Study of the impact of long-term space travel on the Astronauts' microbiome. (Microbiome)

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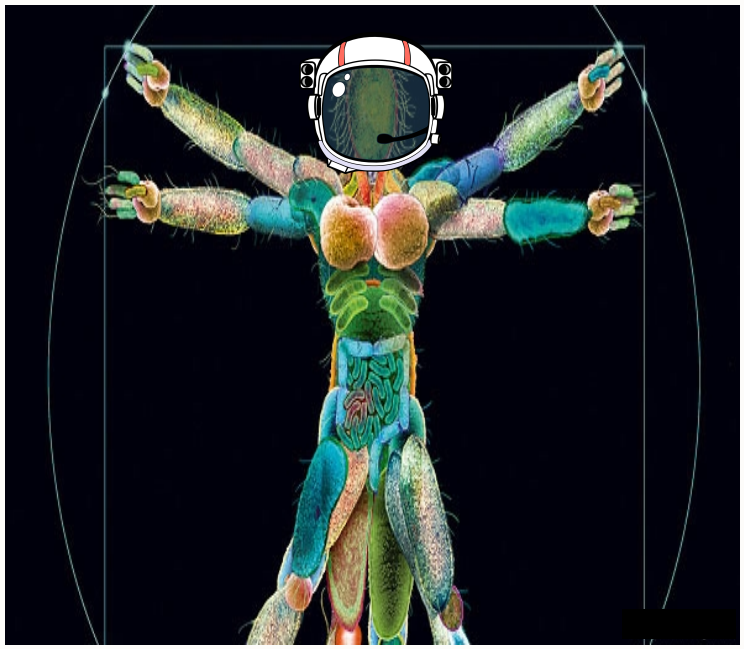

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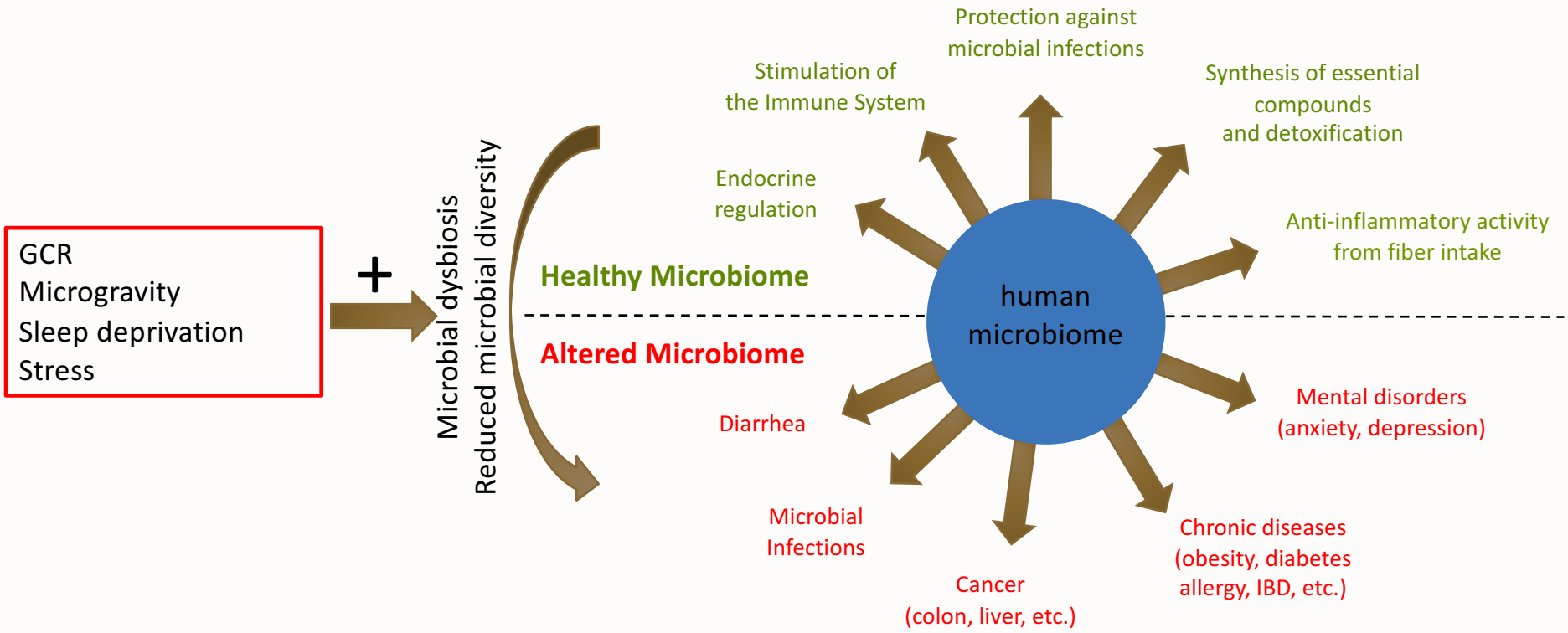
The human microbiome in health and disease



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Project Aims

Hypothesis: Long-term exposure to stressors specifically associated with spaceflight affects the composition and relative abundance of the astronauts microbiome.

- Aim 1: To characterize changes occurring in the gut, oral, skin and nose microbiomes of astronauts during a space mission
- Aim 2: To assess astronauts' immune function and stress levels and their effect on the crew microbiome.
- Aim 3: To investigate whether environmental microbes of the ISS and other factors such as diet may promote changes in the astronaut's microbiome.

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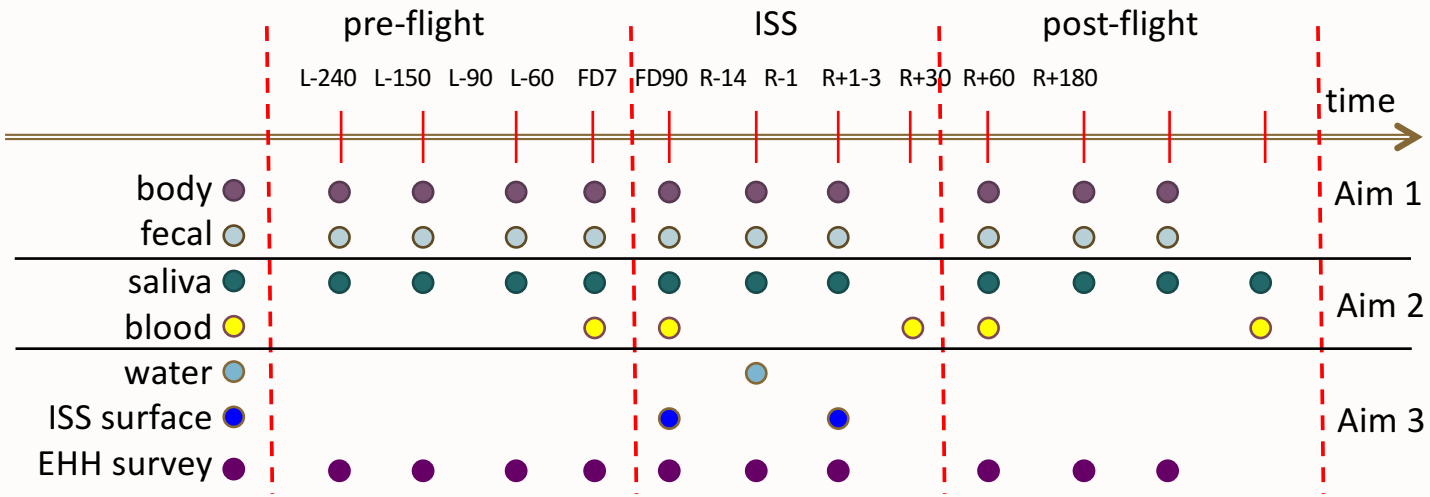
Experimental design

– Longitudinal study; N=9 astronauts that stay at least 6 months in ISS



	astronauts' microbiome	stress	immune system	environmental microbiome	EHH survey
Data types	-16S V4 -metagenomic sequencing (microbial and viral fractions)	-cortisol -VZV/EBV virus reactivation	-cytokines	-16S V4	-Metadata: diet health status Temp Humidity

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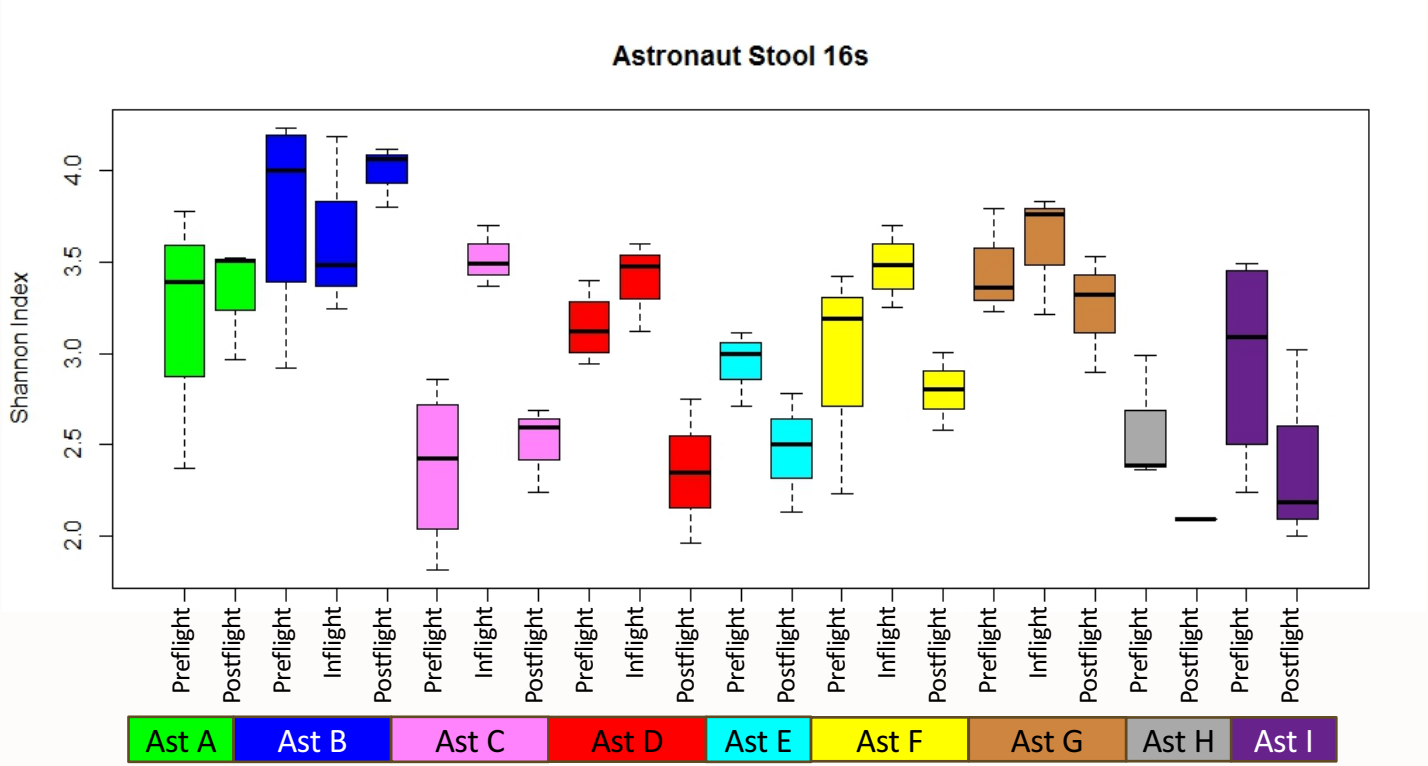
Variation of stool alpha diversity during a mission to the ISS



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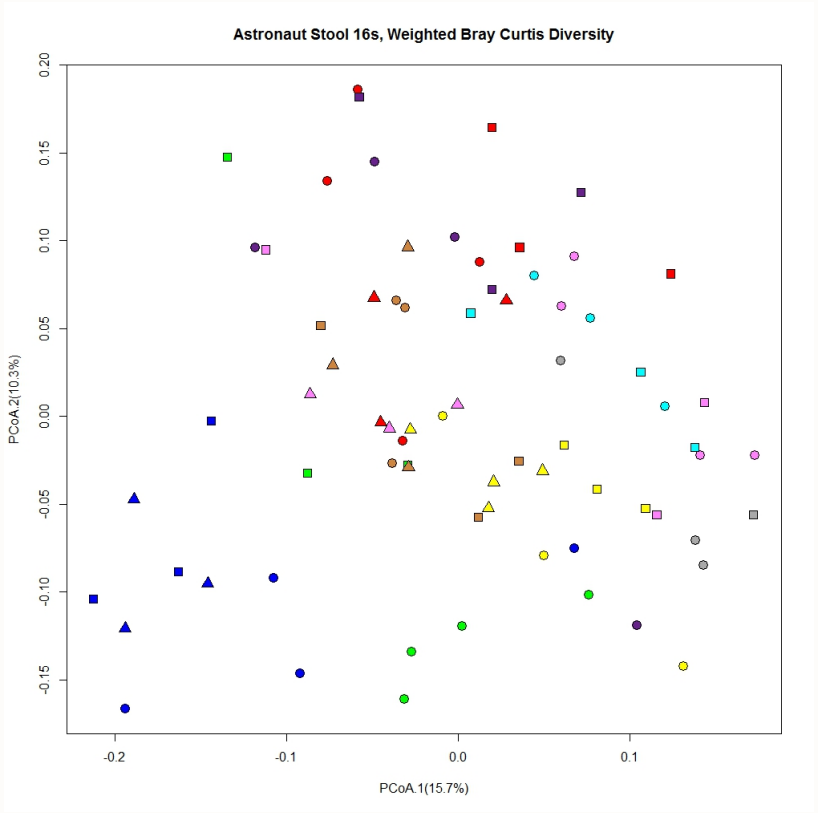
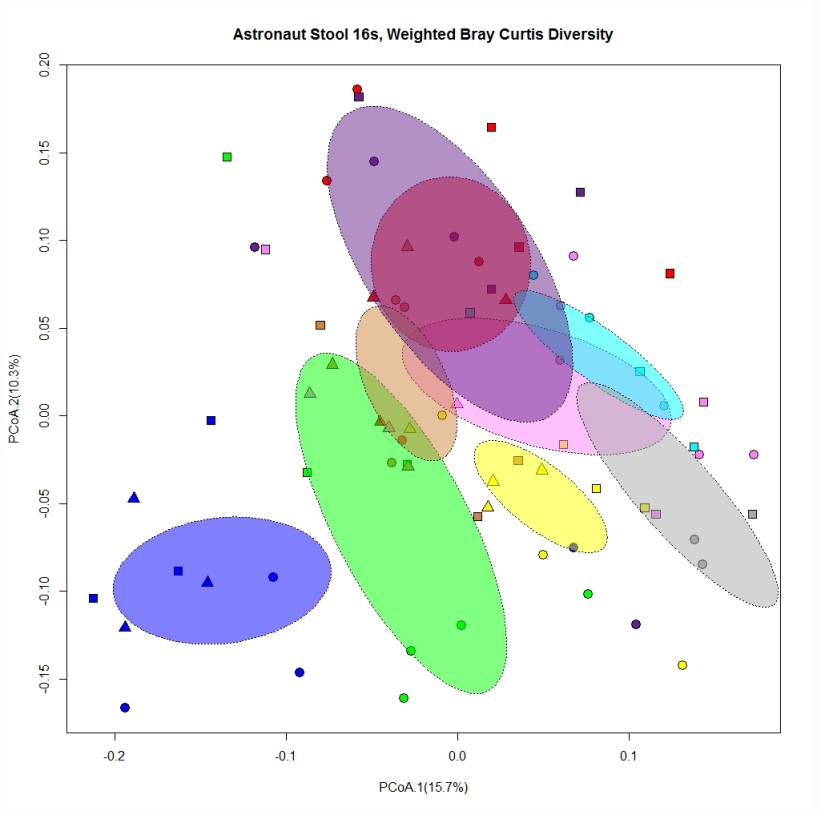
Variation of stool beta diversity during a mission to the ISS





Ast A | Ast B | Ast C | Ast D | Ast E | Ast F | Ast G | Ast H | Ast I

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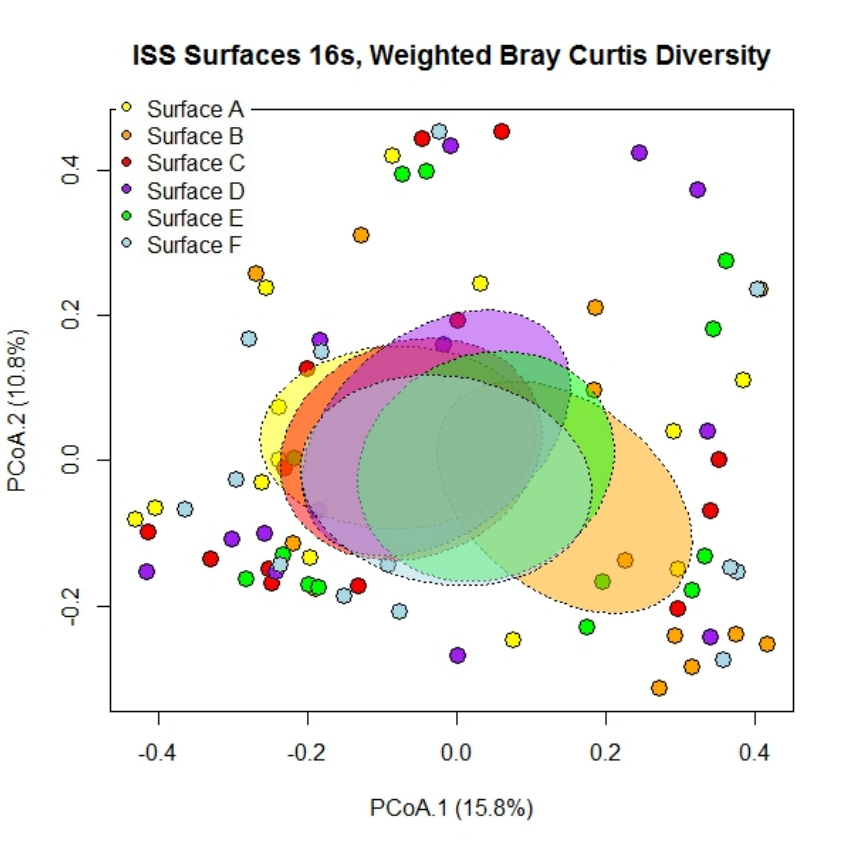
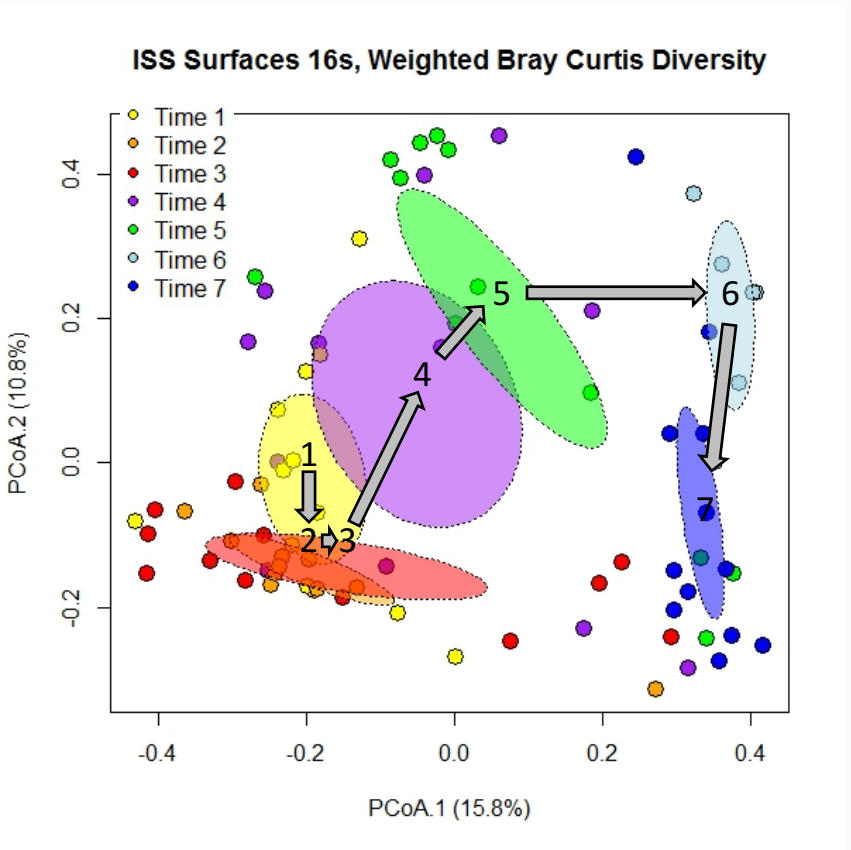
Composition and dynamic of the ISS microbiome over time.





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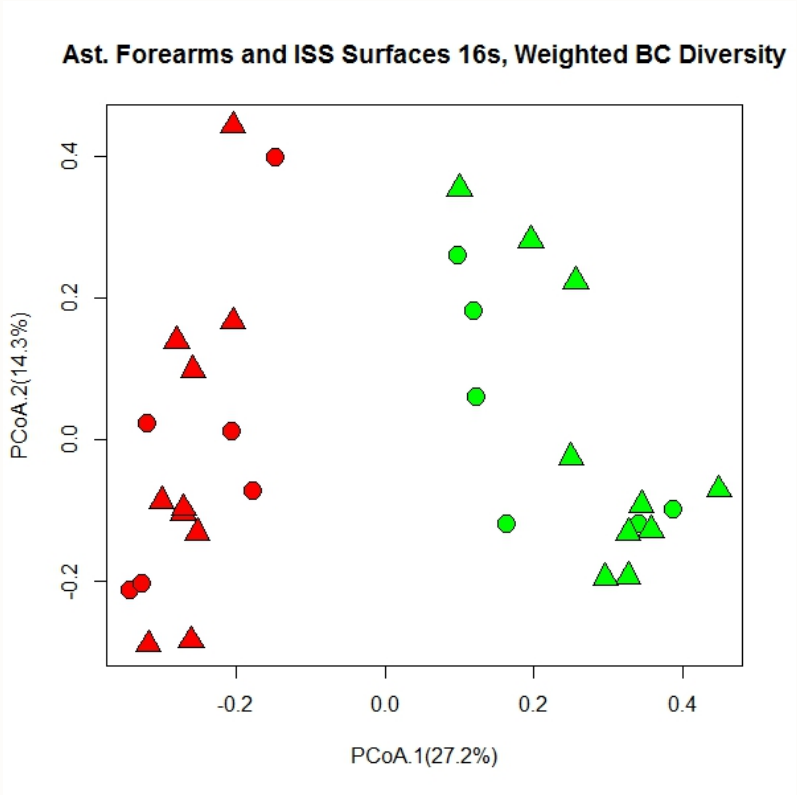
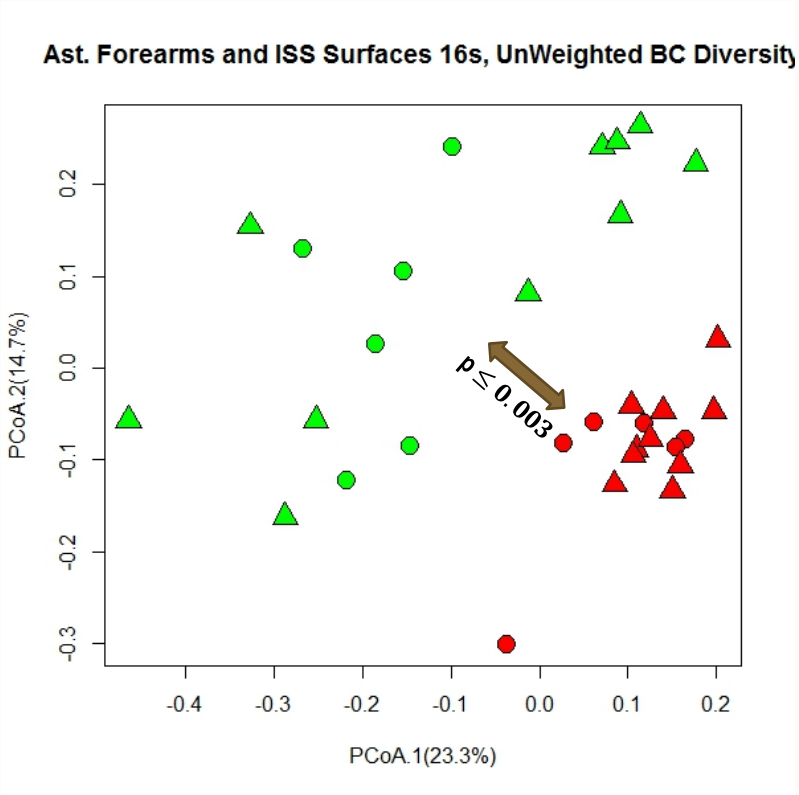
Interaction between the ISS and astronauts' microbiomes

- Early Astronauts
- Late Astronauts
- Early ISS Surfaces
- Late ISS Surfaces





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Conclusions

- The gut mirobiome changes during spaceflight and may or may not recover within the 60 days after the crew returns to Earth.
- The microbiome of the ISS changes over time and is influenced by the skin microbiota of the crew members inhabiting the ISS at a particular time.

Acknowledgments

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