human interaction
- Solutions:
  - Implementation of species specific environmental enrichments
  - Incorporation of non-invasive ECG monitoring equipment
- Future research:
  - Implementation and assessment
  - Behavioral analysis
  - Study of environmental enrichments as supplement for ILMH

CONCLUSIONS: HABITAT RESEARCH

- Connections between Rodent and Human habitat design and assessment
- Use of audio/video journaling
- Environmental enrichments

ACKNOWLEDGEMENTS

- NASA, Dr. Yuri Griko, John Rask, Tanner Adams, Rhonda Weigand
- Dr. Jack Stuster and Anacapa Sciences, Inc.
- UND: Dr. Vadim Rygalov, Dr. Pablo de Leon and the entire Space Studies Faculty/Staff
- Special thanks to Caitlin Nolby & Marissa Saad and the NDSGC for funding my internship endeavors

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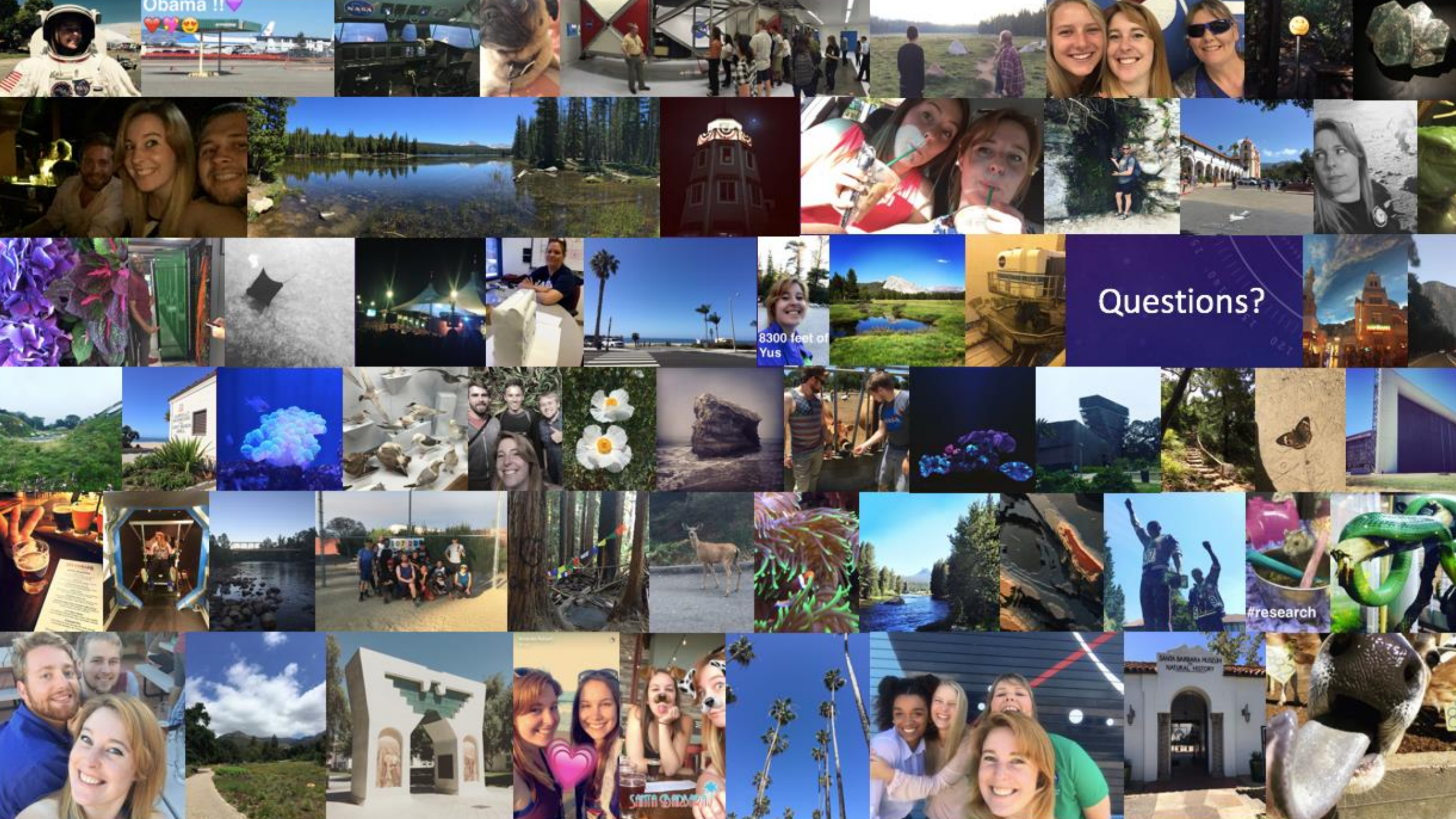
Obama !!
8300 feet of Yus
Questions?
#research