

# Sending seeds in a stratospheric balloon as a motivator in sciences to basic education students

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In 2019 the space science team Longe Laq̄tve, composed of Brazilian students of basic education, sent seeds and monitored the temperature, pressure and incidence of ultraviolet in the atmosphere from the flight of a stratospheric balloon with the Garat ea-E project [1 ] (Figure 1).



Figure 1 - Photo obtained during the stratospheric flight

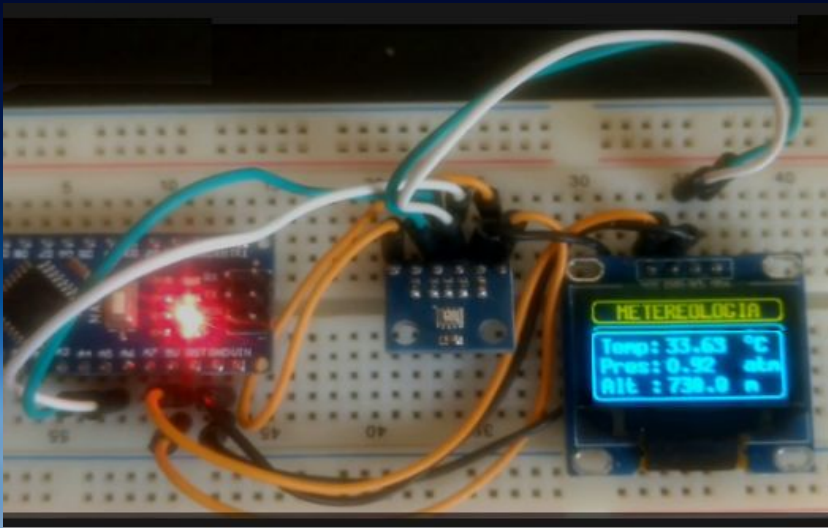


Figure 2 - Programming test and sensor connection

Elementary school students, motivated by the idea of oxygen release in the Martian atmosphere selected seeds of “Japanese Kiri” (*Paulownia tomentosa*) [3] since they easily adapt to different soil types and environmental conditions (Figure 3).

Ultraviolet temperature, pressure and incidence data in the stratosphere were obtained from an Arduino Nano interface [2], configured by high school students and connected to the respective environmental sensors (Figure 2).

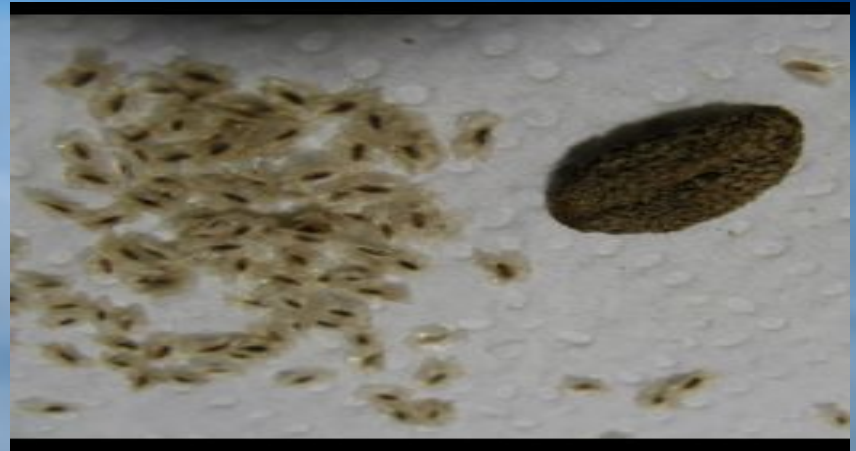


Figure 3 - *Paulownia tomentosa* seeds

## Obtained data

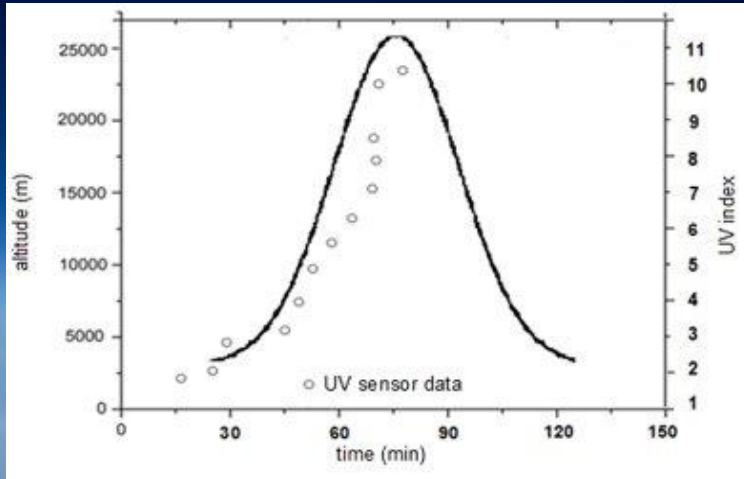


Figure 4 - UV index and altitude x time

The temperature and pressure sensors worked up to the 9,000 meter range, according to the manufacturer's specification. There is no UV index data on the right face of the Gaussian curve, due to invalid data, probably coming after the balloon burst (Figures 4, 5 and 6).

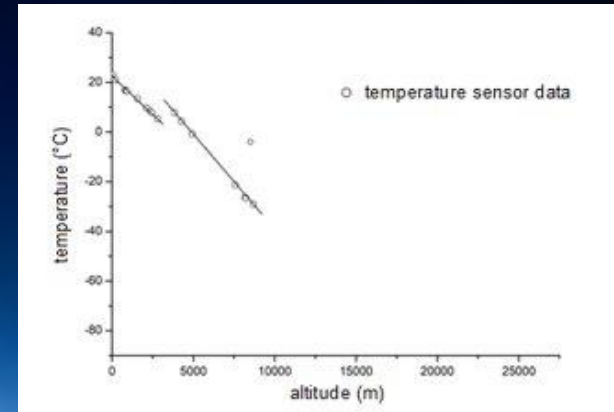


Figure 5 - Temperature x Altitude

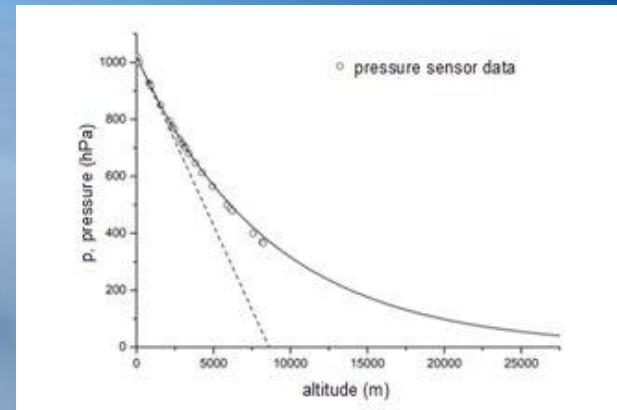


Figure 6 – Pressure x Altitude

## Second phase of the project

For the purposes of a future comparative study, the seeds were divided into two groups. Half of them flew in the stratospheric balloon and the other half do not. The idea was to plant all seeds in separated flower beds in 2020, but this was avoided by the Pandemic of Covid 19. In 2022, the seeds were planted but none were born.

## Project continuity

In 2022 the team classified two other experiments for a future cultivation on Mars. Lichens, collected at an altitude of 1,600 meters on the mountain of Serra do Mar, will be sent, since these vegetables are able to decompose rocks and will be able to help the Earth formation of Mars and also mosquito flower seeds (*Gypsophila paniculata*) due to the ease of their later analysis in biology laboratories.

## References

[1] Garatúa-E project, vídeo available in < <https://www.youtube.com/watch?v=Lap1VWlx7WI> >

[2] Arduino nano, available in < <https://www.store-usa-Arduino.cc/products/Arduino-nano> >

[3] *Paulownia tomentosa*, available in < [https://pt.wikipedia.org/wiki/Paulownia\\_tomentosa](https://pt.wikipedia.org/wiki/Paulownia_tomentosa) >

Thank you for your attention

Obrigado pela sua atenção