DEPARTMENT OF PHYSICS

GDC CHENNOOR DIST.MANCHERIAL

TELANGANA STATE

Submission of

JIGNASA STUDY PROJECT

Titled

"STATISTICAL STUDY OF SOLAR ECLIPSES AND ITS EFFECTS"

Conducted By

1. **P.Samatha – MPC III Year**
2. **S. Keerthana – MPCs III Year**
3. **Ruksaana Huzlath – MPCs II Year**
4. **Raazia Khanam – MPCs II year**
5. **N. Swathi – MPCs I year**
6. **P. Tharun – MPCs I year**

Under the Guidance of

Ms. Sridevi. K.
Principal (FAC) & Asst. Prof of Physics
GDC Chennoor

To

The Commissioner
Collegiate Education, Nampally
Hyderabad, Telangana State

CERTIFICATE

Certified that the Student Project titled "Statistical Study of Solar Eclipses and its effects" in the subject of physics is a genuine study conducted by the following students under the guidance of K. Sridevi, Asst. Prof of Physics GDC Chennoor, as part of JIGNASA initiative of Commissionerate of Collegiate during the year 2021-2022 and neither in part nor in whole is taken from already published works.

S.No	Name of the Students	Class & Year
1	P. Samatha	MPC III yr
2	S. Keerthana	MPCs III Yr
3	Raazia Khanam	MPCs II Yr
4	Ruksana Huzlath	MPCs II Yr
5	N. Swathi	MPCs I Yr
6	P. Tharun	MPCs I yr

Signature of Guiding Teacher

(K. Sridevi)

Asst. Prof of Physics

GDC Chennoor

Submitted On: 31.12.2021

PROJECT ON SOLAR ECLIPSES

Title:

Statistical Study of Solar Eclipses and Its Effects

Statement of the problem or Hypothesis:

Solar eclipse occurs when moon comes in between earth and sun. Solar eclipses have always been a topic of fascination for astronomical studies. Its study is a never ending process. There is a lot of scope to discover many facts about planetary motion and the stability of planet earth. We tried to conduct this study in a different dimension touching various facts for taking that very first step towards a long journey to be accomplished in the future.

Aims and Objectives:

- To study the formation of solar eclipses and trajectory of earth-moon motion.
- To study the statistics of occurrence of solar eclipses.
- To study the impact of solar eclipse on global environment causing calamities like earth-quakes, tremors and storms.
- To study if solar eclipses affect human health and human behaviour.
- To take pride in our ancient knowledge and scholars.

Review of Literature:

1. https://eclipse.gsfc.nasa.gov
2. https://insiderpaper.com/strong-earthquake-hits-chile-during-the-solar-eclipse/
3. https://osho.work/the-great-american-eclipse-%E2%80%93-earthquake-and-tsunami
4. https://wfoster2011.wordpress.com/2012/01/03/total-solar-eclipses-and-global-earthquakes/
5. Precise measurement of gravity variations during a total solar eclipse by Qian-shen Wang, Xin-she Yang, Chuan-zhen Wu, Hong-gang Guo, Hong-chen Liu, and Chang-chai Hua Phys. Rev. D **62**, 041101(R) – Published 14 July 20
6. Leow Choon Lian, The Indian Calendar, Honours Year Project 2000-2001, Department of Mathematics, National University of Singapor

Research Methodology:

- We first tried to build a model of sun-earth-moon motion and basing on the information available online and tried to understand the formation of eclipse.
- We took the information of eclipses available in the official NASA website and studied the statistics of occurrence of eclipses.
- We collected news about earth quakes that happened during solar eclipses
- Reports of people complaining solar eclipse affected the foetus
- We approached local Siddanti Shri. Datta Murthy who is well known in the area, to know about Surya Siddantham

Analysis of Data:

- We calculated time period between consecutive eclipses for a period of 100 years
- Grouped the data for the occurrence of 2, 3, 4, 5 eclipses
- A pattern is observed for 2 eclipses but could not find any repetition pattern for 3, 4, 5 eclipses.
- Due to alignment of earth, moon and sun in a straight line it is obvious that the gravitational pull by moon-sun system on earth increases. So, we can expect imbalance of forces at some points which may cause earth-quakes, high tides etc.
- There is a high temperature gradient for a short period along the places of occurrence of eclipses which may affect flow of winds.

Findings:

- **The plane of revolution of moon around earth cannot be the same as the plane of revolution of earth around sun**.
- **Maximum number of solar eclipses in a year recorded up to now is 5 and minimum is 2. We also observe that solar eclipse in general occurs every 176 days.**
- We could study few earthquakes of high magnitudes recorded during solar eclipse like Chile on Dec14th 2020 but a study showed that of 5300 earth quakes, from the period 1973-2011, the probability of occurrence of earth quakes is more about 5-10 days before or after the eclipse.
- Whether it is coincidence or impact we cannot say; but the during the first world war period, 4 eclipses occurred in 1917 and during the second world war period, 5 eclipses

occurred during 1935, 5 eclipses previous to this was in the year 1805 during which war of third coalition in Europe took place cannot be clearly stated **if eclipses actually influence human behaviour.**

- **The predictions of dates of occurrence of solar eclipses by our ancient calendars are remarkably precise.**

Conclusions and Suggestions:

- Prior predictions alert us about any alarming calamity due to gravitational changes
- Deeper studies of eclipses need to be conducted to know about the impact of eclipses on the human health behaviour and in particular to that of foetus.
- Some concepts and theories of our ancient knowledge system may be introduced into our text books to make our younger generations feel proud of our scholars.

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PRINCIPAL
Govt. Degree College
CHENNOOR, Dist: Mancherial (T.S)

DATA ANALYSIS OF SOLAR ECLIPSES TAKEN FROM NASA WEBSITE

DEPARTMENT OF PHYSICS, GDC CHENNOOR

JIGNASA STUDENT STUDY PROJECT 2021-2022

Name of the Student: Ch. Shyam Sunder / Raazia Khanam

Class & Year: B.Sc [M.P.C.S] IIIrd year

Admission Number:

S.No	Date of eclipse	No.of days from last eclipse
1	18.05.1901	
2	11.11.1901	177
3	08.04.1902	148
4	07.05.1902	29
5	31.10.1902	177
6	29.03.1903	149
7	21.09.1903	176
8	17.03.1904	178
9	09.09.1904	176
10	06.03.1905	178
11	30.08.1905	177
12	23.02.1906	156
13	21.06.1906	139
14	20.08.1906	60
15	14.01.1907	147
16	10.07.1907	177
17	03.01.1908	177
18	28.06.1908	177
19	23.12.1908	178
20	17.06.1909	176
21	12.12.1909	178
22	09.05.1910	148
23	02.11.1910	177
24	28.04.1911	177
25	22.10.1911	177
26	17.04.1912	178
27	10.10.1912	176
28	06.04.1913	178
29	31.08.1913	147

S.No	Date of eclipse	No.of days from last eclipse
30	30.09.1913	30
31	25.02.1914	148
32	21.08.1914	177
33	14.02.1915	177
34	10.08.1915	177
35	03.02.1916	177
36	30.07.1916	178
37	24.12.1916	147
38	23.01.1917	30
39	19.06.1917	147
40	19.07.1917	30
41	14.12.1917	148
42	08.06.1918	176
43	03.12.1918	178
44	29.05.1919	177
45	22.11.1919	177
46	18.05.1920	178
47	10.11.1920	176
48	08.04.1921	149
49	01.10.1921	176
50	28.03.1922	178
51	21.09.1922	177
52	17.03.1923	177
53	10.09.1923	177
54	05.03.1924	177
55	31.07.1924	148
56	30.08.1924	30
57	24.01.1925	147
58	20.07.1925	177

DATA ANALYSIS OF SOLAR ECLIPSES TAKEN FROM NASA WEBSITE
DEPARTMENT OF PHYSICS, GDC CHENNOOR
JIGNASA STUDENT STUDY PROJECT 2021-2022

Name of the Student: D. Pranay 4th year, P. Tharun.
Class & Year: BSC (MPCS) III, B.Sc MPC I Year
Admission Number:

S.No	Date of eclipse	No.of days from last eclipse
59	14.01.1926	
60	09.07.1926	176
61	03.01.1927	178
62	29.06.1927	177
63	24.12.1927	178
64	19.05.1928	147
65	17.06.1928	29
66	12.11.1928	148
67	09.05.1929	178
68	1.11.1929	176
69	28.04.1930	178
70	21.10.1930	176
71	18.04.1921	179
72	12.09.1931	147
73	11.10.1931	29
74	07.03.1932	148
75	31.08.1932	177
76	24.02.1933	177
77	21.08.1933	178
78	14.02.1934	177
79	10.08.1934	177
80	05.01.1935	148
81	03.02.1935	29
82	30.06.1935	147
83	30.07.1935	30
84	25.12.1935	148
85	19.06.1936	177
86	13.12.1936	177
87	08.06.1937	177

S.No	Date of eclipse	No.of days from last eclipse
88	02.12.1937	177
89	29.05.1938	178
90	21.11.1938	176
91	19.04.1939	149
92	12.10.1939	176
93	07.04.1940	178
94	01.10.1940	177
95	27.03.1941	177
96	21.09.1941	178
97	16.03.1942	176
98	12.08.1942	149
99	10.09.1942	29
100	04.02.1943	147
101	01.08.1943	178
102	25.01.1944	177
103	20.07.1944	177
104	14.01.1945	178
105	09.07.1945	176.
106	03.01.1946	178
107	30.05.1946	147
108	29.06.1946	30
109	23.11.1946	147
110	20.05.1947	178
111	12.11.1947	176
112	09.05.1948	179
113	01.11.1948	176
114	28.04.1949	178
115	21.10.1949	176
116	18.03.1950	148.

DATA ANALYSIS OF SOLAR ECLIPSES TAKEN FROM NASA WEBSITE

DEPARTMENT OF PHYSICS, GDC CHENNOOR

JIGNASA STUDENT STUDY PROJECT 2021-2022

Name of the Student: B. Deepika / P. Samatha

Class & Year: MPCS IIIrd year / IIIrd year

Admission Number:

S.No	Date of eclipse	No.of days from last eclipse
117	12.09.1950	
118	07.03.1951	176
119	01.09.1951	178
120	25.02.1952	177
121	20.08.1952	177
122	14.02.1953	178
123	11.07.1953	147
124	09.08.1953	29
125	05.01.1954	149
126	30.06.1954	176
127	25.12.1954	178
128	20.06.1955	177
129	14.12.1955	177
130	08.06.1956	177
131	02.12.1956	177
132	30.04.1957	149
133	23.10.1957	176
134	19.04.1958	178
135	12.10.1958	54) 176
136	08.04.1959	178
137	02.10.1959	177
138	27.03.1960	177
139	20.09.1960	177
140	15.02.1961	148
141	11.08.1961	177
142	05.02.1962	178
143	31.07.1962	176
144	25.01.1963	178
145	20.07.1963	176

S.No	Date of eclipse	No.of days from last eclipse
146	14.01.1964	178
147	10.06.1964	148
148	09.07.1964	29
149	04.12.1964	148
150	30.05.1965	177
151	23.11.1965	177
152	20.05.1966	178
153	12.11.1966	176
154	09.05.1967	178
155	02.11.1967	177
156	28.03.1968	147
157	22.09.1968	178
158	18.03.1969	177
159	11.09.1969	177
160	07.03.1970	177
161	31.08.1970	177
162	25.02.1971	178
163	22.07.1971	147
164	20.08.1971	29
165	16.01.1972	149
166	10.07.1972	176
167	04.01.1973	178
168	30.06.1973	177
169	24.12.1973	177
170	20.06.1974	178
171	13.12.1974	176
172	11.05.1975	149
173	03.11.1975	176
174	29.04.1976	178

DATA ANALYSIS OF SOLAR ECLIPSES TAKEN FROM NASA WEBSITE

DEPARTMENT OF PHYSICS, GDC CHENNOOR

JIGNASA STUDENT STUDY PROJECT 2021-2022

Name of the Student: N. Vaasha Sri / S. Keerthana

Class & Year:

Admission Number:

S.No	Date of eclipse	No.of days from last eclipse
175	23.10.1976	
176	18.04.1977	177
177	12.10.1977	177
178	07.04.1978	177
179	02.10.1978	181
180	26.02.1979	147
181	22.08.1979	177
182	16.02.1980	178
183	10.08.1980	176
184	04.02.1981	178
185	31.07.1981	177
186	25.01.1982	178
187	21.06.1982	147
188	20.07.1982	29
189	15.12.1982	148
190	11.06.1983	178
191	04.12.1983	176
192	30.05.1984	178
193	22.11.1984	176
194	19.05.1985	178
195	12.11.1985	177
196	09.04.1986	148
197	03.10.1986	177
198	29.03.1987	177
199	23.09.1987	178
200	18.03.1988	177
201	11.09.1988	177
202	07.03.1989	177
203	31.08.1989	177

S.No	Date of eclipse	No.of days from last eclipse
204	26.01.1990	148
205	22.07.1990	177
206	15.01.1991	177
207	11.07.1991	177
208	04.01.1992	177
209	30.06.1992	178
210	24.12.1992	177
211	21.05.1993	148
212	13.11.1993	176
213	10.05.1994	178
214	03.11.1994	177
215	29.04.1995	177
216	24.10.1995	178
217	17.04.1996	176
218	12.10.1996	178
219	09.03.1997	148
220	02.09.1997	177
221	26.02.1998	177
222	22.08.1998	177
223	16.02.1999	178
224	11.08.1999	176
225	05.02.2000	178
226	01.07.2000	147
227	31.07.2000	30
228	25.12.2000	147

PHYSICS PROJECT - JIGNASA

GDC CHENNOOR

TITLE OF THE PROJECT

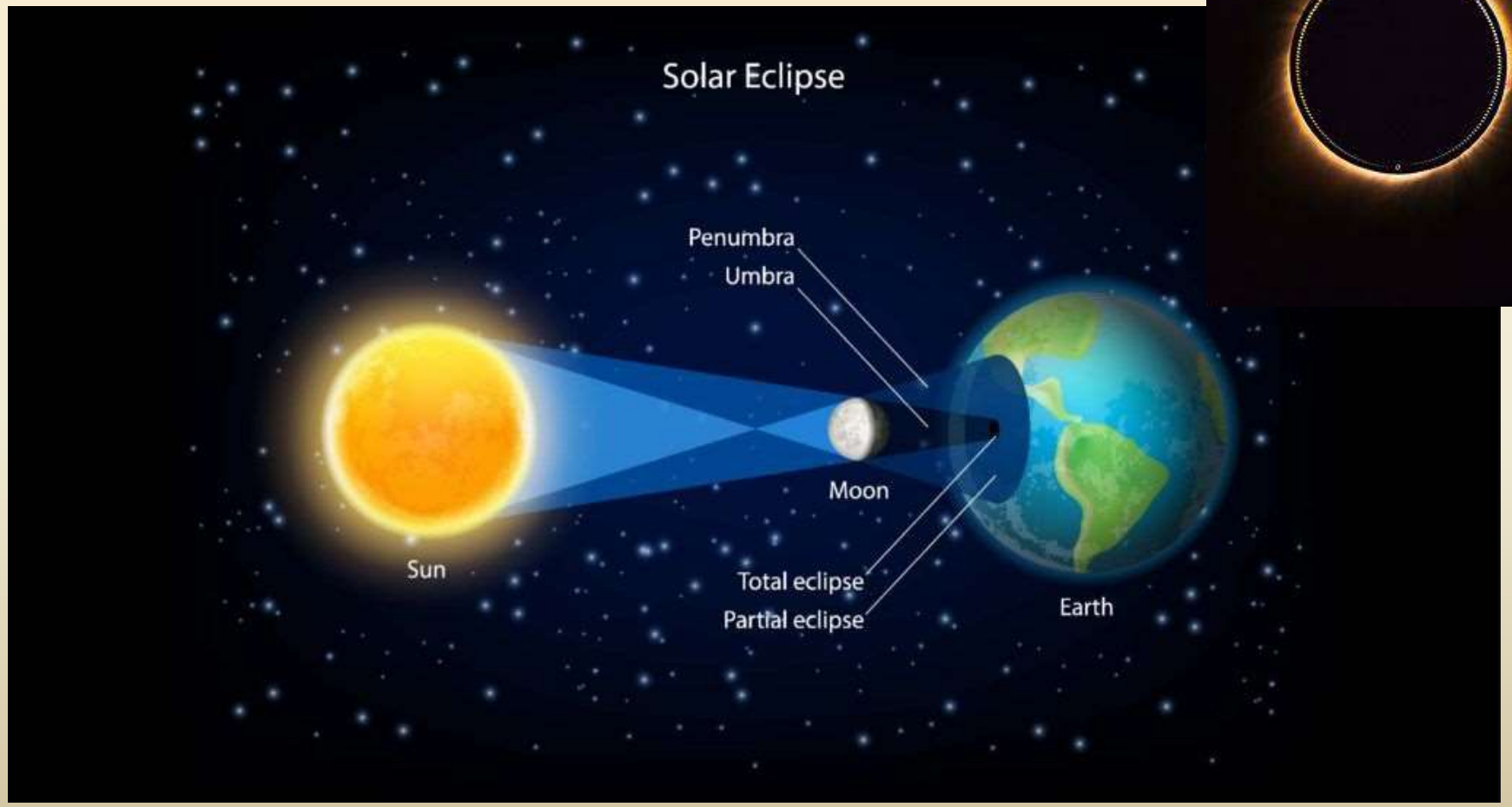
STUDY OF SOLAR ECLIPSES

Our interest of study was

- how the solar eclipse occurs
- how many times does it occur in an year
- Significant affects of solar eclipse
- Ancient calendars testify the qualitative knowledge

Formation of Solar Eclipse

Solar eclipse occurs when moon comes in between earth and sun and casts its shadow on the earth



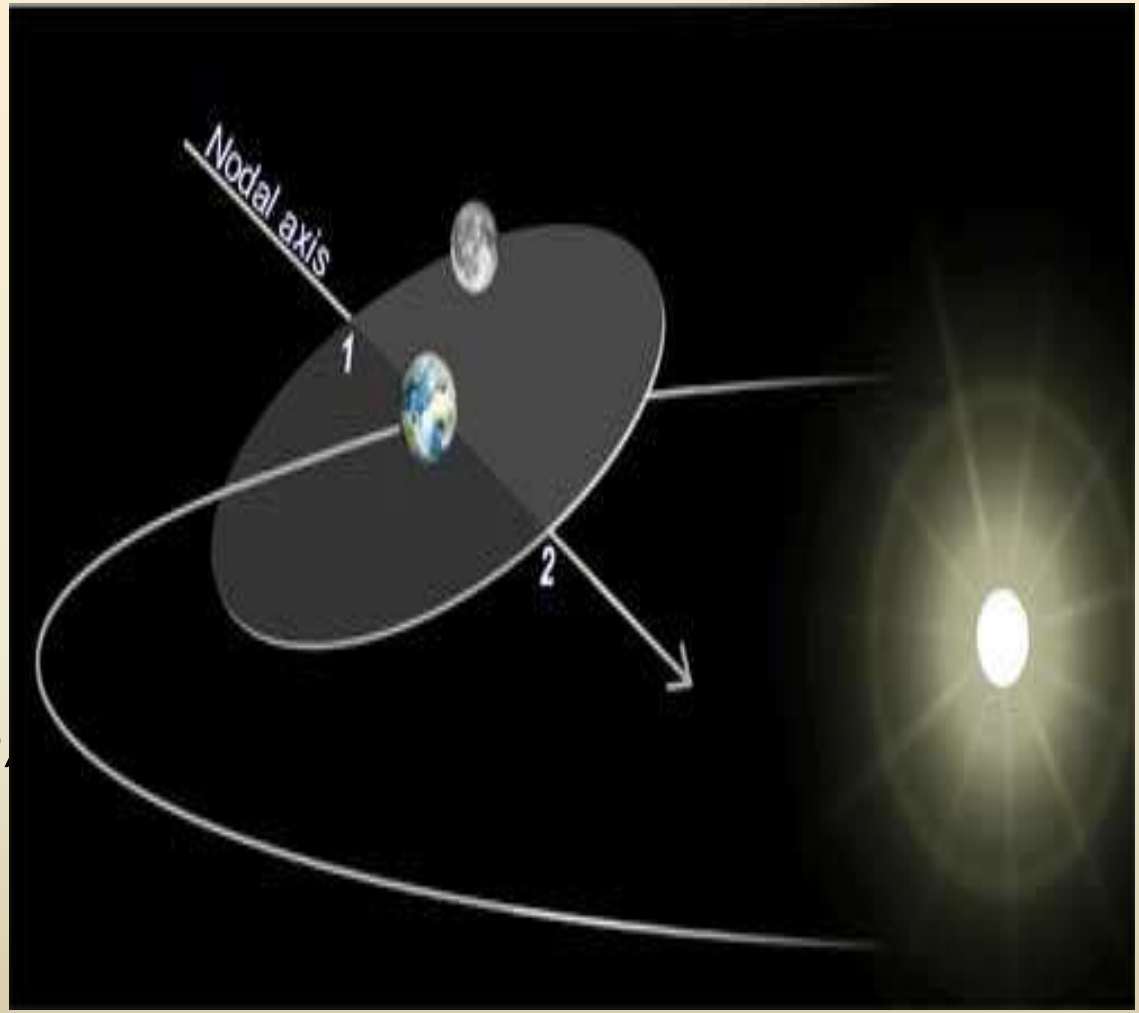
The Problem

- The moon completes one revolution around the earth in about 27 days 7 hrs 43 min 11.5 seconds.
- This means the moon comes in between earth and sun in every 27 days.
- So, we should have around 12-13 solar eclipses in an year???

- We conducted a study on last 100 years data of eclipses downloaded from NASA website.
- Solar eclipses occur mostly at a duration of 176 days which means twice a year.
- But few years registered more than 2 eclipses.
- The year 1935 experienced 5 eclipses

Reason for few eclipses

- The reason for 2-5 sola eclipses per year is because the plane of revolution of moon is titled and makes an angle of 5° with the plane of revolution of the earth.
- Due to this, the moon passes the earth from above or below. Hence, no solar eclipse will form in other months.



Gravitational Pull

- Due to the alignment of sun, moon and earth in a straight line, gravitational pull on earth increases appreciably which is evident by the high tides occuring during the solar eclipses.

Earth Quake Of Chile on 14th Dec, 2020

- Studies show that there can be earthquakes or tremors due to the plate tech-tonics getting influenced by the gravitational pull.
- Earthquake of Chile that measured 6.1 magnitude on 14th December, 2020 during the solar eclipse.

Context of Panchangam

- The Indian Calendar Panchangam predicted eclipses with good precision over the ages which means our ancient texts are of high quality with deep insight about planetary motion.

Conclusion

- Study of solar eclipses can give us deep knowledge and understanding of planetary motion.
- Knowledge of solar eclipses can be a prior warning of earth quakes.
- As our ancient texts reflects that they are of high quality, there is a need to revive them and study them.