CAPTAIN COOK

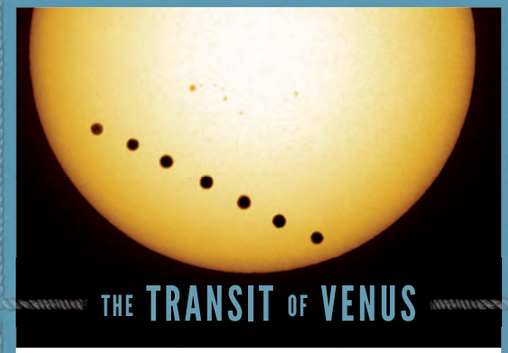
CHARTING OUR ISLANDS

by Melanie Lovell-Smith

When James Cook set sail from Britain in August 1768, he had two sets of instructions. The first was to travel to Tahiti to observe the transit of Venus, an event that would be watched by scientists around the world. Cook's second set of instructions was secret. After the transit, his ship, the *Endeavour*, was to head south. It was hoped Cook would find the "Great Southern Continent". People thought this landmass must exist – to "balance" out the world. The time had come to put it on the map.

After observing the transit, Cook set sail to the south. He had very little idea of what he might find. Three months later, on 6 October 1769, a twelve-year-old sailor named Nicholas Young spotted land. The *Endeavour* sailed into Tūranganui-a-Kiwa – near present-day Gisborne – two days later.

What was known of the world by Europeans around 1750



THE TRANSIT OF VENUS

Like Earth, Venus travels around the sun, but it follows a closer orbit. Sometimes, the planet's path takes it between Earth and the sun. When this happens, we can see Venus move across the sun's face. This is called a transit. Venus transits are rare but predictable. They occur in pairs eight years apart, separated by long gaps of either 105 years or 121 years.

In 1716, English astronomer Edmond Halley worked out a way to use the transit of Venus to calculate the distance between Earth and the sun. In the early eighteenth century, people didn't have this information. Over a hundred scientists watched the transit of Venus in 1761, but some couldn't take accurate measurements because of bad weather. Luckily they were able to try again in 1769. (If they were unsuccessful, they would have had to wait another 105 years!) As well as Tahiti, the 1769 transit was watched from various places that included Canada, Norway, and Russia. The results were combined with those from 1761, and a few years later, it was announced that Earth was around 93,727,000 miles from the sun.

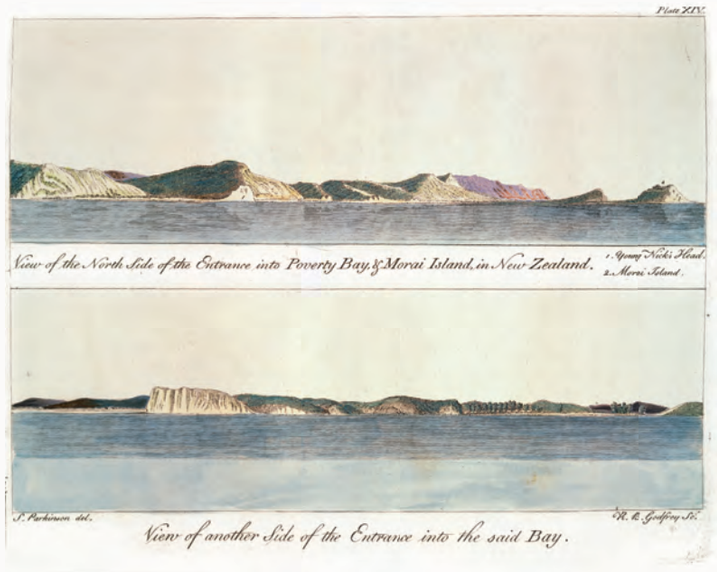
Today, using modern technology such as radar, we know it's around 149,600,000 kilometres. So how accurate was the eighteenth-century calculation? Do the maths to find out.

FIRST DAYS IN NEW ZEALAND

One of the crew's first tasks was to take a **sounding**. This told the captain where it was safe to drop anchor. (Cook recorded that they anchored in "ten fathom water, with a fine sandy bottom".) Over the next three days, the crew continued to record information about their surroundings. Men took more soundings, and the ship's artists drew coastal profiles of the land. Cook and his officers took observations of the sun, moon, and stars, which helped them to calculate their exact position in the world.

On their first day, Cook and a small group of men also went ashore. They hoped to find food and fresh water, but instead, a dispute broke out with local Māori. A Ngāti Oneone leader, Te Maro, was shot and killed by one of Cook's men. Cook returned to shore the following day, this time bringing Tupaia, the Tahitian priest and navigator who had travelled on board the *Endeavour* from Tahiti. Although Tupaia could communicate with local Māori, the encounter again ended with violence. Cook's men shot and killed the Rongowhakaata chief Te Rakau and wounded several others. Several more Māori were wounded or killed over these first days before the *Endeavour* finally left Tūranganui-a-Kiwa and sailed north.

Over the following months, more conflict and misunderstandings occurred about trade. However, in some places, because of Tupaia, the visitors communicated well with local Māori and were able to learn more about their land and customs.



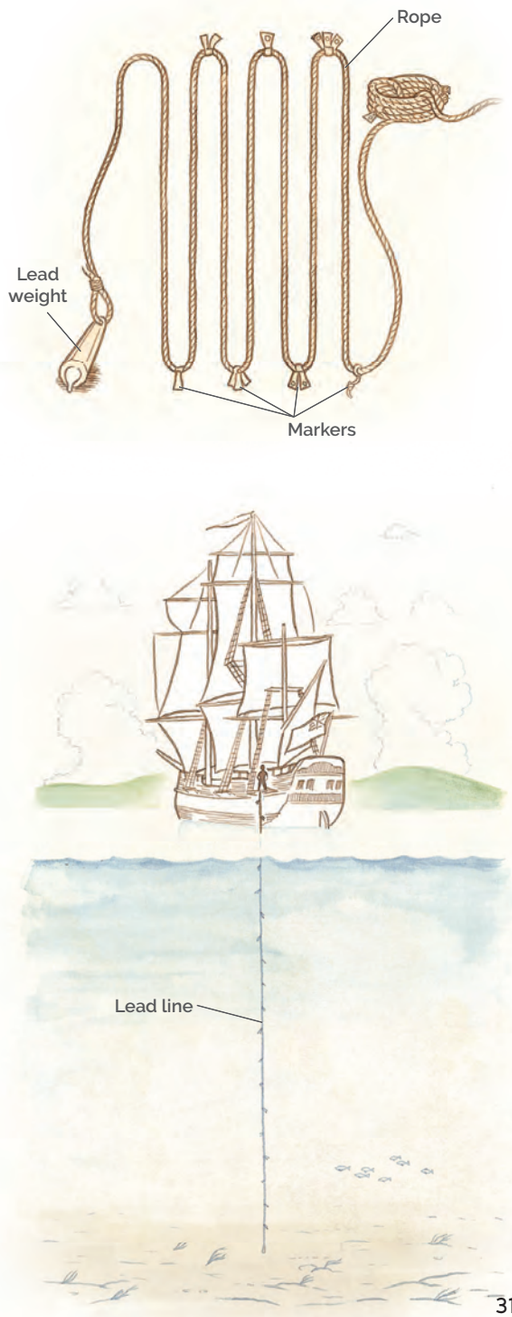
These two coastal profiles show the crew's first views of Aotearoa New Zealand

SOUNDINGS

Knowing about water depth was essential information for a ship's captain. No one wanted to run aground. In Cook's time, water depth was measured in fathoms (1.8 metre units). Depth was found using a lead line – a lead weight attached to a rope thrown overboard by a sailor called the leadsman. To save time, the rope was marked at regular intervals using different kinds of materials, such as leather and calico. The leadsman was able to "read" the depth by looking at these markers, and he would call out the fathoms.

The lead weight also had a small hollow on the bottom. This was filled with tallow, a sticky fat that picked up whatever was on the sea floor. Knowing what was on the sea floor helped a captain decide where to anchor. Some materials, such as sandy mud, were better at holding an anchor than others. A clean lead weight usually meant the sea floor was rock.

Sailors onboard the *Endeavour* had two kinds of lead weights: a hand lead and a deep-sea lead. The hand lead, which weighed 7 pounds (about 3.2 kilograms), was used for measuring the depth of shallow coastal waters. The deep-sea lead weighed 14 pounds (about 6.4 kilograms). It was attached to 200 fathoms of rope (about 365 metres). Pulling up a deep-sea lead was a long, arduous process.



9,300 MILES

Cook had been instructed that if he found land, he was to chart it. Although he didn't know it when he set out from Tūranganui-a-Kiwa, an enormous task lay before him: 9,300 miles (15,000 kilometres) of unfamiliar coastline.

Surveying New Zealand would take Cook seven months.

Cook charted New Zealand using a method called a running survey. To do this, he sailed close to shore, taking compass readings of prominent landmarks, such as big hills, headlands, and cliffs. Then he would sail a short distance along the coast so that he could take readings of the same landmarks from a different position before plotting them on his chart. Cook then sketched the coastline between the plotted landmarks to complete the outline.

A crucial part of the running survey involved finding latitude and longitude. These gave Cook his exact position, which allowed him to chart the coastline and place New Zealand correctly on a world map. Cook worked out latitude by measuring the angle between the horizon and the sun when it was at its highest position in the sky. He did this using a quadrant. Occasionally men went ashore to take measurements. This work was easier on land, away from the movement of the ship, and the results were more precise.

Longitude was much more difficult to work out because it is based on time. To find their longitude, Cook needed to know the time in both Greenwich and New Zealand. Like explorers before him, Cook relied on what he already knew to find out what he didn't. He knew how long the sun took to move across the sky, and this helped him to work out local (New Zealand) time. But there weren't any clocks that kept Greenwich time accurately enough – especially on a rocking ship over a long voyage. Instead, Cook had to work out the time in Greenwich by making a long series of calculations, using his own observations and the **lunar tables** in a nautical almanac.

Cook used a compass to find out the direction of landmarks in relation to north. This information allowed him to slowly plot an image of the coastline.

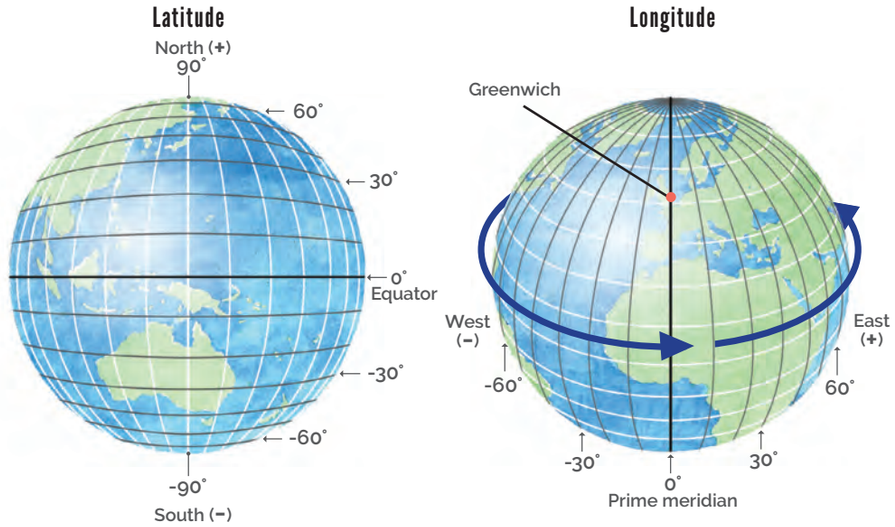
A quadrant was used to measure the angle between the horizon and the sun.

LATITUDE AND LONGITUDE

AN IMAGINARY GRID

Latitude and longitude are imaginary lines that form a grid around our planet. This grid is a way of locating places and being able to describe their location. Each place has an "address", written as a set of numbers called coordinates. Both latitude and longitude are measured in degrees.

Lines of latitude circle Earth horizontally. The equator is the starting point for measuring latitude. The latitude of a place is described in terms of how far north or south of the equator it is.

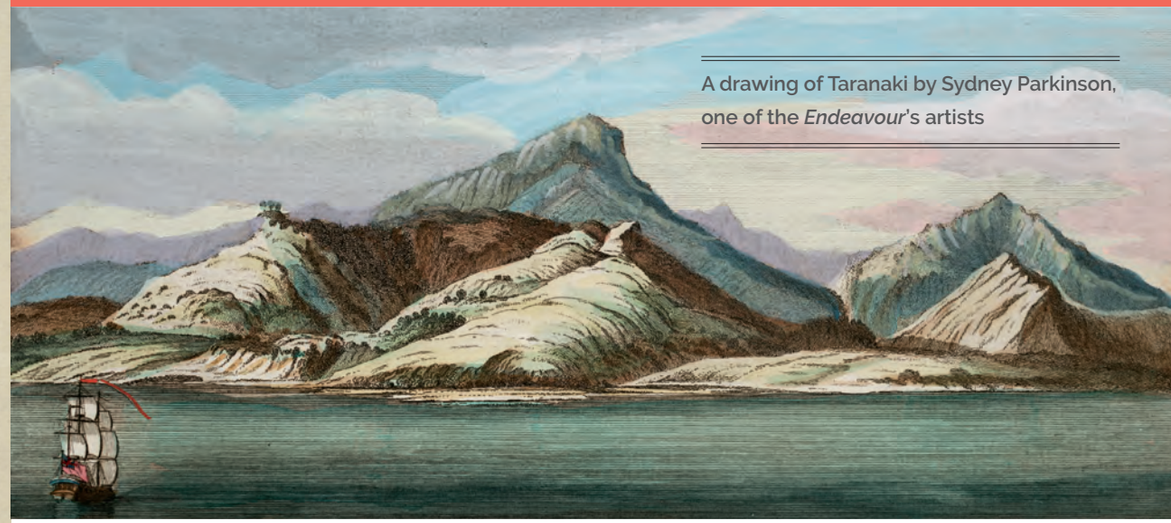


Lines of longitude run vertically from the top of Earth to the bottom. They divide the world into segments like an orange, meeting at the north and south poles. Lines of longitude are called meridians. Like latitude, they also have a starting point – at Greenwich, London. This is called the prime meridian. The longitude of a place is described in terms of how far east or west of the prime meridian it is.

Longitude is based on Earth's rotation through 360 degrees, which happens once every twenty-four hours. Put another way, Earth turns 180 degrees every twelve hours or 15 degrees every hour. Because of this connection between time and longitude, Cook could work out his approximate longitudinal position if he knew the time in Greenwich.

During his time in New Zealand, Cook also made some detailed charts, like this one of the River Thames and Mercury Bay. The dotted line shows the course the *Endeavour* sailed. The numbers along this line show the depth of the sea. In the middle of the chart, near the bottom, there are extra numbers. This is the Firth of Thames, where the crew would have taken soundings from rowboats because the water is shallow. Cook recorded this additional information so that future ships would know where in the inlet they could go safely. In some places on the chart, like the top left corner, the coastline has been only partly drawn. Cook had a limited amount of time, so he didn't always stop to fill in the details. In other places, he couldn't work because of bad weather.

HOME



A drawing of Taranaki by Sydney Parkinson, one of the *Endeavour*'s artists

Captain Cook completed his **circumnavigation** of New Zealand in March 1770. Then he sailed west, landing on the east coast of Australia four weeks later. He claimed the area as British territory, just as he'd done with New Zealand, and charted 2,000 miles (3,219 kilometres) of coastline. The *Endeavour* was shipwrecked on the Great Barrier Reef, and repairs took six weeks, but Cook and his men finally reached home in July 1771. Although Cook took great care of his crew, thirty sailors died during the epic three-year voyage. Cook was to visit New Zealand twice more before he was killed in Hawai'i in 1779 during an argument over a stolen boat.

The *Endeavour* being repaired off the east coast of Australia

Plate XXV

MAP
of the Coast of
NEW ZEALAND
discovered
in the Years 1769 and 1770,
BY I. COOK,
Commander of
His Majesty's Bark
ENDEAVOUR.

ON THE MAP

Cook's charts were published in 1773. Although they showed he hadn't found a great southern continent, his work still had a huge impact. The British now knew a lot more about the South Pacific and what could be found there. Cook's chart of New Zealand, which was used for almost a hundred years, helped people travel safely from the other side of the world. The first Europeans came here for seals, whales, timber, and flax – and to convert Māori to Christianity; others came later to start new lives. The British would colonise New Zealand, and the country would become part of the British Empire. For Māori, after that, everything would change.

An artist's impression of Nelson, 1842

GLOSSARY

circumnavigation: sailing right around something

lunar tables: a list of the angles between the moon and certain stars at known times, predicted months in advance

sounding: the process of measuring the depth of the water and taking samples of the sea floor

surveying: recording the size, features, and position of land to make a map

Captain Cook: Mapping Our Islands

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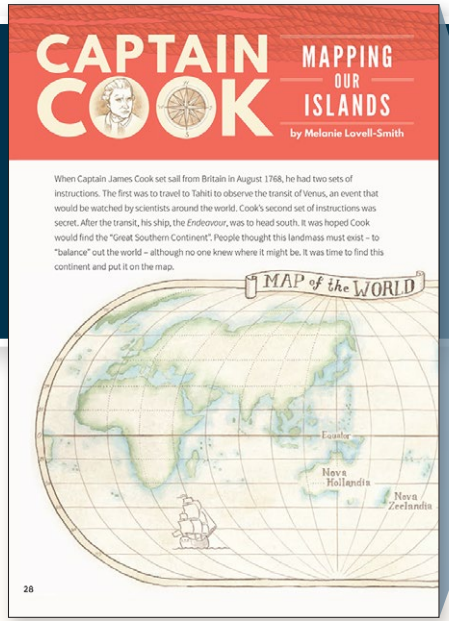

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