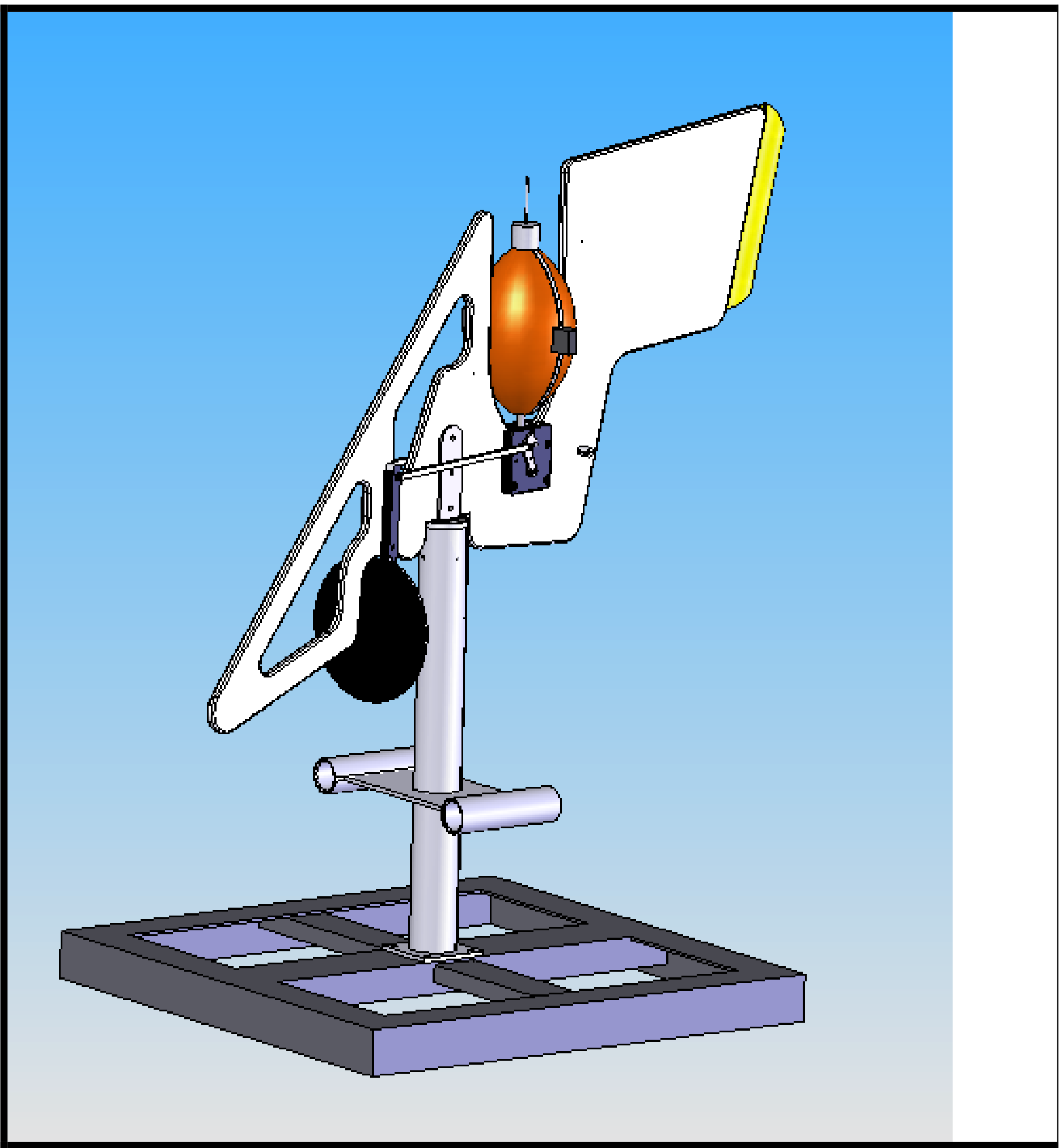
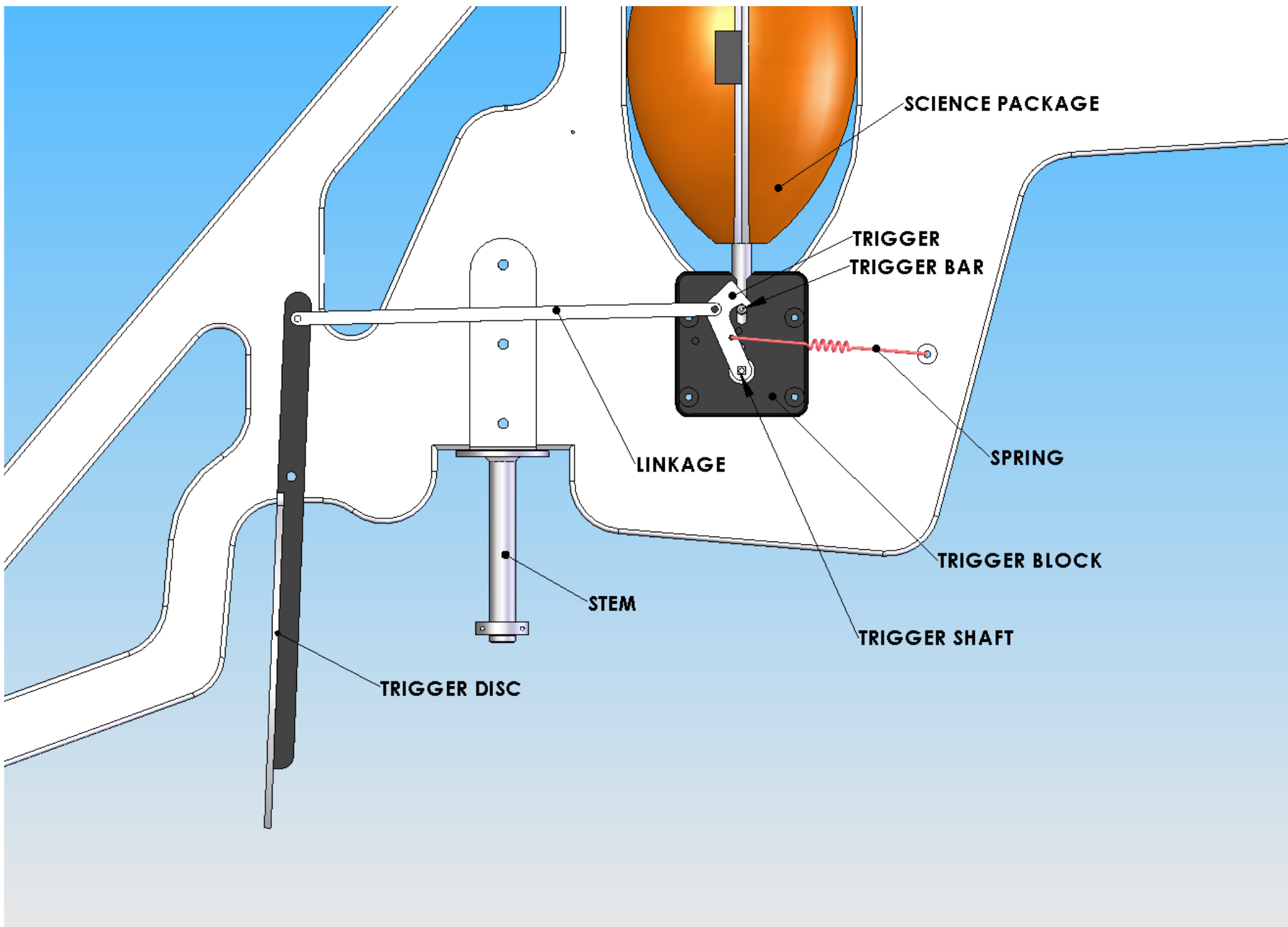


Self-triggering event detectors (STEDs)

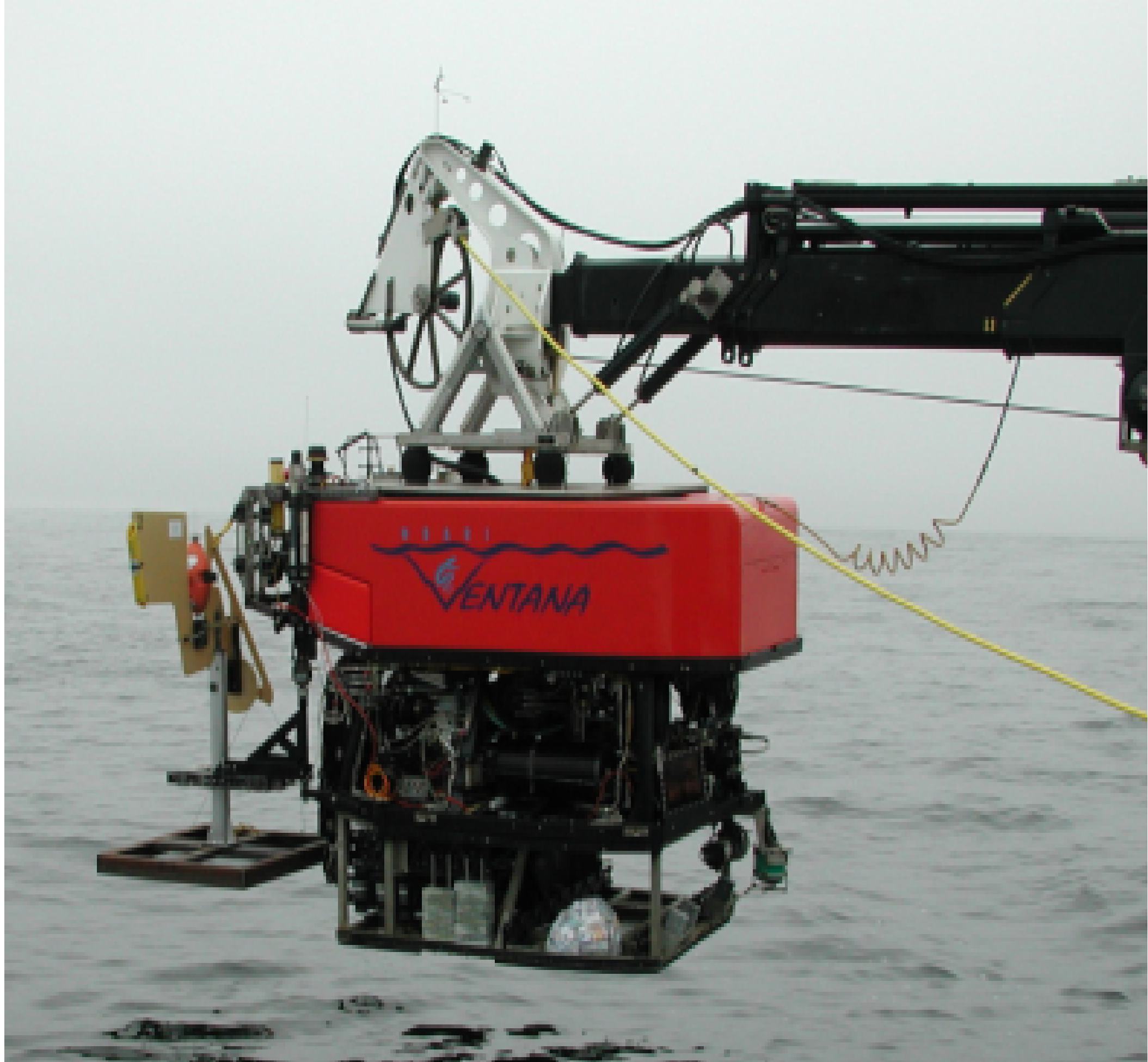
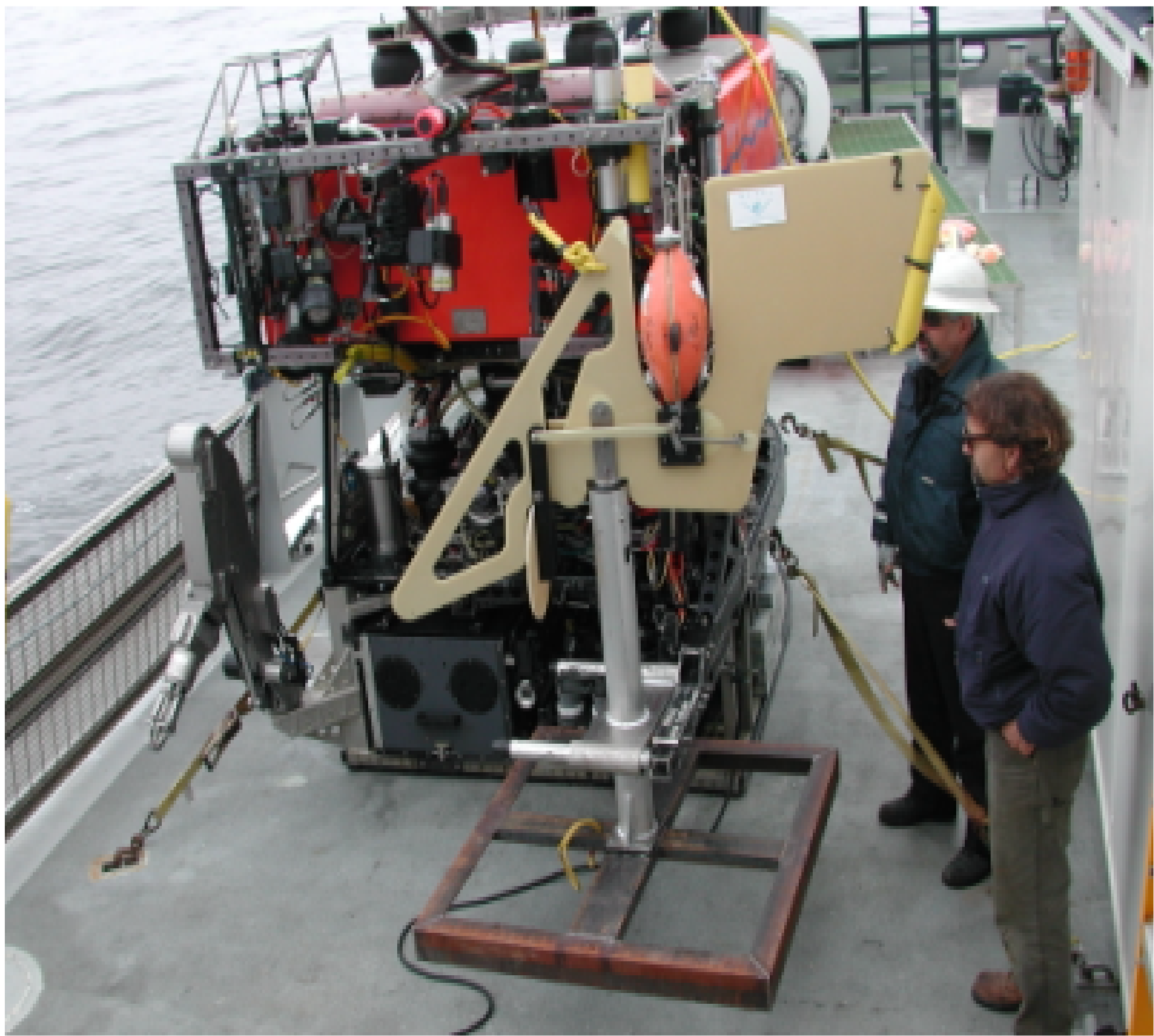
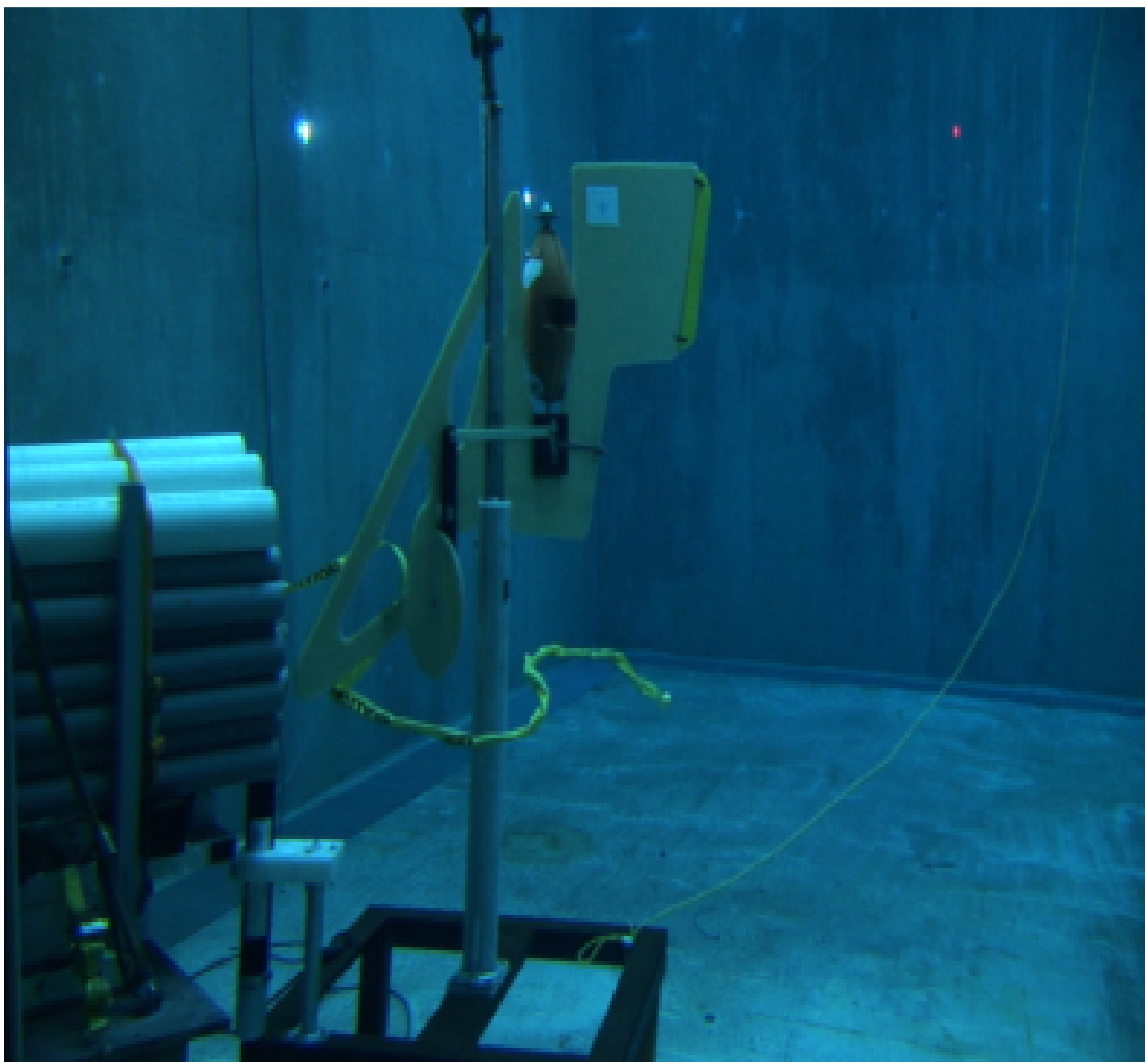
Submarine canyons are known to act as conduits for transporting sediment from the continents into the deep sea. Because the sediment primarily moves in discrete energetic events, determining the occurrence of events and the quantity of sediment involved in these transports has been difficult. Instruments placed at sites known to experience transport events are frequently lost, along with their data. Development of Self-triggering event detectors (STEDs) is a novel way to collect data about these events from even the most hostile environments. The STEDs are designed to release a float when an event occurs, which goes to the surface and phones home, effectively reporting when and where the event occurred. Through a combination of MBARI (Paull et al, 2003) and USGS (Xu et al, 2004) experiments, it is believed the maximum currents on the floor of the canyon are less than 60 cm/sec under normal conditions. During sediment transport events, current velocities of over 200 cm/sec are sustained for several minutes. When these STED platforms experience currents in excess of 200 cm/sec, one meter above the seabed, a positive buoyant science package is released to the surface. Included in this science package is a Pop-off ARGOS transmitter that will time stamp the event and provide essential scientific data. With multiple STED devices deployed along the length of the Monterey Bay Canyon. The frequency, location, size, and, timeframe of transport events will be determined.



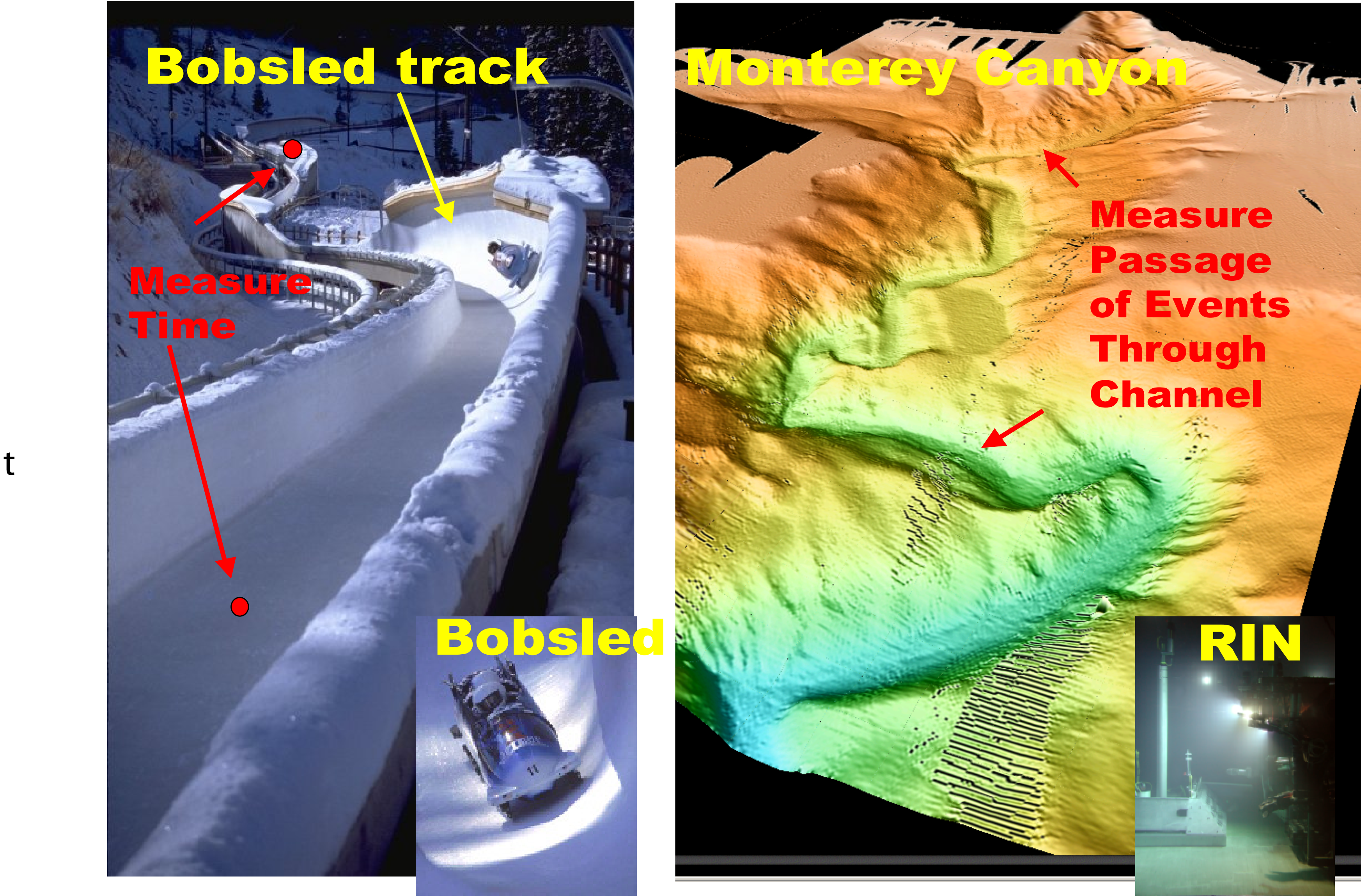
Drawing showing a STED.



Drawing showing the STEDs release mechanism. The larger surface area of the main surface of a STED acts like a wind van and keeps the smaller surface facing the current. When the force on this plate is adequate, the mechanical release triggers the float to be released.

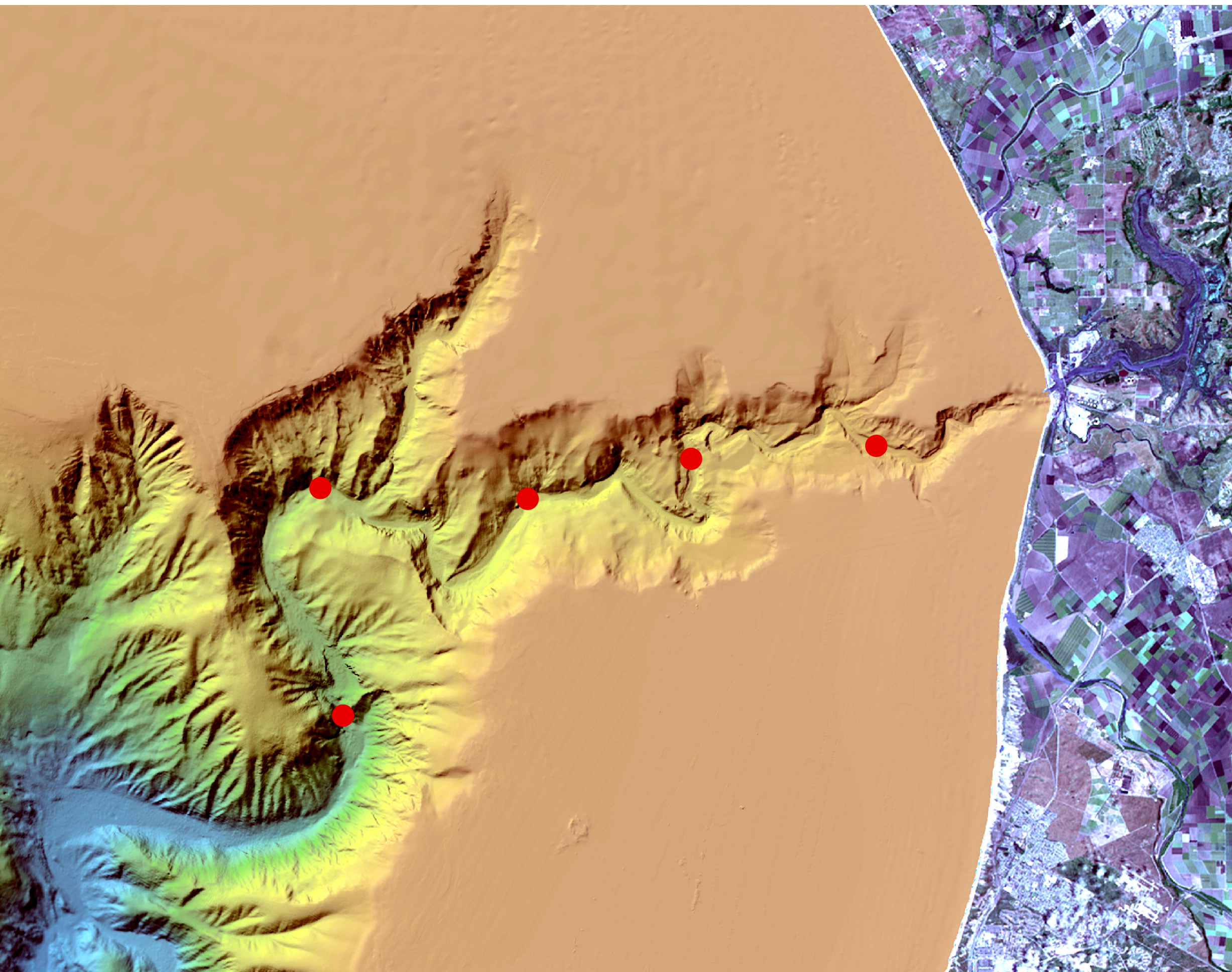


Images showing a STED being lowered into the test tank (upper right) and on the bottom of the tank being tested in an induced flow (upper left). The STED triggers were adjusted to release when the current exceeds 200 cm/sec. The lower right and left images show a STED being deployed from the Ventana.



Analogy with bobsled is used to illustrate how two or more STEDs can be used to determine the velocity at which these gravity flow events pass through the canyon and how far they extend. Both measurements have never been made unequivocally before.

Photographs of the float (orange) carrying a Pop-off Argos transmitter mounted on a STED and ready for deployment. To the right is a Pop-off beacon without the additional floatation.



In May 2007, five STEDs were deployed in the axis of Monterey Canyon in water depths between 290 and 1,390 m at sites indicated with red dot. This array has the potential to track the velocity and extent of the next major sediment transport event within the canyon.