# UWO High Altitude Balloon Initiative

# Executive Team Members

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# Science Goals

The threshold goal of the High-Altitude Balloon (HAB) is to sample bioaerosols in the atmosphere at one or more point(s) during the initial ascent phase. Our threshold goal can be extended to sample the atmosphere at 3–5 specific points during the ascent and extended flight. We are applying the proven design concept of Bryan et al. (2014) who sampled microbial aerosols in the atmosphere using a minimal payload flown with a sounding balloon. The augmented mission objective is to simultaneously collect samples of atmospheric moisture using a separate system of a similar design. Once the samples have been collected and returned the microbial aerosols will be characterized and the origin of the air mass will be determined using *δ*18O and *δ*2H of hydrogen and oxygen isotopes.

# Significance of Bioaerosols

Bioaerosols can be associated with the spread of disease in humans, animals and plants. Studies of bioaerosol content is often used to assist allergists in their treatment of patients by identifying taxa distribution and concentration. Fungus, bacteria, viruses and pollen are all bioaerosols that can be found within the planetary boundary layer of the atmosphere. Some human diseases associated with the spread of bioaerosols include pneumonia, whooping cough, influenza, hepatitis, chicken pox and the common cold. The study of bioaerosols is also relevant to astrobiological studies and mission preparation. Viable cells found in the upper atmosphere could help identify microbial genes and / or enzymes that contribute to the development of radiation resistance. Samples from the Earth’s upper atmosphere could also be employed to explore whether organic aerosols could have been synthesized in the atmosphere, and if airborne transport of microbials influenced their subsequent speciation and mutation.

# Sampling System

The sampling system will be modified from Bryan et al. (2014) in order to better integrate with the STRATOS gondola. Each chamber designed to sample microbial aerosols will hold 40 Rotorods ® each with a surface designed to sample via impaction. Linear actuators will be set in place to open and close the sample chamber doors at specific altitudes, however, the power supply and tracking equipment will be removed in favor of those provided. The sampling system for atmospheric moisture is conceptual and there is currently no specific design to follow pending further input from SME’s.

**Reference:**

Bryan N.C., Stewart M., Granger D., Guzik T.G., Christner B.C. 2014. A method for sampling microbial aerosols using high altitude balloons. Journal of Microbiological Methods. 107: 161–168.