Accelerometer(g-force sensor) - Measures the acceleration in addition to the amount of G's that the tissues experience throughout the flight. This assists in our understanding of how motion influences each chip tissue. Furthermore, comparing the effects of motion between each tissue can help us understand parts of the body that are more vulnerable to damage upon exiting and entering space.

Barometer - Records the pressure that the sounding rocket faces upon launch, along with the entry and exit of the atmosphere. This shows us how the variable that pressure plays on the degradation of tissue when launched into space. Moreover, this assists in the creation of astronaut protection to reduce the damage short space flights induce.

Vibrometer - Detects vibrations and their frequency that the sounding rocket faces during flight to observe how the tissues are affected. These vibrations can be encountered during ignition, ascent, or reentry, allowing us to assess how those vibrations might mechanically stress or detach muscle tissue, disrupt fluid flow, or alter the behavior of embedded sensors.

Thermo-hygrometer - Monitors the payload's condition by measuring both temperature and humidity. This is done to ensure that the chips are kept in a stable environment, to ensure that the only changes in variables are movement. This is done to confirm each cell's viability since overheating, dehydration, or condensation could affect tissue survival.

Chips

Eye Tissue

Transepithelial Electrical Resistance(TEER) - TEER is a method that uses embedded electrodes to measure the electrical resistance across a cell layer. In a muscle-on-a-chip system, TEER monitors the integrity of any supporting cell layers, showing any damage that may have occurred in the tissue.

Optical coherence tomography - An imaging technique that uses light waves to create high-resolution images of the tissue. This allows us to see the internal structure of the muscle fibers before and after flight, allowing researchers to see any damage or structural changes caused by launch stresses and microgravity exposure.

Liver Tissue

Micro Balance - Measures mass, a highly sensitive mass measurement tool capable of detecting microgram-scale changes.
Why we have it: To measure tiny changes in tissue mass caused by muscle contraction, swelling, degradation, or fluid uptake, providing quantitative data on tissue response to microgravity or stress.

Ion Selective Electrode - What it is: A sensor that detects specific ions (like calcium, potassium, or sodium) in solution.
Why we have it: To monitor ion exchange involved in muscle excitation and contraction, allowing real-time tracking of biochemical activity and tissue health throughout the flight.

Optical coherence tomography - What it is: A non-invasive imaging technique that uses light waves to create high-resolution cross-sectional images of tissue.
Why we have it: To visualize the internal structure of the muscle fibers before and after flight, enabling researchers to detect any damage, detachment, or structural changes caused by launch stresses or microgravity exposure.

Skeletal Muscle

Micro Balance - What it is: A highly sensitive mass measurement tool capable of detecting microgram-scale changes.
Why we have it: To measure tiny changes in tissue mass caused by muscle contraction, swelling, degradation, or fluid uptake, providing quantitative data on tissue response to microgravity or stress.

Ion Selective Electrode
What it is: A sensor that detects specific ions (like calcium, potassium, or sodium) in solution.
Why we have it: To monitor ion exchange involved in muscle excitation and contraction, allowing real-time tracking of biochemical activity and tissue health throughout the flight.

Water Recovery

- For the GRIT Mission, we have decided to have a water recovery for the payload after descent back to earth.

Iridium GPS: With the sounding rocket recovery, we will need to be able to track the rocket for its location while it's in the water. Iridium GPS used a Satellite network to constantly track the sounding rocket.
Water Sealed body: We will need a water tight sealed rocket that can withstand the ocean. We want to protect the payload of the Rocket, the instruments, organ-on-chips, and Data.

Payload Design

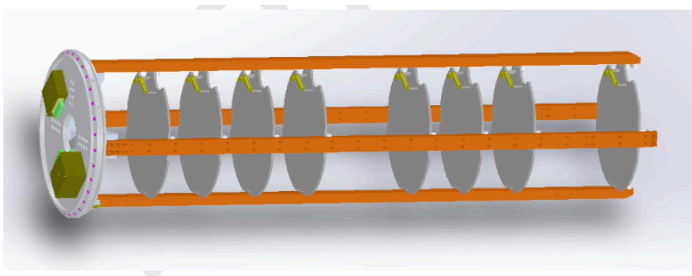

Figure 2-1a: RockSat-X Deck in Longeron Structure (Conceptual)

We will be adopting the Payload organization technique from the RockSAT program. This payload design includes multiple decks that can host instruments inside the Experiment section of the Rocket payload. For our case, each deck will hold all the instruments necessary to collect data on their specific organ on a Chip. The Instruments that we will use are small and only collect the data inside the rocket, meaning no deployment systems are necessary.

We predict that each deck will take up li

Telemetry System: The Telemetry system is an onboard section of the payload. This is the system that transmits the Data collected by our Experimentation instruments down to the Telemetry Receiving Stations on the ground.

Data Acquisition System (DAS): This system will store the Data Collected On Board the Rocket. We will also have ground-based Telemetry Receiving Stations to collect the data transmitted from the sounding rocket's onboard telemetry system. (1.8-13.6 kg)

Telemetry Receiving Stations: These stations are equipped with antennas and receivers to collect the data transmitted from the sounding rocket's onboard telemetry system. This Data will be from the onboard instruments.

What it does, why do we need it, DATA