COSMIC RAY VOCABULARY

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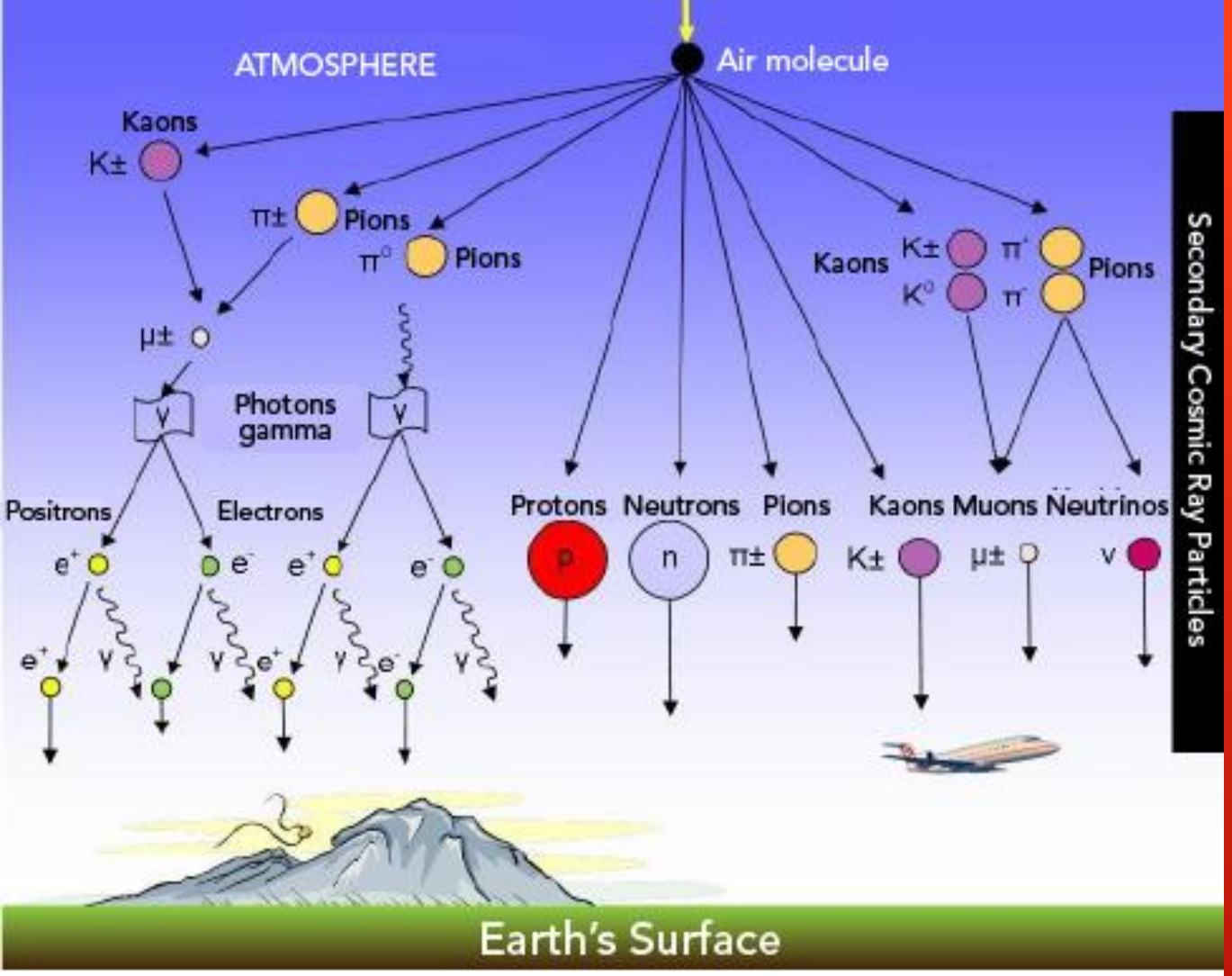
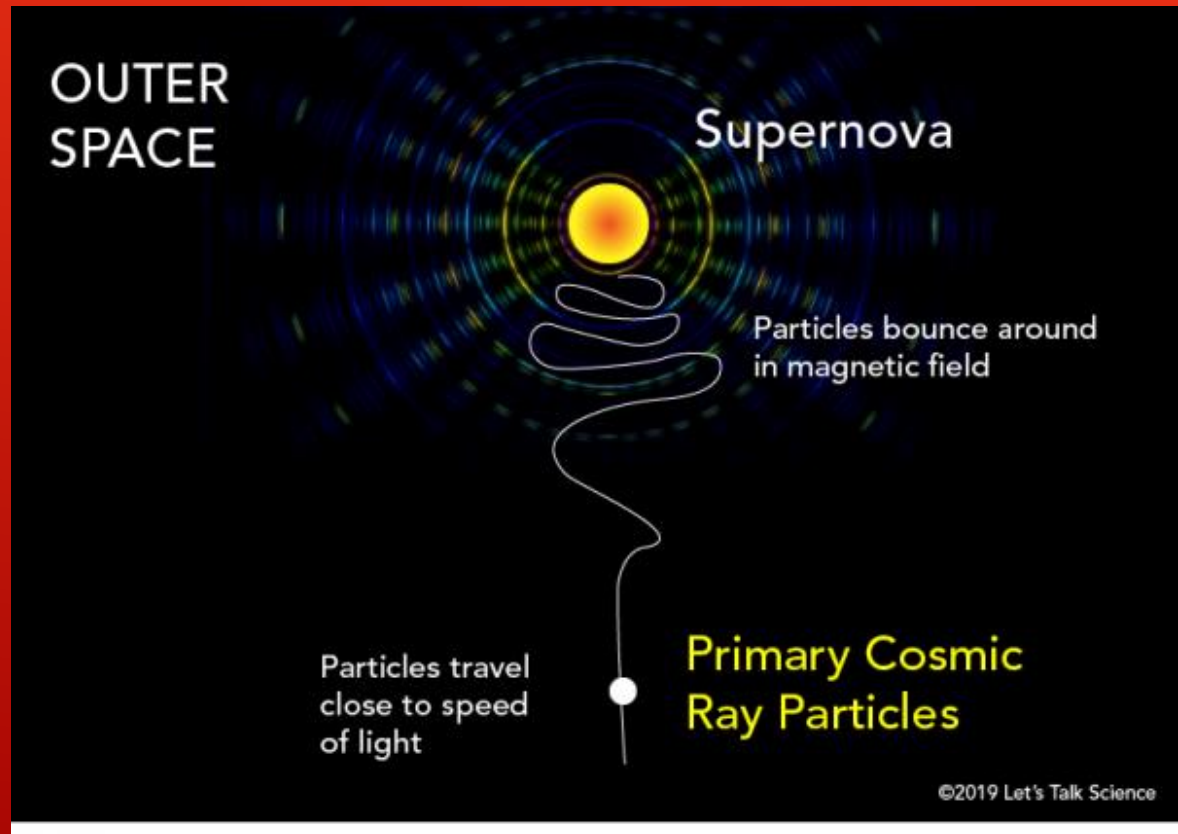
University of New Mexico 26.July.2022

THE UNIVERSITY OF NEW MEXICO

Question	Team
1, 2	Brie and Jeff
3, 4	Tim and Sarah
5, 6, 11	Ken and Bill
7, 8	Philip and Carlos
9, 10, 14	Connie and Turtle
12, 13	Lexi and Tom


ATMOSPHERE
Air molecule
Kaons
K±
π±
Pions
π°
Pions
Kaons
K±
K°
π+
π-
Pions
μ±
Photons
gamma
γ
γ
Positrons
Electrons
e+
e-
e+
e-
e+
e-
γ
γ
γ
Protons
Neutrons
Pions
Kaons
Muons
Neutrinos
p
n
π±
K±
μ±
ν
Secondary Cosmic Ray Particles
Earth's Surface


OUTER
SPACE
Supernova
Particles bounce around
in magnetic field
Particles travel
close to speed
of light
Primary Cosmic
Ray Particles
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FLUX

Flux describes the number of muons that pass or travel through a surface (area) per unit time.

RELATIVITY

- Mass
- **Time**
- Length

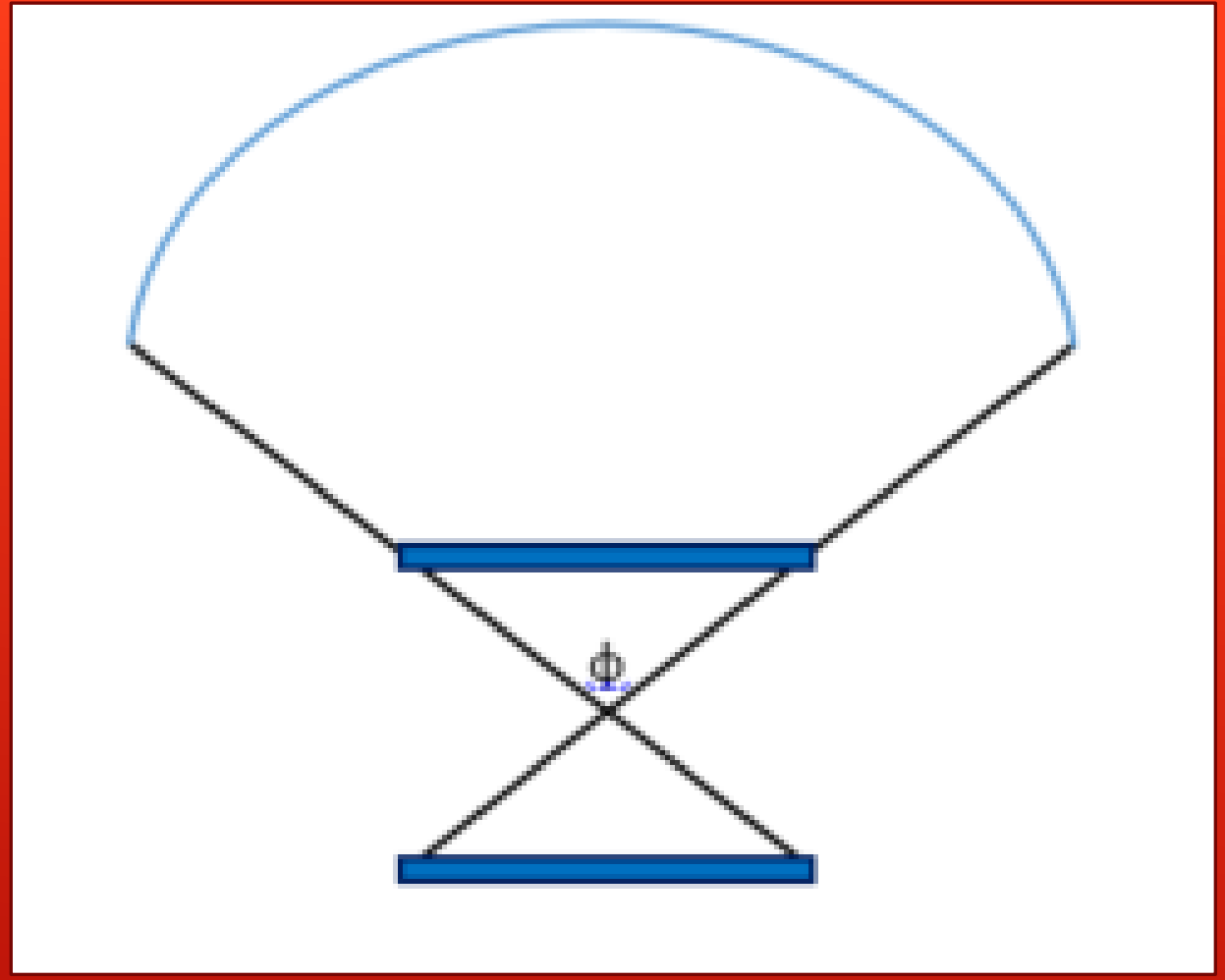
HALF-LIFE VERSUS LIFETIME

- **Half-life** is the time required for a quantity to reduce to half of its initial value. The term is commonly used in nuclear physics to describe how quickly unstable atoms undergo radioactive decay or how long stable atoms survive.

- **Lifetime** is the amount of time a particle takes to decay in the process of one unstable subatomic particle transforming into multiple other particles.

COINCIDENCE AND TRIGGER

- Recording an event when at least two counters have indicated a hit within a gate.
  - Importance is to reduce the number of stray events.
- Trigger rate is the rate of events.



ANGLE OF ACCEPTANCE

New Detector 7026 Entry:

Date: July / 26 / 2022 @ 16 : 35 utc *Detector Geometry*

If you are using EQUIP for data acquisition, you still need to enter geometry data on this page for use in the Cosmic Ray e-lab.

GPS is @ (0,0,0).
Each point (x,y,z) represents the center of a counter.
Confused? Seeing errors? Please consult the Geometry Tutorial.

Active Channels:	1 ☑	2 ☑	3 ☑	4 ☑

	Cable Length (m)	Area(cm^2)	x:E-W(m)	y:N-S(m)	z:Up-Dn(m)
 1	15.3	744.2	-0.50	0.80	-0.30
 2	15.3	744.2	-0.50	0.80	-0.50
 3	15.3	744.2	-0.50	0.80	-0.80
 4	15.3	744.2	-0.50	0.80	-0.83

 ◉ Stacked Orientation ○ Unstacked 

 Visualize geometry

GPS Coordinates

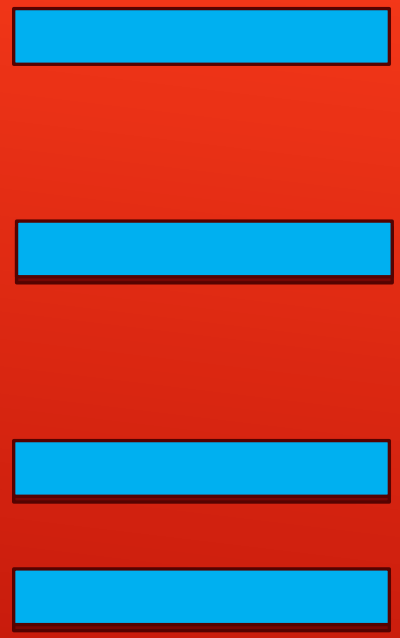
GPS Coordinates Tutorial Find GPS Coordinates

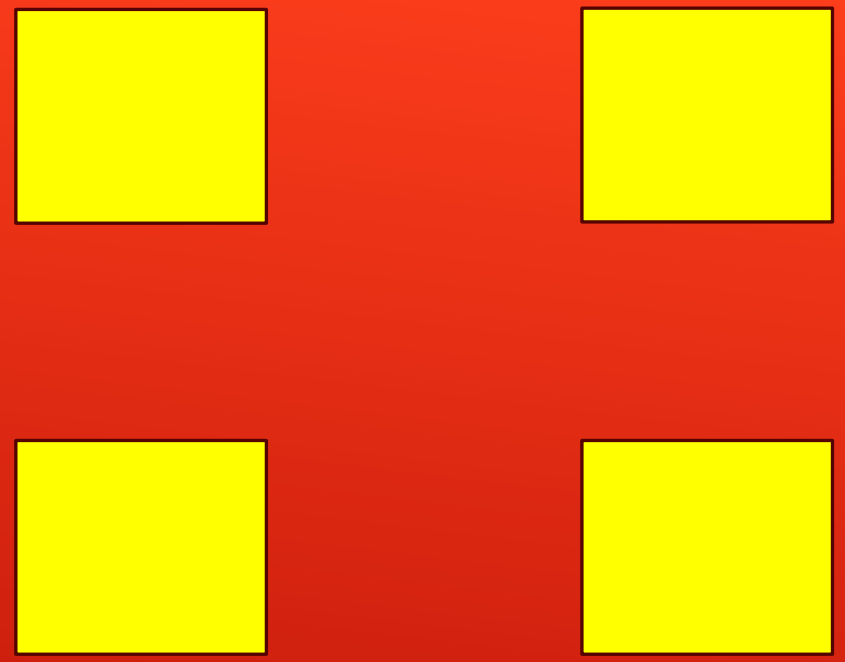
Latitude: 41:50.292946 N e.g., 47:39.234736 N
Longitude: 88:15.694076 W e.g., 122:18.68 W

Map GPS Coordinates

Altitude (m): 270
GPS Cable Length (m): 35.48

Commit Geometry





Stack

Array

GATE WIDTH

A **nanosecond** (ns or nsec) is one billionth (10^{-9}) of a second.

0.000000001 seconds.

MUON SPEED

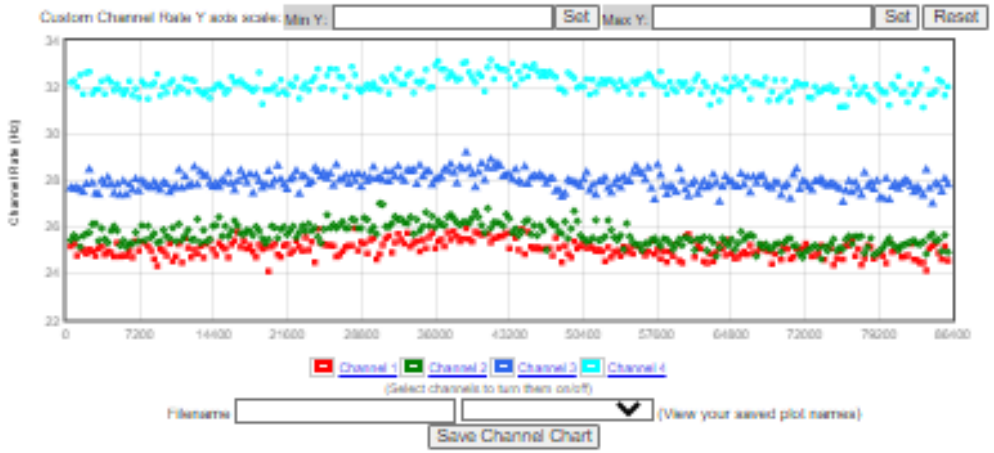
- Time of Flight tool
  - Need geometry
  - Plot on graph paper.

- Time of flight can be used for counts, angle of acceptance, . . .

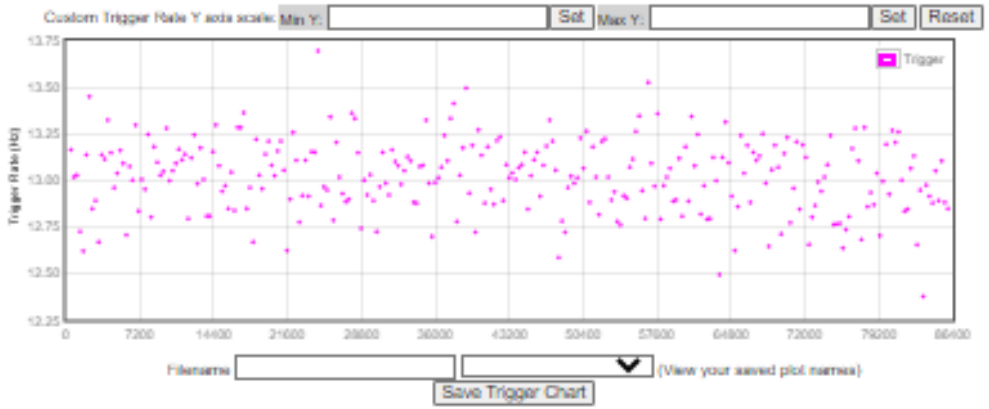
BLESSING DATA

- How is the detector doing
  - Individual rates
  - Trigger rates
  - Satellites
  - Voltage
  - Temperature
  - Pressure

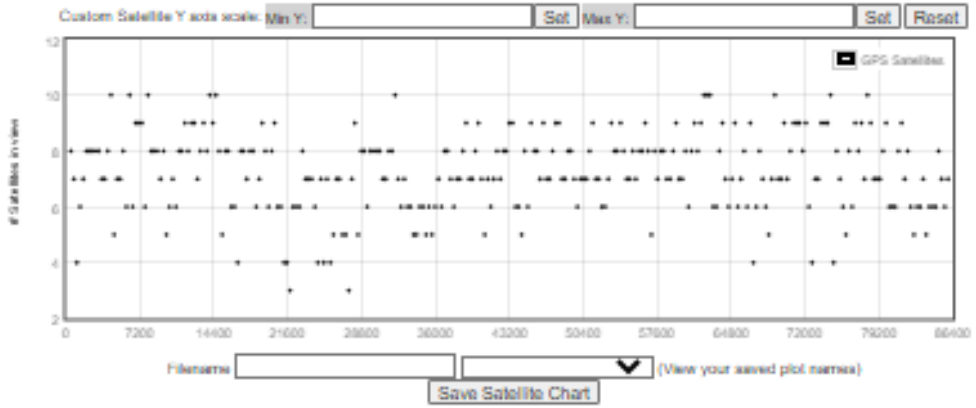
Rates



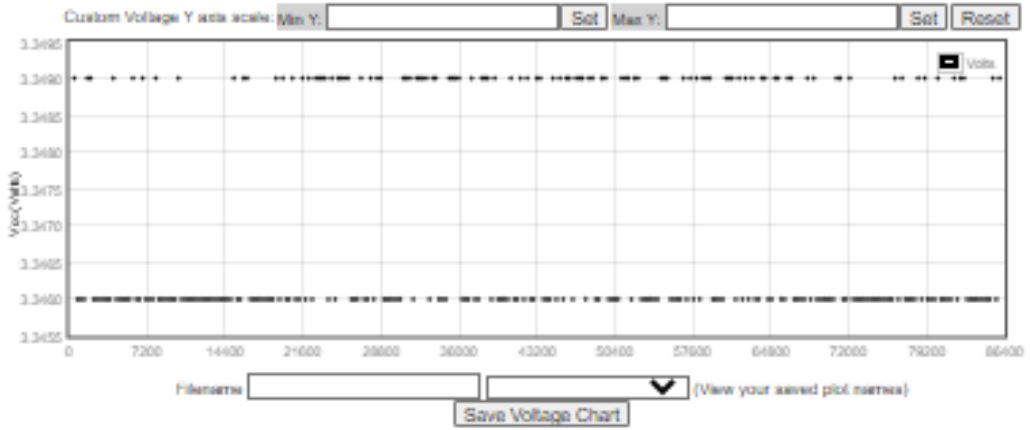
Trigger Rate



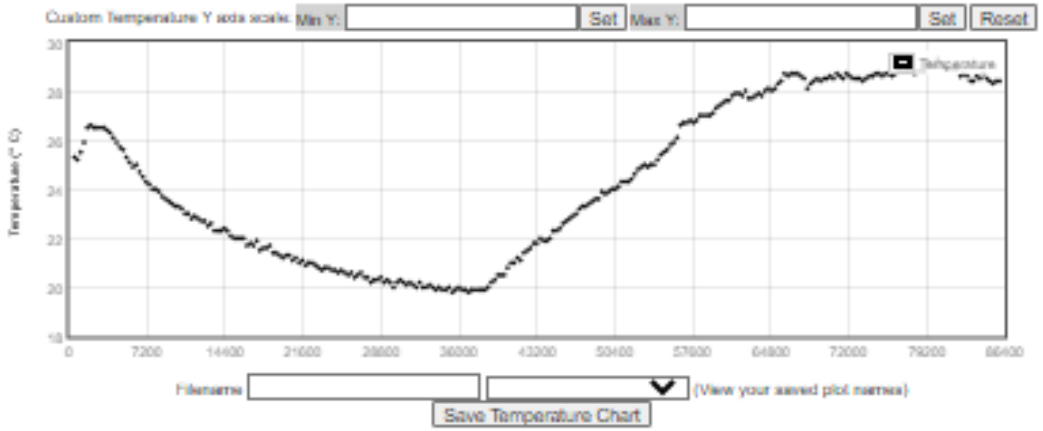
Visible GPS Satellites



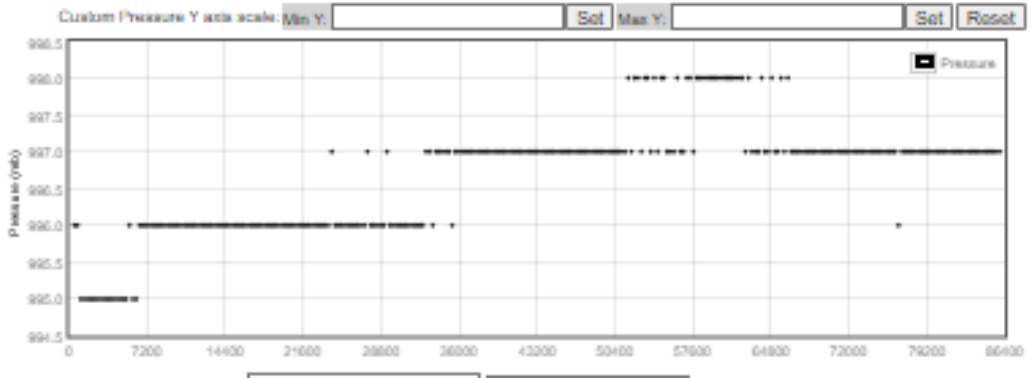
Voltage



Temperature



Barometric Pressure



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