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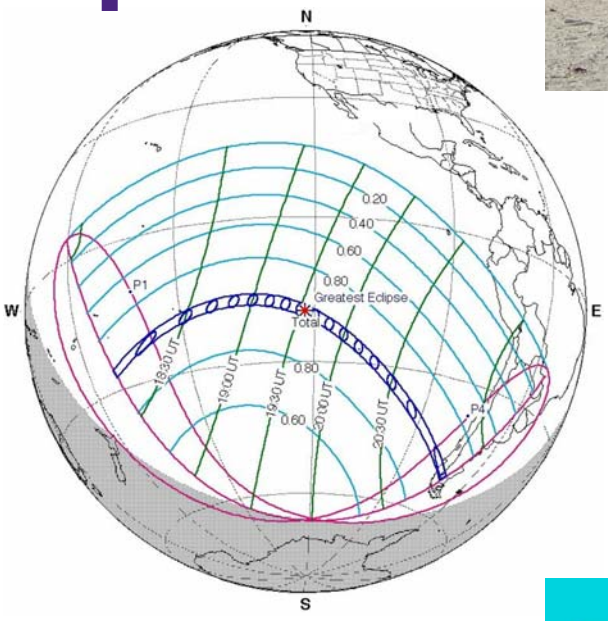
The total solar eclipse of 2010 July 11

The solar eclipse of 2010 July 11 always promised to be a logistical nightmare to observe. The Moon's shadow first touched the Earth in the southern Pacific, encountering land at Mangaia in the Cook Islands only after 1450km of open ocean. The narrow track of totality then swung northeast, passing tantalisingly close to the islands of Tahiti and Moorea, which experienced a 98% partial eclipse. Beyond Tahiti the track crossed the Tuamotu archipelago of French Polynesia – thousands of tiny coral atolls, of which very few are inhabited, and even fewer have airstrips that make them accessible to visitors. The track then sped across 3300km of empty Pacific to Easter Island, known as one of the world's most isolated inhabited islands, and after another 3700km it finally made continental landfall at sunset in winter on the rugged and inaccessible coast of Chile. Crossing the Andes, the shadow left the Earth after entering Argentina at the tourist resort of El Calafate, where the eclipsed Sun was a mere 1° above the mountainous horizon.

Anaa south – Hazel McGee. Inset of 3rd contact by Brian McGee.

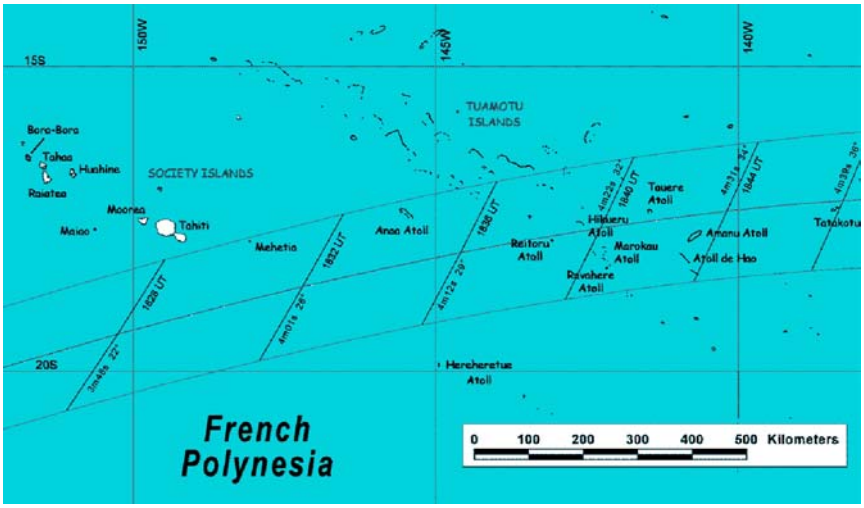


The track of the eclipse of 2010 July 11 across the southern Pacific Ocean. ***Fred Espenak & Jay Anderson, NASA GSFC.***

According to NASA, nowhere on the track had weather prospects better than 50% of cloud, but the Tuamotus offered the best chances, with Easter Island notoriously experiencing its rainy season in July. Two major UK-based expeditions both based their operations in Tahiti, with its substantial tourist infrastructure, and chartered aircraft to travel to three inhabited atolls within the eclipse path. For a report by John Mason and Nick James on Hao atoll, see below.

Astro-Expeditions, led by Brian McGee, Declan Foughnan and Sheridan Williams, carried a total of 160 passengers in a shuttle service of ATR-72 and ATR-42 planes to the tiny Anaa and Hikueru atolls, with a resident population of around 450 people (Anaa) and 150 (Hikueru). With two years to prepare for the event, the locals were looking forward greatly to the party! The population of Anaa took the opportunity to upgrade their home-based visitor accommodation, and each four-person group was housed with a local family for the one or two nights they spent on the island. On Hikueru the visitors stayed in 'fare potee' buildings, wood and palm-thatched longhouses specially constructed for the event.

Two observing sites were used on Anaa, which lay N–S across the eclipse track. Most people were based on the north of the island close to the village and airport, and around 20 of us rode in small local fishing boats (with large outboard motors!) to the south of the atoll, where the journey of almost 20km was predicted to provide an additional 44s of totality. ▸ *p.205*



The track of the solar eclipse of 2010 July 11 through the Tuamotu Islands. ***Fred Espenak & Jay Anderson, NASA GSFC.***

The 2010 July 11 total solar eclipse from Hao

Another group of 130 eclipse-chasers travelled to Hao atoll, 920 km east of Tahiti, which boasts the largest lagoon in French Polynesia. The locals on Hao had been busy preparing a camp site with nearly 80 tents and other facilities including a bar, dining area and toilets, and the Mayor and her staff gave us an enthusiastic welcome on arrival at the airport, famous for having the longest runway in the Pacific. The observing site was slightly south of the centre line, but we still expected 3m 33s of totality.

We awoke early on eclipse morning, with the Magellanic Clouds still visible and the Zodiacal Light indicating the imminent sunrise. Everyone set up their equipment in different locations on the site, some on the ocean side of the atoll, facing north-east and others, more sheltered from the wind, nearer the lagoon shore. There were a few drifting clouds but everything looked good leading up to first contact, which occurred at 07:24 local time. The Moon gradually moved downwards across the solar disk; there were two sunspots visible lower right, and these were covered by the Moon a few minutes before second contact. By this time there was an increase in the amount of drifting cloud, but there were still large, clear gaps.

Children on Hao – Gill Perry

Second contact was due at 08:41:28 and we saw it clearly despite that fact that thin wisps of cloud had by that time moved in front of the Sun. The Baily's beads at second contact were spectacular and lasted for several seconds; the corona then became visible with the naked eye. It was a classic solar minimum corona with well-defined polar brushes, two prominent coronal streamers on the eastern side of the Sun and a single long streamer on the western side. Numerous small, pinkish prominences were visible in binoculars and these showed up well in images. The sky mid-totality was not particularly dark and only Mercury was visible below and right of the Sun. The horizon colours were not as pronounced as from the Gobi Desert in 2008.

Tent city on Hao – John Mason

Approaching third contact, a beautiful large prominence appeared upper left on the eclipsed Sun and the reappearance of the chromosphere in this vicinity was clearly visible by naked eye. The third contact diamond ring at 08:45 broke out as a single, then multiple beads around the limb, lingering for several seconds close to the large prominence, before merging. Totality was over and the partial phase would continue for a further 1h 28m, the amount of the cloud cover decreasing rapidly as the Sun rose higher in the sky. Many observers using digital cameras obtained excellent images in spite of the drifting thin cloud and a few of these are included with this report.

Further images and video sequences will be published on a BAA DVD, and these should be e-mailed to Nick James at **ndj@nickdjames.com**. Please contact Nick directly for how to send large files or videos.

Nick James & John Mason
Hao Atoll, 2010 July 11

Images:

Left, top: Baily's Beads at second contact. 1/400s, ISO 200, 500mm f/8 mirror lens, Canon EOS 450D. *John Mason*.

Left, lower: Large prominence approaching third contact. 1/1600s, ISO 800, Megrez 72 refractor, 2× Barlow, Canon EOS 550D. *Nick James.*

Above: Corona at mid-totality. 1/40s, ISO 400, 355mm FS60C refractor at f/5.9, Canon EOS 300D. *Martin Mobberley*.

Anaa & Hikueru – continued from p.203

Notice seen in Anaa airport – Hazel McGee

Wading through the cool waters of the lagoon, we joined the boats at first light on a promising morning, with large patches of clear sky interspersed with drifting cloud, and the troublesome wind much reduced from the day before. An exhilarating three-quarter hour speedboat trip brought us to probably the most idyllic eclipse site any of us has experienced: a classic 'desert island' beach of firm coral sand and shells, groves of coconut trees providing shade and shelter from the wind, and the quiet waters of the (improbably blue) lagoon lapping gently on the shore. Our local hosts cut coconuts for us to drink, and tiny hermit crabs scurried about, jumping instantly back in their shells should a shadow fall across them, whether of a passing human, or of course the Moon.

First contact was seen at around 07:19 local time (17:19 UT) with the usual mixture of excitement and relief. During the long partial phase the weather was worrying, for the scattered cloud seemed to be increasing, with large patches frequently hiding the Sun for minutes at a time. At second contact, predicted for 18:32:33 UT at this location, the diamond ring shone through a few wisps of cloud but thereafter it remained clear until several minutes after third contact, when cloud covered the Sun again.

Shadow bands rippled across the sand for ten or twenty seconds before second contact, wider, darker and more sharply defined than those in Libya in 2006. (Others also saw them after third contact, but I forgot to look). Then the glorious corona was upon us, two helmet streamers like monkey's ears at the top of the Sun, and an immensely long streamer below, full of delicate structure like petals in the sky. Through binoculars a string of prominences graced the right-hand limb. With the naked eye only Mercury was visible – the sky was quite bright, and Orion above the Sun could not be seen. I looked briefly with binoculars for Comet C/2009 R1 (McNaught) between Mercury and the Sun but as expected, this also was not seen.

Anaa atoll from the air – Sheridan Williams

All too soon the pink chromosphere and a huge floating prominence appeared on the left side of the Sun, binoculars were lowered for a massive, lingering diamond ring, and totality was over. That night the villagers and children of Anaa laid on an unforgettable drumming and dancing pageant in the sports hall, full of joyous local colour, and enjoyed as much by the locals as by ourselves.

Later we heard that our colleagues at both the northern Anaa site and on Hikueru had shared our experience of 'scary cloud' but in both cases it had cleared in time. News from Hao atoll was also good, and then later from Easter Island and even from the cloudy mid-winter Argentinian Andes: a remarkable sequence of success for a most memorable eclipse.

Hazel McGee

Setting up on Anaa north – James Rae

Left: The chromosphere at second contact on Hikueru. Canon EOS 40D, Borg 101ED, field-flattener, f/5.6. *Nick Quinn.*
Right: Third contact, Hikueru. Canon EOS 450D, Williams Optics 66mm refractor, 350mm f6, ISO800. *Sheridan Williams.*

The totally eclipsed Sun one degree above the snow-covered Andes at Calafate, Patagonia, Argentina. The photographer 'put himself into the photo to get a human touch'. © *Janne Pyykkö (with permission), and thanks also to Spaceweather.com.*