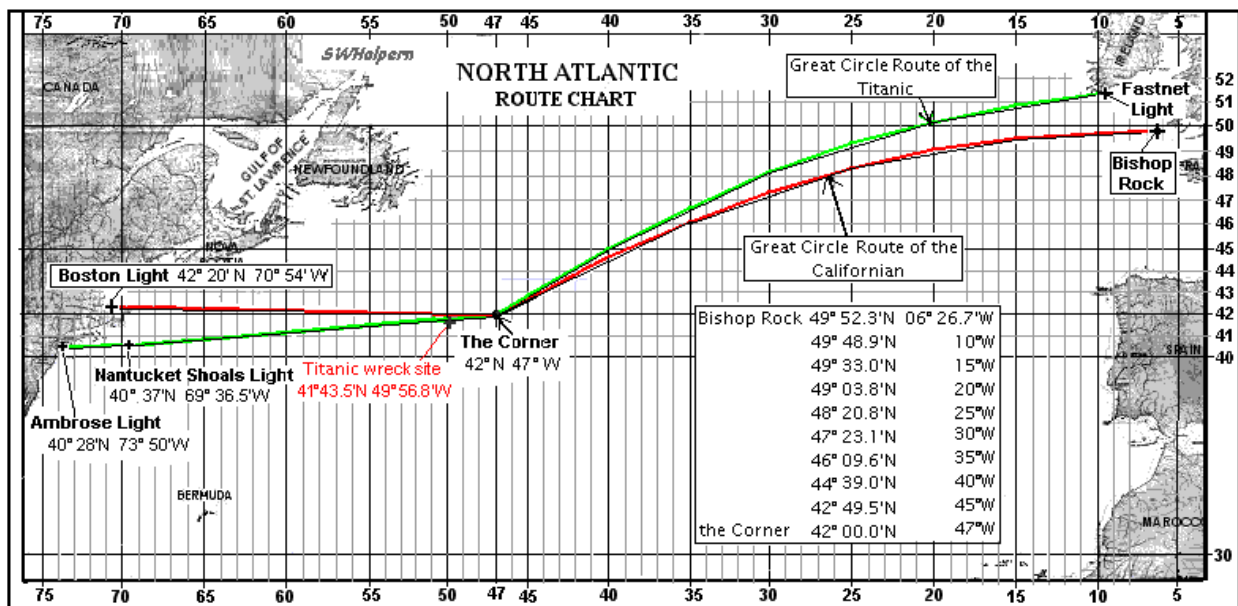


NAVIGATIONAL INCONSISTENCIES OF THE SS CALIFORNIAN

by Samuel Halpern

The Leyland Liner SS *Californian* began her sixth voyage under the command of Captain Stanley Lord on April 5th 1912. She was bound from London to Boston. Her planned route of travel would first take her from her berth at No. 24 Shed in the Royal Albert Dock in London to a point just off Bishop Rock (49° 52' N, 6° 27' W) at the westernmost tip of the Isles of Scilly, a distance of about 400 nautical miles. After taking departure off Bishop Rock, the official starting point of her transatlantic crossing, *Californian* would travel 1,734 nautical miles along a great circle route to a turning point in the North Atlantic known as “the corner” at 42° 00' N, 47° 00' W.¹ From there she would go another 1,067 nautical miles on a fixed course heading of 271° true to the Boston Light Vessel located at a distance of about 15 miles from Boston’s famed Custom House. Arrival at the light vessel would mark the official end point of the transatlantic crossing. From the light vessel she then would go on to the Clyde Street pier of the Boston and Albany docks in East Boston.

The planned route of the *Californian* as well as the planned route of the White Star Liner SS *Titanic* are shown in the diagram below.



NAVIGATIONAL EVIDENCE AND INCONSISTENCIES

Navigational evidence from the official logbook of the *Californian* was presented by Capt. Stanley Lord before the American Inquiry on April 26, 1912, and from both Capt. Lord and Chief Officer Steward before the British Inquiry on May 14 and 15, 1912, respectively. We also have additional navigational information from an affidavit signed by Capt. Lord on June 25, 1959, and from wireless messages sent from *Californian* on April 14 and April 15, 1912.

¹ The great circle route is the shortest distance between any two points on the earth’s surface. To remain on the great circle route, the heading of the ship has to be periodically changed except if it is heading due north or due south, or heading due east or due west when on the equator.

Reading from the logbook of *Californian* on April 26, Capt. Lord testified that his ship was at the corner at 9:40 a.m. on April 14, 1912.

Mr. LORD. On the 14th of April at 6 o'clock we have not got it down here, sir. [*Witness looking at a book, afterwards identified as the log of the Californian.*] I can give it to you at 9.40 o'clock and at noon.

Senator SMITH. Give it to me at 9.40.

Mr. LORD. 42, 47.

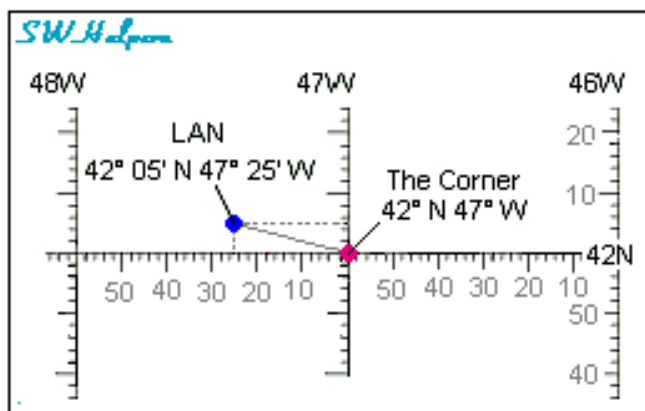
Senator SMITH. A little more specifically, please.

Mr. LORD. 42 north and 47 west.

Senator SMITH. Are you reading from the log of the *Californian*?

Mr. LORD. The *Californian*; the ship's log, yes.

From other evidence presented, we have that the ship's position at local apparent noon on that same day was recorded as $42^{\circ} 05' N$, $47^{\circ} 25' W$. But this creates a bit of a problem. According to Capt. Lord, *Californian* was making 11 knots on the coal consumption they were using.² The distance between the corner and their reported noon position is only 19.2 nautical miles. At a speed of 11 knots, that distance would be easily covered in just 1 hour 45 minutes. It should not take 2 hours and 20 minutes, the time from when he said he was at the corner, 9:40 a.m., to their noontime location at 12:00 p.m.³



So where was *Californian* at 9:40 a.m. when they altered course to a heading of $N 60^{\circ} W$ by compass? And were they really at $42^{\circ} 05' N$, $47^{\circ} 25' W$ when it was local apparent noon as claimed?

To answer these questions we must look further into the times of course changes that were made that morning.

According to data recorded in the logbook, *Californian's* course was changed to $N 60^{\circ} W$ (300°) by compass at 9:40 a.m.⁴ The magnetic variation, the difference between true north and magnetic north, in the vicinity of the corner on April 14, 1912 was $25^{\circ} 33'$ west according to the National Geophysical Data

² British Inquiry, 7115, 7140-7142.

³ If they had set their clocks back a little before noon, it would make the time difference even greater. But there is good reason to believe that *Californian's* clocks, like in ships belonging to the International Mercantile Marine Co., were adjusted around midnight the evening before with a slight correction in the forenoon the following day.

⁴ British Inquiry, 8793.

Center (NGDC).⁵ Chief Officer Stewart testified that the compass deviation error, the uncorrected error affecting the magnetic compass caused by the distribution of steel and iron in the ship's hull was about 5 to 5 ½ degrees west when the ship was heading westward.⁶ Captain Lord also thought the deviation error was about 5 degrees west when heading westward.⁷ To get the ship's true course relative to true north we have to adjust the compass heading for both deviation error and the magnetic variation in the area. Applying these corrections, we find that the ship's true course heading at 9:40 a.m. would be $300^\circ - 5^\circ - 25.5^\circ = 269.5^\circ$ true, almost exactly due west.

At 9:55 a.m., just 15 minutes later, a 1 degree course correction was made to N 59° W by compass.⁸ This would correspond to a heading of 270.5° true, keeping the ship almost on the same parallel of latitude heading close to due west.

The next entry in the logbook is for 12:00 p.m., local apparent noon, when a measurement was taken of the angular height of the sun which showed that they were then at a latitude of 42° 05' N, not at the latitude of the corner which was 42° 00' N. So it is obvious that *Californian* never quite made it to "the corner," but turned west at 9:40 a.m. at a latitude that had to be very close to where she was 2 hours and 20 minutes later when they took that sun sight. They also made another course change at noontime to N 61° W by compass.⁹ This put *Californian* on a heading of 268.5° true. In his 1959 signed affidavit, Stanley Lord wrote, "I steered this course [North 61° West (magnetic)] to make longitude 51° West in latitude 42° North on account of ice reports which had been received." Capt. Lord's intent was to slowly steer down to the latitude of the corner, 42° 00' N, by time they reached longitude 51° 00' W before putting his ship back on a direct course to Boston Light.

Now it can be argued that Capt. Lord believed he really reached the corner at 9:40 a.m. when he changed *Californian's* course to the west based on dead reckoning (DR) navigation, the process of determining your position by course, speed and time from the last position that was determined by a celestial fix. In all likelihood, a sun sight would have been taken in the early morning hours when the sun was well to the east to accurately determine their longitude. From that, and the known course heading and speed of the ship, Capt. Lord would have expected to be at the longitude of the corner, 47° 00' W, by 9:40 a.m. However, his latitude would only be an estimate until a sun sight could be taken at noon which would give him a precise measure of his ship's latitude. Indeed, it appears that this is exactly what was done. The result of their noontime sight, however, showed that *Californian* was actually 5 nautical miles north of where he really wanted to be. But for some unknown reason, they wrote down that the ship was at the corner at 9:40 a.m. according to what Capt. Lord had said.

The next critical position that we know about comes from an ice report sent by wireless from *Californian* to the steamship *Antillian* at 5:35 p.m. New York time, April 14, 1912. This particular ice report was also picked up and acknowledged by *Titanic*.¹⁰

⁵ A useful on-line calculator is available from the NGDC to get magnetic variation for any location on a specified date. It can be accessed at: <http://www.ngdc.noaa.gov/geomagmodels/struts/calcDeclination>.

⁶ British inquiry, 8713.

⁷ British Inquiry, 7269.

⁸ British Inquiry, 8793.

⁹ British Inquiry, 8709.

¹⁰ British Inquiry, 8939-8974.

To Captain, 'Antillian,' 6.30 p.m. apparent time, ship; latitude, 42.3 North; longitude, 49.9 West. Three large bergs five miles to southward of us. Regards. Lord.

With all of this information available, let us rework the dead reckoning navigation of *Californian* on April 14, 1912. We start with Capt. Lord's expectation that *Californian* would reach the longitude of the corner, 47° 00' W, at 9:40 a.m. Furthermore, let us assume that *Californian* was making nearly 11 knots as reported by Capt. Lord.¹¹ At 9:40 a.m. her course was changed to 269.5° true, and at 9:55 a.m. it was changed by 1 degree to a heading of 270.5° true as we have noted before. The intent seems to be to keep her heading about due west until a sight can be taken of the sun at noon to get an accurate measure of latitude.

At 12:00 p.m., local apparent noon, just 2 hour and 20 minutes after turning west at the longitude of the corner, a sun sight was taken that showed that *Californian* was actually 5 miles further north than originally expected. At that time she would have traveled just a little over 25 nautical miles westward of the corner longitude. For the parallel of latitude they were on, the change in longitude should have been 34 minutes-of-arc placing her noontime coordinates at 42° 05' N, 47° 34' W. But that is not what was recorded in the logbook. It seems that someone entered the departure distance of 25 miles in the logbook instead of the 34 minutes-of-arc that would have been obtained from the traverse table that they would have used.¹² A simple transcription error that has escaped notice all these years. So instead of having 42° 05' N, 47° 34' W as her noontime position in her logbook, it was put down as 42° 05' N, 47° 25' W.

VERIFICATION

If this is what actually happened, then we have a logical explanation for the inconsistency between her noontime position and the course change at 9:40 a.m. that we noted before. Furthermore, we should be able to use this corrected noontime position to find the ship's dead reckoning positions when those three icebergs were sighted at 6:30 p.m., as well as iceberg sighting at 7:15 p.m. and the *Californian's* stopping point at 10:21 p.m.

Starting at the presumed corrected noontime position of 42° 05' N, 47° 34' W, let us continue to steam at a speed close to 11 knots for the next 6 ½ hours on a course line of 268.5° true, a course that corresponds to their compass heading of N 61° W after correcting for magnetic variation and compass deviation. This also happens to be the heading that would take *Californian* down toward 42° N, 51° W as Stanley Lord explained in his 1959 affidavit. The distance traveled over 6 ½ hours is almost 71 nautical miles. The DR position reached for 6:30 p.m., after rounding each coordinate to the nearest minute-of-arc, is 42° 03' N, 49° 09' W, the exact same set of coordinates that were transmitted by wireless to the *Antillian*.

At 10:21 p.m., *Californian* was forced to stop when she came up to a vast field of pack ice. We were told that her stopped position was worked out by Capt. Lord and later entered into the ship's log the next morning by Chief Officer George Stewart. If Capt. Lord simply took 11 knots as his speed made good, then the distance that *Californian* would travel from our revised noon coordinates to 10:21 p.m. is just under 114 nautical miles. Starting at our corrected noontime position of 42° 05' N, 47° 34' W on a course 268.5° true toward 42° N, 51° W for 114 miles, we end up at a DR stopping point of 42° 02' N, 50° 07'

¹¹ American Inquiry, p. 716; British Inquiry, 7115, 7141-7142. We will assume she was making almost 10.9 knots for the purpose of this analysis.

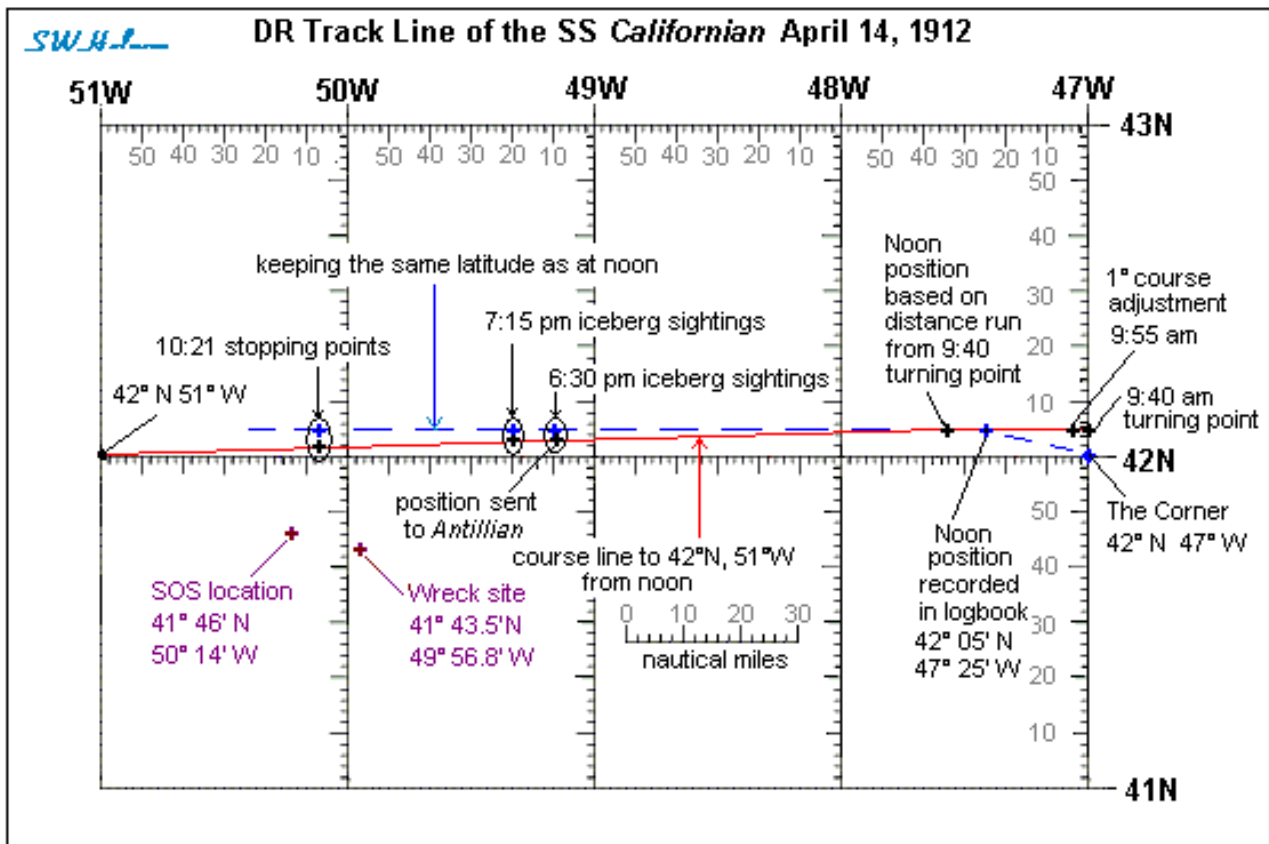
¹² For a latitude of 42 degrees, every mile heading westward (or eastward) produces a change in longitude of 1.35 minutes-of-arc.

W; exactly the same longitude that was entered in the official logbook of the *Californian*, but three miles further to the south.

Notice that these positions were derived by using the simple assumption that *Californian* was indeed making a sustained speed of almost 11 knots until she came to a stop. Furthermore, we found a noontime position for *Californian* that is now consistent with all other positions derived between 9:40 a.m. and 10:21 p.m. All of this work is summarized in the table below along with the coordinates that were entered in *Californian's* logbook for comparison:

Derived Dead Reckoning Positions of the SS <i>Californian</i> for April 14, 1912			
Time	Logbook Coordinates	Derived Coordinates	Description
9:40 a.m.	42° 00' N, 47° 00' W	42° 05' N, 47° 00' W	Turning point at corner longitude. Course N 60° W by compass.
9:55 a.m.	None entered	42° 05' N, 47° 04' W	Course changed to N 59° W by compass.
12:00 p.m.	42° 05' N, 47° 25' W	42° 05' N, 47° 34' W	Noon. Course changed to N 61° W by compass to make 42°N, 51°W.
6:30 p.m.	42° 05' N, 49° 10' W	42° 03' N, 49° 09' W	Sighted three large icebergs about 5 miles south.
10:21 p.m.	42° 05' N, 50° 07' W	42° 02' N, 50° 07' W	Stopped on account of vast ice field stretching from north to south.

The following chart shows the location of these derived positions (red) along with the positions that were later recorded in the official logbook of the *Californian* (blue).



PROOF OF OUR DERIVED DEAD RECKONING POSITIONS

Can we find any specific evidence that our derived DR positions were indeed the same as those that were worked out by those navigating *Californian* on April 14, 1912? The answer is yes.

The first hard piece of evidence is that famous wireless message sent to the *Antillian*. As you can see, we were able to derive exactly the same set of coordinates that were sent in that ice message proving that those on *Californian* believed that to be her DR position at that time. Furthermore, these were the same coordinates that were sent at 5:20 p.m. NY time the following day, April 15, 1912, in an independent ice report sent to *Olympic*, not the coordinates that eventually showed up in *Californian's* logbook when presented at the inquiries.¹³

The next piece of evidence comes from Capt. Gambel of the *Virginian*:

She [the *Californian*] was 17 miles north of the *Titanic*, and had not heard anything official of the disaster. I sent a Marconigram to her as follows: "Titanic struck iceberg, wants assistance urgently, ship sinking, passengers in boats, her position lat. 41.46, long. 50.14."

How did Capt. Gambel know that *Californian* was 17 miles from the SOS position when he sent that message to her? The first wireless call sent out Monday morning by *Californian's* wireless operator Cyril Evans was at 5:15 a.m., *Californian* time. It was a general "CQ" call to any station that would answer. The first to do so was *Mount Temple* who informed Evans that *Titanic* had been reported sinking and gave him *Titanic's* SOS position. The next ship to respond was the *Frankfurt* at 5:30 a.m. They too gave Evans the same information about *Titanic*. Then at 5:50 a.m., we find *Californian* in wireless contact with *Virginian*.¹⁴

Cyril Evans:

Virginian started to call me, 'M.G.M.' ... I answered him and told him to "go." He said, "Do you know the *Titanic* had sunk?" I said, "Yes, the *Frankfurt* has just told me." I sent them a message of my own, what we call a service message, that an operator can always make up if he wants to find out something. I sent a service message, and said, "Please send me official message regarding *Titanic*, giving position."

As explained by Capt. Lord:

The first report I got to the bridge that morning, after I had sent [Chief Officer Stewart] down and had the operator [Evans] called, the chief officer came back and said, "He reports a ship sunk." I said, "Go back and wait until you find out what it is. Get some more about it." So he went back, and I suppose 10 minutes afterwards he came back and said, "The *Titanic* is sunk, and hit an iceberg." The chief officer was delivering the message. I was on the bridge, and he was running backward and forward to the operating room. I said, "Go back again and find the position as quickly as possible." So he went back, and he came back and said "We have a position here, but it seems a bit doubtful." I said, "You must get me a better position. We do not want to go on a wild

¹³ Wireless log of the SS *Olympic* submitted in evidence to the American Inquiry by E. J. Moore on May 25, 1912.

¹⁴ The times of all these communications were all logged in the wireless log of the *Mount Temple*.

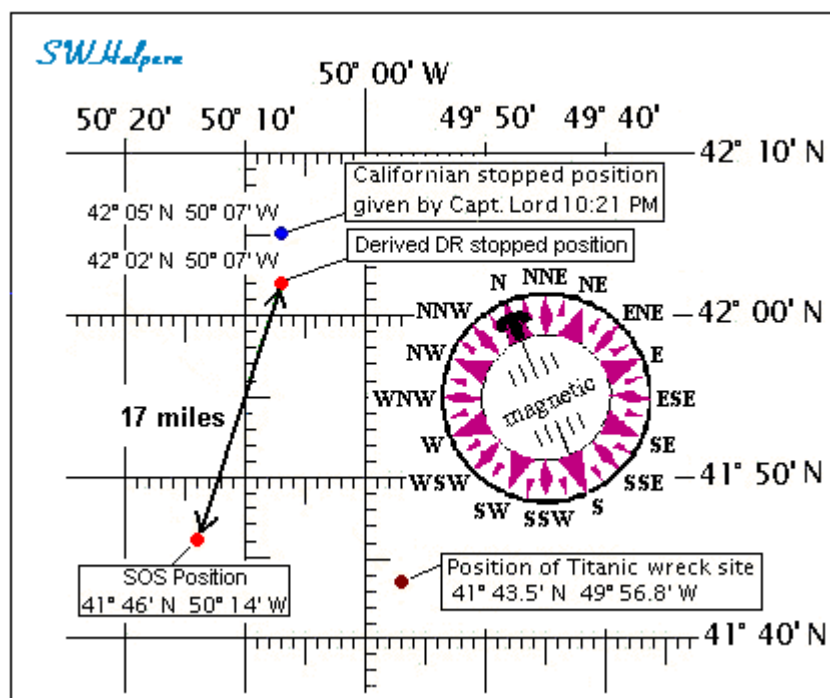
goose chase.” So in the meantime, I marked off the position from the course given me by the *Frankfurt* in the message just from one [wireless] operator to another.

The official message that came back from *Virginian*, a Master Service Gram (MSG), was sent by *Virginian*'s Capt. Gambel at 6:05 a.m. *Californian* time.¹⁵ Before that, *Californian* reported her overnight DR coordinates to *Virginian* from which Capt. Gambel was able to figure out that *Californian* was 17 miles from *Titanic*'s SOS position.

But we have more than Capt. Gambel's word about this. In a letter sent to the Board of Trade (BOT) on August 10, 1912, Capt. Lord wrote:

“April 15 about 6:30 am gave my position to S.S. *Virginian* before I heard where the *Titanic* sunk, that also gave me 17 away.”

Obviously Capt. Lord's 6:30 time that he wrote in that letter was an error. By 6:30 a.m. *Californian* was almost on the other side of the ice field heading toward the SOS position, well after Capt. Lord received the MSG message from Capt. Gambel confirming the SOS coordinates. But the distance he wrote in that letter was also 17 miles, and he admitted that he gave his overnight position to the *Virginian* before receiving Gambel's message in return. Thus we have both Capt. Lord and Capt. Gambel in full agreement that the distance between *Californian*'s stopped DR position and the *Titanic* SOS position was 17 nautical miles. If Capt. Lord really believed he was at the position that was later written in his logbook, the distance would have been almost 20 miles away from the SOS position, not the 17 miles that we see here.¹⁶



¹⁵ The time reported by Capt. Gambel was 5:45 a.m. *Virginian* time. The *Virginian* was 1 hour 30 minutes ahead of New York. The *Californian* was 1 hour 50 minutes ahead of New York. This puts the official MSG received at 6:05 a.m. *Californian* time. Capt. Lord said he had it written in his logbook as “Six o’clock.”

¹⁶ It should be pointed out, however, that at the inquiries back in April and May, Capt. Lord was quite persistent that his stopped position put him 19 ½ to 20 miles from the SOS position (e.g., American Inquiry, p. 723; British Inquiry, 7377).

From the DR coordinates that we derived for when *Californian* came to a stop, 42° 2' N, 50° 7' W, we find that the distance to the *Titanic* SOS position measures 16.8 nautical miles, almost exactly the distance reported by Capt. Gambel and later by Capt. Lord in his August letter to the BOT. This can be seen in the expanded area chart shown above. Once again, what was later entered into *Californian's* logbook was obviously done well after the fact, and leads one to wonder about the truthfulness of how some of those positions recorded in her logbook were really obtained.

APPARENT TIME CALIFORNIAN

Before we end the topic of *Californian's* logbook positions for April 14, it should be pointed out that correcting her noontime longitude from 47° 25' W to 47° 34' W does not significantly change the time difference between *Californian* Apparent Time Ship and New York mean time. Local apparent noon on April 14, 1912, for a longitude of 47° 25' W came at 15:09:57 GMT. For a longitude of 47° 34' W, local apparent noon came at 15:10:33 GMT, just 36 seconds later. In both cases, *Californian's* clocks would have been about 1 hour 50 minutes ahead of clocks in New York.

THE NAVIGATIONAL REALITY

The stopped position that we derived for *Californian* on the night of April 14, 1912, was based purely on dead reckoning, taking into account the course and speed of the vessel from the corrected noontime position. We saw that our derived stopped position was located 17 miles from the *Titanic* SOS position as reported independently by both *Virginian's* Capt. Gambel and later by *Californian's* Capt. Lord himself. The DR track that took us there also gave us the same coordinates for *Californian's* 6:30 p.m. position that was sent by wireless to the *Antillian*. But there is still a little problem that needs to be worked.

As all navigators know, the only way to firmly establish your position at sea is by taking a celestial fix. The difference between your DR position and a fix position gives you the average current set and drift from the time of your last fix to the time of the new one. In 1959 Stanley Lord strangely suggested that his ship was affected by a current that ran WNW at about one knot. This is more or less opposite to the general direction of the expected current for that part of the Atlantic. Generally, in the vicinity of the corner, a current running easterly can be expected. As *Titanic's* Fourth Officer Joseph Boxhall told the Wreck Commission, "invariably we find a strong easterly set there."¹⁷

But Joseph Boxhall also said that the current sometimes changes, and that they can tell that by the temperature of the water. The cold Labrador current, which brings icebergs and field ice down from the north, generally sweeps across the Grand Banks of Newfoundland moving south to southwestward and averaging about ½ knot until it approaches the warmer waters of the Gulf Stream near latitude 43° N.¹⁸ However, in April 1912, the drifting ice was taken much further south than expected.¹⁹

Is there any evidence that *Californian* came under the influence of a south setting current on April 14, 1912? The answer to that is yes. It comes from Stanley Lord himself in a letter submitted to Senator

¹⁷ British Inquiry, 16955.

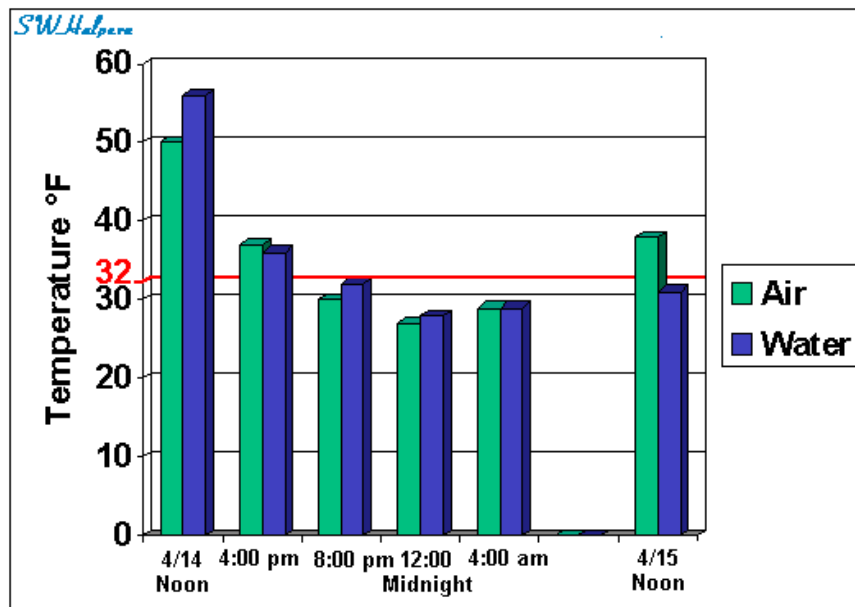
¹⁸ Memorandum regarding the "Drift of Ice On or Near the Grand Banks" submitted by Capt. John Knapp of the Hydrographic Office to Senator William Alden Smith on May 13, 1912.

¹⁹ Capt. James Moore of the *Mount Temple*, "I never knew it [the ice] to be so far south before. Not in my whole experience of 27 years, I never knew it so far South.." (British Inquiry, 9388.)

William Alden Smith dated May 11, 1912 by way of P. A. S. Franklin, Vice President of the International Mercantile Marine Co. In that letter Capt. Stanley Lord wrote:

After leaving Boston I found that I had unintentionally given a wrong reply to one of your questions. You asked me, "Could I give you the temperature of the water from my log book." I replied, "No; but I could give it to you from memory," which I did. The log books I have always used have not had a column for temperature of water, but this voyage we have had a new type of book, which has the column in. Although I had the log book at the time you asked me, my reply was based on the ones I had always been in the habit of using. Below I give you the temperature of air and water from noon April 14 to noon April 15.

The diagram below shows the temperature data that was so innocently recorded in the logbook for the time period. What is most striking is the sharp 20-degree drop in water temperature (from 56° F to 36° F) that took place between noon and 4 p.m. that day. By 8 p.m., the water temperature had reached the freezing mark at 32° F, and by midnight, it reached a low of 28° F. Clearly, the *Californian* came under the influence of the Labrador current sometime between noon and 4 p.m. The influence of that current continued to affect her throughout the night and the following day. As Stanley Lord said at the American Inquiry, "But in the Arctic current you always get cold water, even if there is not any ice."²⁰ And so he did.



Is there any other evidence of a strong southerly current in the region? We just have to look at the position of the wreckage seen at 11:20 a.m. Monday morning compared to the now known position of the *Titanic* wreck site. The distance between the two is 11 nautical miles, and the bearing from the wreck site to the wreckage is 197° true. *Titanic's* hull broke in two approximately 2 to 3 minutes before the stern section was seen to disappear beneath the surface; the time when all her lights suddenly went out. On *Californian*, the lights of the steamer they were watching all night "disappeared from sight and nothing was seen of her again."²¹ *Californian* time was then 2:05 a.m. as seen on her wheelhouse clock.²² The time from 2:05 a.m.

²⁰ American Inquiry, p. 721.

²¹ Signed statement to Capt. Lord by Apprentice James Gibson, dated April 18, 1912, while at sea.

²² British Inquiry, 7565.

to local apparent noon on April 15, when *Californian's* latitude was again firmly established by a sun sight, was 10 hours and 5 minutes after taking into account a 10 minute clock adjustment between noon April 14 and noon April 15.²³ This means that the wreckage had drifted down 11 miles in about 10.1 hours, or an average speed of drift of about 1.1 knots.²⁴

With *Californian* under the influence of a strong, south setting *Labrador* current from 4 p.m. onward, her actual path over ground would take her further southward than her DR track line would suggest. If the south setting Labrador current affecting *Californian* was averaging about one knot between 4:00 p.m. and 10:21 p.m., then *Californian* would have been set about 6 nautical miles southward from her stopped DR position placing the ship close to 41° 56' N, 50° 07' W when she came to a stop because of a large field of pack ice that blocked her westward path. From that point onward, she would drift southward with the local current along with anything else floating on the water in her vicinity.

THAT ELUSIVE 7:30 P.M. POLE STAR SIGHT OF GEORGE STEWART

At the American Inquiry on April 26, 1912, Capt. Lord responded to a question asked about position entries in his ship's log book:

Senator SMITH. What other entries have you in the log, of your position on that date?

Mr. LORD. At 6.30.

Senator SMITH. 6.30 p.m.?

Mr. LORD. Yes; we had, 42° 5' and 49° 10', as having passed two large icebergs.

Senator SMITH. What is the next entry?

Mr. LORD. There is no position given there. The next entry was 7.15 o'clock. "Passed one large iceberg, and two more in sight to the southward."

Senator SMITH. Where were you at that time?

Mr. LORD. No position entered here, sir.

The first part of what Lord gave, having passing two large icebergs at 6:30 p.m., is a key piece of information. The reference to *two* large icebergs was not a misreading by Capt. Lord. It was indeed entered into their logbook as such as confirmed by *Californian's* Chief Officer George Stewart:

8796. [Mr. Robertson Dunlap] At 6.30 your log, if you look at it, records passing two large icebergs, and gives the latitude and longitude? – [Chief Officer Stewart] Yes.

8797. Is that the latitude and longitude of your ship at the time these icebergs were passed? - Yes.

So it is clear from the question that was asked by the representative of the Leyland Line, Mr. Robertson Dunlap at the British Inquiry on May 15, that the logbook entry indeed had *Californian* passing *two* large icebergs at 6:30 p.m. Also listed in *Californian's* logbook were the ship's coordinates, 42° 05' N, 49° 10' W, when those icebergs were passed. And this too was not a misreading of the entry. The same exact set

²³ Local apparent noon April 14 for *Californian* was at 15:10:33 GMT, and local apparent noon April 15 was at 15:20:38, a difference of 10 minutes.

²⁴ Included in the wreckage that was seen in the morning was overturned collapsible lifeboat B (British Inquiry, 25477). That overturned boat could not have floated very far away from where *Titanic* went down except for the drift of the local current considering that "it was absolutely water-logged" as noted by Second Officer Charles Lightoller, one of the men who was standing on that overturned boat from the time *Titanic* sank until they were taken off sometime after daybreak.

of coordinates and information was filed with the Branch Hydrographic Office in Boston on April 22, 1912.²⁵

But this recorded information creates an inconsistency. What was also known at the time of the inquiries, is that *Californian* sent an ice report by wireless at 5:35 p.m. New York time, April 14, 1912, to the steamship *Antillian* that said that *Californian* was at 42° 03' N, 49° 09' W when she passed *three* large icebergs at 6:30 p.m. five miles to their south.

So despite the difference of there being two icebergs versus three, the most important difference between what was written in *Californian's* logbook and what was transmitted by wireless to the *Antillian* are the coordinates of *Californian's* 6:30 p.m. position for April 14. The coordinates written in *Californian's* logbook had her at 42° 05' N, 49° 10' W, keeping to the same latitude that she was at six and a half hours earlier, while the wireless message had *Californian* at 42° 03' N, 49° 09' W, a little more to the southward and a little to the east.

At the British Inquiry on May 14, 1912, Capt. Lord was questioned about this wireless message transmitted from *Californian* to *Antillian*:

6690. [Attorney-General Sir Rufus Isaacs] Do you remember on Sunday, April 14th, sending a wireless message to the "Antillian"? – [Capt. Lord] 6.30 on the 14th.

6691. Is that ship's time? - Yes, ship's time for longitude 47° 25.'

6692. Did you give him the position of some icebergs? - I gave him the position of the ship at 6.30, and I told him the icebergs were 5 miles south of me.

The Commissioner: What was the name of the boat?

6693. (*The Attorney-General.*) It was a message sent to the "Antillian." Your Lordship will see in a moment what happened. (*To the Witness.*) Giving the position of three large icebergs, was it? - Yes.

6694. Would you tell me the position that you gave him? - Forty-two deg. five min and 49 deg. 9 min.

6695. Forty-two deg 5 min N and 49 deg 9 min W? - Yes

Notice it was the Attorney-General, Sir Rufus Isaacs, who mentions three icebergs, not Capt. Lord. But more important, it was Lord who said that the coordinates given to *Antillian* was 42° 05' N, 49° 09' W, which was different from what was actually transmitted to the *Antillian*. The latitude Lord gave in testimony was taken from the entry in *Californian's* logbook, but the longitude he gave at the British inquiry was now in agreement with what Evans transmitted.

Why did Capt. Lord continue to claim a latitude that was different from the one that was actually transmitted in the message to *Antillian*? And why did he now agree to the transmitted longitude value?

The longitude value recorded in the logbook was 49° 10' W while the one transmitted to *Antillian* had 49° 09' W, a difference of only 1 minute-of-arc. One may argue that this was simply be due to the way the calculated longitude was rounded off to the nearest minute-of-arc when the position was given to Evans as

²⁵ File No. 62908-2995. British S. S. *Californian*. Master, Lord. Received in branch hydrographic office, Boston Mass., on April 22. Received in Hydrographic Office April 23. The complete report submitted read, "April 14, 6:30 P.M., latitude 42.05 N., longitude 49.10 W., sighted two large icebergs 5 miles south of the above position. At 7:15 P.M., latitude 42.05 N., longitude 49.20 W., two bergs, and 7:30 P.M. two bergs. At 10:20 P.M., latitude 42.05 N., longitude 50.07 W., encountered heavy packed field ice, extending north and south as far as the eye could see and about 5 miles wide; also numerous bergs could be seen. From above position until April 15, 2:30 P.M., latitude 41.33 N., longitude 50.42 W., almost continuously in field ice. At the last position sighted two bergs and cleared the field ice."

opposed to when it was entered into the logbook. But the difference in latitude is more than a simple round-off difference.

To get an answer for the latitude difference we have to look to the testimony of Chief Officer Stewart:

8807. [Mr. Robertson Dunlap] Is the explanation this: That at 6.30 the latitude given to the Marconi operator was latitude by dead reckoning from your noon position? - [Chief Officer Stewart] Yes.

8808. But at 7.30, an hour later, you got an observation which enabled you to fix your actual position? - Yes.

8809. Which differed two minutes [of arc] north of the position by dead reckoning? - Yes.

8810. And is that observation at 6.30 recorded in your log of this star an accurate one? - Yes.

8811. Is there any room for doubt about the accuracy of that position there? - No.

8812. Then at 10.21 there is an entry that the ship was stopped in latitude 42.5 north and longitude 50.7 west? - Yes.

8813. Do you know who took that position? - The captain gave us that position.

8814. Did you or not subsequently verify this position? - Yes.

8815. When did you verify it? - The next day.

8816. And did you find this position to be accurate? - Yes.

The observation Stewart was referring to was a measurement of the angular height of the pole star Polaris above the horizon allegedly taken at 7:30 p.m., about an hour after these three icebergs were sighted, and close to the time that the wireless ice warning was being transmitted to the *Antillian*. So the explanation, if all of this is to be believed, is that an accurate latitude was obtained by taking a pole star sight at 7:30 p.m. showing that *Californian* was still at that same latitude as she was seven and half hours earlier despite her true course heading being slightly south of due west. And when Stewart wrote up the logbook the next day, he simply put down for the ship's latitude when those icebergs were sighted the same latitude that he obtained an hour later by taking that pole star sight. Yet, he never bothered to correct his ship's 9:40 a.m. position for the latitude obtained by a sun sight taken at noon that very same day.

But not only did Stewart adjust the position for 6:30 p.m. to the same latitude as at noon, he also put down that same latitude for the ship's position at 7:15 p.m. when more icebergs were sighted, and also for the ship's position when she stopped at 10:21 p.m. because of a field of pack ice that blocked her westward progress.

Californian's position for 7:15 p.m. was filed with the Branch Hydrographic Office in Boston on April 22, 1912. It stated that *Californian* passed one large iceberg and two more to the southward at 7:15 p.m. when she was at 42° 05' N, 49° 20' W.²⁶ Yet, as we have seen, Capt. Lord told Senator Smith on April 26, just four days after that report was filed up in Boston, that their logbook had no position entered in it for this 7:15 p.m. sighting. This seems to bring into question just when was their logbook actually written up?

The position for *Californian's* stopped overnight position recorded in her logbook, 42° 05' N, 50° 07' W, was also put in the report filed with the Hydrographic Office on April 22. Capt. Lord said that he himself worked out that position, a position that Chief Officer Stewart claimed to have verified as being accurate "the next day." So what we have, if all of this is true, is that *Californian* remained on the same parallel of latitude, 42° 05' N, for at least ten and half hours, from noon until she stopped, despite steaming on a

²⁶ Ibid.

course heading to take her south of due west.²⁷ Not only that, but just how did the Chief Officer actually verify Capt. Lord's overnight position the next day? Did he take another pole star sight during early morning twilight that showed the ship mysteriously remained on the same parallel of latitude all night long despite a south setting current in the area that we now know existed? He never really said just how he managed to verify his ship's overnight position the next day.

But the official explanation, given by Mr. Robertson Dunlap in his leading questions put before Chief Officer Stewart, is that the difference in latitude from what was put down in *Californian's* logbook and the latitude sent to the *Antillian* was the result of an observation taken of the pole star Polaris about 7:30 p.m. on April 14th that showed *Californian* remained at the same latitude since noon. If this pole star sight was actually taken, then the ship's position for 7:30 p.m. would be relatively easy to fix by either advancing a longitude line of the sun taken in the late afternoon to the time of the pole star sight to get what is called a running fix, or by taking an observation of a second star to get an accurate star fix for both latitude and longitude for that time. Why just take a latitude by pole star to accurately fix just one coordinate?

An argument can be made that taking an angular measurement of the altitude of the pole star with a sextant will give you an accurate latitude measurement without the need of going through a bunch of tedious calculations to get a more precise fix. This is because the angular height of the north celestial pole above the horizon is equal to your latitude. But there are still corrections that have to be taken into account. You still have to adjust your measurement for sextant index error, subtract out the dip of the horizon for your height of eye above the sea, subtract out the refraction error for the measured angle, and then look up a correction from the nautical almanac to apply after taking into account your DR longitude and the date and time of the pole star observation. The latter must be done because the pole star is not exactly located at the north celestial pole. Some of these corrections if not properly taken into account can cause significant errors in the result. For example, the correction for dip of the horizon for the height of *Californian's* bridge (40 ft) would have been 6.1 minutes-of-arc, and the refraction error for the angular height of Polaris would be another 1.1 minutes-of-arc. If *Californian* was actually being set southward at about 1 knot by the Labrador from 4 p.m. onward, her actual position for 7:30 p.m. would be 3.5 miles south of her DR course line position for that time, making her true latitude at that time to be about 41° 59.4' N. If during the sight reduction process, Chief Officer Stewart forgot to subtract the correction for dip, the latitude he would get would be $41^{\circ} 59.4' + 6.1' = 42^{\circ} 05.5' \text{ N}$. What is interesting about that particular value of latitude is a statement that Stanley Lord wrote in his 1959 affidavit: "At 7.30 p.m. the Chief Officer, Mr. G. F. Stewart, reported to me a latitude by Pole Star of $42^{\circ} 5 \frac{1}{2}' \text{ N}$."

Was it a simple oversight error in the sight reduction process that led to the wrong conclusion as to where they stopped for the night? Unfortunately, we may never really know. But what is almost certain, is that the entries put in the log book were made well after the *Californian* resumed her voyage to Boston, not before.

CONCLUSIONS

In this short article we have taken a close look at how the Leyland Liner *Californian* was navigated on April 14th 1912. What we found is that there were several inconsistencies in the positions reported in her

²⁷ When asked what course was *Californian* on before coming to a stop, Capt. Lord said they were heading S 89° W true, which is 269° true by modern notation. The magnetic variation from the NGDC is given as 25.2° W for the reported stopped location. Using a deviation error of 5 degrees west, *Californian's* true course heading works out to 268.8° true assuming her compass heading remained the same since noon.

logbook and presented in evidence at the inquiries following the *Titanic* disaster. In particular, we found that the reported noontime position seems to be out of place with her reported 9:40 a.m. turning point longitude and the speed she making westward. The correct noontime position should have been 42° 05' N, 47° 34' W; not 42° 05' N, 47° 25' W that was put down in her logbook and accepted by so many without challenge for so long. The mistake appears to be in writing down the distance travelled in miles as the number of minutes-of-arc westward from the longitude of the corner. (The value was short by a factor of 1.35, the conversion of miles to minutes-of-arc for a latitude of 42° N.) We also found that the DR stopping point for *Californian* was at 42° 02' N, 50° 07' W, three miles further south than what was eventually put in her logbook, and 17 miles from *Titanic's* SOS position as reported by Capt. Gabel of the *Virginian*, and confirmed by Capt. Lord in a letter he wrote to the BOT in mid August. In all likelihood, *Californian* was set further southward by a strong Labrador current that affected her course over ground as she travelled westward for about 6 ½ hours before coming to a stop at 10:21 p.m. From that point onward, the current would have taken her further southward and slightly westward as she drifted freely with the surrounding ice on the frigid waters the North Atlantic.