

Frank A. Worsley, 1872-1943

Navigator Supreme.



**Memorial in
Akaroa, NZ**

When Ernest Shackleton with 27 men was marooned on Elephant Island in 1916, he knew nobody would be looking for them. He had to go to fetch help. With 5 men he sailed the 22 ft wooden boat 'James Caird' across 800 miles of the wildest ocean in the world to reach South Georgia in 16 days.

The Skipper and Navigator was Frank Worsley, a New Zealander. Their voyage remains today as the supreme sea passage of all time. Worsley was able to observe the sun on only 5 of those stormy days, but he was quick and accurate with the Sextant. His calculations were reliable and he guided them to safety.

For me Shackleton is the Supreme Leader. He chose his men well and he was confident that Worsley would turn out to be the Supreme Navigator. These brief notes describe how he navigated them to safety.

'James Caird' sets off from Elephant Island-Scene from the film 'Shackleton'



Worsley's navigation on the 'James Caird' voyage to South Georgia, May 1916

Landfall was made on the W side of South Georgia, even though the only settlements were on the E side. The hope was that they would round the N tip of the island and work down the E side to reach safety. However the weather was so appalling this was deemed to be too dangerous.

They fetched up in King Haakon Sound, where they found a huge pile of drift wood and figure-heads from ships wrecked on Cape Horn, fresh water, and food in the form of sea-lions and birds. After 10 days building up their strength, 3 of the 6 men walked over almost impossible terrain to reach Stromness in 36 hours. The weather was not too bad for this trek, yet had they been a day later conditions became appalling and they may not have made it.

At sea, Worsley checked their position as Lat/Long at noon for 14 consecutive days. He observed sun-shots for 5 of these days, the rest being estimated by DR (Dead Reckoning). I want to describe briefly the problems that Worsley had to overcome to achieve this amazing accuracy:

1. In the matter of taking sights, Worsley had to adjust the slider of the Sextant so that the horizon was lined up with the Lower Limb of the Sun. At first he tried bracing himself inside the cockpit. But it was no good. To remain upright was difficult enough; to get an accurate reading was impossible. He found that it was best to kneel on the helmsman's seat, with Vincent and McCarthy holding him around the waist

2. The damage to Worsley's navigational books by the constant soaking was a serious problem. Every effort was made to protect them, but they had to be taken out whenever a sight was taken. Both covers of the logarithm book were soggy, and the wet was beginning to spread to the inside pages. The Nautical Almanac, with its tables of sun and star positions, was in even worse shape. It was printed on cheaper paper and was fast approaching a state of pulpiness. Its pages had to be carefully peeled apart to separate them.

3. The Chronometer was slower than they thought. Before leaving Elephant Island, they had not been able for several days to get good sight of the sun to check the chronometer against a known line of Longitude. It was already 10min50sec slow, so they estimated another 1min05secs. They started with the Chronometer 11min55sec slow and losing by 5sec/day.

On South Georgia, Worsley was able to check the chronometer and found an error of 5sec, which at 4 miles/second meant they were always about 20 miles astern of their estimated positions. This could have been serious if they were rounding the N tip of the island, but their latitude was accurate so it did not really matter too much.

4. Remember that the Sextant observations and all the mental arithmetic were done in freezing conditions, cramped space, and wearing wet clothes. Knowing their DR, or approximate, position they would know the time of the local 'noon'. Worsley would measure the Sun's altitude SA with the sextant until the sun appeared not to get any higher and started to go down, and note the Time

5. For Latitude, small technical corrections and height of eye above the sea would be corrected to give True Altitude TA. This total would be subtracted from 90° to give Zenith distance ZD. The Sun's Declination, which depends on the time of the year, would be subtracted to give their Latitude.

For Longitude, the time noted would be the time that the Sun had taken to travel from Noon at Greenwich, which is 000° longitude, to their position. Since 1 hour is equivalent to 15° around the earth they convert that time to degrees to give their Longitude West of the Greenwich meridian.

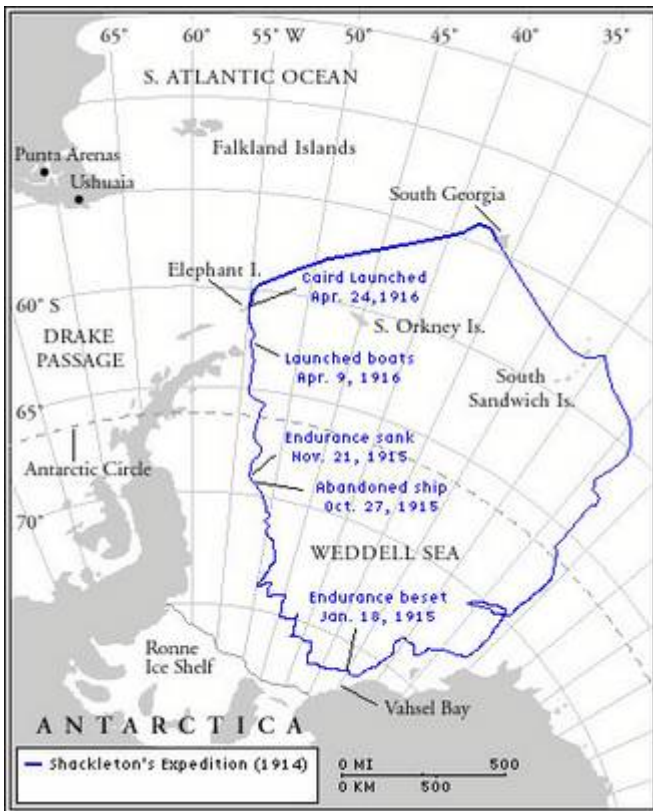
6. In King Haakon Sound, their Longitude was $037^{\circ} 20' W$, or about 1430hrs GMT.

7. Their latitude, using Worsley's own figures from his Work Book, was calculated as follows:

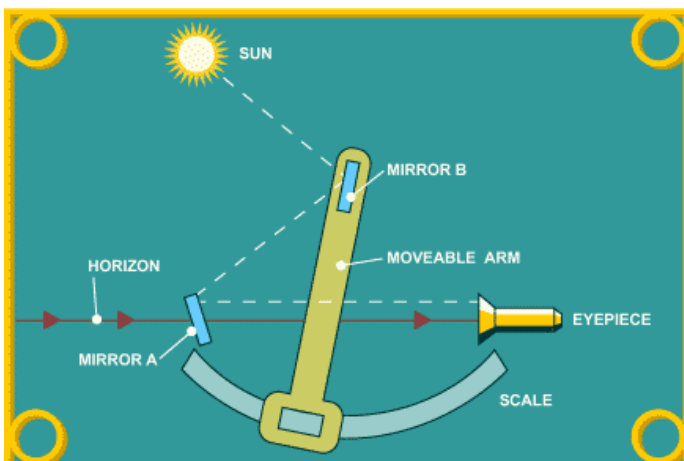
SA, Noon observation	$17^{\circ} 17' --$
Height of eye 12ft	$00^{\circ} 09' 20''$
TA, True altitude	$17^{\circ} 26' 20''$
ZD, Zenith distance	$72^{\circ} 33' 40''$
Sun's declination	$18^{\circ} 22' 53''$
Latitude	$54^{\circ} 10' 47'' S$



The chronometer is set to GMT. They had been away nearly 2 years, and it was about 12 minutes slow



This Chart suggests they changed course dramatically to reach South Georgia. That is not the case. The figures show that their latitude varied little from $54^{\circ} 30'$ for the last 4 days.



This diagram shows how the Sextant works. Mirror A allows you to see the Horizon and the Sun. The arm is moved until the two are lined up. The Diagram is misleading, because Worsley would be sighting on the Lower Limb of the Sun, not at its centre as shown.



Frank Worsley was a New Zealander, born in Akaroa. He became an apprentice to the merchant navy at the age of 15 serving on both sailing and steam ships.

He returned to sea after the expedition, commanding "Q boats" in the First World War - anti-submarine boats disguised as merchant shipping. He was twice decorated for anti-submarine action, once with the D.S.O.

After the war, he was involved in Shackleton's last expedition on the Quest, cut short by Shackleton's death on South Georgia. Like Shackleton, Worsley was bad with his own finances and for several years earned money by giving lectures about the Endurance expedition.. In 1925 he became joint leader of an Arctic expedition to Franz Josef Land and in 1935 was part of a treasure hunting expedition in the Cocos Islands.

Despite retiring from the sea in 1939, he remained a Royal naval reserve officer and continued to instruct at the Royal Naval College in Greenwich until his death in 1943. He had secured a job on a merchant ship called the "Dalriada" working at Sheerness in 1941 by lying about his age, he claimed to be just 65, when he really was 70!

Unfortunately he lost the job once found out.

He died of cancer of the lung in February 1943, just a few days after diagnosis. His was cremated at Woking. The memorial service at Greenwich College Chapel was as grand an affair as would be expected for someone with Worsley's maritime history. His ashes were scattered at sea near the mouth of the River Thames.

Leaving Elephant Island



SeaHorse Publications, Cambridge, CB5 8DJ

Worsley's medals at Greenwich



Frank Worsley's medals. The DSO with bar is on the left, next to his OBE. His Antarctic Medal is silver is third from right, with the Russian decoration, the Order of St Stanislas, extreme right.

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