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Up, Up and Away! Launching & Tracking Balloons for Student Engagement in STEM

There's more to balloons than birthday parties! Hot air balloons changed the world centuries ago, and they continue to teach us a lot about science.

Medium altitude balloons are a fantastic tool for igniting learning in a classroom. Teachers can incorporate lessons on buoyancy, weather patterns, global citizenship, the earth/sun system, and the electromagnetic spectrum. While relatively cheap, they can provide substantial opportunities for connecting students to the world and their classroom learning. Medium altitude balloons are also a great tool for teaching physics and earth science.

This workshop proposes to describe an economical medium altitude balloon launch that in particular configurations may be flown around the world using a microlight tracking payload called a SkyTracker.

Educators from many post-secondary institutions have been launching high-altitude balloons to engage university students in science and engineering for more than ten years. High altitude balloons ascending to altitudes greater than 30,000m are equipped with sensors and cameras along with position tracking systems. They also have parachutes to control descent and are designed to be recoverable. They require reasonably strict guidelines to be followed. These rules and regulations are moderated by the Civil Aviation Safety Authority (CASA) in Australia and require balloons that carry payloads to be registered and controlled in launching and recovery.

Medium altitude balloons with very light payloads however fall under the CASA category of small balloons and do not require authorisation for launch. This makes the balloon design cheaper and the launch process much easier for educators to control.

There are 2 different types of balloons that are generally used to attach a micro-light tracking payload. The first is a 1-meter diameter Mylar balloon, very similar to the ones that might be seen at a child's birthday party. This balloon can ascend to around 8500 meters and sustains pressure for an average of 6 days, but with proper sealing has been known to last up to 2 weeks. The other balloon commonly used is a high-pressure balloon that can sustain altitudes of 12,500 meters or more and lasts substantially longer than the Mylar balloon.

The workshop will describe how medium altitude balloons relate to student learning and link to curriculum and also describe the steps required to enable a launch from a school. The cost and equipment needed is also described as well as a demonstration of free, online tracking software.

Preparation materials

Workshop presentation for Launching & Tracking Balloons for Student Engagement in STEM will be loaded onto a Google drive here https://drive.google.com/drive/folders/1eY5sj0yJ8dBw_QIJnd4kpgx4ZSwesJYw?usp=sharing
Links to sites referenced in presentation, earth.nullschool.net: https://earth.nullschool.net/#current/wind/isobaric/500hPa/orthographic=-217.55,-37.02,2538/loc=144.959,-37.901
Air pressure at altitude calculator: https://www.mide.com/air-pressure-at-altitude-calculator
Air Resources Laboratory Predictor: https://www.ready.noaa.gov/hypub-bin/trajsrc.pl
APRS tracking site: https://aprs.fi/#!call=a%2FVK3ZWI-1&timerange=604800&tail=604800
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