Title of Work

Degree name

in

Name of Department

by

PG

(Roll No. ....)

Supervised by

Dr. DC

to

DEPARTMENT OF ....

VISVA BHARATI

BOLPUR, SANTINIKETAN - 731 235, INDIA

DECLARATION

I, **PG (Roll No: ....)**, hereby declare that this report entitled **"Title"** submitted to Visva Bharati, Bolpur, Santiniketan towards the partial requirement of **Degree Name** in **Department Name**, is an original work carried out by me under the supervision of **Prof. DC** and has not formed the basis for the award of any degree or diploma, in this or any other institution or university. I have sincerely tried to uphold academic ethics and honesty. Whenever a piece of external information or statement or result is used then, that has been duly acknowledged and cited.

Bolpur, Santiniketan - 731 235 **PG**

July 2023

VISVA-BHARATI

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Certificate from the Supervisor

Date: 25.05.2023

This is to certify that the work contained in this project report entitled **"Title"** submitted by **PG** (**Roll No: .....**) to Visva Bharati, Bolpur towards the partial requirement of **Degree Name** in **Department of ....** has been carried out by him under my supervision and that it has not been submitted elsewhere for the award of any degree.

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ABSTRACT

Name of the student: **PG**   Roll No: **......**

Degree for which submitted: **Degree name**   Department: **Department ....**

Thesis title: **Title**

Thesis supervisor: **Prof. DC**

Date of thesis submission: **July 2023**

Abstract

Keywords:

Circular Statistics, Spherical Statistics, Time series Analysis, meteoroids, Solar Data

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Notations and Abbreviations

- G_h = Global Flux received on a horizontal surface (W/m^2)

- I_h = Direct Flux received on a horizontal surface (W/m^2)

- D_h = Diffuse Flux received on a horizontal surface (W/m^2)

- I_0 = Solar Constant (W/m^2)

- C_t = correction of Earth-Sun Distance

- h = Height of the sun(in Degrees)

- T_{sv} = True Solar time(Hours)

- δ = Solar Declination(Degrees)

Introduction

Meteoroids are objects in space that range in size from dust grains to small asteroids. Think of them as "space rocks." When meteoroids enter Earth's atmosphere (or that of another planet, like Mars) at high speed and burn up, the fireballs or the "shooting stars" are called meteors. uniformity **C. de la Fuente Marcos and R. de la Fuente Marcos. "Recent multi-kiloton impact events: are they truly random?" In:** *Monthly Notices of the Royal Astronomical Society* **446 (2014). DOI:** https://doi.org/10.1093/mnrasl/slu144. After verifying the statement we tried to see if the data is following Von Mises Distribution or not.

Section 2

gdygbsjcb dsc ds

mkjdbhcgvddvelhhedncl

Section 3

The whole point of including the part of the asteroid belt is to present that when the sunspot or the solar activity increases, the increase of magnetic field attracts the meteors toward Earth and the majority of meteors came from the Asteroid Belt. Alessandro Morbidelli and Brett Gladman. "Orbital and temporal distributions of meteorites originating in the asteroid belt". In: *Meteoritics & Planetary Science* 33.5 (1998), pp. 999–1016

Section 4

Theory part 1

Theory Part 2

density.circular(x = M_data_cir_long_mv, bw = 50)

Density circular

$\frac{\pi}{2}$

π +   0

$\frac{3\pi}{2}$
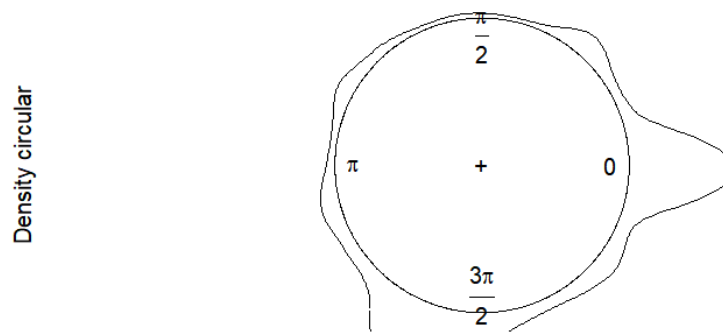
N = 38401   Bandwidth = 50   Unit = radians

Figure 6.1: Rose plot for Longitude of the data

Results and Discussion

Parameter	Test Statistics	Alpha	Critical Value	Distribution
Longitude	135.6698	0.01	0.09	Not Vonmises Distribution
Latitude	89.9386	0.01	0.09	Not Vonmises Distribution

Table 7.1: Watson Test Result for Data 1

$$\text{(Longitude, Latitude)(y)} \sim \text{Mass}(x_1), \text{Solar Radiation}(x_2)$$

```
    Call:
arima(x = tsd, order = c(2, 1, 3))


Coefficients:
          ar1       ar2       ma1      ma2      ma3
      1.6135   -0.9346   -1.4216   0.4267   0.1373
s.e.  0.0258    0.0246    0.0617   0.0983   0.0557


sigma^2 estimated as 236.2:  log likelihood = -1197.1,  aic = 2406.2
```

Conclusion

Further Works

Appendices

Use of Circular Statistics R packages

circ.cor	Correlation Coefficient for angular variable
rao.spacing	Rao spacing test of Uniformity
watson.test	Test of Uniformity or Test of Von mises distribution.
circ.plot	Circular Data plot
lm.circular	Circular Linear Regression
skmeans	spherical K means Algorithm
watson.two.test	Watson Two sample test for Homogenity
density.circular	Circular Density of data set

Table A.1: Coding Function Description

Bibliography

Fuente Marcos, C. de la and R. de la Fuente Marcos. "Recent multi-kiloton impact events: are they truly random?" In: *Monthly Notices of the Royal Astronomical Society* 446 (2014). DOI: https://doi.org/10.1093/mnrasl/slu144.

Morbidelli, Alessandro and Brett Gladman. "Orbital and temporal distributions of meteorites originating in the asteroid belt". In: *Meteoritics & Planetary Science* 33.5 (1998), pp. 999–1016.