



# CREW WELLNESS IN SHORT DURATION MARS ANALOG MISSION – PILOT STUDY

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# Disclaimer – Planetary Protection Law was considered!

- Disclosure – NIL
- CITIZEN SCIENCE
- These are my personal views and doesn't necessarily represent the organizations
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# Background

- Flight Surgeon – Royal Air Force of Oman
- Candidate – Project SIRIUS
- Scientist-Astronaut Candidate – Untethered Exploration (Project PHENOM/ARES, Project PoSSUM)
- Analog Astronaut – Mars Academy USA



# MDRS

- Mars Desert Research Station
  - *Hanksville, UT*
- Mars Simulation
- Myself one of the subject
  - *Limited participants*
  - *Too important data to be missed*
  - *Tried to eliminate confounding as much as possible*



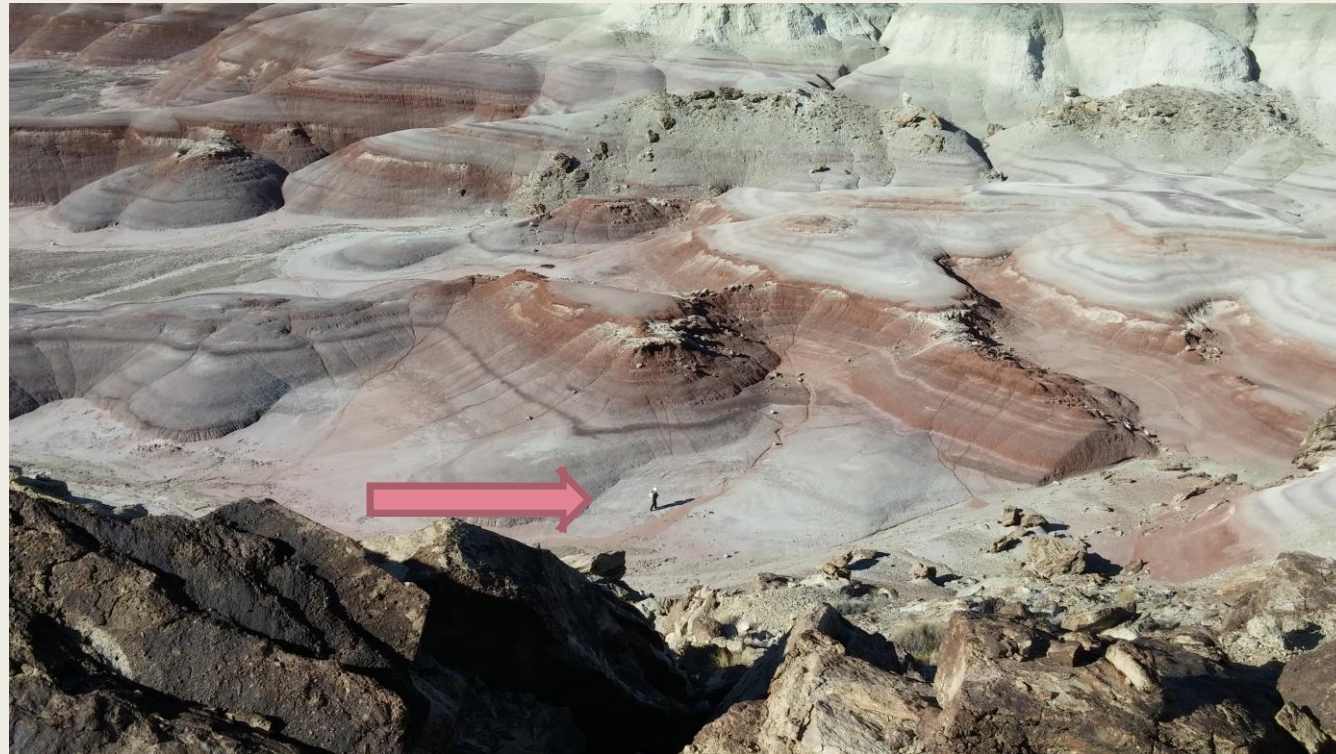
# Crew



- Five
  - 3 American, 1 Indian, 1 Canadian/Romanian
- Background
  - Diver (US Navy Cdr-ret'd)
  - Pilot
  - Flight Surgeon
  - Engineer-computers
  - Science-PR



# Martian looking landscape



# The Hab (spent rocket)



- Upper Deck
- Lower Deck
- Science Dome
- Astronomy
  - *Solar*
  - *Night*
- RAM (repair and maintenance module)



# Role

- Primary
- Secondary – Everything else





# Simulation Spacesuit

- Cannot be used in real missions
- Open loop
- Basic life support systems



# Martian Simulation Environment

- 12 days
- Close quarters
- Limited Resources
  - *30 gallons of water/day – entire crew*
  - *Food ration*
  - *1 GB data per day*
  - *No synchronous contact with outside world*



# WEMWBS

- Warwick-Edinburg Mental Well-being Scale
  - *5 point Likert Scale*
  - *14 statements*
- Validated for previous 2 weeks
- Simple and easy to use

## The Warwick-Edinburgh Mental Well-being Scale (WEMWBS)

Below are some statements about feelings and thoughts.

Please tick the box that best describes your experience of each over the last 2 weeks

STATEMENTS	None of the time	Rarely	Some of the time	Often	All of the time
I've been feeling optimistic about the future	1	2	3	4	5
I've been feeling useful	1	2	3	4	5
I've been feeling relaxed	1	2	3	4	5
I've been feeling interested in other people	1	2	3	4	5
I've had energy to spare	1	2	3	4	5
I've been dealing with problems well	1	2	3	4	5
I've been thinking clearly	1	2	3	4	5
I've been feeling good about myself	1	2	3	4	5
I've been feeling close to other people	1	2	3	4	5
I've been feeling confident	1	2	3	4	5
I've been able to make up my own mind about things	1	2	3	4	5
I've been feeling loved	1	2	3	4	5
I've been interested in new things	1	2	3	4	5
I've been feeling cheerful	1	2	3	4	5

Warwick-Edinburgh Mental Well-being Scale (WEMWBS)

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# Result - Wilcoxon

- Mean average of crew wellness of entire crew is higher between pre and post sim
- Feeling optimistic, Feeling relaxed, Interested in new things, Feeling good about myself showed significant change
- Dealing problems well, thinking clearly, energy to spare, feeling cheerful showed positive change
- Individual Analysis – 1 – fully significant; 1 – no change; 2 – higher (not statistically significant); 1 –  $P < 0.05$  but  $W$  is 0

# Discussion

- Overall Positive impact of mission
- Cohesion of crew - composition
- Prior engagement and training of crew – online and field
- Expectations defined prior to mission
- Contingencies and preparation along with adaptation

# GreenHab

- Vegetarian Astronauts
  - *Long duration mission*



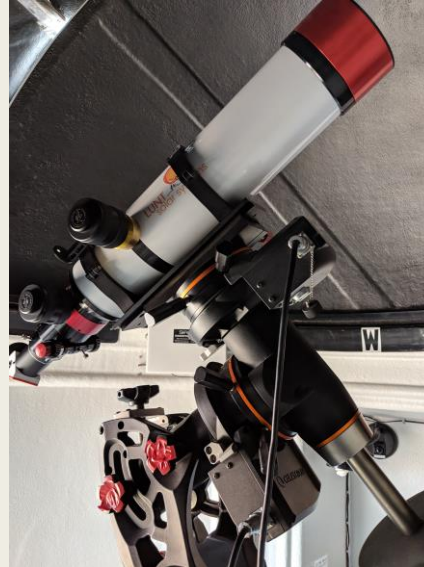
# Space Food

*Vegetarian astronauts have advantage in long duration mission*



# Astronomy

- Solar
- Night time





# Scientific Experiments

- Skeletal muscle study
- Weight measurements – pre & post EVA
- MAG study
- Wellbeing Study
- 360 photosphere
- Medical emergency in EVA



# MAG

- Maximum absorption garments
- Astronauts do wear diapers



# Navigation

- Map
- Compass
- Celestial



# Geology



# Astrobiology



# Extra Vehicular Activity (EVA)



# Extra Vehicular Activity

- EVA



# Rovers







# Social Media - SpaceDocAshok



- Facebook: <https://www.facebook.com/Space-Doc-Ashok-432453850541529/>
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# Thank You



# Questions

