

ASTRONOMY

Paradox Eclipse Will End The Day Before It Begins

Sun's Shadow, Racing Eastward, Crosses International Date Line; Two Small Islands Only Observation Points

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THE COMING total solar eclipse, February 14-13, will go down in history as the paradox eclipse, the eclipse that ended the day before it began.

This is not a "trick" statement but it is just an unusual result following from natural causes.

The eclipse will start in East longitude and after sweeping across the Pacific, will finish in West longitude, crossing the date line—the 180th meridian—therefore losing one calendar day.

The solar eclipse will begin off the Malay Peninsula at sunrise on St. Valentine's Day, Wednesday, the fourteenth of February, and will finish off the Alaskan coast at sunset on the afternoon of the day before, Tuesday, the thirteenth of February.

Almost the entire portion of the earth's surface over which the moon's shadow will pass is confined to the Pacific Ocean. The outer limits of the shadow will pass over Eastern Asia, Northern Australia, and the extreme western part of North America, but these countries are so near the edge of the path of the eclipse that its darkening effect will scarcely be noticed.

The total eclipse will be visible only within a relatively narrow path varying from 60 to 80 miles in width. The eclipse path will begin about 200 miles off the Malay Peninsula and will follow a slowly curving course across the Pacific. At first, the course of the eclipse path will be a little to the South of East. It will then curve very gradually toward the North. In fact, it will curve so slowly that nearly one-half of its course will lie between 2 degrees and 6 degrees North latitude. It then will take a northeasterly course, and the eclipse will end off the coast of Alaska.

Although the eclipse path passes over Northern Borneo and the Northern tip of the Celebes and a few islands off its coast, these locations are all too near the

beginning of the eclipse to permit observations of any scientific value. If viewed from any of these positions, the eclipse will be so near the horizon that the moon's shadow cone will be very nearly tangent to the earth's surface and will therefore travel too rapidly to be observed with any success.

With the exception of two small islands, Losap and Oroluk in the Caroline group, the eclipse will pass over no other islands or coral reefs. Under these circumstances, all observations must be made from the decks of ships within the path of totality, or on the two islands, Losap and Oroluk.

Losap lies a little nearer the central line of totality than Oroluk, and therefore is more suitable for observation stations. At a point of Laol, one of the Losap group, Longitude 152 degrees 43 minutes East, Latitude 6 degrees 54 minutes North, the duration of totality will be 2 minutes 5 seconds.

These islands are located on an atoll reef 5 miles in a north and south direction and 2 to 4 miles in an east and west direction. The lagoon within them

is reported to be comparatively free from shoals and affords an excellent anchorage for light-draught ships.

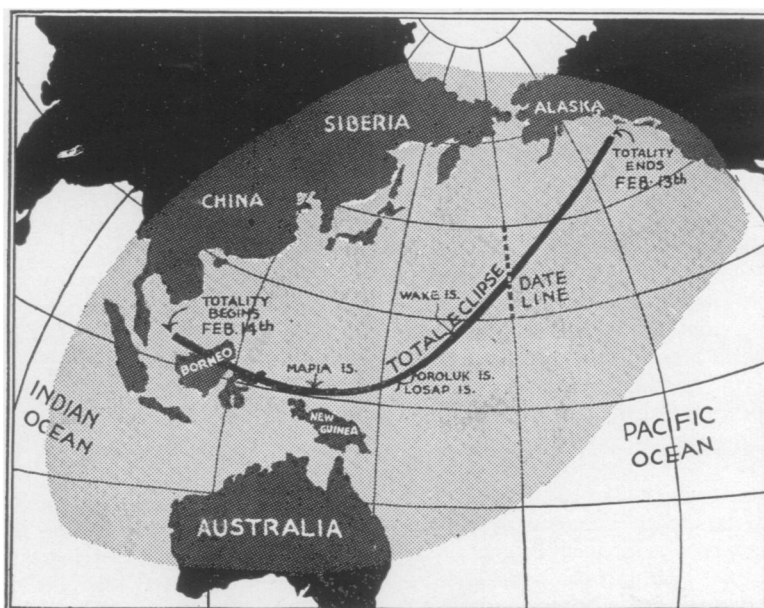
The pilot charts furnished by the U. S. Naval Hydrographic Office show that the weather is usually clear in that region during the month of February. The prevailing winds are from the northeast with a velocity of 11 to 18 miles per hour.

Losap is 50 miles southeast of Truk, the large group in the Caroline Islands, and the seat of government for the central islands.

The total phase viewed from these islands will occur at about 10:17 a. m. local civil time. The altitude of the sun at that time will be 55 degrees. With the sun so near the zenith, the effect of refraction errors will be greatly reduced.

Losap and Oroluk are under the control of the Japanese government which is extending courtesies to parties of foreign astronomers who may desire to join Japanese expeditions organized to observe this coming eclipse.

When expressed in the world time (Greenwich Civil Time) and 24 hour day that is used by the astronomer, the progress of the eclipse will, of course, be continuous in time as well as by the calendar, beginning on February 13 at 22 hours 5.1 minutes at East Longitude 120 degrees 45 seconds, South Latitude 6 degrees 35 seconds. It will end, expressed in Greenwich Civil Time, on February 14 at 3 hours 11.3 minutes at West Longitude 146 degrees 40 seconds, North Latitude 42 (*Turn to Page 75*)



DARKNESS AND SHADOW

The black line represents the path of totality; all of the shaded earth surface will be covered by the moon's shadow.

ASTRONOMY

February to Be Month Without Full Moon

Shortest Month Happens to Fall Within Complete Phase; Planets Poor Attraction But Stars Most Brilliant of Year

By JAMES STOKLEY

THIS MONTH brings high into the southern sky the most brilliant of the constellations, Orion, the mighty warrior, which can be recognized from the three stars forming his belt, above which is the giant Betelgeuse, and below, Rigel. With upraised club in his left arm and a lion skin over his right, Orion is supposed to be warding off the attack of Taurus, the bull, the constellation next towards the west. In Taurus is the red star Aldebaran, which marks the bull's eye and is part of a V-shaped group of stars called the Hyades. A little farther west are the Pleiades, a famous loose cluster of stars, six of which can be seen with the unaided eye.

Nearly overhead and directly north of Orion is the star Capella, part of Auriga, the charioteer. To the southeast of Auriga are two bright stars, Castor and Pollux, forming part of the constellation of Gemini, the twins, and south of them is the lesser dog star, Procyon.

Sirius, the dog star, in Canis Major, the greater dog, is in the south. It is the brightest star in the sky and the nearest of those seen ordinarily from the United States.

The Great Dipper is to the northeast, with the handle downwards and the pointers above. A line from the pointers indicates the pole-star, Polaris. In the northwest, on the other side of the pole, is the constellation of Cassiopeia, shaped like a W on its side.

No bright planets can be seen this month during the whole of the evening; but Mars may be glimpsed early in the evening, just after sunset, and will be accompanied by Mercury about the eighteenth. Jupiter appears in the east about ten o'clock as a brilliant star, and rises higher during the night.

The stars visible this month are the most brilliant that can be seen at any time of the year. Orion is always a delight, whether observed with the naked eye or a small telescope. The

star Betelgeuse, brightest in the constellation, is of particular interest because of its great size. Our sun, which is a star, is about 866,000 miles in diameter, but Betelgeuse has a diameter of 215 million miles, which means that if it were a hollow shell 27 million suns could be poured into it. However, it consists of only fifty times as much matter as the sun, because the stuff of which it is made is very diffuse, more so than the highest vacuum that can be attained on earth.

The second brightest star in Orion, Rigel, is also of interest, because it is one of the brightest stars in the sky, not in appearance, but in reality. Sirius, the dog-star, looks the brightest, but that is because it is so close to us, only 8.6 light-years away, and it exceeds the sun in candlepower by only 27 times. Rigel, however, is 14,000 times the intrinsic brightness of the sun, and is 540 light years from us. The light-year, the astronomer's measuring stick, is the distance that a beam of light will travel in a year, going all the time at the rate of 186,000 miles a second, and is equal to approximately six trillion miles.

During February the moon is new on the thirteenth. Last quarter occurs on the seventh, and first quarter on the twenty-first, so that the last few days of the month will have moonlit evenings.

There is no full moon in February,

a rather rare occurrence. This is because it is full just at the end of January, and the time between any phase and the same phase again is about 29 days. The moon takes about 28 days to make one circuit about the earth, but during that time the sun has moved eastward a little among the stars, and so the moon has to go that much farther to catch up to it. Full moon happens when the sun and moon are on opposite sides of the earth, and we can see all of the moon's illuminated half. When it is in line with the sun, we can see none of the bright part, but a few days later the young crescent is visible in the western evening twilight.

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Paradox Eclipse

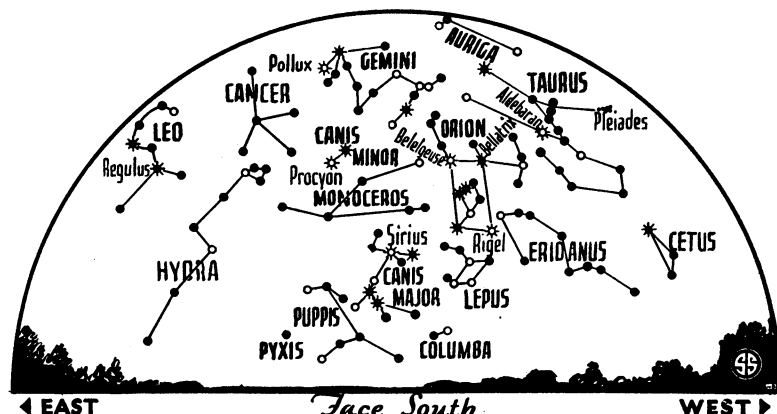
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degrees 19 seconds. Expressed in the local civil times of locations of its beginning and ending, the eclipse will begin on February 14 at 6:08 a. m. and end on February 13 at 5:24½ p. m.

It was the Naval Observatory's intention to organize an expedition to observe the eclipse from the Island of Losap, but federal finances did not warrant this expense, which would be very heavy because of the inaccessibility of Losap and the necessity of maintaining a floating base during the period of preparation.

Steamships on the Pacific at the time of the eclipse are being urged by the Navy Department to alter their courses so as to be within the path of total eclipse. The U. S. Naval Observatory through the U. S. Hydrographic Office has furnished mariners with complete suggestions for observing the eclipse in the belief that their observations will be of considerable scientific interest.

Science News Letter, February 3, 1934



Orion, the bold winter constellation, continues to shine gloriously.