

BY THE STUDENTS OF
"LICEO SCIENTIFICO STATALE
TEMISTOCLE CALZECCHI ONESTI"

PROJECT EEE: INTERNATIONAL COSMIC DAY 2021

"Data analysis of POLA-01 rivelator"



TIME ANALYSIS

EXCEL

1. We noticed that the time frames are variable:

Time (seconds since 1/1/2007)	Minuti
365300070	6088334,5
365300130	6088335,5
365300190	6088336,5
365300310	6088338,5

2. To fix this “error” we formatted Time cells in minutes passed since event 0

Between value 3 and 4 two minutes are passed

	A	B	C	D
1	Time (seconds since 1/1/2007)	Minutes	Time-lapse (min)	0
2	365300070	6088334,5	1	1
3	365300130	6088335,5	1	2
4	365300190	6088336,5	2	4
5	365300310	6088338,5	2	6

A2/60

B5-B4

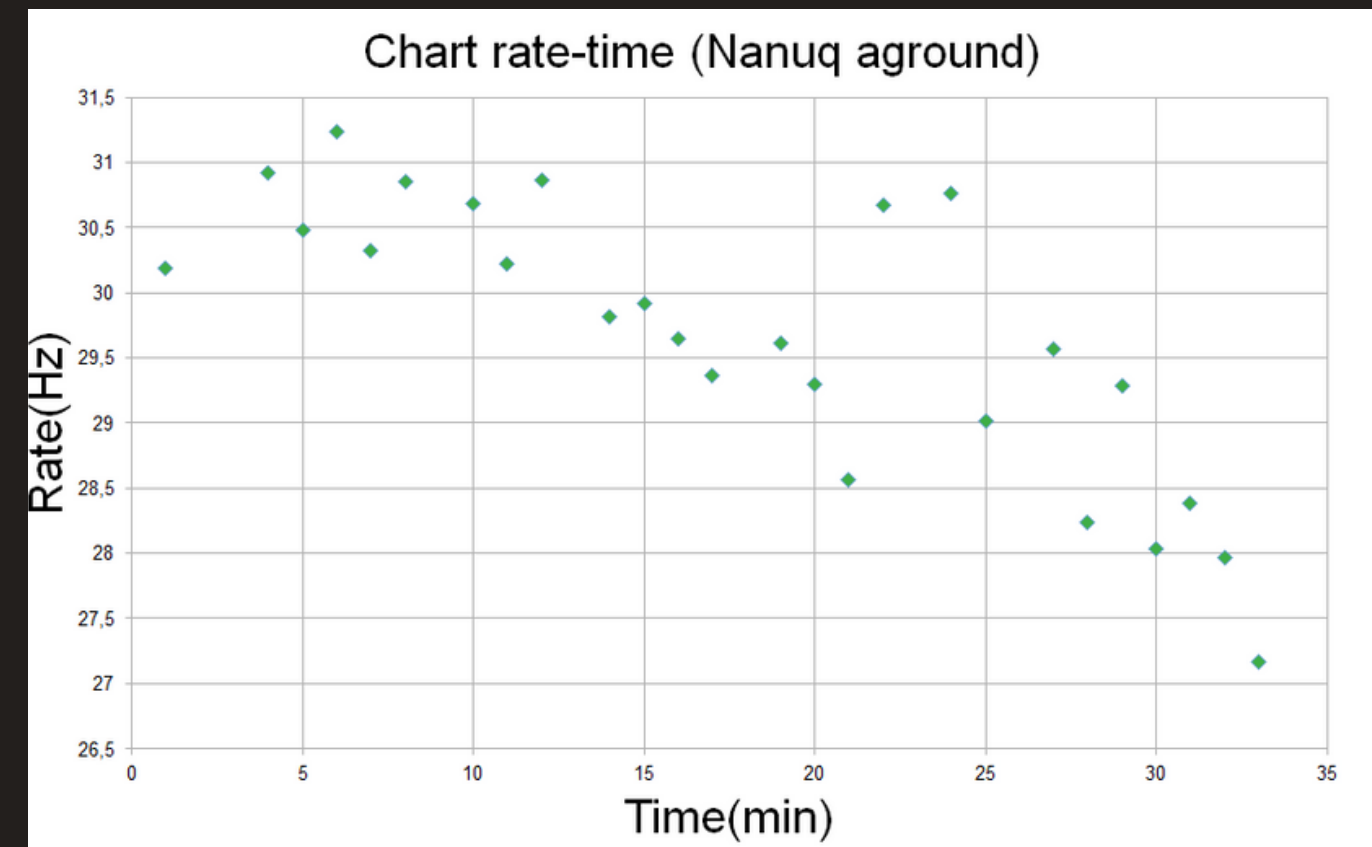
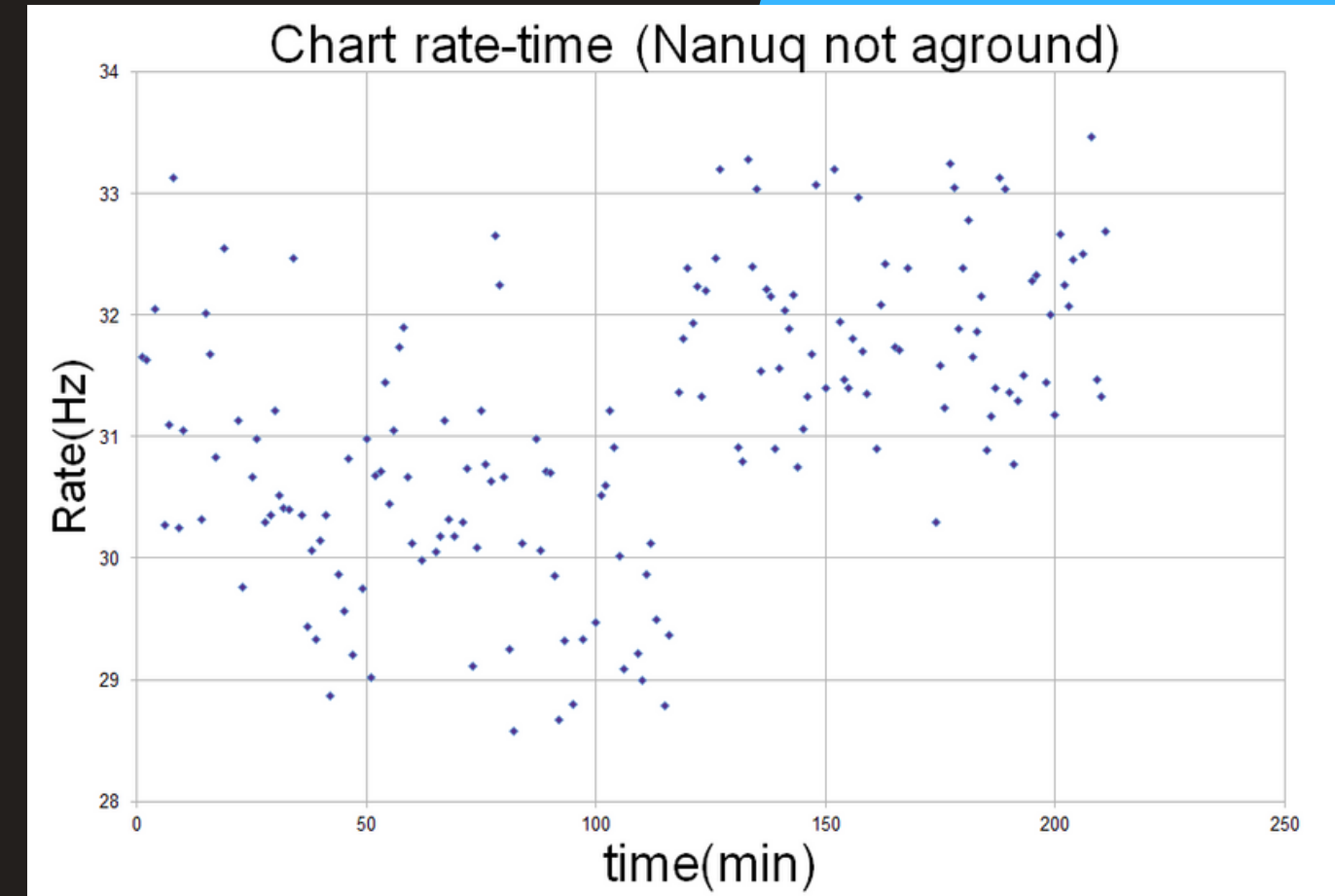
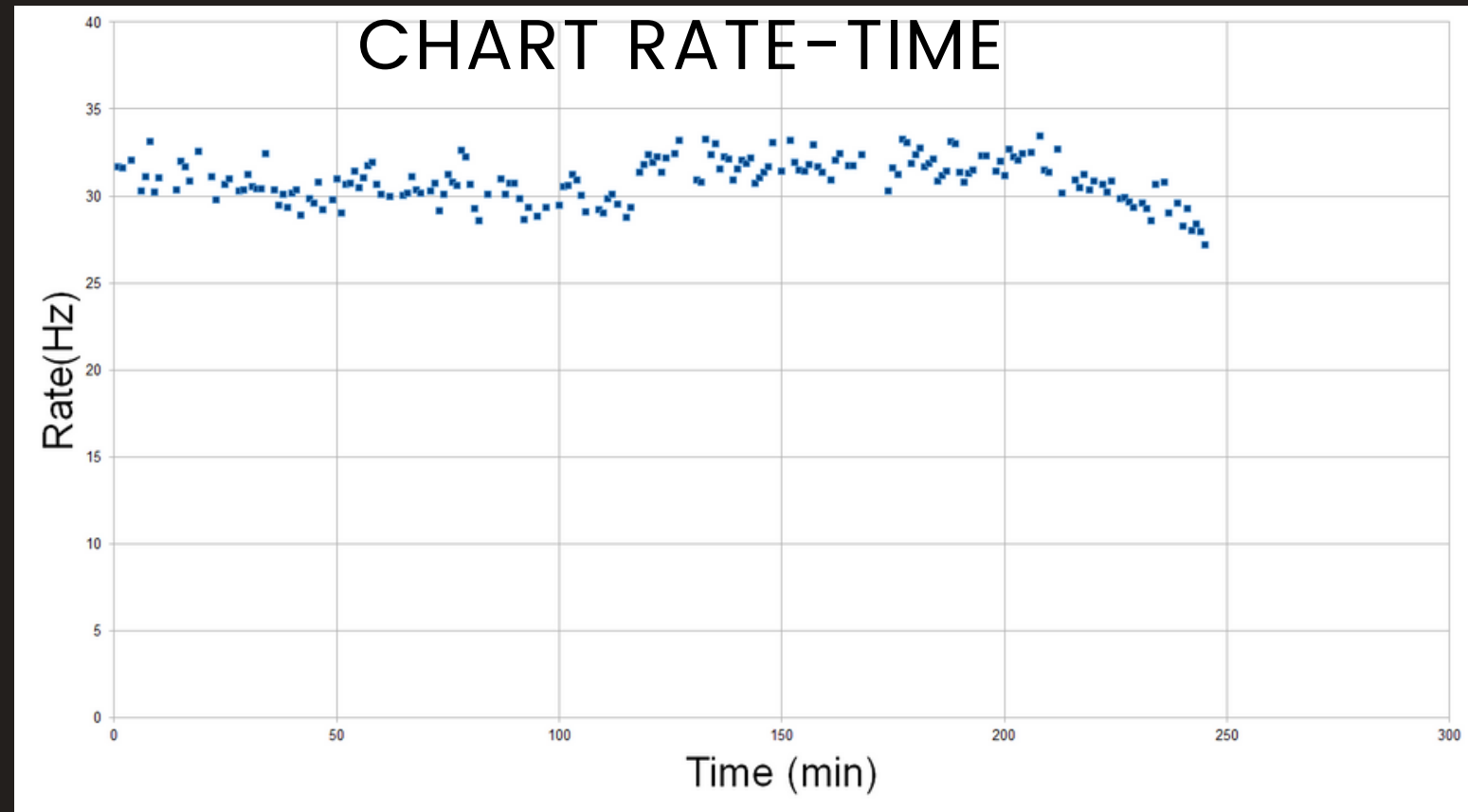
Sum(C5+D4)

3. We then noticed a big gap (more than 9 hrs) which indicates the detector shut down as the Nanuq inclination became dangerous for the machine. We worked on the first area of data (1-193)

CHARTS

RATE-TIME

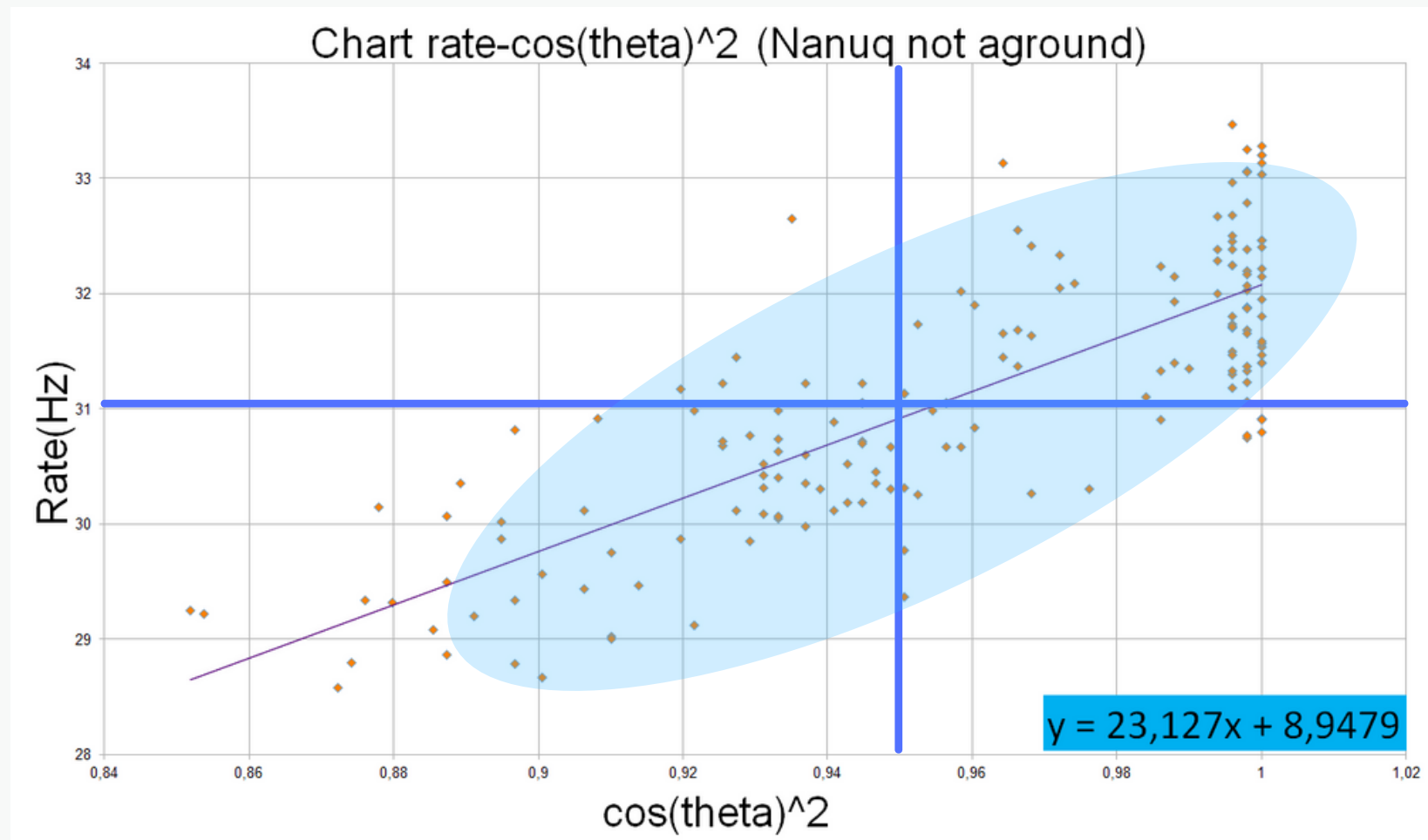
EXCEL



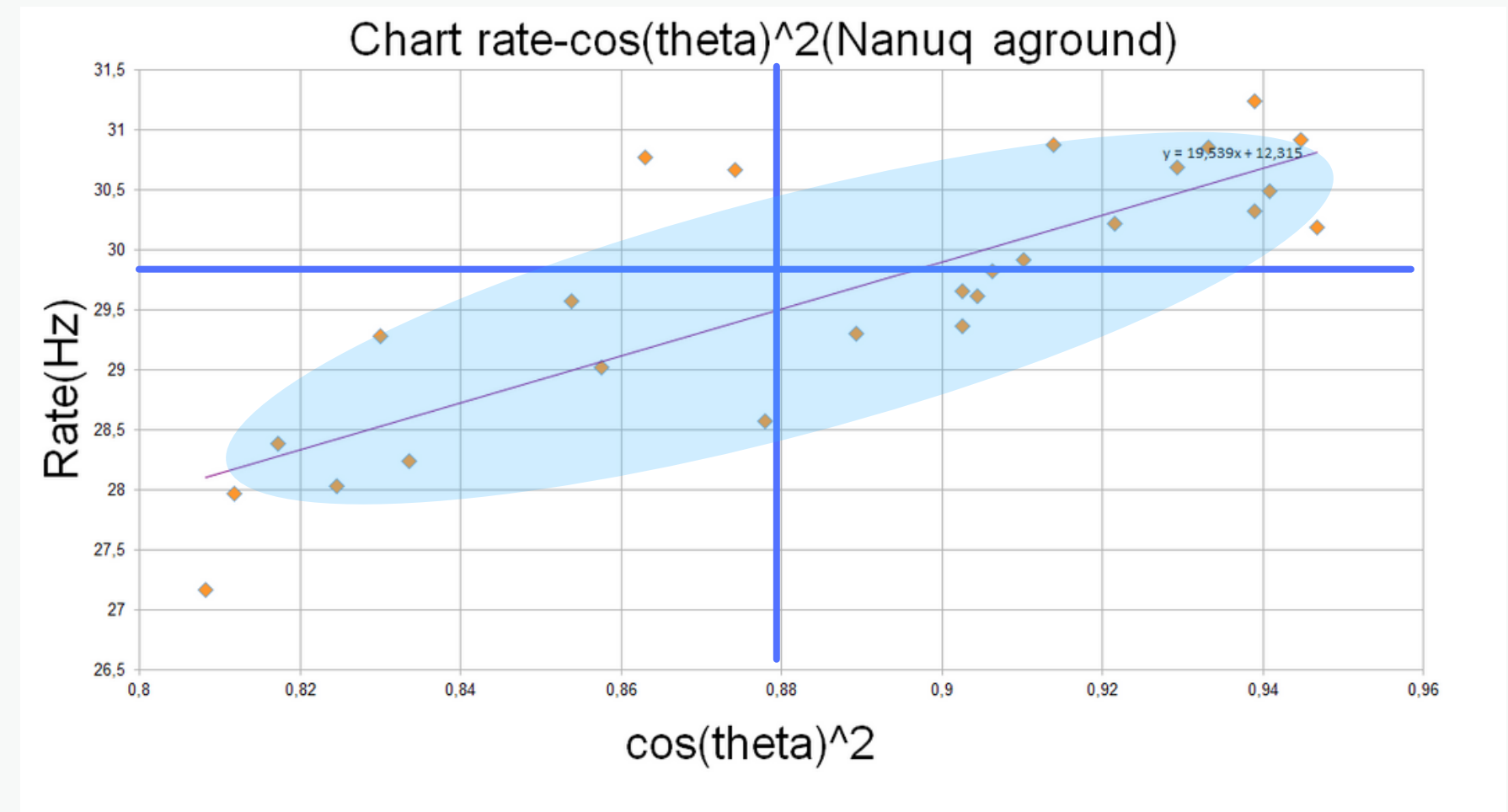
CHARTS RATE-COS²(theta)

EXCEL

$r=0,80$



$r=0,79$



We found correlation between rate and $\cos(\theta)^2$ values by finding r (covariancy/ stdev rate *stdev $\cos(\theta)^2$) and by setting a linear trend line. The charts division is based on Nanuq's grounding.

CHARTS RATE-TIME(GROUPED) EXCEL

Chart rate-time(grouped values, Nanuq not aground)

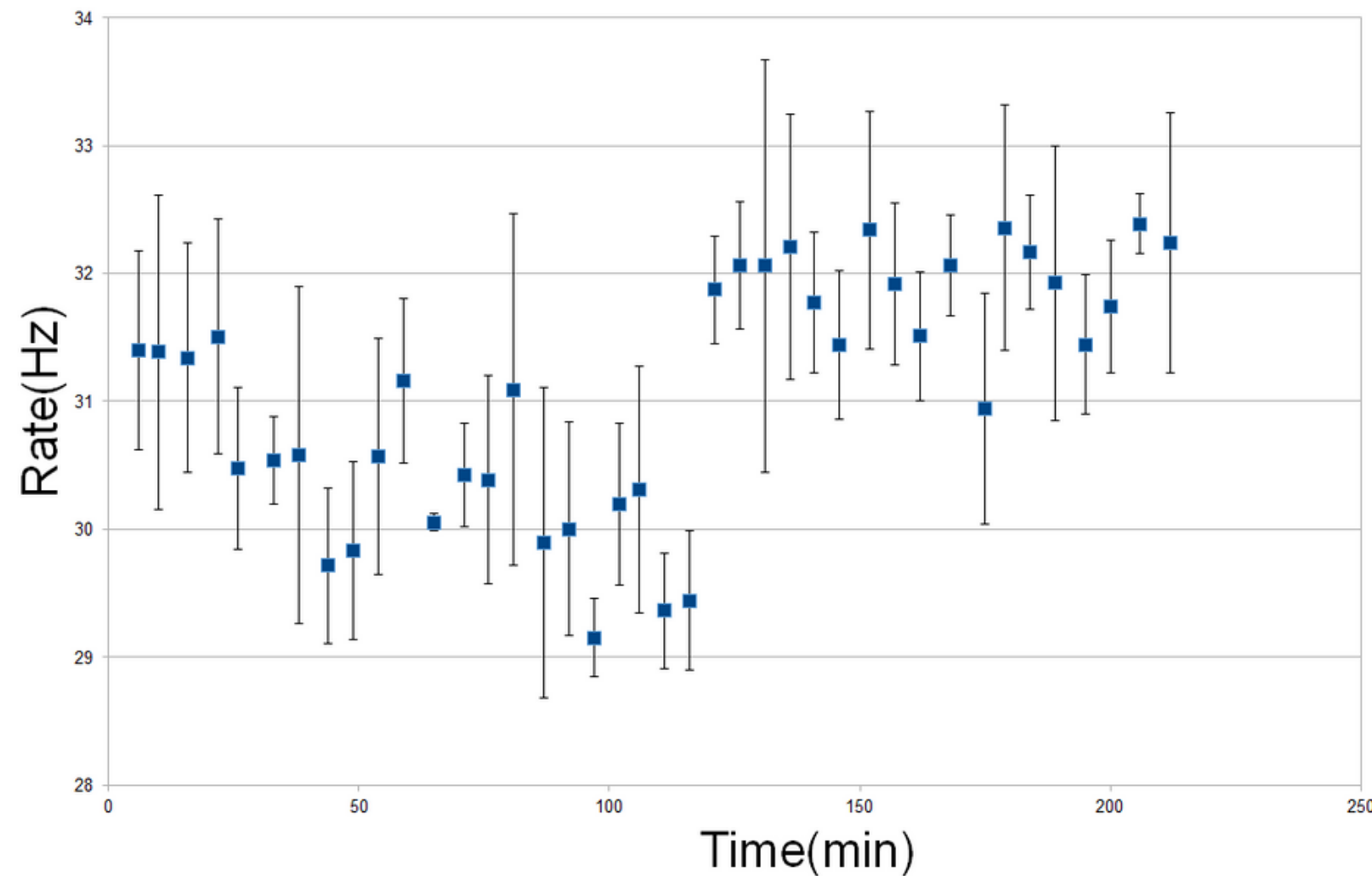
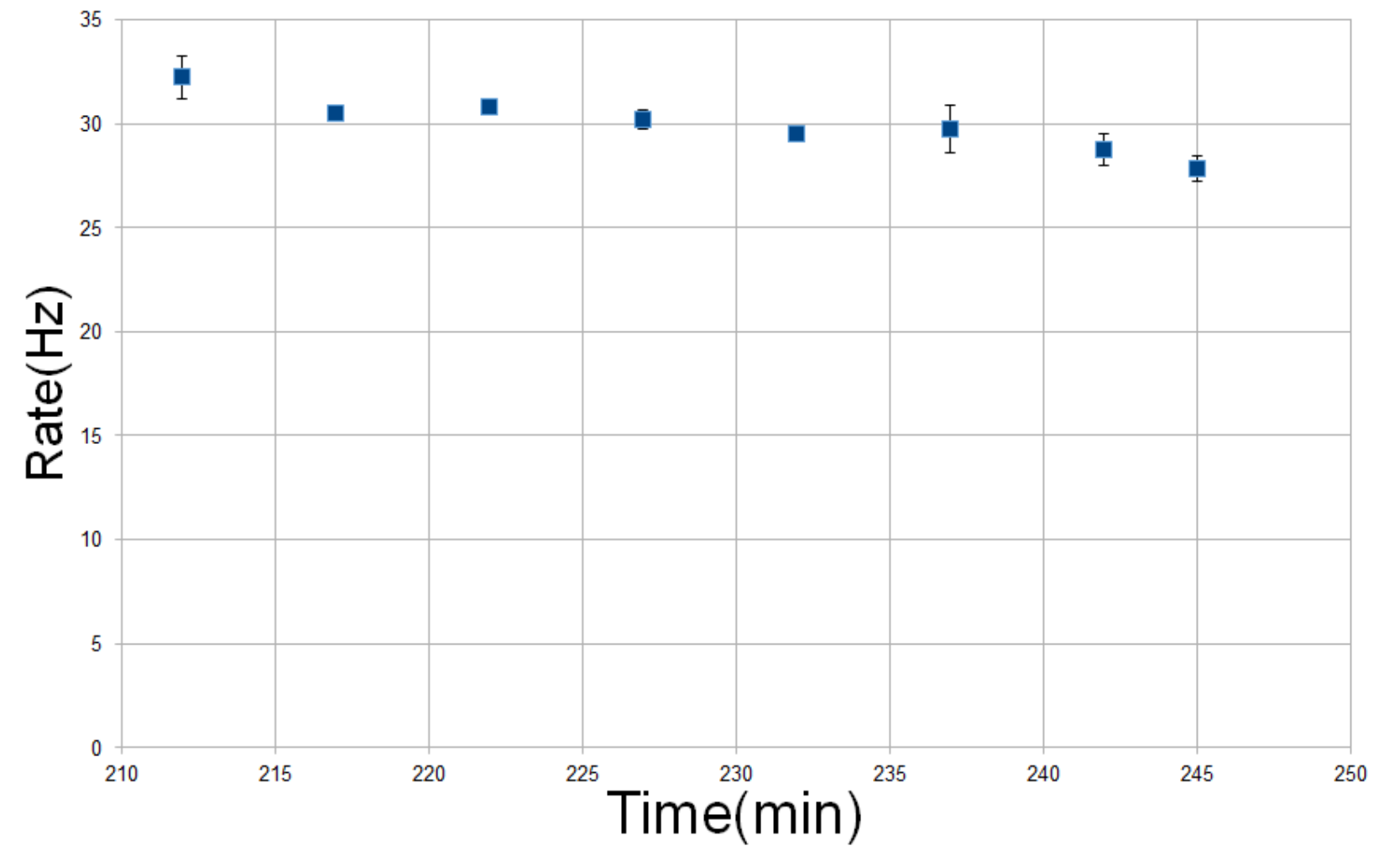


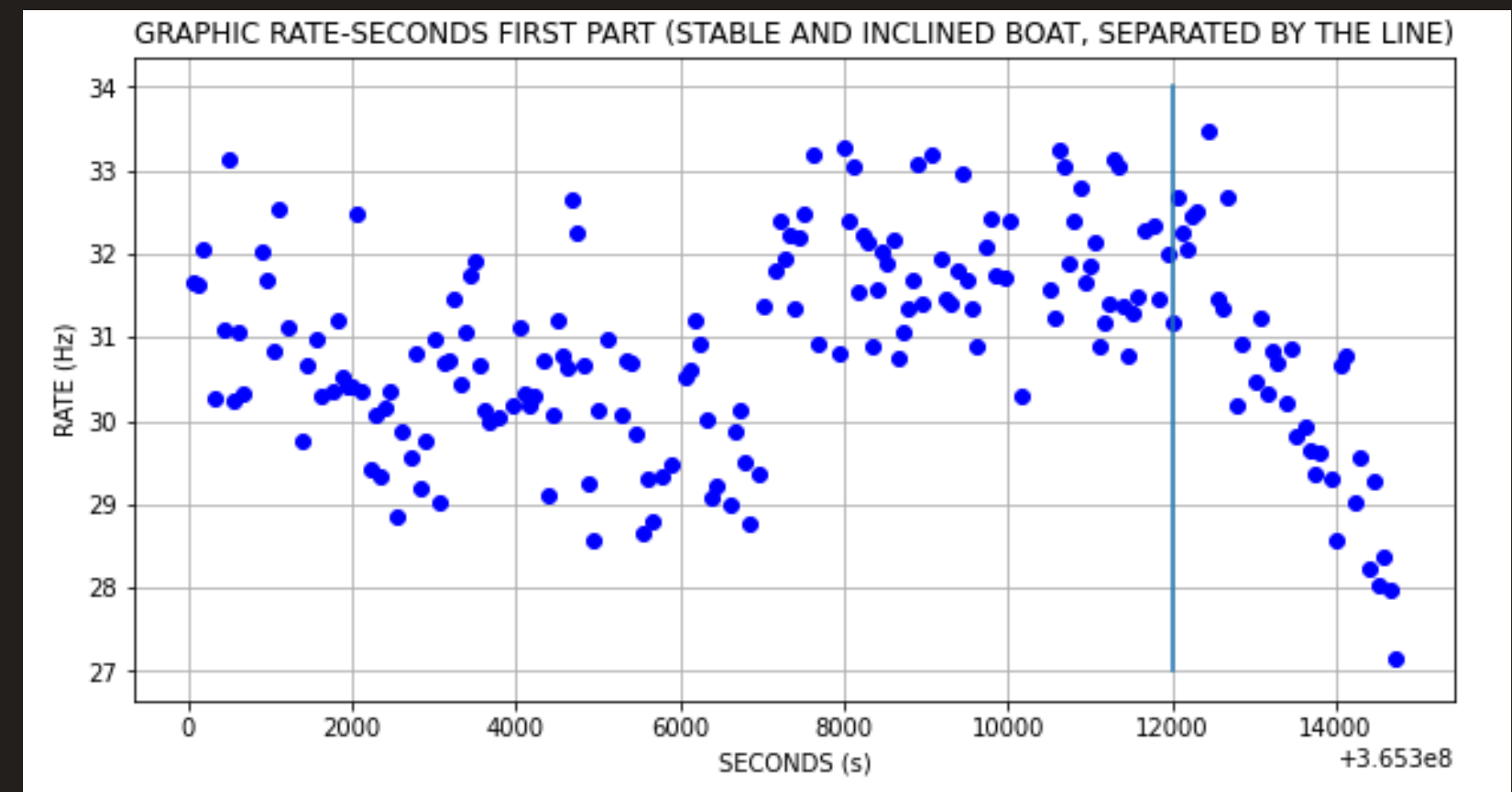
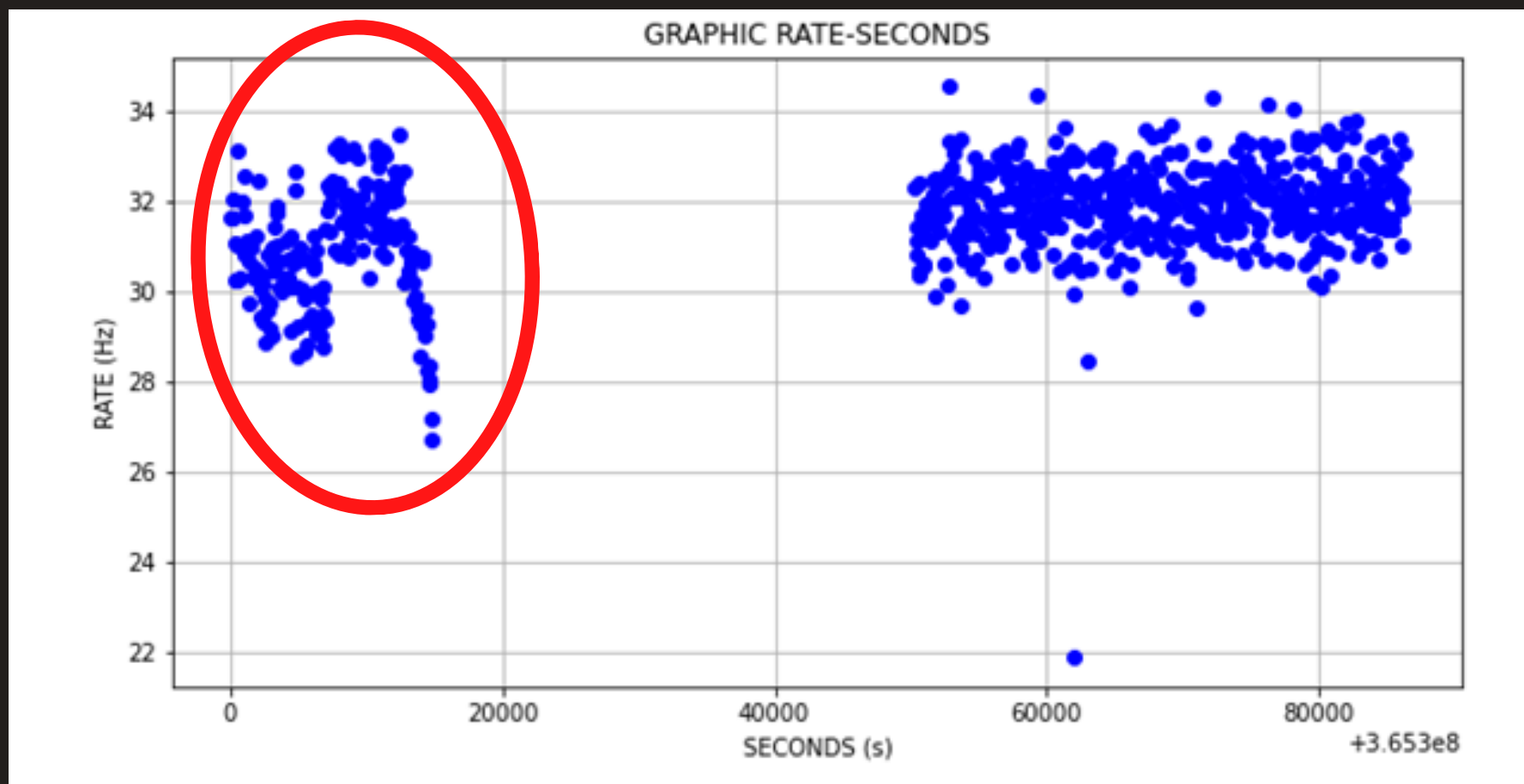
Chart rate-time (grouped values, Nanuq aground)



We remade the analysis using grouped values. We used time values with lapses of 4/6 minutes. We found the relatives rate and cosine values (using function average for each time lapse) and we also calculated every standard deviation

CHARTS RATE-TIME

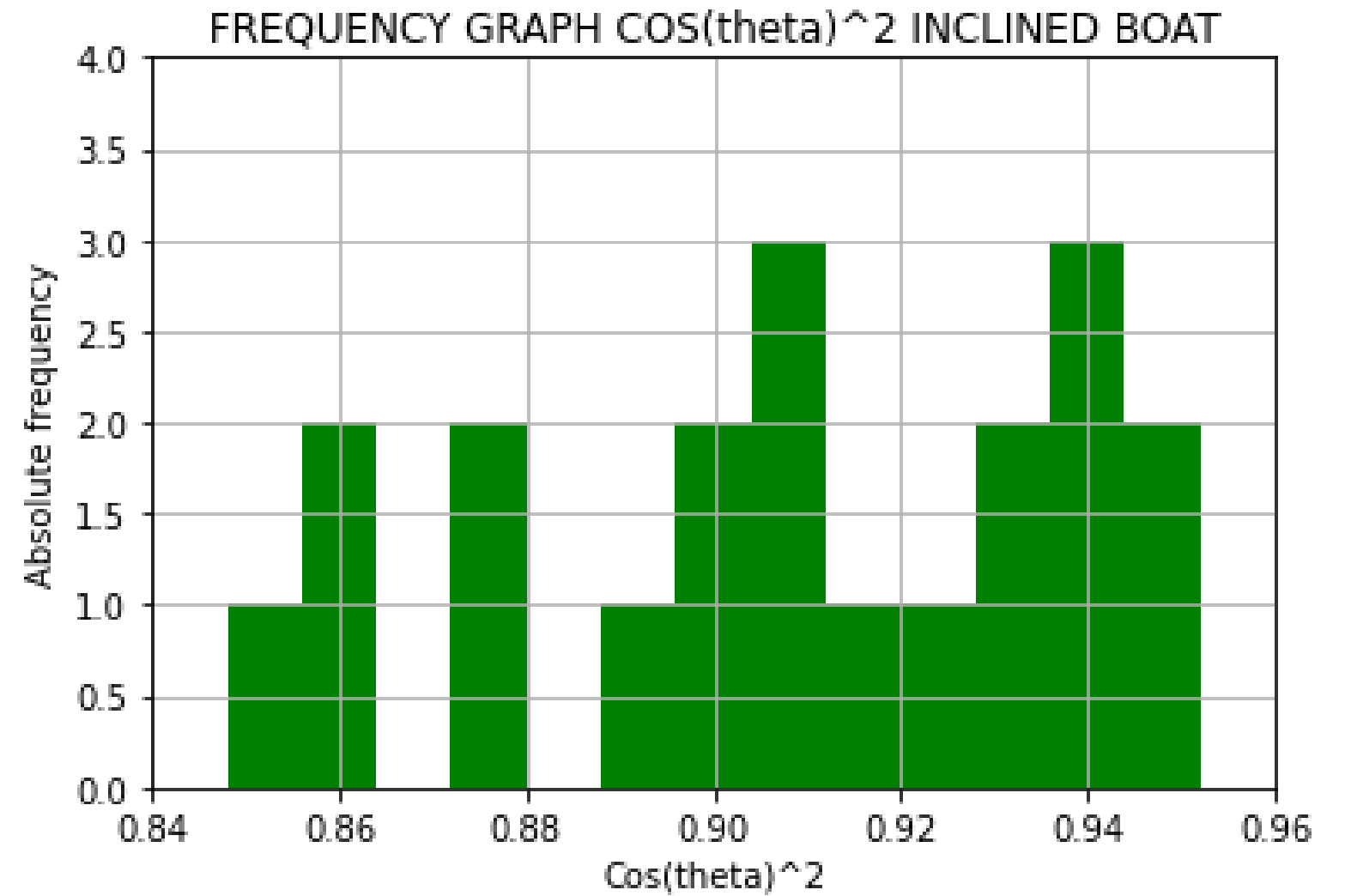
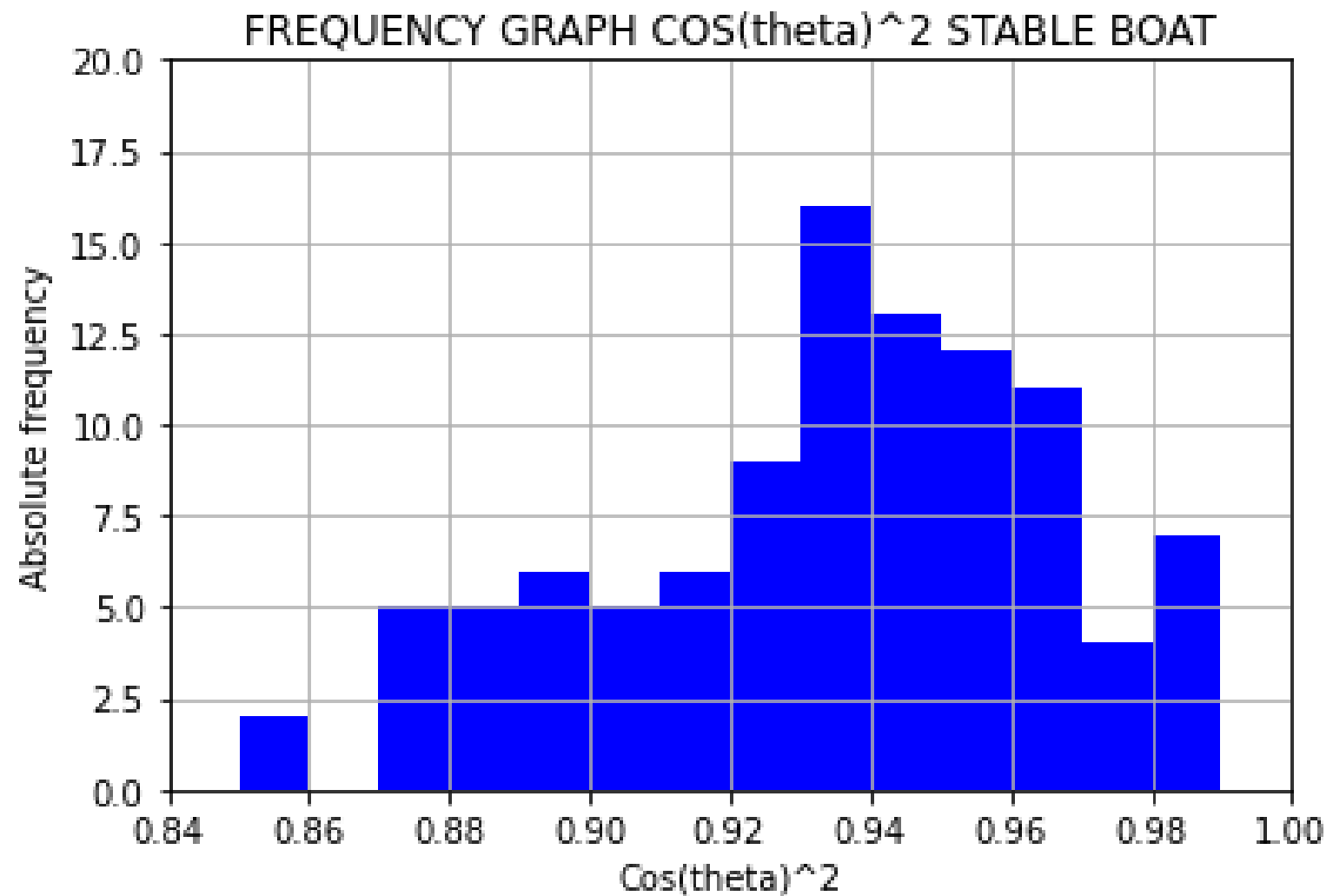
PYTHON



We considered the time, rate and cosine parameters, from the rate over time graph we verified that there was a pause in the measurement activity of about nine hours. We focused on the first part of the data, and we clearly visualized the difference between the two situations proposed in the second graph.

FREQUENCY HISTOGRAMS

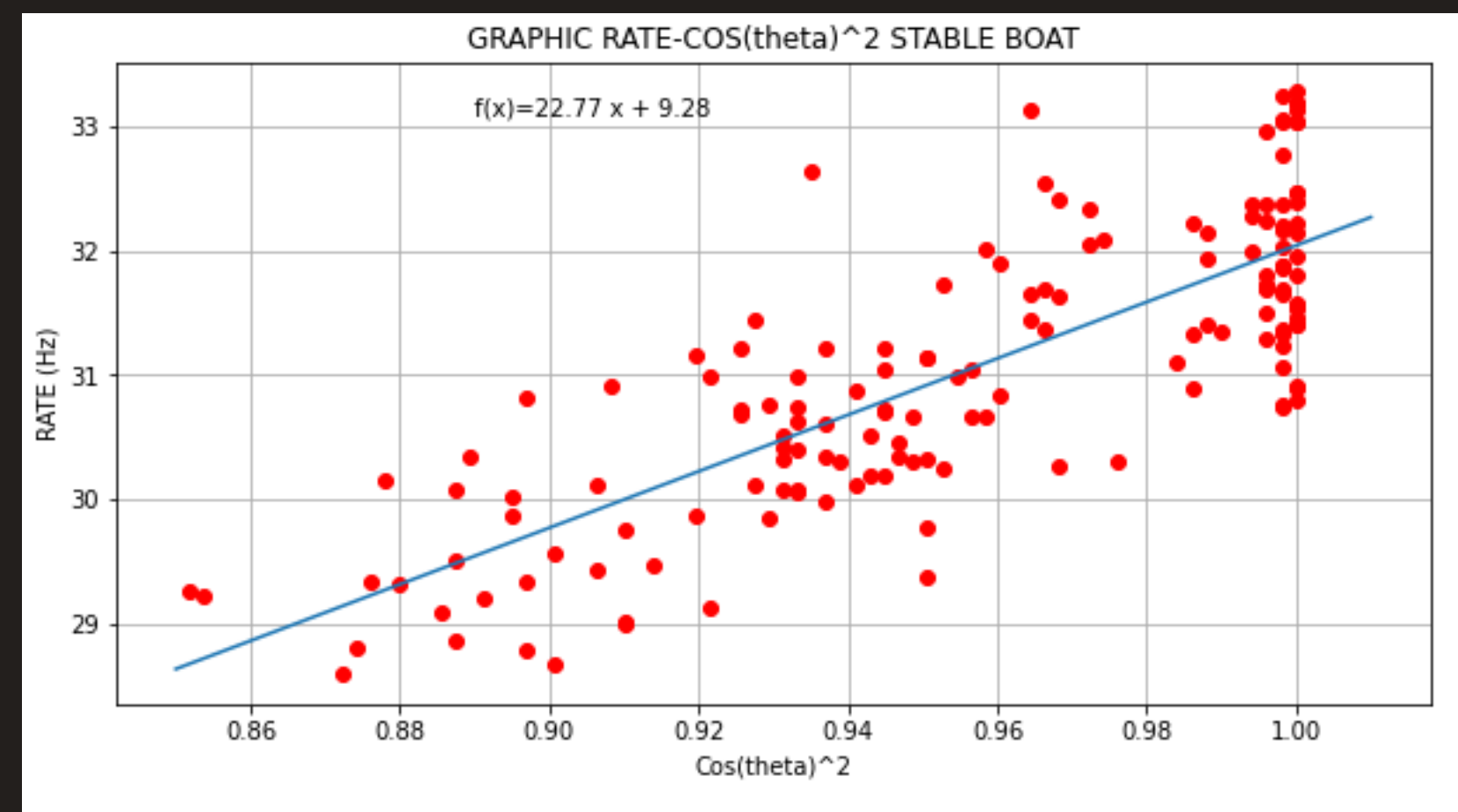
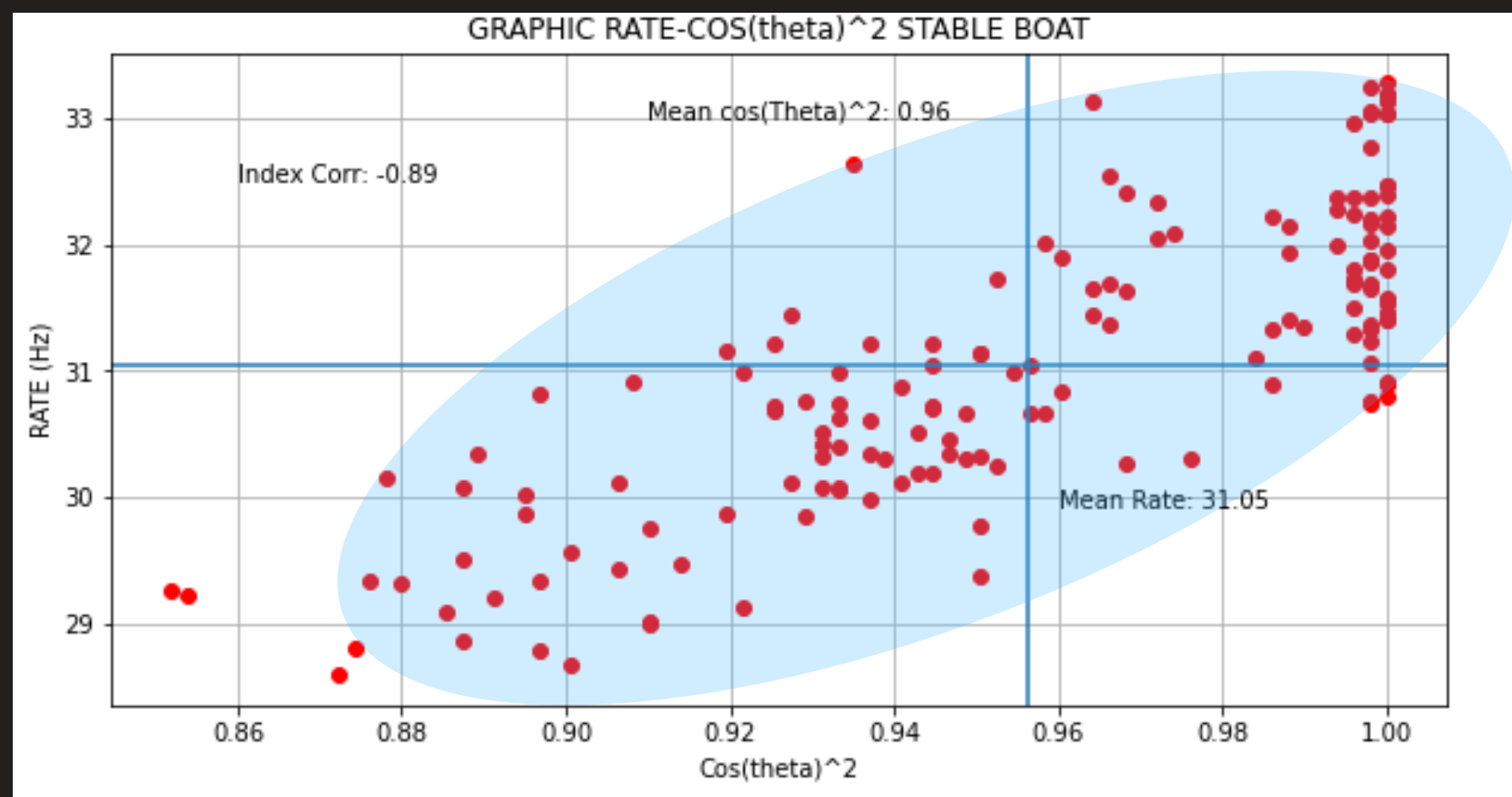
PYTHON



We also represented the frequencies of the cosine square(θ) in both conditions with histograms.

RATE-COS(theta)^2

STABLE BOAT

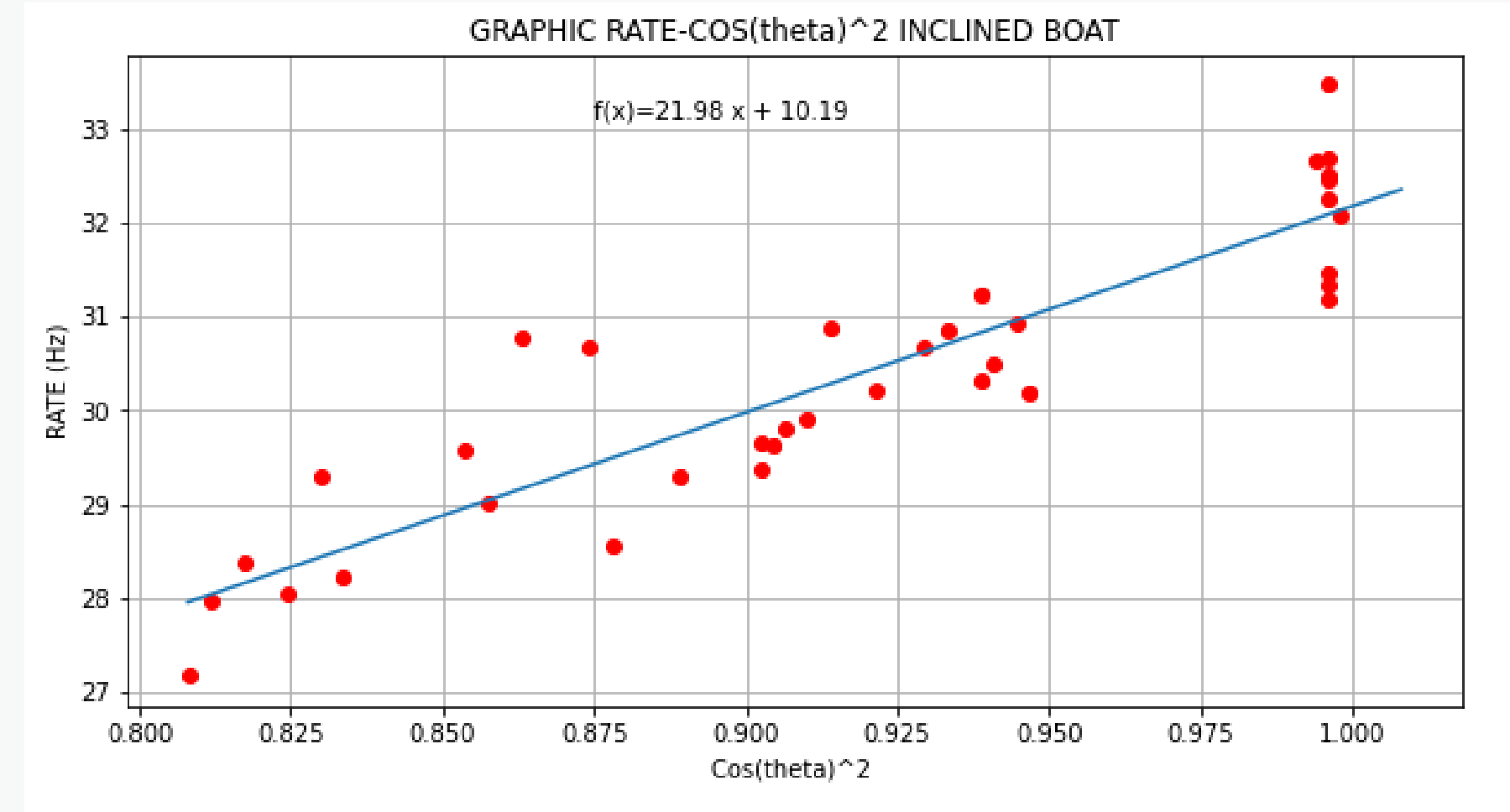
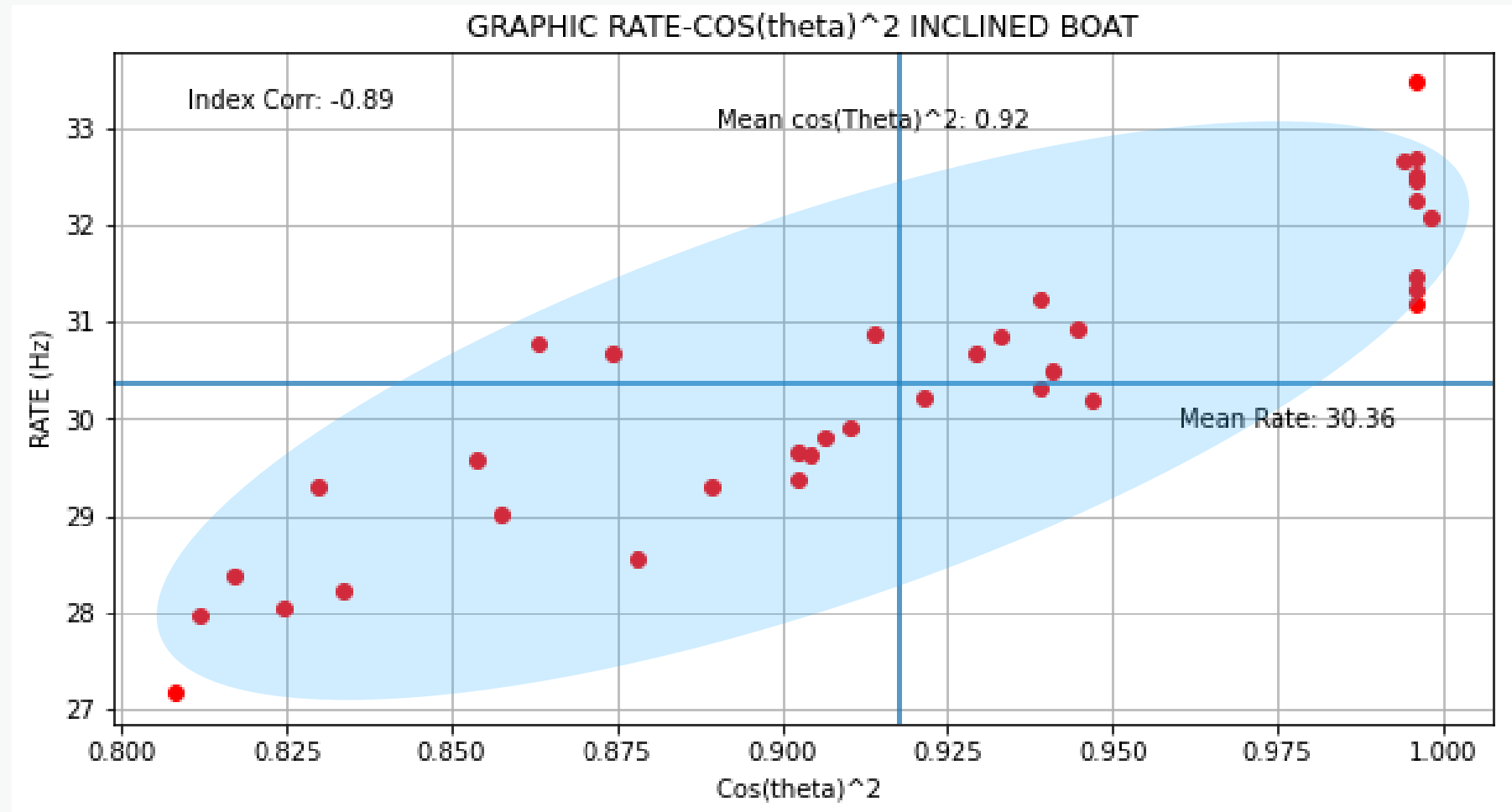


We represented with other graphs the trend of the rate on theta cosine square values when the boat is stable.

CHARTS

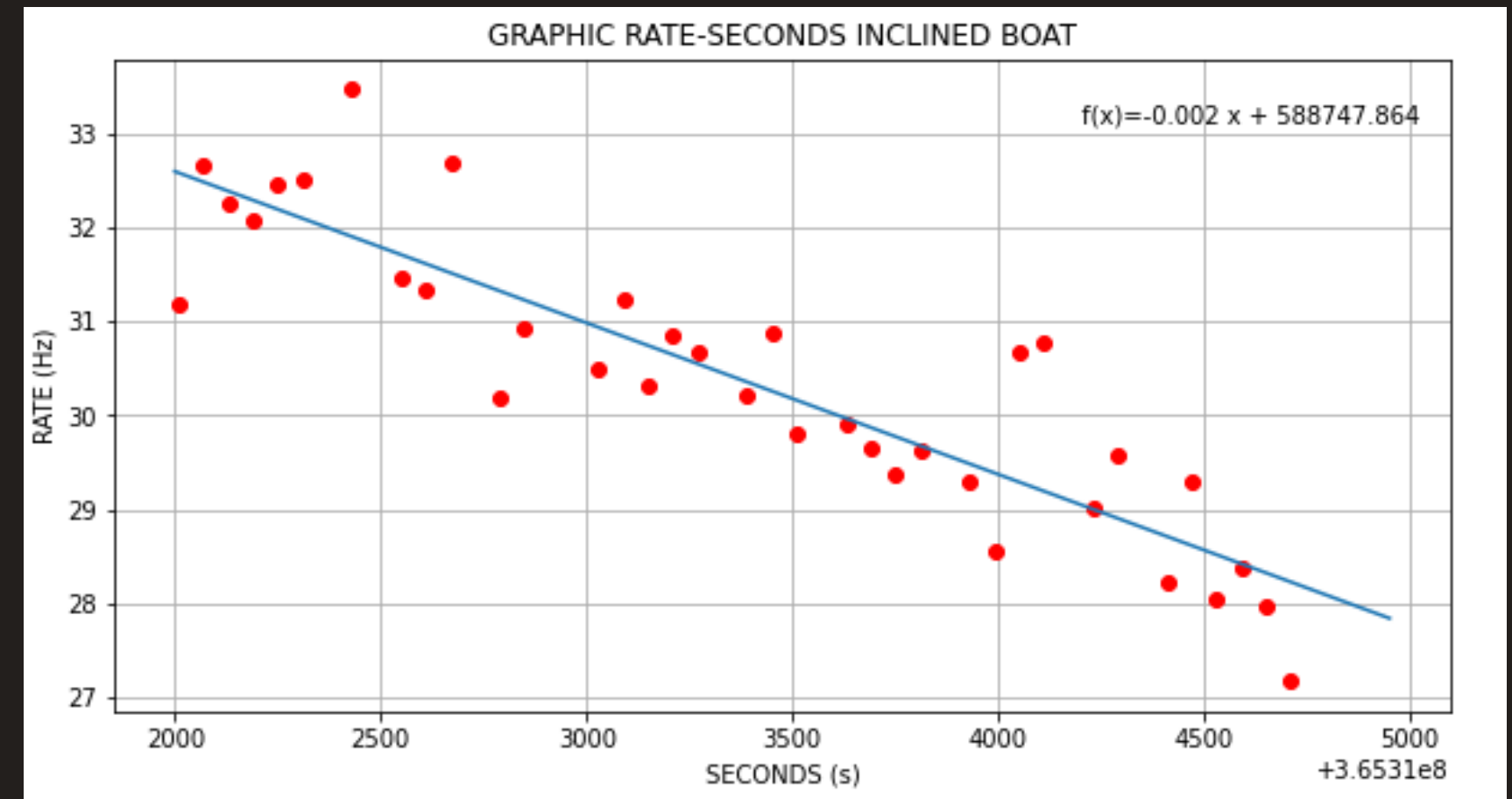
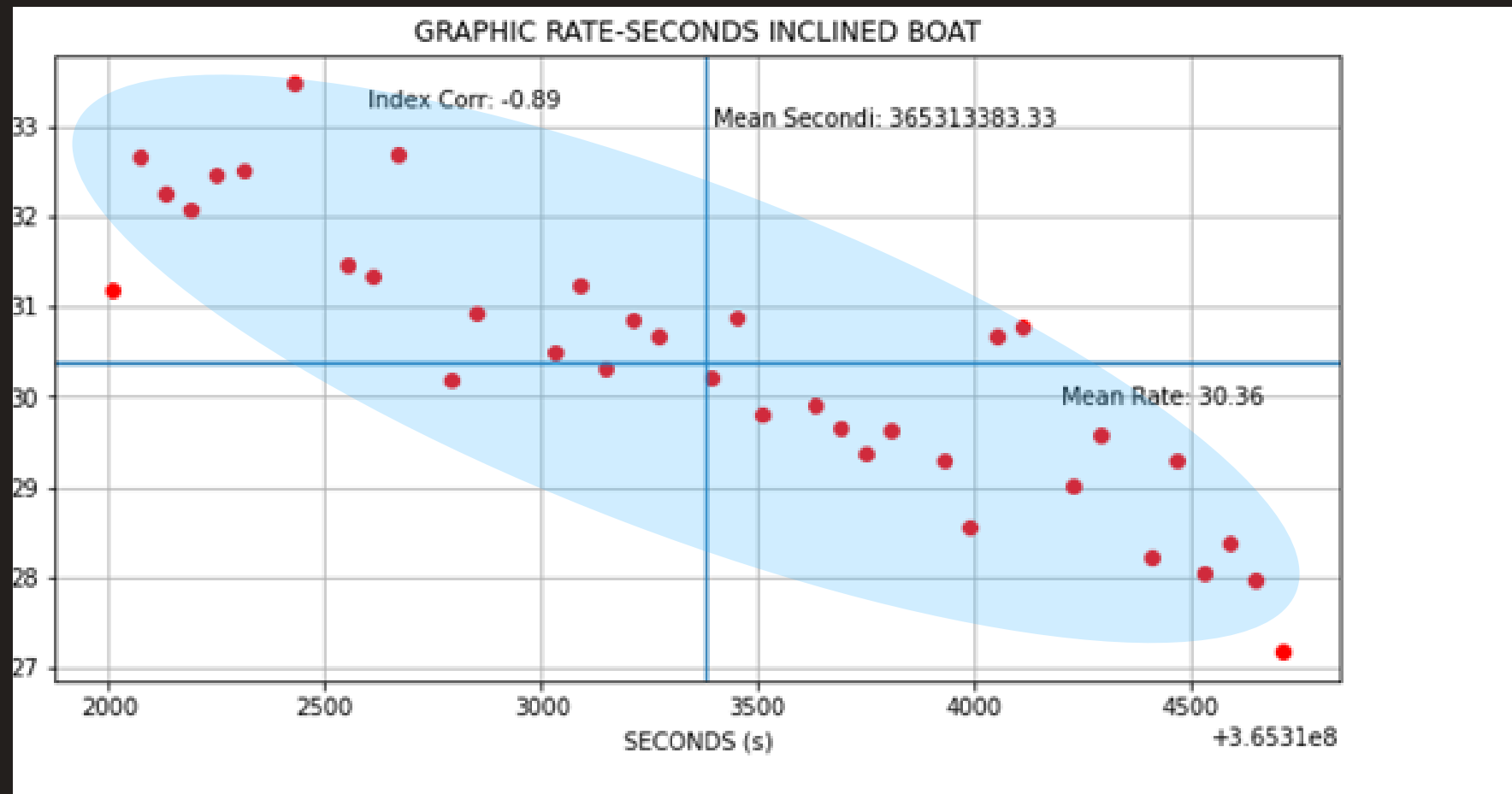
RATE-COS(theta)^2 INCLINED BOAT

PYTHON



We represented with other graphs the trend of the rate on theta cosine square values when the boat is inclined.

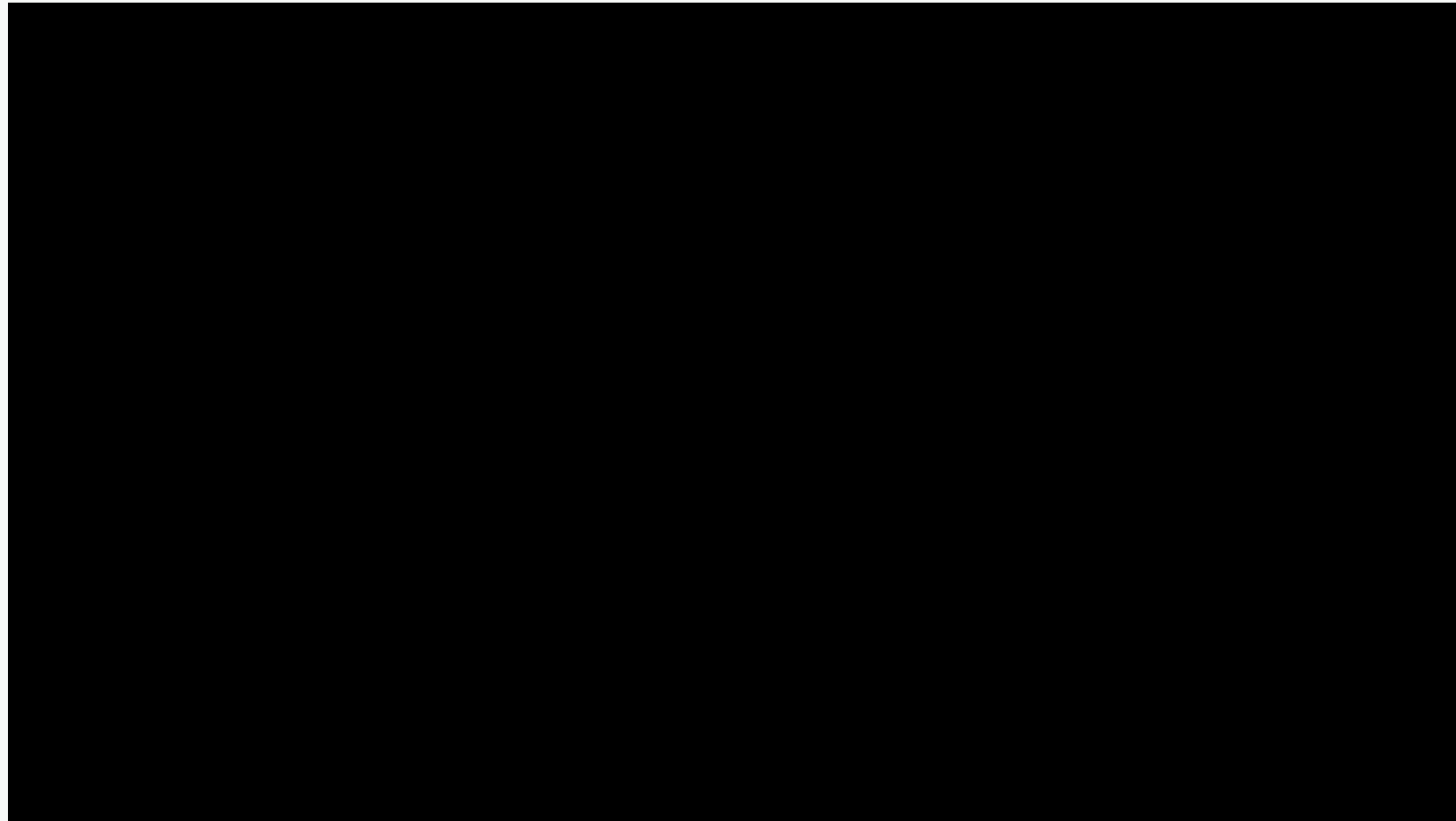
CHARTS INCLINED BOAT RATE-TIME



We analyzed the second part highlighting the correlation (this part is recognizable by a linear regression of the rate value) between the values and the area in which they were located, with its center of gravity.

Presentation video ICD

DAY OF ICD



Traces of cosmic rays

DAY OF ICD

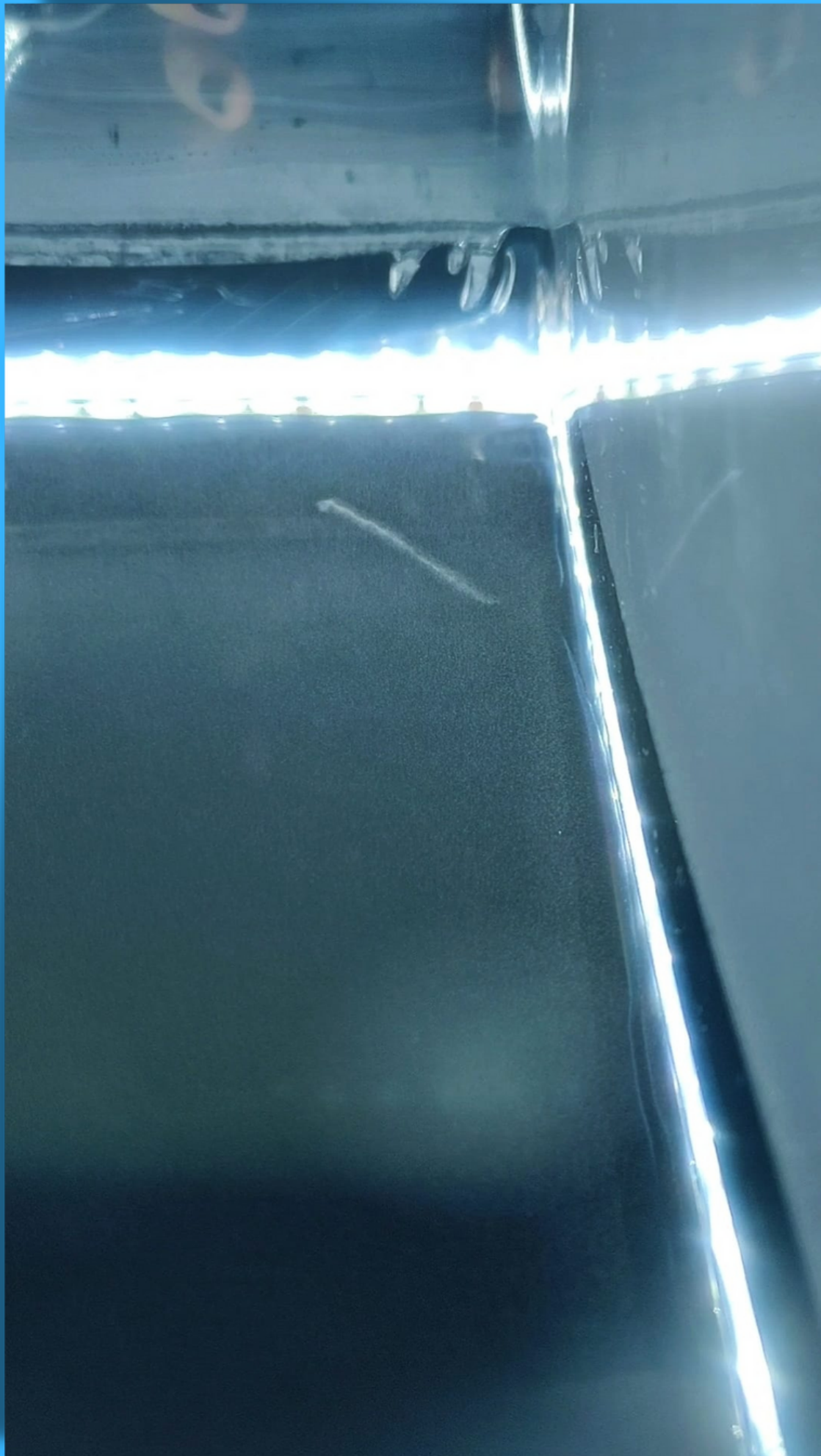


What did we do that day?

DAY OF ICD

This is the Mosconi Laura's
photograph, the winner of the photo
contest.

A special photo



THANKS FOR WATCHING

Jacopo Ascenzi

Adriano Basso

Vanessa Brizzola

Matteo Catalini

Alessandro Ciucci

Andrei Massaroni

Alessandro Mattetti