# CME Observation during the Total Solar Eclipse on November 14, 2012（1）

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**ABSTRACT**

During the total solar eclipse on November 14, 2012 the white-light corona was observed in the northern Australia and Pacific Ocean. I took many frames of white-light corona on the ship "Pacific Venus" cruising about 500 km north from New Zealand. In the frames I took, the CME can be discerned but in frames taken at Australia, 35 minutes before, there is no image of CME. Then, I concluded provisionally, transverse velocity of the CME was 330~450km/s and the transverse acceleration was 0.7~2.0 km/s$^2$ .

## 1. Introduction

In order to measure coronal motions, multi point observations of total solar eclipse had planed many times. For example, members of Tokyo University of Science Astronomical Club observed the total solar eclipse on February 16, 1980 in Kenya and India. The time difference between two sites is about 110 minutes. They caught movement of two loops and one small streamer of corona. The transverse velocity of each was about 20km/s, 7~8km/s and 23km/s [1](see Figure 1). Generally, the velocity of the change of the coronal structures is small. In order to catch them, we need two observation sites having some time difference.

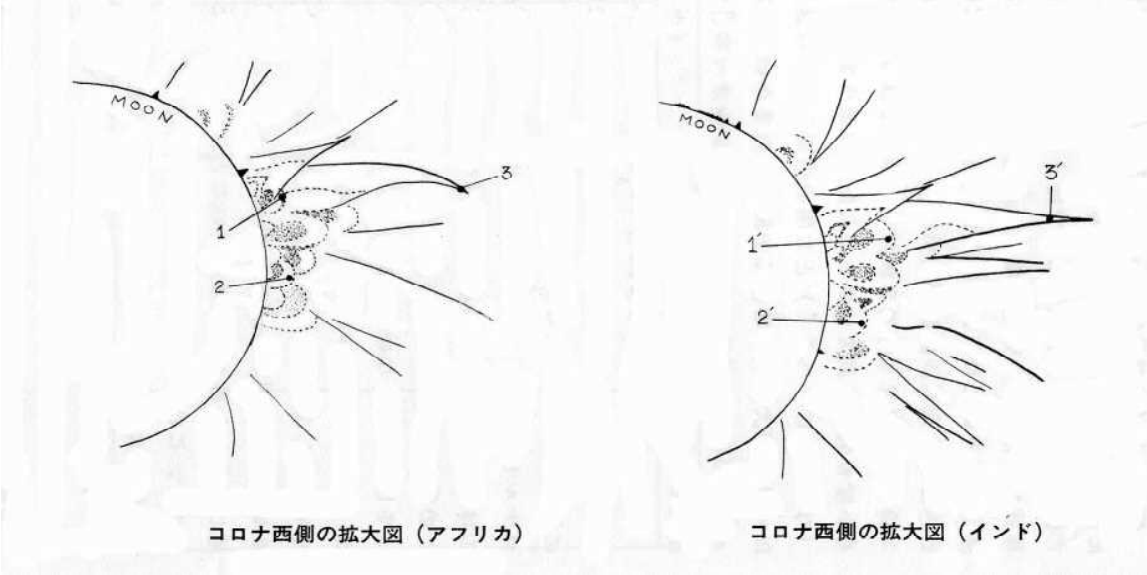



Figure 1　Movement of structures of the corona on 1980 February 16

There is a fast-moving phenomenon in the corona like a CME（coronal mass ejection). It is not unusual to occur some CMEs during a total solar eclipse [2](see Figure 2). But it is very rare that we can see the motion of the CME at one observation site.

## 2. Basic Information on the 2012 November 14 eclipse observation

The path of totality stretched from northern Australia to the Pacific Ocean. In the Pacific Ocean

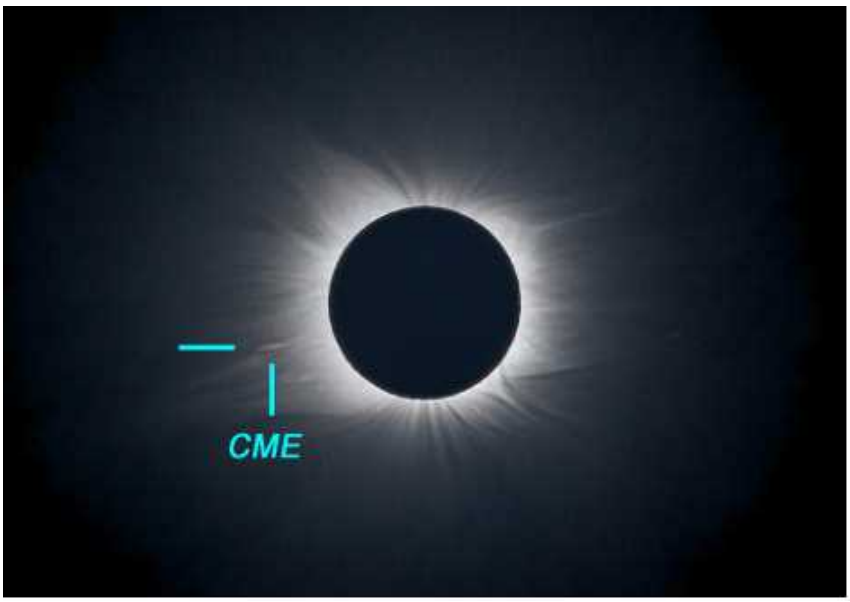



Figure 2 Computer-processed image of the corona taken by Osamu OHGOE, 2010 July 11 at HAO atoll, French Polynesia.

the Moon's shadow made no landfall. Our ship "Pacific Venus" left Noumea of New Caledonia on Nov. 12 for Auckland in New Zealand. When we caught the total solar eclipse on the way, the location of the ship was 173°04′32″E~173°04′23″E and 30°02′04″S ~ 30°02′02″S [3].

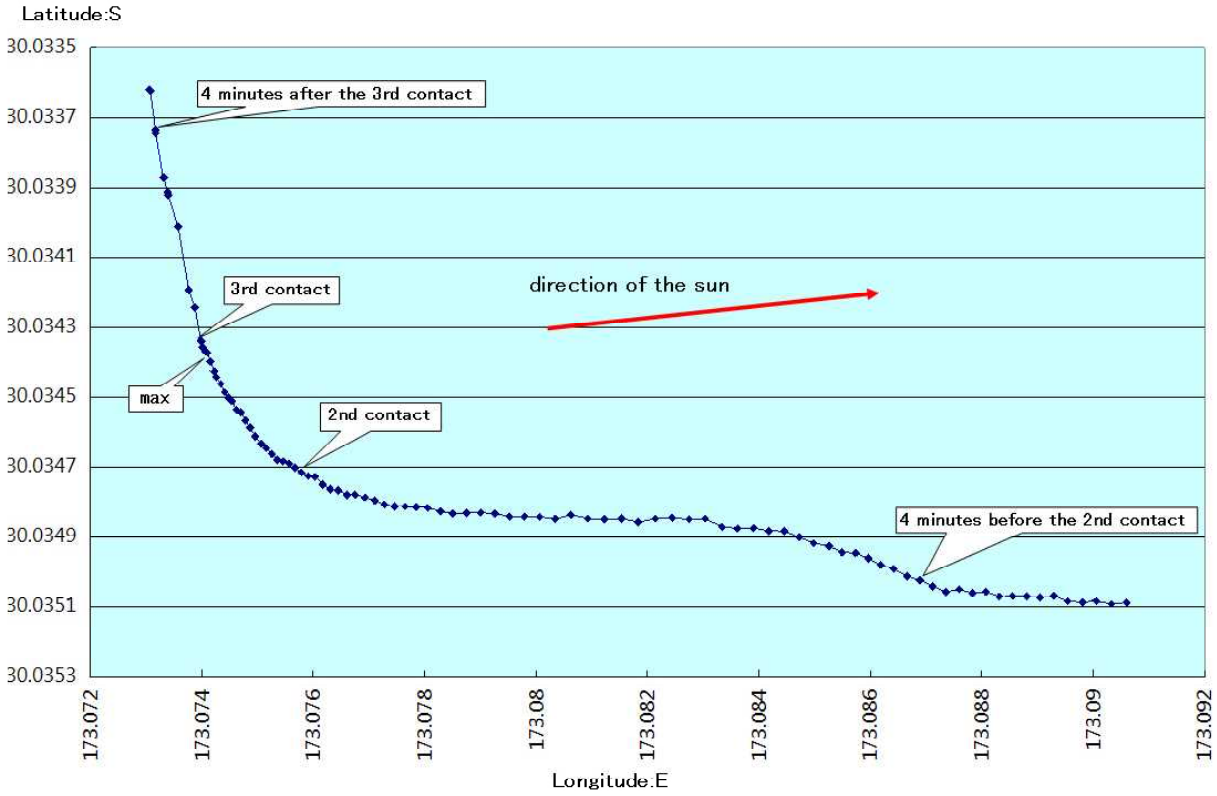
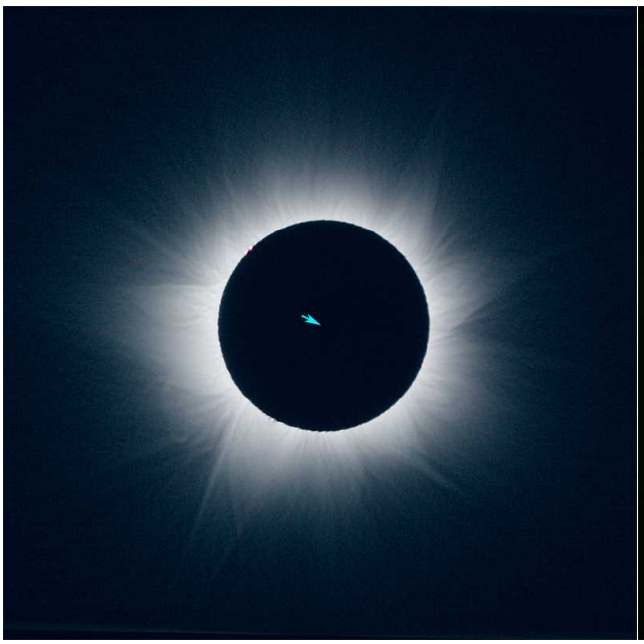


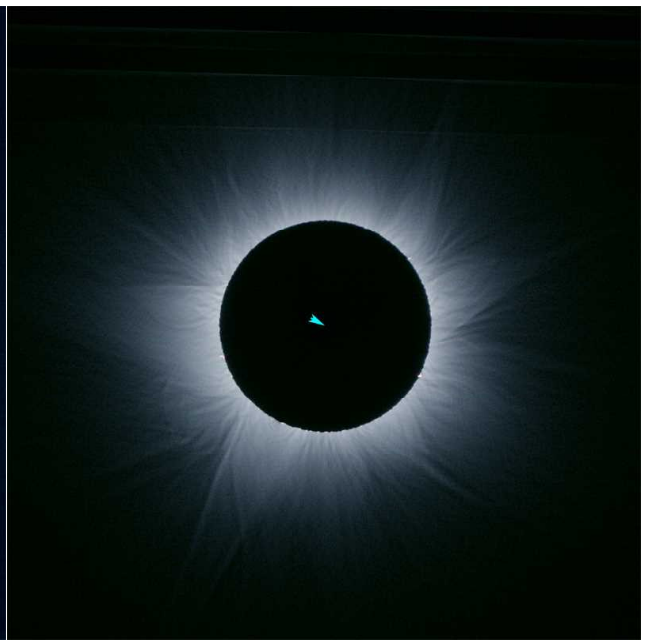

Figure 3 The location of our ship during the total solar eclipse, GPS Data provided by Jun Nakazawa

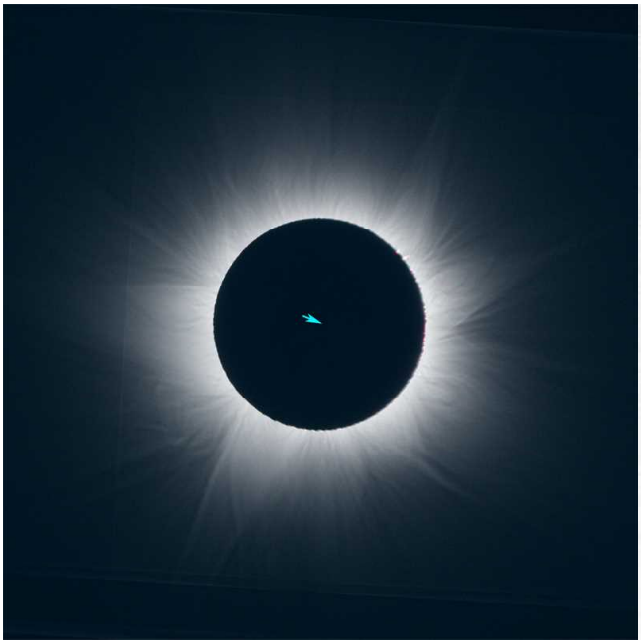
I observed the eclipse with one telescope 100mm in diameter and 512mm in a focal length, and took 209 frames of the corona. With 33 frames among them, I got 5 images of the fine structure of the white-light corona processed by Shiota's method [4].

### 3. Movement of the CME

Figure 4~6 illustrates image A, C and E. Each image was taken at 21:14:11 UT, 21:15:08 UT and 21:16:12 UT. I chose 3 points in the front of the CME and Figure 7 illustrate them. The radius of the







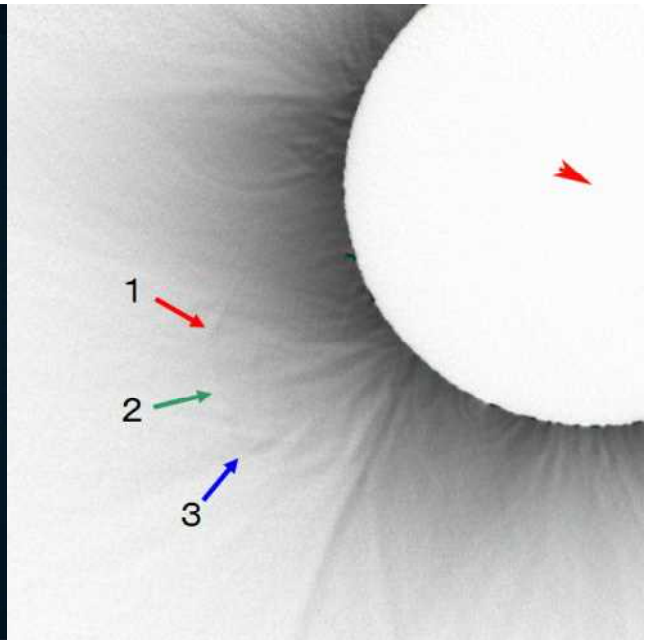



Figure 4 Image A (top left)
Figure 5 Image C (top right)
Figure 6 Image E (bottom)

Figure 7 Choice 3 points in the front of the CME

Sun is 6.960 × $10^5$km. The semi diameter of the Sun is 969 seconds of arc. The semi diameter of the Moon is 1017 seconds of arc.

The provisional values of transverse velocity and acceleration of the CME ware calculated as follows .

| Point 1 | transverse velocity | transverse acceleration |
|---|---|---|
| Image A | | |
| | (3.3±0.9) X$10^2$ km/s | |
| Image C | | 0.7±2.7 km/$s^2$ |
| | (3.8±0.8) X$10^2$ km/s | |
| Image E | | |

| Point 2 | transverse velocity | transverse acceleration |
|---|---|---|
| Image A | | |
| | (3.3±0.9) X$10^2$ km/s | |
| Image C | | 2.0±2.7 km/$s^2$ |
| | (4.5±0.8) X$10^2$ km/s | |
| Image E | | |

| Point 3 | transverse velocity | transverse acceleration |
|---|---|---|
| Image A | | |
| | (3.3±0.9) X$10^2$ km/s | |
| Image C | | 0.7±2.7 km/$s^2$ |
| | (3.8±0.8) X$10^2$ km/s | |
| Image E | | |

These are rough analysis of velocity and acceleration. I plan to measure my images more closely and make a report on it.

**REFERENCES**

[1] Ohoge, O. ,et al. 1980, Proceedings of The annual meeting of Astronomical Society of Japan in 1980 autumn (Japanese)

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[4] Ohgoe, O. , Shiota, K. , 2012, Chasing Shadows: An Observer's Guide to Solar Eclipses (Japanese), Seibundo Shin Kousha