The HOAX Known As MH370

Not Missing, Largely Intact

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Contents

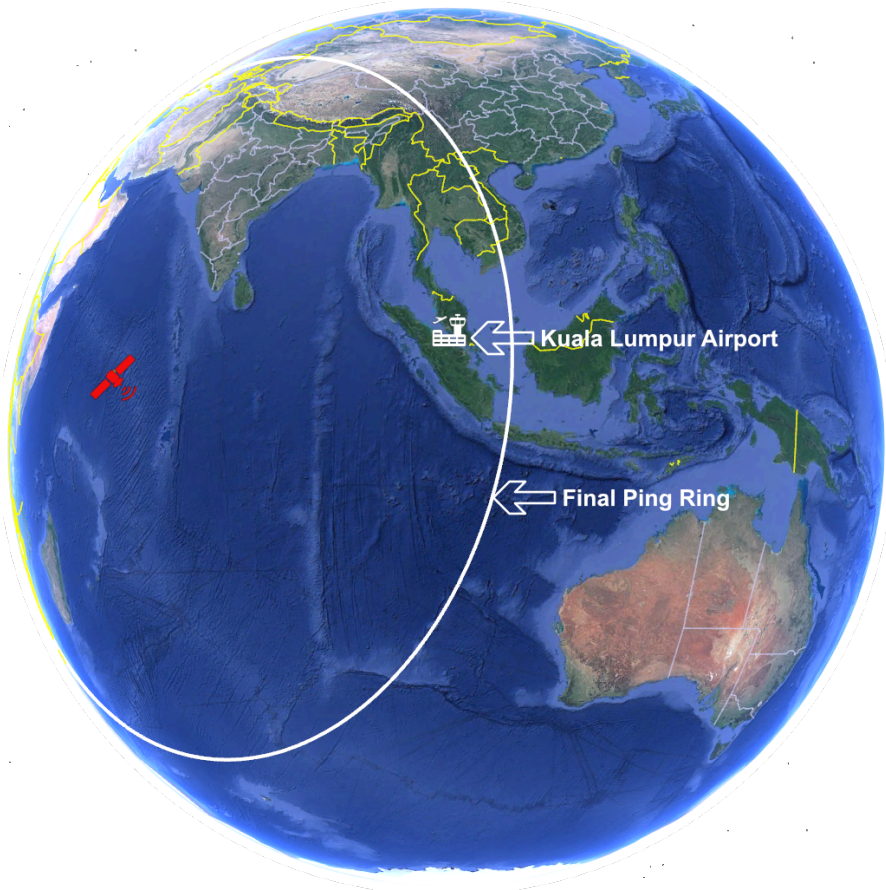
Introduction

In late 2016 MH370's final resting place was calculated by the author to be at or near what is now colloquially known as the "Zenith Abyss" in the South Indian Ocean 1,200 kilometers west of the small town of Exmouth, Western Australia. The author used publicly available telemetry acquired by Inmarsat's 3-F1 satellite on March 8, 2014, to calculate the plane's endpoint.

The analysis initially endeavored to identify the relatively small portion of the plane's final ping – with a circumference of 30,254 kilometers – that could actually have been flown the day the plane was lost. Specifically, where was the plane when the satellite recorded its final ping at 8:19 AM local? The only thing certain was that the answer — if one could be found — would be unlike anything else in use at the time because it would have nothing whatever to do with fuel reserves, ground speed, or compass heading. Those traditional metrics had become unknowable after the plane's communication systems were disabled forty minutes after takeoff.

The solution turned out to be surprisingly straightforward. The plane's location on the circumference of the final ping required nothing more than an accurate measure of the radius of the final ping, which was known to

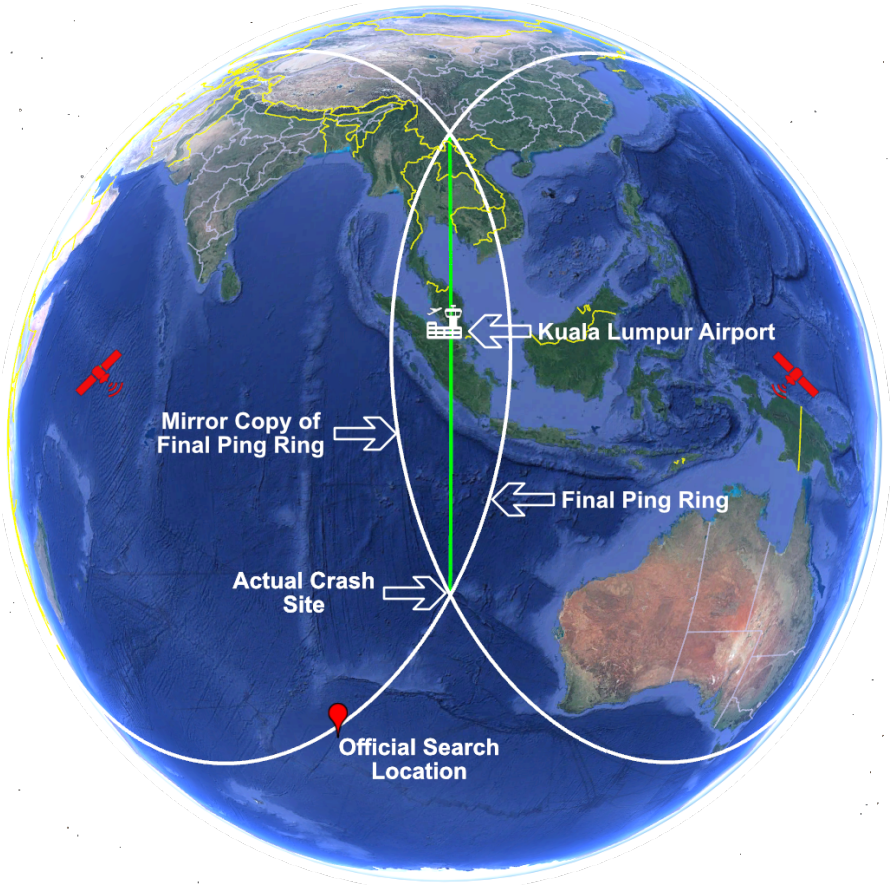
have been 4,815 kilometers. At the moment MH370 entered the South Indian Ocean at Zenith, the illustration below shows the departure airport at Kuala Lumpur, Inmarsat's 3-F1 satellite, and provides a partial overview of the area spanned by the circumference of the final ping. The latter extended from the Democratic Republic of the Congo in west central Africa to the Malay Archipelago.



A Google Earth overview of the South Indian Ocean and parts of Oceania when MH370 collided with the ocean surface seven kilometers above the seafloor of Zenith Abyss, 2,760 kilometers south of Kuala Lumpur Airport.

Based entirely on the radius of the final ping, two "geometric reflections" were added to the Indian Ocean tableau: a mirror image of the 3-F1 satellite

and a mirror image of the final ping. Mathematical formulas can be easily used in lieu of illustrations, but illustrations alone are used here. Neither of the two additional geometric reflections is “real” if defined as "space junk." Yet both are geometrically and mathematically valid constructions. This technique is ancient and is used in the building trades, engineering, optics, and many other pursuits. It is also taught in primary and secondary schools worldwide.



A Google Earth overview of the East Indian Ocean and the Malay Archipelago showing the two geometric reflections used to aid identification of MH370's location as it crashed into the surface of the South Indian Ocean above Zenith Abyss.

The geometric reflections that pinpointed MH370 created two equally likely crash location possibilities at either end of the green vertical line, sometimes known as a "common chord" or "radical axis." As a rule, additional information is needed to determine which of the two endpoints is the correct endpoint. With MH370, that task was greatly simplified by China when it announced that the plane did not enter its airspace. That left only the southern endpoint at Zenith Abyss, which would be confirmed by Germany three years later.

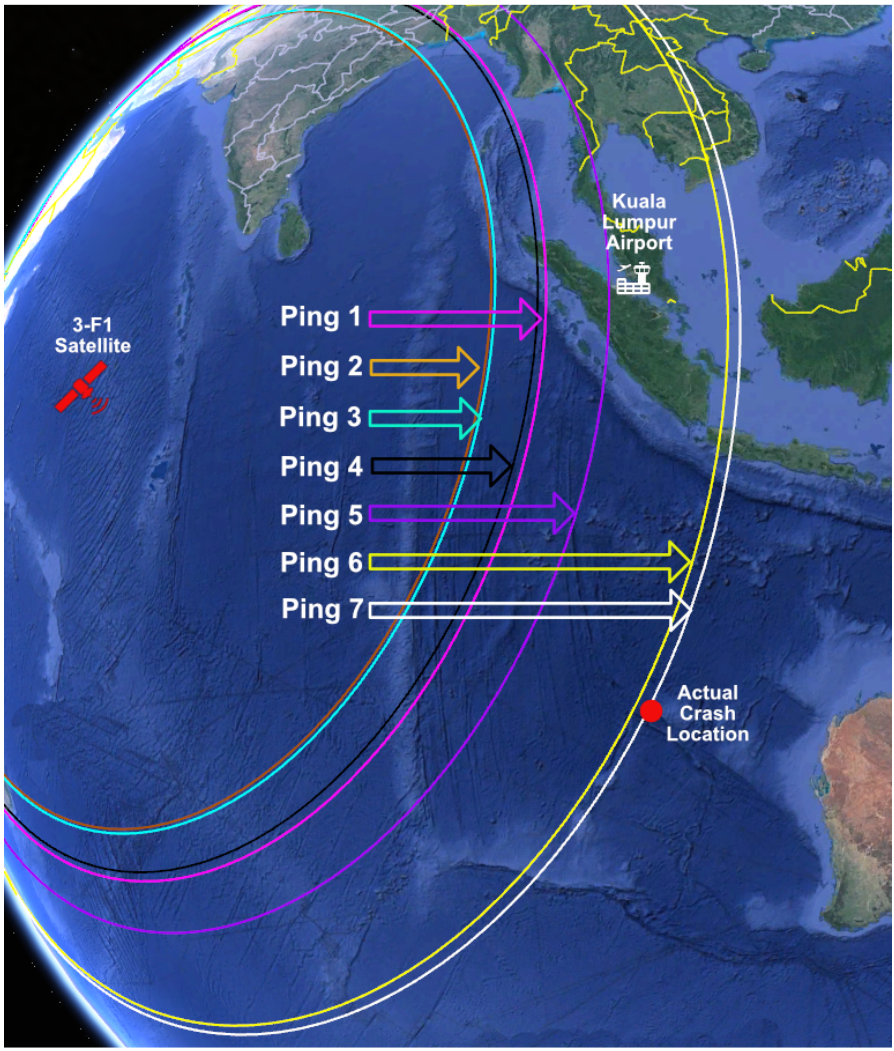
The following chapters take the reader through the steps needed to confirm MH370's final flight path from takeoff at Kuala Lumpur Airport on March 8, 2014, to its crash site at Zenith Abyss eight hours later.

Chapter 1

Circles Encompass

Circles of all sizes are fundamental to the way we interact with the world around us. We use them in countless ways in art, sports, architecture, decoration, and more.

Two-dimensional circles and their spherical cousins occur in varying degrees of perfection as asteroids, planets, galaxies, and stars, and we mimic them in myriad ways with a wide variety of copycat lookalikes, including wheels, gears, propellers, and ancient satellite dishes. Circles are so unique and important, they have their own mathematical language: trigonometry.



Circumference of each of seven pings sent from MH370's emergency ping locator to its 3-F1 satellite on March 8, 2014.

One of the ways we use circles is to limit things that radiate out from a single point. That limit may represent the distance between the center of a circle and something of importance; concentric circles can be used to measure changes over time. Those who followed coverage of MH370 for the first few years may recall distance and range depictions that were similar to the illustration above.

Within each of the pings transmitted by MH370 to its 3-F1 tracking satellite on March 8, 2014, were several pieces of information. One of those pieces of information was a timestamp that marked the exact moment the ping left the plane. Since pings travel at the speed of light and since light travels at the same rate everywhere within earth's atmosphere, the distance between a plane and its satellite on any given ping was simply "time received" minus "time sent" times the distance light travels each microsecond. Once a plane's distance from its satellite is determined, its precise Global Positioning System (GPS) location is easily determined.

MH370 transmitted seven pings to its 3-F1 tracking satellite after it left Air Traffic Control radar screens on the night of March 8, 2014. Those seven pings told technicians exactly how far the plane was from the satellite about once each hour.

Chapter 2

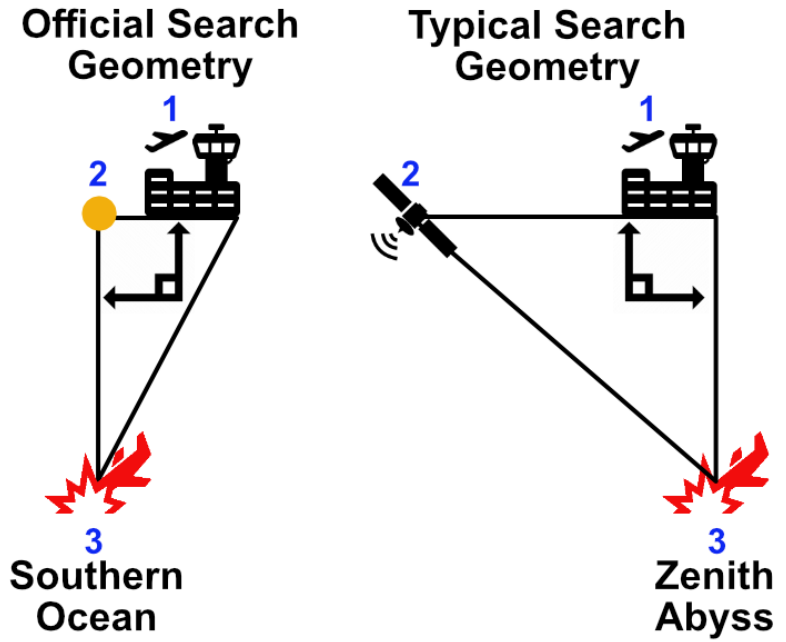
Radiuses Limit

At the outset of MH370's disappearance, one of the most discussed topics relative to the plane was, How far could it have flown before crashing? The most widely accepted assumption was that the plane had been placed on autopilot shortly after turning south out of the Bay of Bengal. As a result, the reasoning went, the plane's heading was probably about 180 degrees due south.

It was further suggested that the plane continued on a southerly course, perhaps without human intervention, until fuel reserves had been exhausted. There was disagreement among experts about where the plane ran out of fuel, but with assistance from Boeing, the official crash site was estimated to have been about -38.0 E, 88.5 S, which is 4,713 kilometers southwest of Kuala Lumpur Airport.

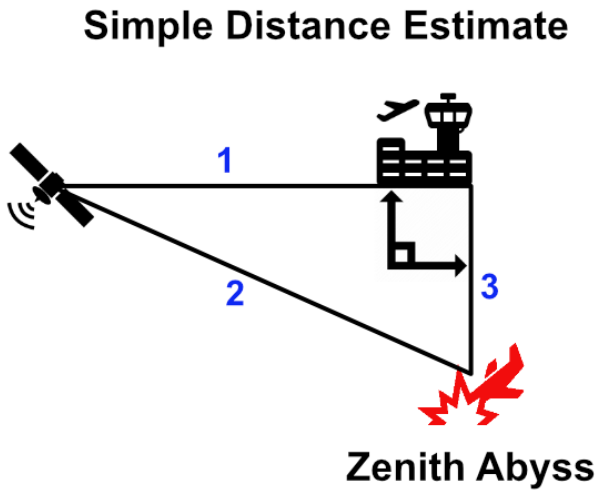
For whatever reason, no one caught the simple reality that MH370 could not possibly have flown 4,713 kilometers southwest of Kuala Lumpur Airport when the radius of the final ping was only 4,815 kilometers. A back-of-the-envelope test is as simple as subtracting the 4,713-kilometer radius from the 4,815-kilometer radius, which is 102 kilometers. That is the *maximum* distance the 3-F1 satellite could have been from Kuala Lumpur Airport in any direction if the 4,713-kilometer Southern Ocean

crash site had any chance of being plausible. The satellite was actually more than 4,000 kilometers west of the departure airport. It was an astonishing oversight that appears to have gone unnoticed for four years.



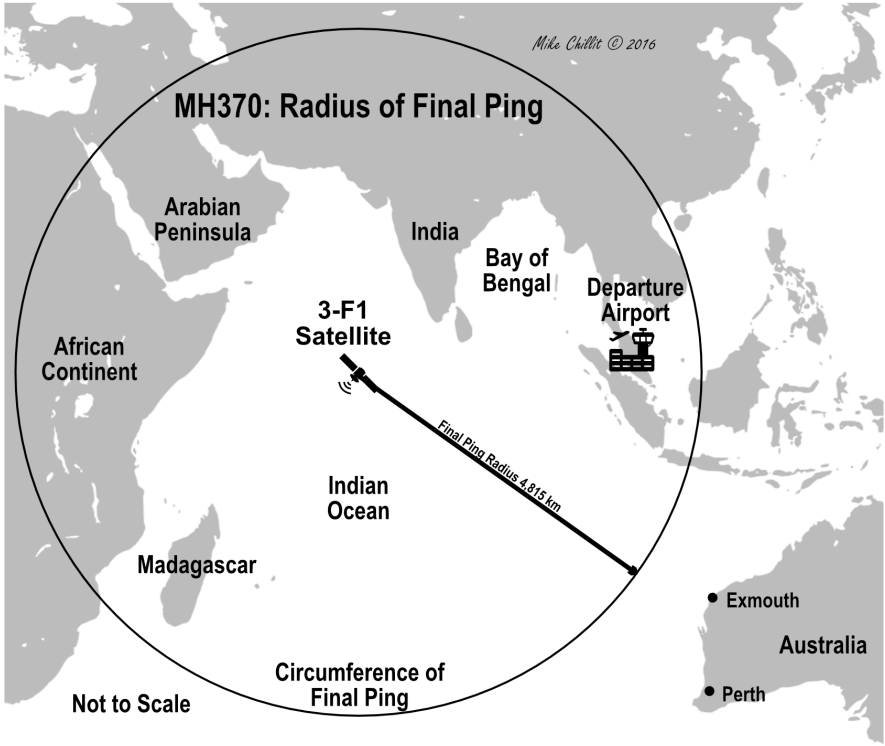
These illustrations show the difference between the geometry that was used for estimating the official search locatioln and the geometry that would have been helpful. Geometry is such a versatile tool that it can seldom be said that there is only one approach. Therefore, the only thing that can be said is that the 2014 approach did not work.

The yellow dot on the left marks the approximate location MH370 issued its first emergency ping after turning west from the Gulf of Thailand.



A typical estimate of "distance traveled" is shown here. One of the three angles must be a right angle, 90 degrees. In this example, the departure point, satellite, and crash location are shown approximately where they were located when MH370 was lost. Different scenarios would normally require different arrangements. The two known distances are between (1) the satellite and the departure airport and between (2) the satellite and the final ping ring. The distance between the airport and the crash site is typically calculated on an as-needed basis.

In the end, MH370 crashed only 2,760 kilometers south of Kuala Lumpur Airport after flying 5,500 kilometers from the Gulf of Thailand to the Bay of Bengal and from there to Zenith Abyss. The pilot likely had Zenith Abyss in mind long before March 8, 2014. He ordered and received additional fuel before departure. It would not have been needed for the scheduled flight to Beijing. Investigators eventually learned that the pilot had rehearsed South Indian Ocean “water landings” on his home flight simulator.



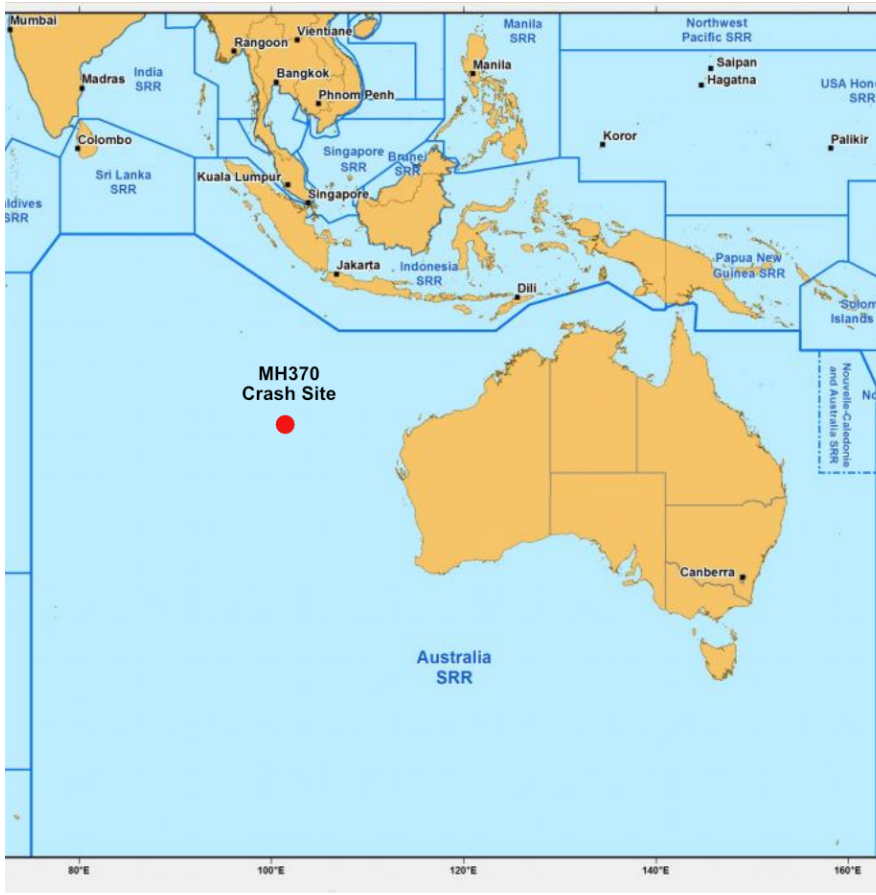
The illustration above shows that the radius of the final ping was 4,815 kilometers in length.

Chapter 3

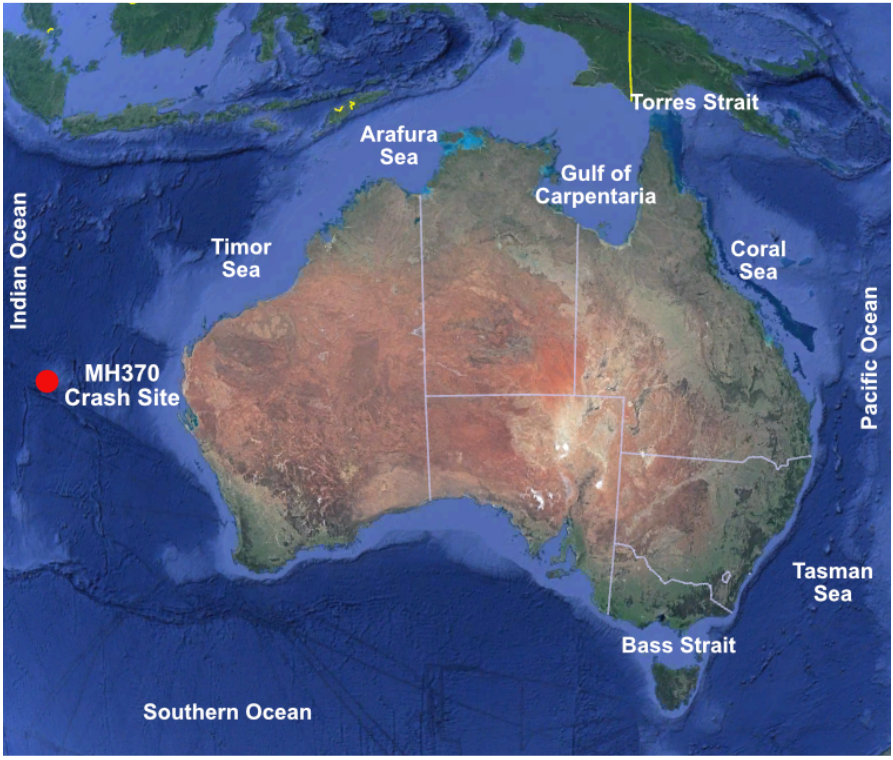
Australia's Search

Various international agreements guide responsibility for search and rescue on land and sea. Two such agreements determined who had primary responsibility for locating a Malaysia-owned aircraft believed lost in Australian waters. As a rule, responsibility for search and rescue in any given area falls to one or more nations bordering the body of water in which the incident occurred. Multinational responses often follow voluntarily for humanitarian reasons, depending upon the nature and severity of the incident.

Two organizations with relevant agreements were the 1) International Civil Aviation Organization (ICAO) and the 2) International Maritime Organization (IMO). Since the Australian Continent is surrounded by sea and ocean, border issues were not involved. Australia got the nod to lead the search for MH370, and Australian Prime Minister Tony Abbott accepted the challenge on behalf of his nation.



Australia, with a population of fewer than 30 million, has the dubious distinction of owning the world's largest Search and Rescue Region (SRR).

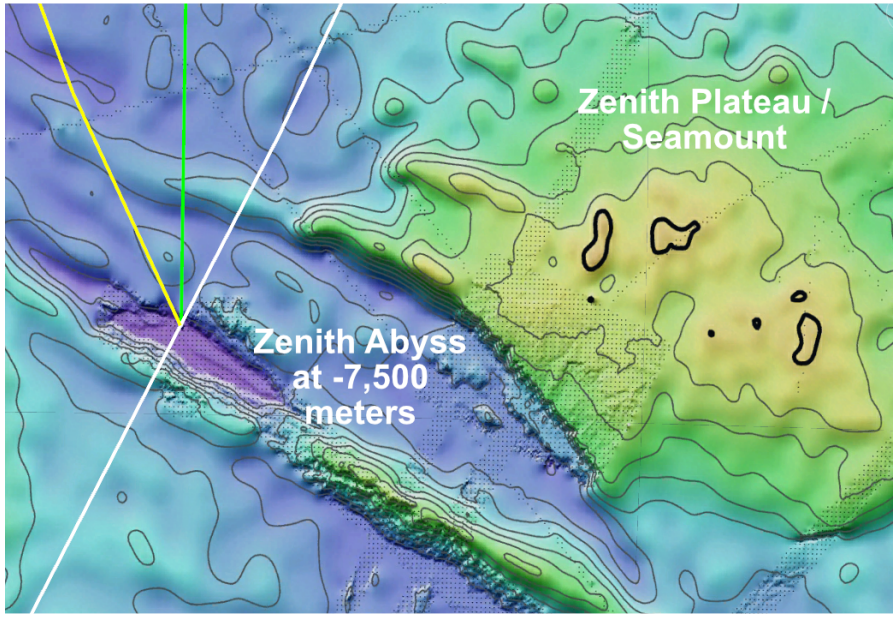


Australia's Search and Rescue Region (SRR) encompasses all or part of three oceans, four seas, one gulf, and two straits.

Chapter 4

Surface Debris

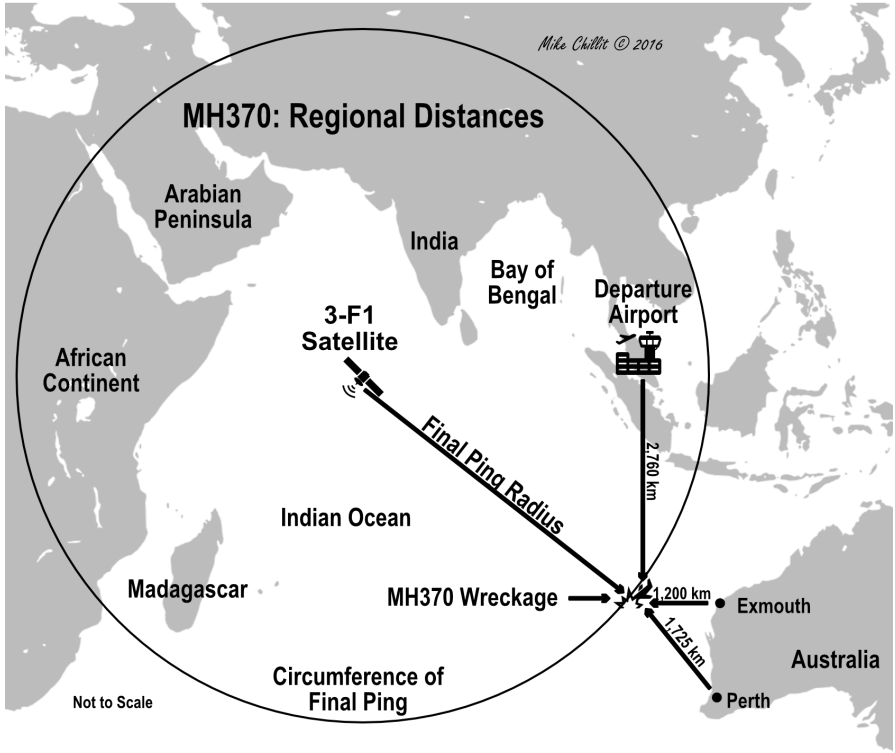
The Australian agency with initial responsibility for locating MH370 was the Australian Maritime Safety Authority (AMSA), headed at the time by John Young. At a press conference in Canberra on March 28, 2014, Young and his counterpart from the Australian Transport Safety Bureau (ATSB) announced that images acquired by an unspecified satellite appeared to show aircraft debris in the South Indian Ocean near a large underwater feature known as Zenith Plateau or Zenith Seamount.



The pieces of debris Mr. Young and his colleague spotted in satellite imagery were almost certainly associated with MH370. Images of the debris were apparently not published, but some of it, including the plane's right flaperon, drifted west for fifteen months or more before washing ashore on various Islands and beaches between Australia and eastern Africa. The flaperon washed up on Reunion Island 4,800 kilometers west of the crash site. The imagery Mr. Young mentioned had been acquired within days of the crash.

The excerpt below is from Mr. Young's press conference on March 28, 2014. Far to the south of Australia that day, an armada of international search vessels headed north to Zenith Abyss, where they would find nothing at all on the ocean surface a week after Cyclone Gillian moved across MH370's crash site and sent what remained of it to the bottom.

> "The Australian Geospatial-Intelligence Organization, AGO, is retasking satellites to capture images of the new area. Weather conditions are better in the revised area, and ten aircraft have been tasked for today's search. They are two Royal Australian Air Force P3 Orions, a Japanese Coast Guard Gulfstream V jet, a Japanese P3 Orion, a Republic of Korea P3 Orion and C130 Hercules aircraft, a Royal New Zealand Air Force P3 Orion, a Chinese People's Liberation Army Air Force Ilyushin 76, a United States Navy P8 Poseidon aircraft, and one Australian civil jet acting as a communications relay." (***Statement from AMSA's John Young, March 28, 2014, Press Conference***)"



The crash site and other landmarks in the vicinity.

Chapter 5

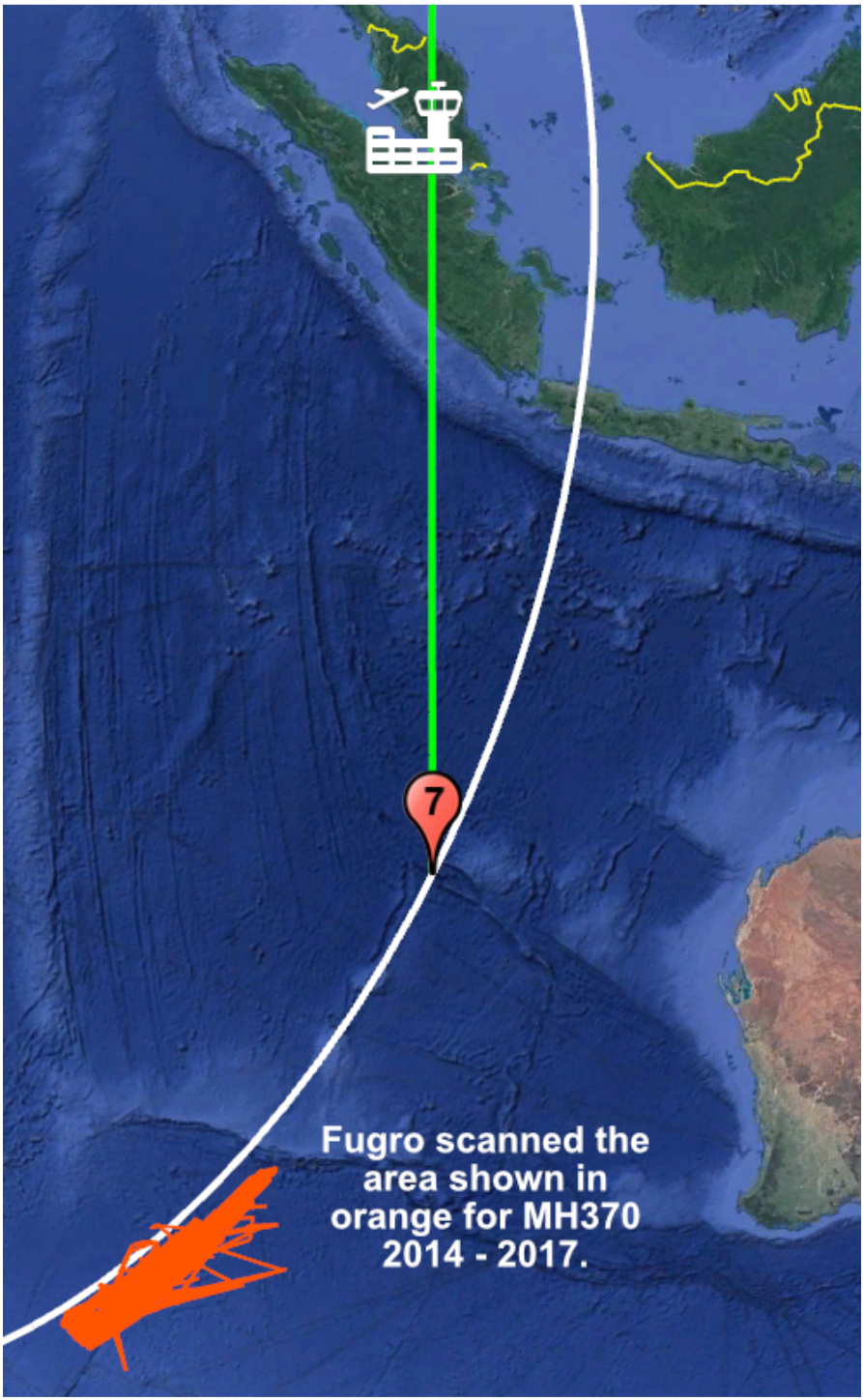
Southern Ocean

Australia halted the surface search at the end of May 2014 after concluding that a costly underwater search seemed inevitable. The Dutch firm Fugro was selected to conduct the seafloor search, including preliminary Multibeam Echosounder searches to locate underwater obstructions capable of damaging or destroying expensive equipment. While the multiyear effort did not locate MH370, the bathymetry acquired by Fugro is stunning. Rich in detail, it will serve education and research needs for years. It includes a geological feature known as Broken Ridge and a deep fracture southwest of Perth known as the Diamantina Fracture Zone. Fugro's bathymetric contributions are valuable for scientific pursuits in general, as well as for marine biology, geology, and ecology. The bathymetry Fugro gathered in connection with the MH370 tragedy is available to individuals, schools, and universities. It has also been added to the large collection of underwater charts and maps known as the "General Bathymetric Chart of the Oceans" (GEBCO).

Fugro used a hull-mounted Multibeam Echosounder for bathymetric profiling, and it used towed sonar sleds to scan the seafloor for aircraft debris. One year after Fugro completed its portion of the search, US firm Ocean Infinity spent six months rescanning parts of the same seafloor before moving north to locations not previously scanned. As with

Fugro, Ocean Infinity did not find aircraft debris anywhere it searched. More about Ocean Infinity's efforts and what they appear to suggest in subsequent chapters.

In terms of coverage, the initial bathymetric focus by Fugro extended from Wharton Basin north of Zenith Plateau and contiguous to Zenith Plateau to about -38.0° S Latitude, a linear north-south distance of about 2,700 kilometers. The three-year underwater sonar scan effort that followed covered a smaller area, all of it located south of Broken Ridge, which extends westerly from the southernmost extremities of the Australian Continent.


7
Fugro scanned the area shown in orange for MH370 2014 - 2017.

Chapter 6

Drift Modeling

On July 29, 2015, the floundering 15-month search for MH370 was the beneficiary of a much-needed boost when MH370's right flaperon washed ashore at Reunion Island in the southwestern Indian Ocean near Madagascar. It was found by a local man named Johnny Begue and turned over to the Australian Transport Safety Bureau (ATSB) in Canberra for identification, confirmation, and forensic analysis.

The flaperon's serial number was quickly matched to the MH370 airframe with serial number 9M-MRO. It was the first piece of recovered debris positively linked to MH370, and it reinvigorated an otherwise lethargic search. An immediate question, of course, was, "Where did the flaperon begin its 15-month trek across the South Indian Ocean?" The hope was that if its origin could be determined with some degree of confidence, it might give the official search a better chance of locating the crash site. A drift analysis technique dubbed "reverse drift" tracking was considered. As the name suggests, reverse drift uses ocean currents and wind patterns to map debris drift paths across large bodies of water.

As it happened, the US National Oceanic and Atmospheric Administration (NOAA) had worked on Indian Ocean Basin drift dynamics for more than 20 years. Much of it was sophisticated and useful.

Among the questions NOAA had asked of its own research long before there was an MH370 was: How does water move into, around, and out of the Indian Ocean Basin? What happens to debris when buffeted by winds? And, how predictable are ocean drift patterns when used to trace the path taken by a partially submerged flaperon?

The answers to those questions turned out to be that ocean drift modeling without satellite-linked transmitters is part science, part seasonal variation, and part luck. It is not an exact science. While winds and currents generally move surface debris due west between Western Australia and East Africa, that knowledge alone was determined to have been insufficient to be of much value in the search for MH370.

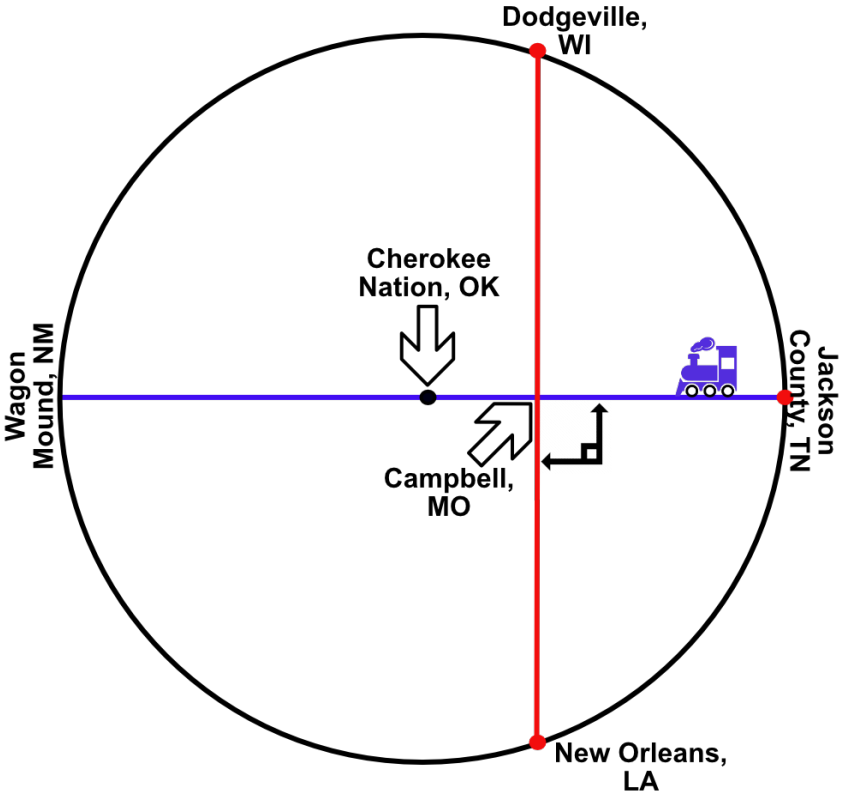
As an aside, it is now known that the plane came to rest at -22.2° S Latitude. The flaperon was recovered at -21.0° S Latitude on Reunion Island, a slight northerly drift of +1.2° across 4,800 kilometers of the Indian Ocean during a 15-month period. That means it ended up just 1.2° (132 kilometers) farther north than it had been at the time of the crash. While that knowledge was interesting, it was not specific enough to reverse-track a recovered flaperon back to the airframe that owned it.

The flaperon's primary contribution, in addition to boosting morale, was that it helped confirm that MH370 was somewhere in the South Indian Ocean. But its precise location would wait for telemetry, which was about to begin.

Chapter 7

Ping Rings Are Circles

Ping rings are *concepts* rather than tangible objects, such as the rings of Saturn. When visually depicted in relation to the earth, ping rings may appear to be slightly elliptical because the earth is slightly elliptical. But as a concept, ping rings are perfect circles around a central object like a satellite. Every part of a ping ring's circumference is exactly the same distance from its center as any other part. They can be graphically depicted and often are, but they are just imaginary markers that lend themselves to the task of illustrating distances from a central point. The illustrations below show how ping rings and circles can be used to measure distance.



Above, a locomotive approaches a fictional north/south junction located within a large circular area that spans multiple US states from Dodgeville, Wisconsin to New Orleans, Louisiana. Assume there is a straight track between the two cities, which may not be the case. When the locomotive reaches the junction at Campbell, Missouri, the engineer will turn to the north or to the south, depending upon his or her whim at the time. Which direction is the shortest and why?

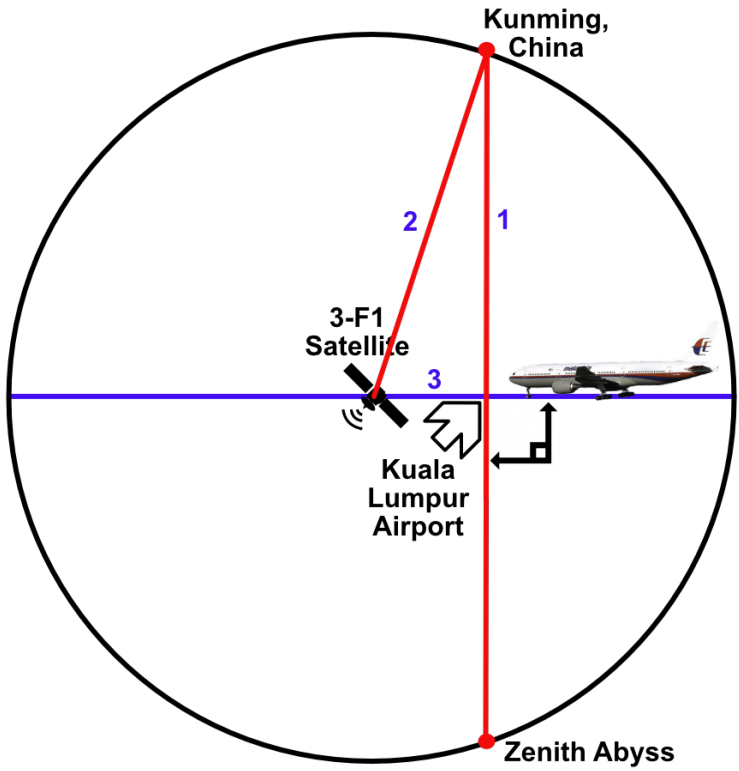
Answer: neither. For the following reasons.

1. First, referring to the illustration above, notice that the black ring is identified as a circle. On that basis, the blue horizontal line passes through the circle's center and extends across the entire circle;

that makes it a diameter; the only requirement for "diameters" is that they pass through the center of a circle and extend to the circumference on opposite sides.

2. Second, notice that the red vertical line, which is a chord in this two-dimensional depiction, is perpendicular to the circle's blue diameter; we know it is perpendicular because the "perpendicular bracket" at the intersection tells us the lines are perpendicular; finally, lines that are perpendicular to a circle's diameter and that extend to that circle's circumference in both directions are of equal length on either side of the diameter.

3. Third, since the red vertical line is bisected by the diameter, the locomotive will travel exactly the same distance on the northern track as it will on the southern track; this may seem obvious and trivial, but it is a key reason MH370's crash location remained unknown for four years.



Above, a Boeing 777 has replaced the locomotive. The plane will take the northern route to Kunming, China. A satellite will monitor progress.

The issue that comes up with planes in these schematics is that while trains, cars, and other land-based vehicles require tracks or roads to move from point to point, planes cut their own highways through the earth's atmosphere. That gives a plane the flexibility to be somewhere other than exactly above a "road" like the red vertical track. Does the absence of a physical "road" change how we calculate endpoints? No, for the reasons noted below. Whether travel is by train, plane, or automobile, the same three measurements are required to pinpoint the location of the vehicle of interest at any given moment:

1. the linear distance between the start location (airport, terminal, etc.) and the end location (circumference);

2. the linear distance between the end location (northern circumference) and the circle's center (satellite, hub, etc.); and,

3. the linear distance between the circle's center and the start location (airport, terminal, etc.).

With those three measurements, it makes no difference if the vehicle is on land, water, or in the air. Nor does it matter if a depiction is two-dimensional (flat) or three-dimensional (spherical). Calculated endpoints will be the same for any mode of transportation if all three measures are accurate, as they were when MH370 was tracked by Inmarsat's 3-F1 satellite.

Also, note in the illustration above that the three distance measures (numbered in blue) form not only a fairly ordinary triangle but a right triangle. When constructed as above, we have all of the information needed to locate a vehicle of interest. Is it accurate? Yes. MH370's debris field is well within ten meters of its predicted location.

Chapter 8

MH370 Telemetry

'Telemetry' refers to the transmission and receipt of data from a remote location. The prefix is of Indo-European origin, meaning "far." There are more than 60 "tele" words in English, including telephone and telescope. They all refer to the remote exchange of information.

Aviation telemetry monitors aircraft performance in real-time, usually via radio transmission, to alert ground crews of critical electrical and mechanical issues, safety margins, and much more. Thanks to telemetry, we know where MH370 crashed because one of the plane's telemetric applications, an emergency pinger, continued to function properly after all others had been disabled.

Telemetry from Inmarsat's 3F1 satellite shows that the plane turned slightly east toward Zenith Abyss in the southeastern Indian Ocean shortly after it cleared Indonesia's radar installations west of Sumatra. The remaining 2,800 kilometers of flight were flown on a heading of 161° SSE and did not vary. There was no detectable effort to suggest a destination other than Zenith Abyss.

The "Aircraft Communications Addressing and Reporting System" (ACARS) used in commercial airliners like the Boeing 777-200ER is a telemetric application, and it is believed to have been disabled shortly after

takeoff. It did not transmit data to its satellite or ground stations after the plane disappeared from Air Traffic Control monitors at Waypoint IGARI in the Gulf of Thailand about 40 minutes after takeoff. Fortunately, a failsafe telemetric application turned itself on approximately 60 minutes after the plane turned west and flew above the Malaysia-Thailand border for half an hour. Shortly after emerging into Malacca Strait west of Penang, Malaysia, the first of seven pings was transmitted automatically at about 18:25 UTC, 2:25 AM Malaysia time. The plane's emergency pinger continued to function normally for the remainder of the flight, sending a single "ping" to its satellite about once each hour.

Each ping contained a small amount of information that included the precise time each ping had been transmitted from the plane. That "moment sent" information allowed the 3-F1 satellite and its ground station at Perth, Australia, to calculate elapsed time between the moment the ping was sent and the moment it was received. Since pings travel at the speed of light through the earth's atmosphere, that elapsed time between "sent" and "received" values was used to determine the plane's distance from its satellite on each ping. That, in turn, created a Hansel and Gretelesque trail of "breadcrumbs" that have since been used to recreate the plane's flight path from the Strait of Malacca to Zenith Abyss.

How accurate were those hourly pings? Very. Shortly after MH370 was declared lost, Inmarsat audited the accuracy of 17 preflight pings and found that the sum of all errors was 10 meters over a distance of 2.6 million kilometers. That suggested that while there is variability in individual ping accuracy over long distances, it was entirely satisfactory for tracking and recovery purposes.

The following year the author audited all 54 of the plane's published preflight pings and found that the sum of all errors was 1.6 centimeters over a distance of 8.3 million kilometers. Switzerland's William Tell would

have approved. While that degree of precision was welcomed, it was not surprising. International station-keeping requirements help ensure that satellites are well-maintained, closely monitored, and within performance tolerances.

There are actually a number of ways to pinpoint MH370's crash site with the telemetry Inmarsat gathered. One approach is to simply overlay a mirrored reflection of the final ping on top of the original ping to help determine where they intersect. The original final ping ring had a radius of 4,815 kilometers and was centered at 0.53°N, 64.5°E; the mirrored reflection has the same radius and is centered at 0.53°N, 140.2°E. The southern point of the intersection at -22.2°S, 102.3°E is MH370's terminal location.

Other methods involving more traditional tools should produce identical results. Earth is a three-dimensional sphere, of course, so GPS coordinates for each of the two key locations (departure airport GPS and satellite GPS at the time of the crash) are essential, as well as the radius of the final ping. A great deal of information about airframe 9M-MRO, aka flight MH370, is available in a document titled "The Search for MH370." It was published online on October 7, 2014. It may still be freely available in PDF format. The document was also published in *The Journal of Navigation* (2015), 68, 1–22, under copyright to The Royal Institute of Navigation 2014.

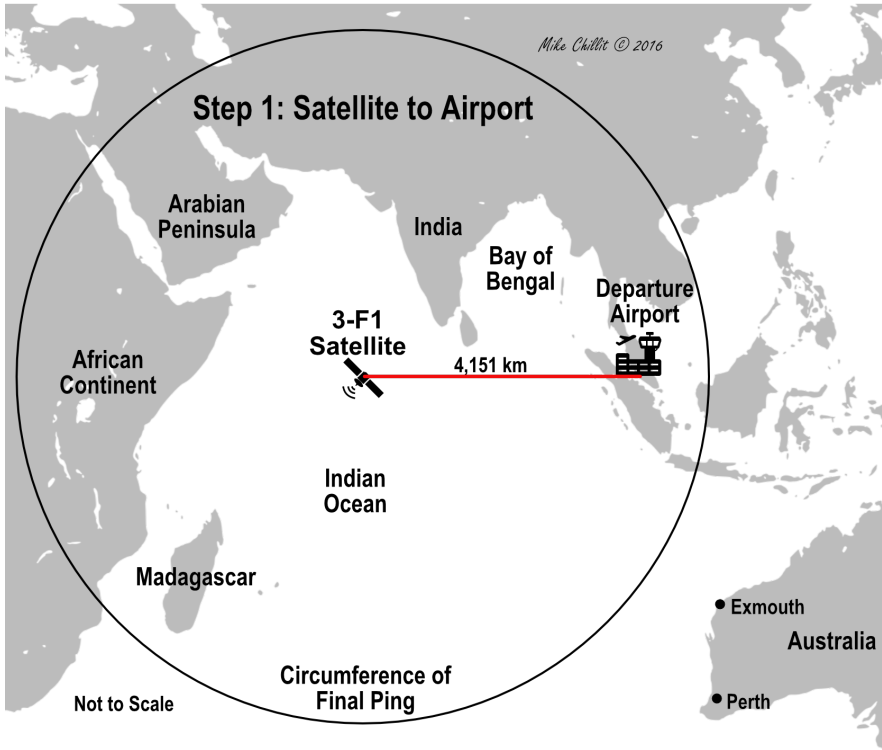
The first three pieces of information below are required to pinpoint MH370's crash location.

1. GPS for the 3F1 tracking satellite on the plane's final ping (0.53°N, 64.5°E);

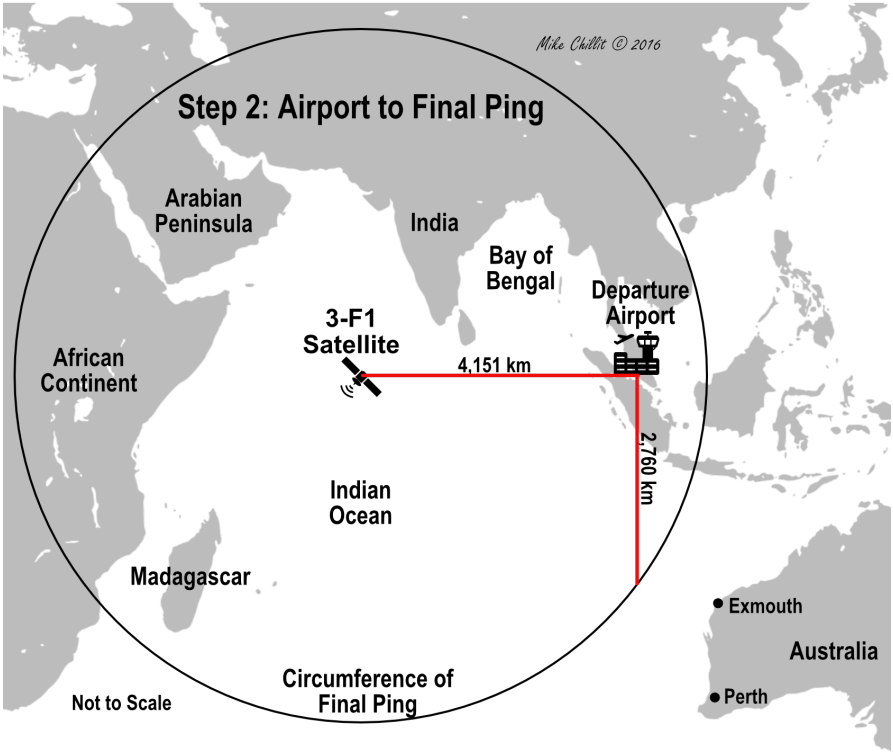
2. Distance between the 3F1 satellite and the Kuala Lumpur departure airport (4,151 kilometers);

3. The radius of the final ping (4,815 kilometers); and,

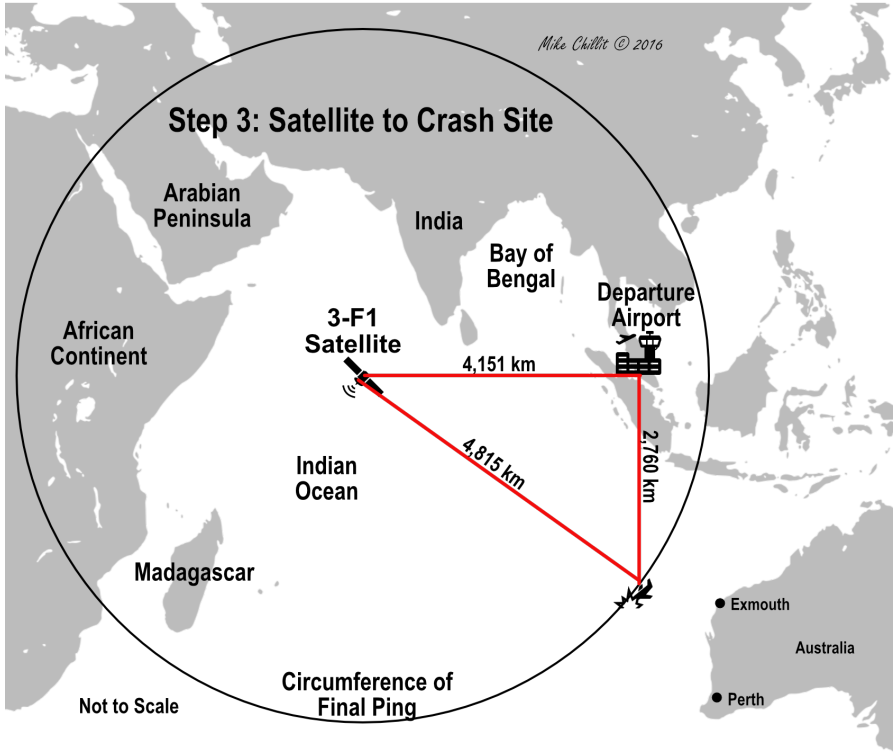
4. Crash GPS: -22.2°S, 102.3°E.



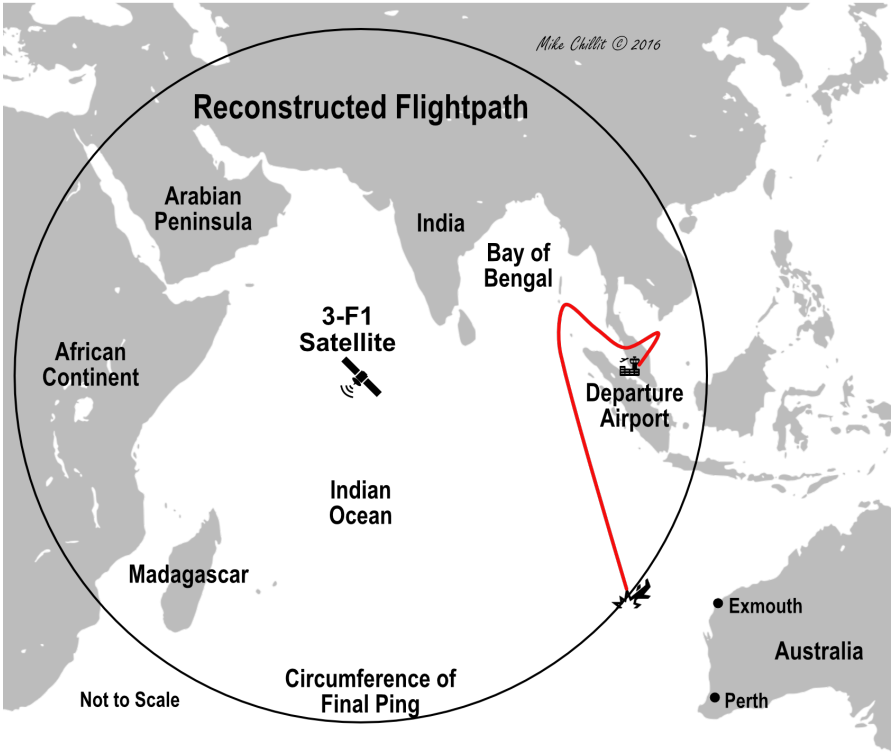
The departure airport at Kuala Lumpur was 4,151 kilometers east of the 3-F1 satellite when MH370 collided with the surface of the East Indian Ocean above Zenith Abyss.



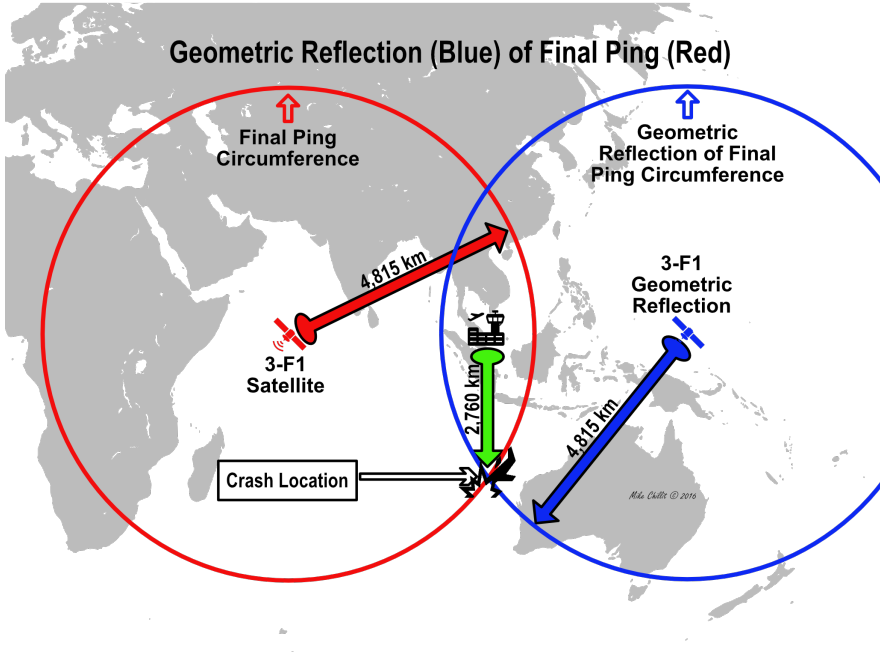
A line perpendicular to the satellite-to-airport line is extended south from Kuala Lumpur airport to the circumference of the final ping. It is 2,760 kilometers in length.



The radius of the final ping, 4,815 kilometers in length, can now be added. It extends from the satellite to the circumference intersection in the previous step. No math is required if drawn with a GPS mapping tool like Google Earth.



This illustration shows the reconstructed flight path for MH370 from takeoff at Kuala Lumpur to its crash at Zenith Abyss. It is calculated using the same telemetry used to pinpoint the crash site.



This is an alternative approach to the method outlined above. It is sometimes used by government agencies to display earthquake epicenters. The method is similar to "geometric reflections" preferred by the author, but not identical. The "final ping ring" is shown in red; its mirror image is shown in blue.

It is worth repeating that the methods used in many of these illustrations create two equally likely crash locations in opposite directions from the departure airport. Additional information is needed to determine which of the two locations is the correct location.

Because the Kuala Lumpur Airport is almost on the equator, and the 3-F1 satellite is nominally above the Equator, illustrations specific to the MH370 incident may *appear to show* that the satellite-to-airport line is *parallel to the equator* and the airport-to-crash site is perpendicular to the Equator. That illusion is caused by the similarity between airport and satellite latitudes, 4,151 kilometers apart. If the Kuala Lumpur Airport had been where O'Hare International Airport or Bejing Capital International

Airport is, the geometry would remain the same, but it would look much different on paper.

Chapter 9

Specular Reflection

The term "specular reflection" may not ring a bell for everyone, but it is as common as sunshine. The word *specular* means "mirrorlike:" something capable of giving a true representation of an object or scene. Examples of mirrorlike surfaces include glass, polished metal, still-water, and exterior aircraft surfaces, to name but a few. Specular reflections are everywhere during daylight hours when visible light is in good supply. Specular reflection also occurs with artificial light. Light and the reflection of light are fundamental to human vision. Without them, there is nothing to see.

Specular reflection is not limited to visible light. It also occurs with other types of energy, such as infrared light, ultraviolet light, and sonar (sound). As a rule, we expect perfectly proportioned reflections from flat-surface mirrors used for dressing and grooming. That is precisely what specular reflection provides, no matter which form of energy creates it. The same principles of reflection are at work with specular reflection. That is, specular reflection obeys all physical laws of reflection associated with visible light.

When obtained with sonar, specular reflection is often an undesirable byproduct of highly reflective manmade objects like ships and aircraft lost

at sea. We cannot see specular reflection created by sonar any more than we can see sound itself. But specular reflection from sonar is common and quite visible after processing.

Terms used for Reflection and Specular Reflection:

"incidence" = incoming light or sound wave;

"reflection" = outgoing light or sound wave;

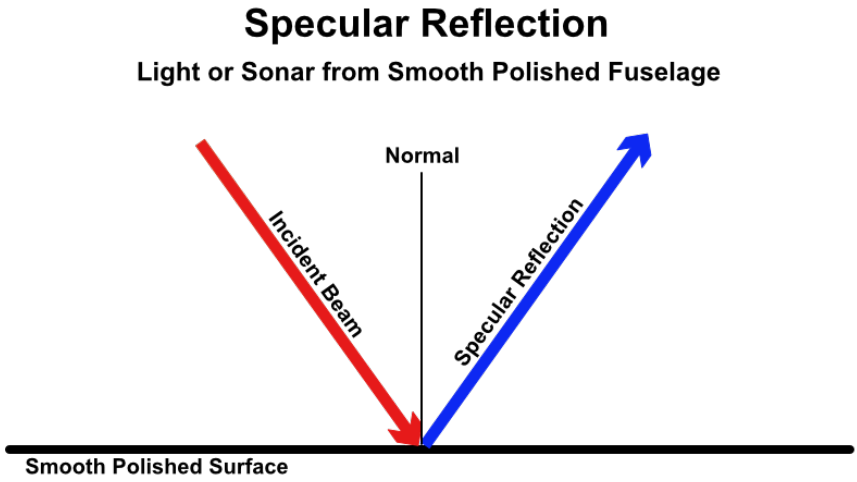
"normal" = a line that is perpendicular to the reflecting surface at the point of reflection;

The Law of Reflection: The angle of incidence (incoming) equals the angle of reflection (outgoing).

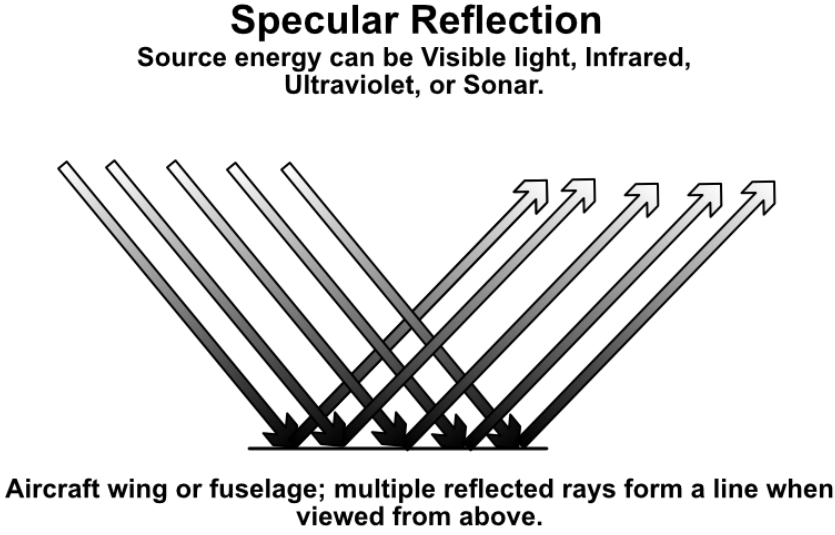
Examples:

- if the angle of incidence is 25° the angle of reflection is 25°;
- if the angle of incidence is 70° the angle of reflection is 70°;

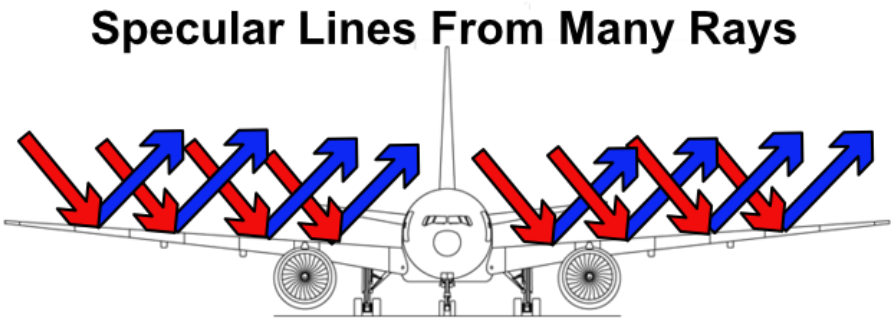
The graphic below shows how light and sonar reflect off of polished surfaces like aircraft wings and fuselages. The angle between the incoming ray and outgoing ray varies with the location of the energy source, as well as with the nature of the reflecting surface.



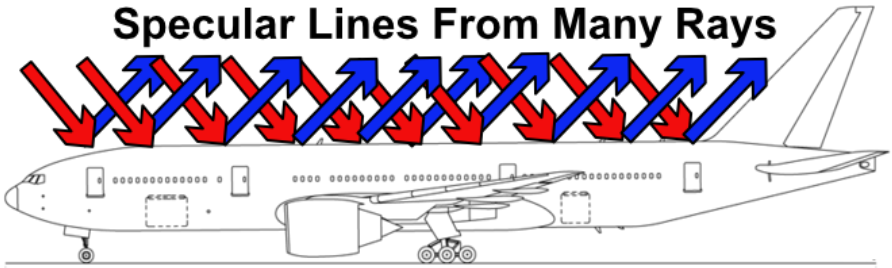
A single incoming light or sonar wave is reflected at the same angle relative to the normal line.



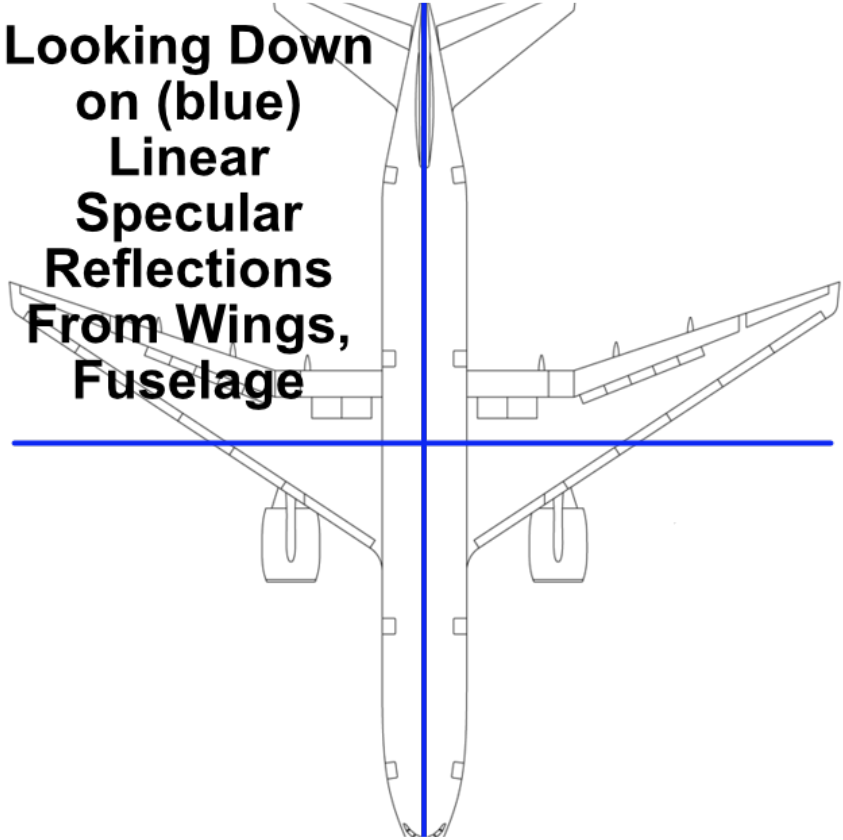
Multiple incoming light and/or sonar waves are reflected from an aluminum alloy aircraft surface. When viewed from above, they form a straight line if the reflecting surface has a straight line contour.



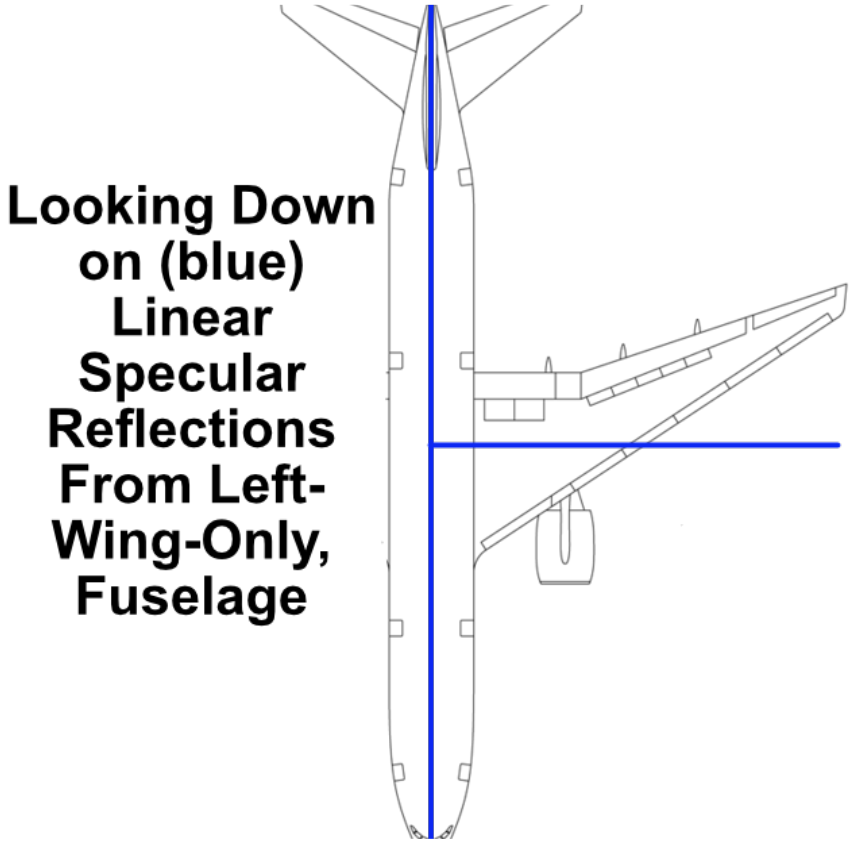
The front profile of Boeing 777-200 shows incoming sound waves in red and outgoing specular reflections in blue. When viewed from a forward elevated location, reflections form straight lines that follow the apex of the fuselage or wing relative to the source of the sonar (such as a vessel). When a wing and fuselage appear in the same image, reflections are perpendicular to one another (orthogonal). Swept wings appear to be perpendicular to the fuselage.



The lateral profile of Boeing 777-200ER shows incoming sound waves in red and outgoing specular reflections in blue. When viewed from a forward elevated location, reflections form straight lines that follow the apex of the fuselage or wing relative to the source of the sonar (such as a vessel). When a wing and fuselage appear in the same image, reflections are perpendicular to one another (orthogonal). Swept wings are perpendicular to the fuselage.



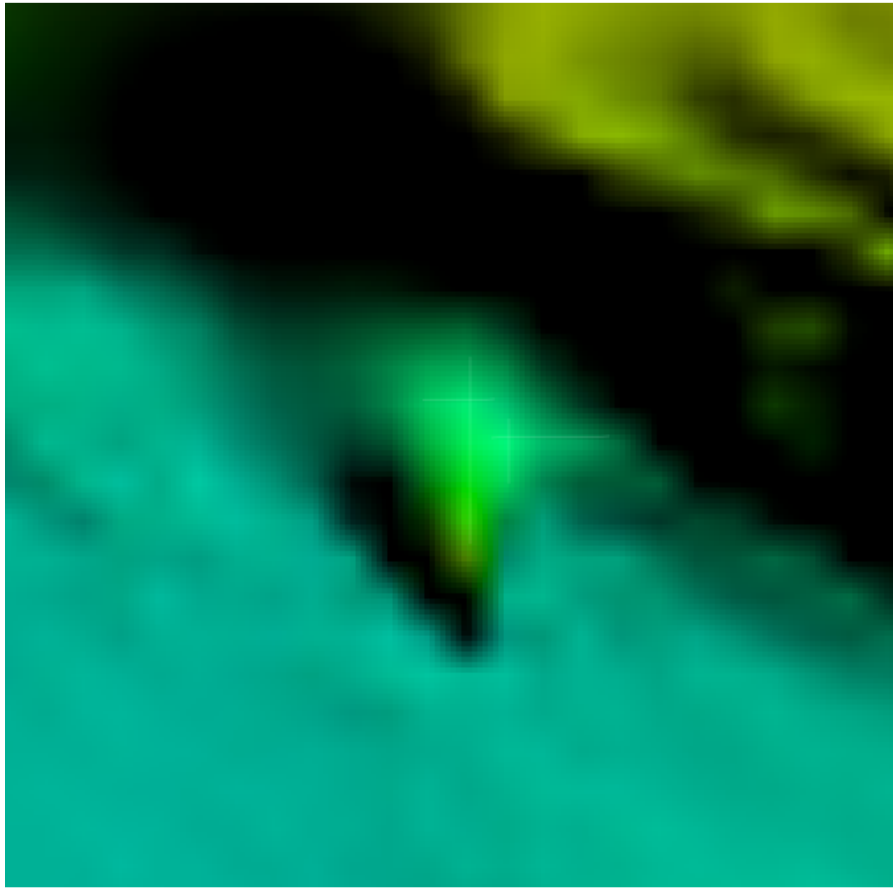
Overhead profile of a Boeing 777-200ER showing straight-line front and lateral surfaces mirrored in specular reflections from straight-line contours. Reflections are perpendicular to one another.



Overhead profile of a Boeing 777-200ER showing straight-line front and lateral surfaces mirrored in specular reflections from straight-line contours. Swept wing features characteristic of many planes do not appear in specular reflections; such reflections appear to be perpendicular to one another.

It is also true that, at times, specular reflection is all we see in sonar returns. That happens when the surface reflects sonar waves, such as polished aluminum, but is too distant from the scanning source to show the surfaces themselves. That is precisely what happened when Geomar scanned MH370 in June 2017. The plane's aluminum alloy skin returned the skeletal profile of a Boeing 777-200 that was missing its right-side wing.

Notice that reflections from the fuselage follow the apex of the cylindrical body, as well as the apex of the remaining left-side wing.



MH370 at -7,000 meters at Zenith Abyss in June 2017. The right-side wing and engine were sheared on impact, as predicted by Canadian crash investigator Larry Vance.

Chapter 10

Germany's Geomar

Geomar is a German oceanographic institution based in Kiel, Germany. It was formerly known as the *Leibniz Institute of Marine Sciences and* joined the Helmholtz constellation of 18 research centers in 2004. Like many nations, Germany has long had an active and scientifically respected focus on the world's oceans and marine ecosystems.

While Germany was not an official MH370 search partner to the author's knowledge, and none of the victims are known to have been German citizens, a Mauritian *postdoctoral fellow* was employed by Geomar in July 2015 when MH370's right flaperon washed ashore at Reunion Island, a scant 200 kilometers southwest of his home island. Perhaps because his professional focus had been and continued to be on *ocean drift dynamics*, Geomar enlisted his expertise to test the possibility that he might be able to develop a drift model capable of reverse-tracking the flaperon's path from Reunion Island to the plane's then-unknown crash site. It was not a far-fetched idea. Others had attempted to use drift models of one sort or another for the same purpose, including the author.

Intrigued by drift model possibilities but having already developed what appeared to be a promising telemetric approach, the author shared his telemetry with Geomar's reverse-tracking specialist and with Australia's

Prime Minister, Malcolm Turnbull. Mr. Turnbull did not reply. Geomar's specialist replied some weeks later to say, "I hope your method works better than reverse drift worked," or words to that effect. The author did not know then that Geomar and Australia had sailed to Zenith in the interim and had used telemetry, not drift dynamics, to confirm MH370's crash site. It would be another two years before he would learn how Geomar and Australia came to collaborate on MH370.

To this day, the most surprising aspect of the Geomar-Canberra connection is that none of the MH370 victims' families were told the plane's location had been confirmed and imagery obtained. Families, as far as can be determined, were left to twist in the wind while Canberra and Kuala Lumpur licked self-inflicted wounds in private. But now, years later, there is a claim from Perth, Australia, not Kuala Lumpur or Canberra, that at least some families have been told where the debris field is located. That has not been independently verified, but if true, there may be a private remembrance voyage to Zenith Abyss in 2023.

As for the author, he learned of the plane's confirmation in late 2019 when he happened upon the Google Earth plugin created by Scripps Oceanographic's Brook Tozer et al. There is a great deal more to learn. Hopefully, some of the journalists who tried to cover it years ago will take a renewed interest in it.

A number of things remain surprising. For example, Geomar's published research guidelines are at odds with its own involvement in the confirmation, including collaborating with Australia and Malaysia to keep families in the dark. In a number of ways, the Zenith voyage was an enormous departure from many of the things post-World War II Germany had come to represent, particularly in light of World War II atrocities.

Below are Geomar's published guidelines titled "Good Scientific Practice at GEOMAR." Most Western-aligned nations have long had similar standards. Hopefully, most nations take them more seriously than Geomar appears to take them. Decades of procedural norms established by the 1944 Chicago Convention on International Civil Aviation (ICAO) were breached by Australia, Germany, and Malaysia. Who made the decision to keep the plane's location under wraps for six years? Najib Razak? Malcolm Turnbull? Angela Merkel? Geomar's Chief Scientist or his employer? Someone else?

> "In the following, please find a (non-exhaustive) list of the most common breaches of the guidelines to give you an idea of what we are talking about."

- **addition of "big" names as co-authors to facilitate publication;**
- **omission of co-authors;**
- **trimming of statistical procedures;**
- **theft of ideas from confidential documents, e.g. from manuscripts or proposals in review;**
- **hiding unwanted data;**
- **rejection of competing papers or proposals;**
- **theft of data or samples;**
- **plagiarism;**
-

data falsification.

Chapter 11

Crash Site Confirmed

Had Geomar's 2017 confirmation voyage to Zenith Abyss been public knowledge, it might have been well received by a small group of individuals who ardently believed the pilot put the plane on autopilot northeast of Cocos Islands and parachuted to safety with an unidentified female confederate. The theory went that the parachutists were plucked to safety by a waiting vessel and taken to an unknown location, eventually disappearing. That theory, like so many others, seemed silly and implausible. It still does. Too many moving parts. Yet the plane's flight path had one and only kink south of the Equator, and it was just northeast of Cocos Islands. The author is skeptical that this could have happened. The autopilot component seems highly unlikely, given the plane's near-perfect abyssal endpoint. But strange things do happen from time to time.

Yet another group claimed the plane landed at Christmas Island for various nefarious purposes and eventually parked the plane in the ocean east of the Island's runway. That theory is easier to debunk. MH370 did not approach Christmas Island. The Cocos Islands theory is marginally possible as long as it doesn't require the plane to deviate from its rendezvous with Zenith Abyss. We seem to have come to thrive on conspiracy stuff. A bit of D.B. Cooper lives on.

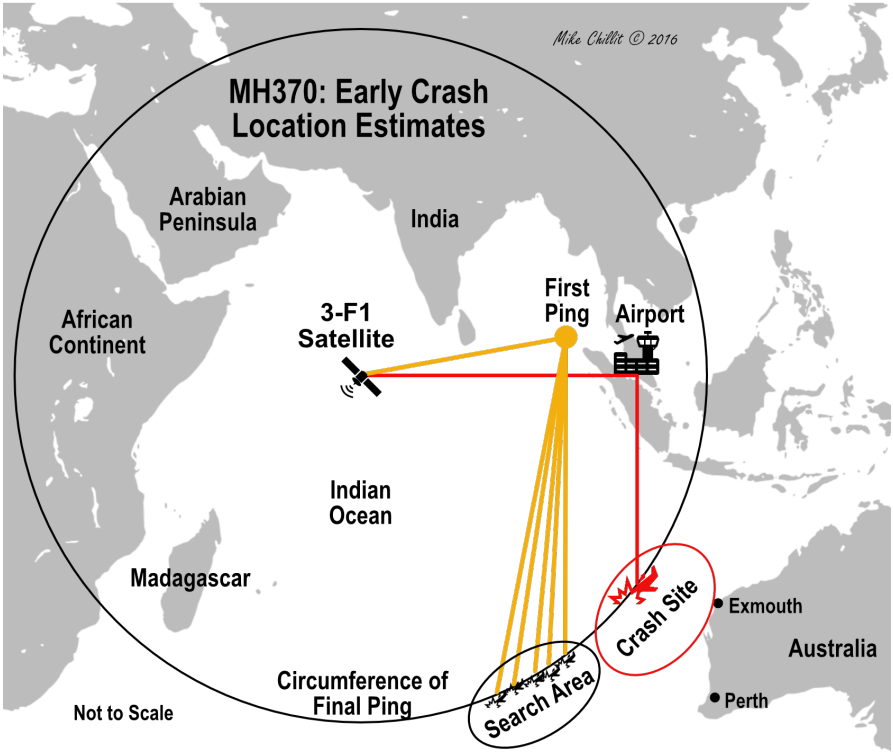
This chapter examines what is known and plausibly surmised about Geomar and its role in confirming MH370's final resting place. The chronology has been taken from published events, such as Australia's declaration immediately prior to Geomar's June 2017 voyage to Zenith that it was suspending the official search ***"until further credible evidence becomes available that could identify the specific location of the aircraft."***

The sentence highlighted above is what is commonly known as a ***Freudian Slip***.

Prediction Errors

It is not known to the author how many, if any, of the official and semi-official crash predictions shown below were fictional from the start. It is certainly possible that even Inmarsat participated in what became an enormous ruse. But, if that happened, the author has seen no evidence of it and has no reason to believe it occurred. He continues to believe that the earliest phases of the Inmarsat-framed search were legitimate, well-intended, and genuinely humanitarian in all respects.

Most of those who adamantly insisted that MH370 crashed in the Southern Ocean were well-educated and technically competent. Mistakes happen, but how could a respected organization like Inmarsat, among others, have made such egregious prediction errors? Whatever the explanation, it may forever be considered *The Lulu* of all lulus.



The image above shows where most official predictions of MH370's terminal location were concentrated. The technique used to estimate the plane's endpoint was developed by Inmarsat using something akin to Doppler to estimate the plane's heading for its last six and a half hours. All of those estimates have a common problem: they are mathematically impossible when considered in light of the radius of the plane's final ping. Inmarsat's approach may have been occasioned by the absence of traditional flight data after communications were disabled aboard the plane shortly after takeoff. All official estimates of the plane's crash location were thousands of kilometers farther south than the plane could possibly have flown if subjected to ordinary laws of physics and mathematics.

German Research Standards

In spite of Geomar's best efforts to disguise its June 2017 confirmation that MH370 crashed at Zenith Abyss, its funding source, the German government, in whole or in part, required it to make all aspects of the

voyage public. That is a common contingency with state-funded research in the United States, as well. But Geomar only partially complied with its requirement. For example, the organization appears to have shared all of its Zenith Abyss datasets with key international groups like the *Scripps Institution of Oceanography* (SIO) and the *General Bathymetric Chart of the Oceans* (GEBCO).

However, Geomar did not meet Germany's open government requirements when it selectively shared or denied access to sonar data that had been earmarked by Germany as "public." For example, sonar returns that contained any portion of MH370's debris field were deleted from publicly accessible datasets. For example, the email below to the author from Geomar's Chief Scientist aboard the 2017 voyage to Zenith falsely claims MH370's debris field was "*just outside the area which we have mapped*." Note the tagline that datasets "are all publicly available." Actually, select portions of "the data" were not publicly available at all because Dr. Werner or a colleague made certain it had been removed.

Re: Zenith Plateau; Batavia Seamount; Leg/Phase/Trip: SO258/1
From: Reinhard Werner
Friday, October 30th, 2020 at 10:08 AM
To: Mike Chillit

Dear Michael Chillit,

Many thanks for your email and these info! Your findings are indeed very interesting!.

In the meantime I checked our multi-beam data recorded in this area more carefully. Unfortunately I do not have good news. The position you indicated (-22.19°, 102.32°) is just outside the area which we have mapped (small orange dot in center of the attached screen shot). I have knowingly plotted the uncleaned raw data here. You can see that there are many artifacts (peaks and holes). This is not due to the EM122 multi-beam echo-sounder from R/V SONNE, which works excellently, but because the research devices deployed in this area required the ship to turn again and again. This causes these artifacts. When processing the data later on, these artifacts are usually cleaned up, but sometimes something is overlooked and may end up in Google Earth. Furthermore I don't believe that a multi-beam echo-sounder installed in the ship can detect aircraft parts in 6,000 m water depth (too low resolution). For this purpose you would have to use an AUV as this was also done in previous searches for aircraft wrecks.

But of course you are welcome to check the data yourself. They are publicly accessible:

Werner R, Wölfl A-C (2018) Raw multibeam EM122 data: transits of SONNE cruise SO258/1 (Indian Ocean).

PANGAEA, https://doi.org/10.1594/PANGAEA.892681

Best regards,

Reinhard Werner

Before replying to the author, Reinhard Werner obviously thought about how he should frame his reply. An outright denial that it was "not MH370"

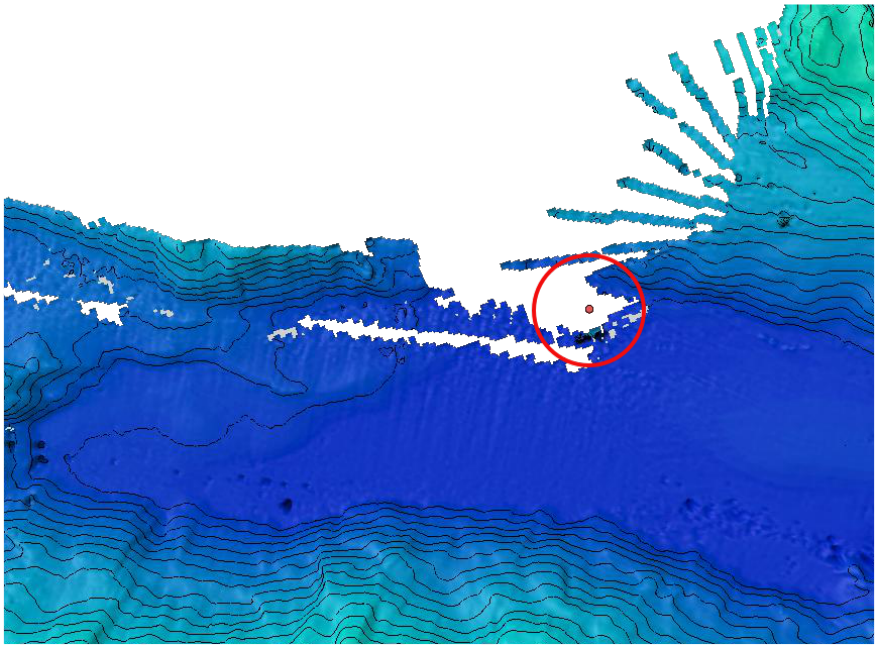
might have encouraged more questions, such as "how do you know that?" The author expected a reply that might go something like, "I never noticed that before," or "I don't know what it could be," or "It appears to be a sonar anomaly of some sort, which happens from time to time." Or something else along those lines. The author certainly did not expect a straight-out fib that would not have fooled a five-year-old.

Reinhard Werner had been busy with another project at the time of his reply. That is, he had time to think about what to say to potentially dissuade the author from making further inquiries if that had been his objective. Werner may have asked associates from the June 2017 voyage for advice in dealing with "an American buttinsky."

Ultimately, Werner claimed that his Kongsberg EM122 Multibeam Echosounder had "a senior moment" just as it approached the MH370's debris field. He might have eventually suggested, "hire your own vessel and crew." Werner was not allowed to do that because it seemed fairly certain that he was as determined not to reveal anything as the author was determined to get an informed and credible reply to his questions. But the "get your own dingy" argument was quickly adopted by Canberra and Kuala Lumpur. It appealed to them, perhaps, because it would have cost a few million dollars for a two-day sonar excursion, and they suspected the author would not take that approach.

It is absolutely true that anomalies often occur in Multibeam sonar scanning. Sonar is sensitive to many things, including temperature gradients and various other disturbances that pop up now and then in water columns. Most anomalies can be "cleaned" with specialized software, but when it becomes necessary to remove evidence of something that really is there, like a Boeing 777-200 you don't want anyone to know about, Chief Scientists may sometimes feel they have to use a tried and true method, like physically removing it.

Geomar's Chief Scientist chose to claim that the R/V Sonne had simply failed to acquire anything in the vicinity of: *"The position you indicated (-22.19°, 102.32°) is just outside the area which we have mapped (small orange dot in the center of the attached screenshot)."*



The MH370 debris field is located where the small red dot appears. Reflections and associated pieces of debris were removed from the image by R/V Sonne's Chief Scientist at some point after it was acquired in June 2017. His motivation is unknown. He is now deceased. Independent Kongsberg sonar specialists recommended by Norway's Kongsberg company found that MH370's debris field is in Geomar's original 2017 dataset, but was removed in public access copies in contravention of the German Government's funding policies.

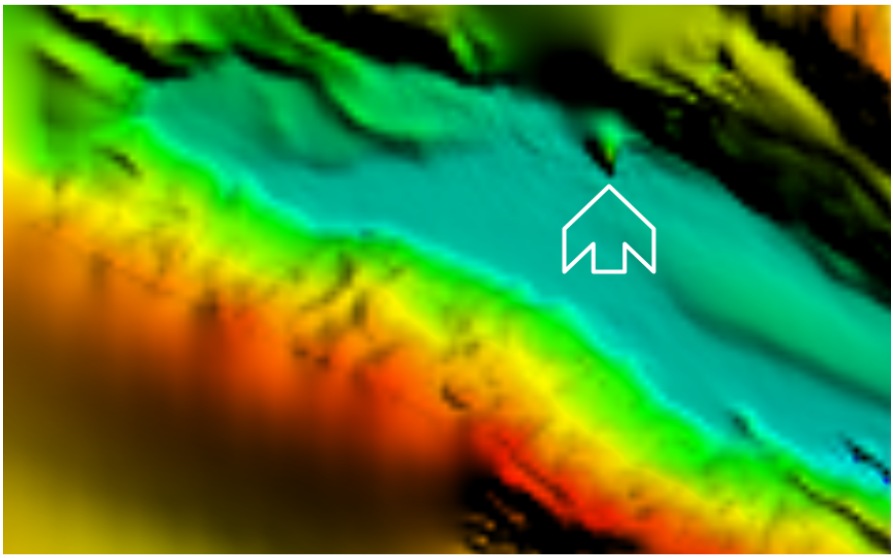
Because official denials in connection with all things MH370 had become legion by 2019, multiple authorities were consulted on the "missing object," including professionals at Scripps. The author also contacted the manufacturer of Geomar's Kongsberg EM122 Multibeam Echosounder for recommendations. Norway's *Kongsberg Maritime* recommended two

US firms. The firm the author chose to work with agreed to have its experts examine all sonar acquired by Geomar in June 2017 to determine what it contained and what it did not contain.

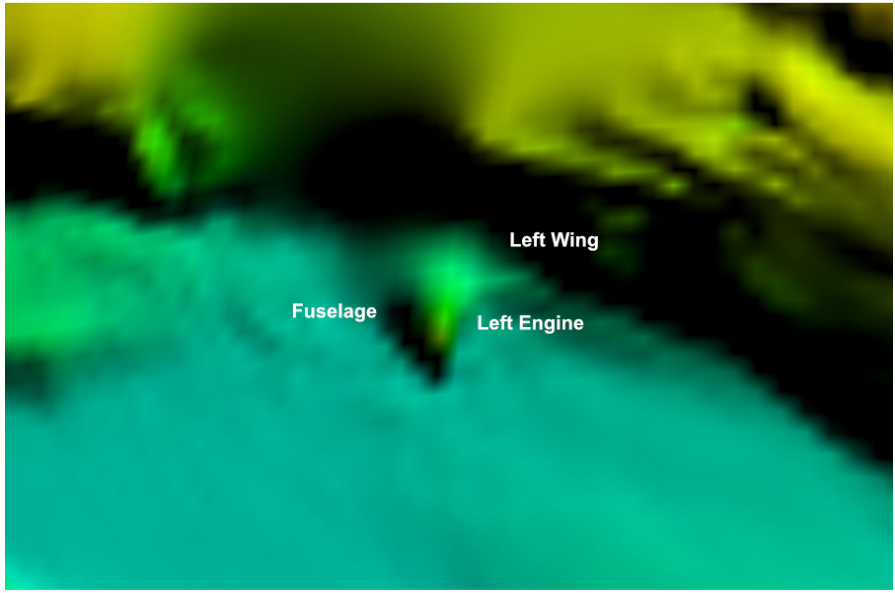
That independent review began by examining the contents of three datasets: 1) Geomar's publicly available dataset, 2) the dataset copy Geomar had sent to Scripps of California in 2017, and 3) the dataset copy Geomar had been sent to the United Kingdom's GEBCO. In less than 24 hours, the Scripps and GEBCO datasets were determined to be identical. The public access dataset Geomar had posted on its own website to meet funding requirements turned out to be an altered dataset in which all imagery related to MH370 had been removed.

The Kongsberg team spent additional time processing the dataset with Kongsberg's proprietary software. The results were revealing, to say the least. For example, Canadian forensic investigator Larry Vance's 2018 prediction that the right-side wing may have been sheared on impact with the ocean surface was quickly confirmed. In addition, Vance's suggestion that MH370's pilot attempted to bring it down 'softly' was also confirmed. The airframe is recognizable, and it is largely intact. It did not crash in a high-speed dive. It was not shredded. Compared to the 2009 Air France 447 tragedy, salt water is the only commonality. MH370 was not destroyed, but it would have been destroyed without human intervention from the cockpit. That is, the pilot had to have been actively involved in setting the plane down gently during the final moments.

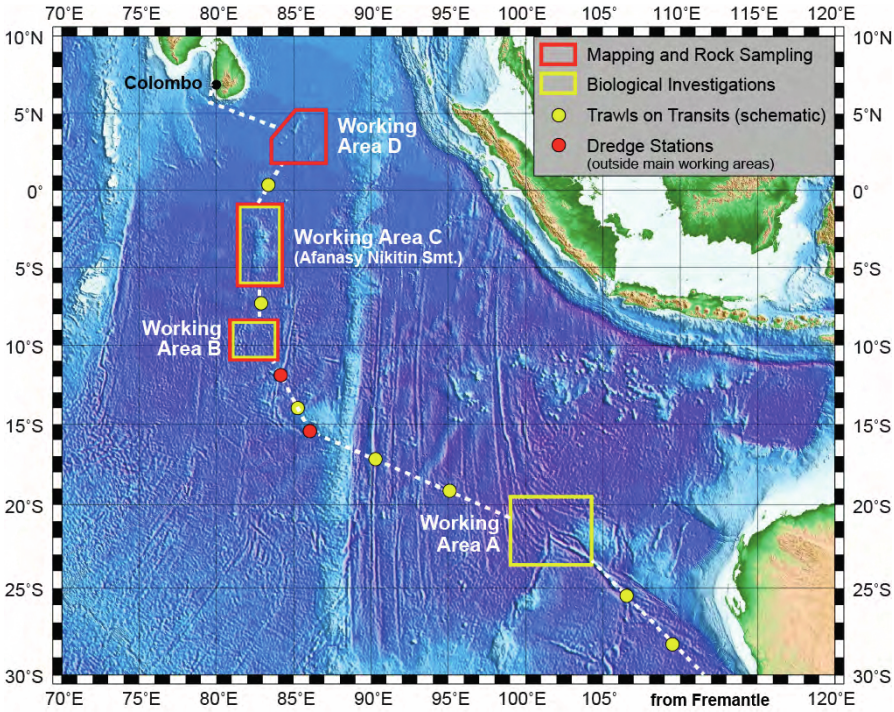
Geomar's attempt to conceal the terminal location of a horrific criminal event seems to have been myopic. Geomar is a valuable organization but appears to have made a careless decision that has prevented families and travelers from learning what happened to a high-profile flight, its passengers, and its crew.



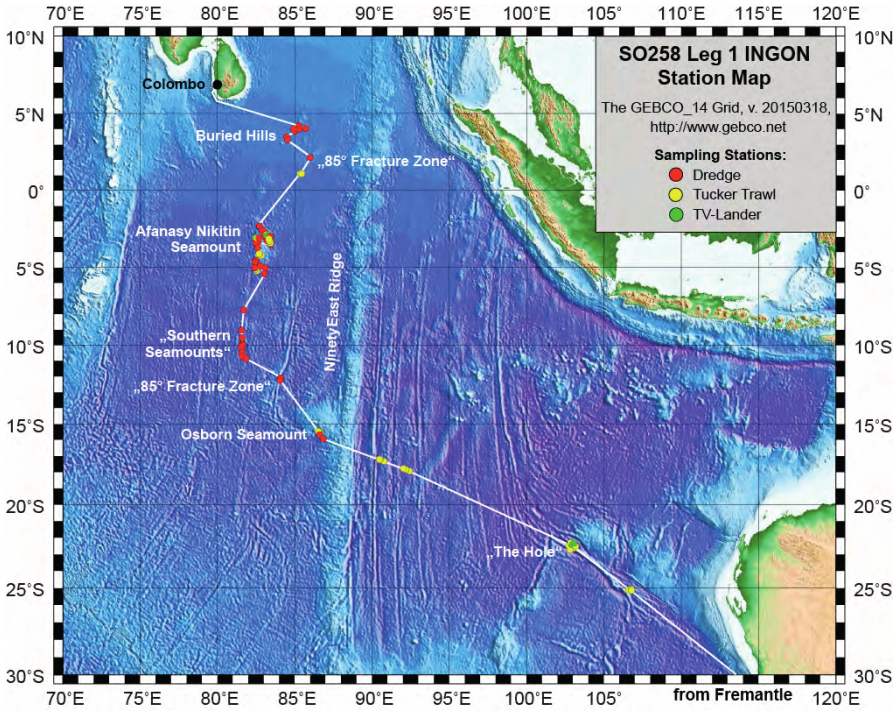
The abyssal seafloor Geomar claimed it did not scan in June 2017. The original Geomar dataset was examined by an independent Kongsberg-recommended affiliate in early 2021. Everything that should be visible is visible. This image shows reflections from the remains of a Boeing 777-200ER. It is a highly reflective mass of aluminum alloy with geometric features and proportions. It is manmade. The plane is largely intact, as Canadian forensic investigator Larry Vance suggested in his 2018 book: MH370: Mystery Solved.



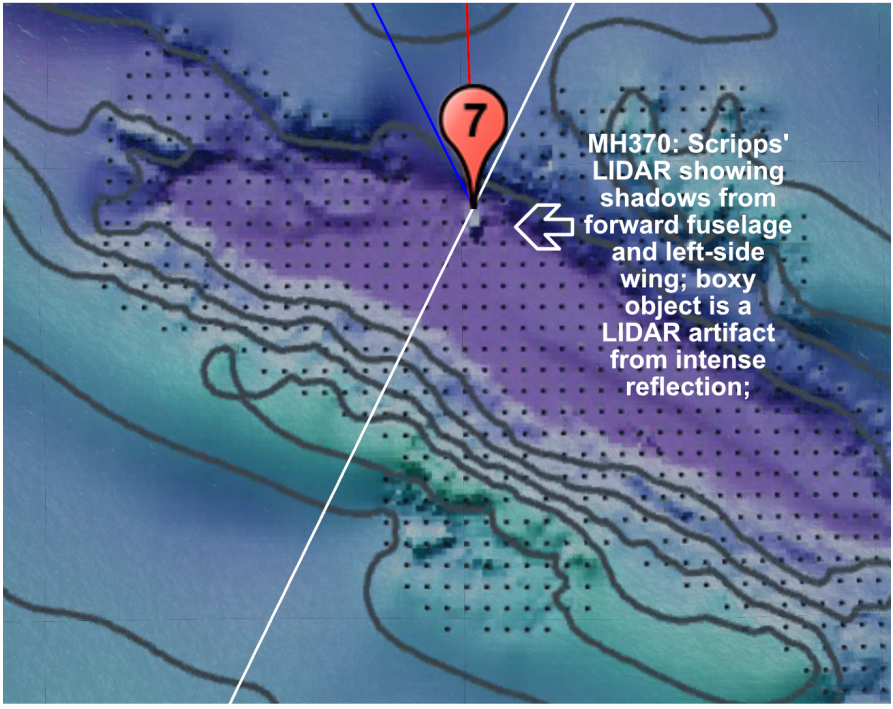
This is the only publicly available image of MH370 acquired by Germany's Geomar in June 2017. Many other photgraphs are believed to be in Geomar's possession. This image is a straight-on frontal view of a largely intact 777-200 fuselage and left-side wing. The image was not acquired "in passing." It was acquired when Geomar's R/V Sonne had been carefully brought into the most ideal position available, given that the aft side of the plane was blocked by a steep precipice. Physical debris is not visible in this particular image. The EM122 Multibeam Echosounder aboard R/V Sonne was an older-generation device, even in June 2017. But that turned out to be a blessing for families and investigators. Specular reflection helps confirm that it is the missing airliner. Newer sonar technology may have muted or removed specular reflection.



The route sailed by Geomar's R/V Sonne in 2017 when its first stop out of Fremantle, Australia, was Zenith Abyss. The vessel's nominal destination was Colombo, Sri Lanka. Here, Zenith Abyss is simply referred to as "Working Area A."



Perhaps the most succinct statement the author has come across to date about the mindset of those aboard the R/V Sonne when they realized they had spent the better part of a week in an umarked cemetery that held the remains of 238 innocent children, women, and men. Originally labeled "Working Area A," it was renamed "The Hole."



This image is from Scripps Oceanographic's bathymetric plugin for Google Earth showing the abyssal floor at Zenith. The shiny boxy object is MH370 at -7,000 meters. Intense reflection appears to have interfered with resolution in this instance. The red vertical line is linked to the departure airport; the white arc is part of the circumference of the final ping; the blue line is the final portion of the recreated flight path. All lines converge on the plane's terminal location.

Chapter 12

Ocean Infinity

Initially dubbed "a Good Samaritan effort" to locate MH370 and wrap up the search forever, the US Austin, Texas-based firm *Ocean Infinity* offered to finish locating MH370 in 2018 after the search had been called off by Australia and Malaysia the previous year. At the time, it was not public knowledge that the plane had already been confirmed at Zenith by Germany.

Ocean Infinity entered into the agreement shown below on January 10, 2018, and then spent several months scanning 1,600 linear kilometers of seafloor that extended from the Southern Ocean north into the South Indian Ocean. The firm did that, purportedly, at its own expense under terms of an agreement known as “no find, no fee,” a common contingency in deep sea salvage.

The author has long suspected that the agreement between Kuala Lumpur and Ocean Infinity may not have been as advertised. Initially, he suspected that Kuala Lumpur and Canberra collaborated to prevent Ocean Infinity from learning that MH370's terminal location was already known and that it had been confirmed by Germany six months before Ocean Infinity offered to "find" it again.

But that scenario now seems unlikely for a couple of reasons. One is that Ocean Infinity's owners and officers are seasoned professionals who know how to avoid costly mistakes. They are unlikely to fall victim to career bureaucrats and politicians looking for private gigs and votes.

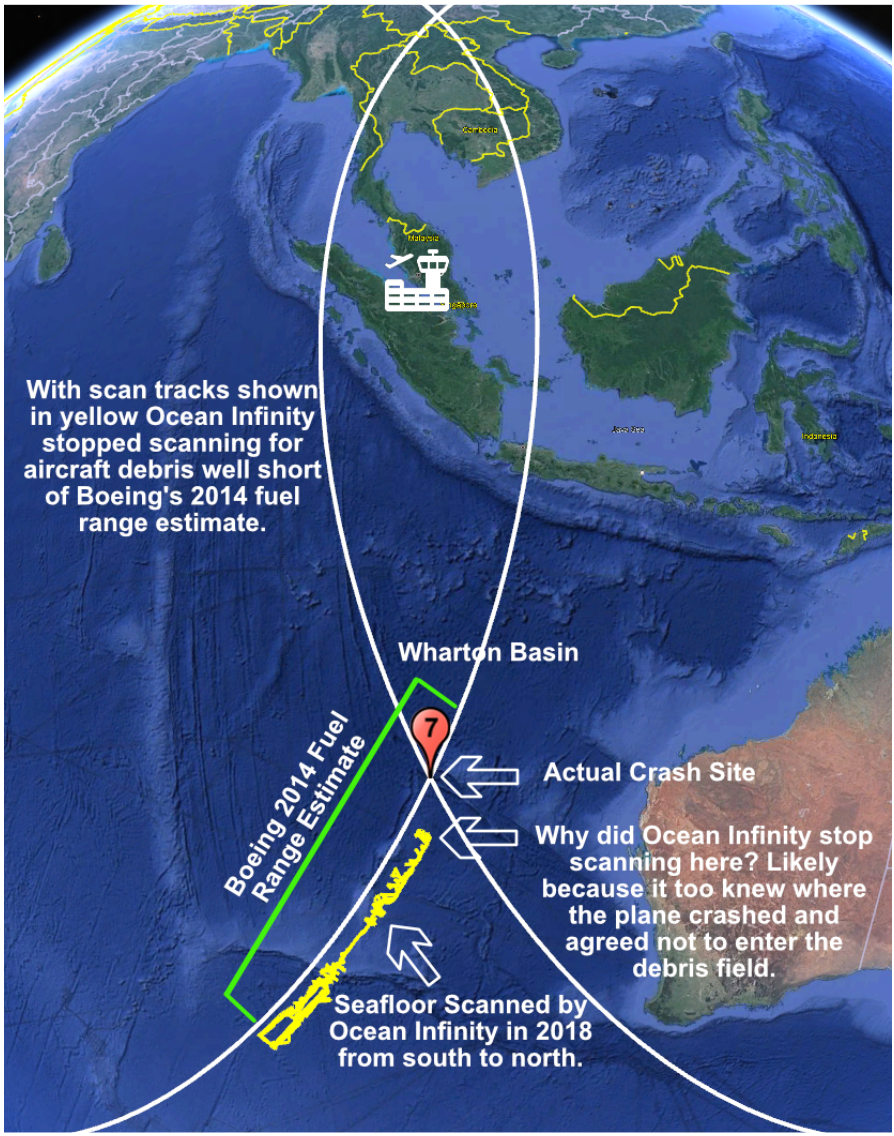
It seems more likely that Ocean Infinity was advised upfront or had already learned from its own sources that the plane had been located by Germany in 2017. If that happened, Ocean Infinity may have offered or asked to help play a "killdeer" role in sending the focus of the search back to the Southern Ocean, where Australia had successfully diverted it years earlier. The scenario would be something akin to a "showboat search" to seal media and family interest in the Southern Ocean far, far from Zenith Abyss.

In attempting to look into this possibility, the author and others have attempted to gain access to the 2018 bathymetry Ocean Infinity has said it intends to donate to the *General Bathymetric Chart of the Oceans* (GEBCO), or a similar "good cause." So far, such imagery does not seem to exist. Perhaps Ocean Infinity has simply not had time to follow through. Or it may have changed its mind, which would be entirely within its right to do so.

It is also possible that Ocean Infinity discovered the imagery it had acquired in 2018 was not entirely useful for some reason or that it had discovered that its AUVs were not actually recording. Technology can be a beast.

Another aspect of the author's curiosity about Ocean Infinity's decision to call off the search just before reaching Zenith Abyss is the Boeing Company's initial determination that MH370 was likely to have crashed as it crossed Wharton Basin, just north of Zenith Seamount and contiguous to Zenith. Boeing's initial expectation was remarkably accurate. Ocean Infinity's crews certainly knew where Boeing believed the crash occurred.

It seems highly unlikely they would have ignored it with a US $70 million payday on the line. Instead, the firm chose to go home empty.



This image shows the seafloor Ocean Infinity searched for MH370 (yellow tracks) between January and July 2018. It also shows where Boeing originally advised search teams to search for the plane, beginning at Wharton Basin in the NORTH and moving south. Instead, the search started at the southern end of the range and never made it to the NORTH end. Boeing's most likely crash location was slightly north of its now-confirmed location at Zenith Abyss.

For all of the considerations discussed above, the scenario the author believes is most likely is that Ocean Infinity agreed to conduct a showboat search in exchange for compensation of some sort. If that happened, such payments might have been "in kind" to avoid the IRS's beagle corps and to keep it out of stockholder reports. It may also have included a stipulation that payment would be contingent upon the passage of a certain amount of time. Ocean Infinity may have also wanted something more fungible than good PR, with which it was amply rewarded. Again, these issues are based on the incongruity of conducting an expensive "search" AFTER the object sought was confirmed by Germany six months earlier.

There continue to be occasional assertions that Ocean Infinity will "soon return" to the Southern Ocean for another... whatever. They appear to be nothing more than puffs of smoke from a small collection of shills. If so, it is probably pure flimflam geared to tabloid consumption, as so much of it has been.

Below is the contract Ocean Infinity inked what the author believes was a "showboat search."

Liow Tiong Lai
Minister Of Transport
At MH370-Ocean Infinity Signing Ceremony
10 January 2018

1.Good afternoon everyone.

2.First and foremost, I wish to thank all of you particularly the families and loved ones of those on board MH370 and members of the media for your presence here today.

3.I would like to take this opportunity to explain briefly regarding the further search operations to locate MH370 by Ocean Infinity.

4.Based on the agreement, Ocean Infinity will undertake search operation to locate flight MH370 at an area of 25,000 square kilometer within the priority search area on South Indian Ocean based on a "no cure no fee" basis within a 90-day time frame. The search operation is scheduled to commence mid January 2018.

5.As we speak, the vessel, Seabed Constructor is currently on her way to the search area, taking advantage of the favorable weather condition in the South Indian Ocean.

6.We have on board 65 crew including two (2) personnel from Royal Malaysian Navy as the Government of Malaysia's representative.

7.The primary mission by Ocean Infinity is to identify the location of the wreckage and/or both of the flight recorders; Cockpit Voice Recorder (CVR) and Flight Data Recorder (FDR) and present a considerable and credible evidence to confirm the exact location of the two main items.

8.The payment/reward to Ocean Infinity is subject to the area where the wreckage is located based on the division of the search area as agreed in the agreement:

(i) RM82 million (USD20 million) for the 5,000 square kilometer primary search area.

(ii) RM122 million (USD30 million) for the subsequent 10,000 square kilometer secondary search area.

(iii) RM204 million (USD50 million) for another 10,000 square kilometer tertiary search area.

Page one of a two-page contract between Ocean Infinity and the Malaysian Government signed on January 10, 2018. The agreement appears to have been intended largely for next-of-kin and media consumtion. Kuala Lumpur already knew where MH370 crashed, and had known of telemetry that pointed to that location for more than a year.

(iv) RM285 million (USD70 million) for additional supplementary search area beyond 25,000 square kilometer.

9.The MH370 Response Team, headed by the Director General of Civil Aviation along with officials from my ministry, the Ministry of Foreign Affairs and Ministry of Communication and Multimedia. Other agencies such as the Royal Malaysian Police and the Attorney General's Chambers will be monitoring the works done by Ocean Infinity via an operation room established within DCA premise.

10.The team will be updating the families of those on board MH370 via text messages and email as well as updated information on the MH370 official website under the nok section at (hyperlink removed) as and when new information becomes available.

11.Once again, I wish to thank all of you for attending this ceremony today.

12.I would like to reiterate our unwavering commitments towards solving the mystery of MH370 incident.

13.Our thoughts and prayers have and will always be with all the families and loved ones of those on board MH370 as we stand with you in these trying times.

14.It my hope that we will find answer that we seek for nearly four years and bring some closure to this unfortunate incident.

15.With that I thank all of you.

Not Signed,

Liow Tiong Lai

Page two of a two-page agreement purported to authorize Ocean Infinity to search for MH370 between January and July 2018. The proposed search area was entirely within international water. No agreement had been required. The only thing the contract assurred was a signing ceremony that was closely followed worldwide. Because the proposed search was in international water, anyone with a dingy and a little shark repellant could have dropped a GoPro overboard without anyone's permission.

Chapter 13

Journalist Ean Higgins

At some point in early 2020, after spending six years covering the MH370 tragedy and detailing what he had learned in a 2019 book, Australian Journalist Ean Higgins vanished. The circumstances remain unknown. Higgins's disappearance is officially considered suspicious. Some believe it was the Australian Government's version of the murder of Saudi journalist Jamal Khashoggi. No physical remains have been found, no sign of violence, and no indication that he had been suffering adverse health issues. In fact, Higgins's recently released book, *The Hunt for MH370*, had been a huge success, much to the consternation of the Australian Government.

One of Mr. Higgins's detractors was an Australian government employee named Greg Hood, who oversaw the *Australian Transport Safety Bureau* (ATSB) for five years. ATSB had been responsible for conducting the official search for MH370.

Mr. Hood took the helm in July 2016, several months before telemetry began circulating on Twitter and elsewhere that placed the plane's likely crash site thousands of kilometers closer to Kuala Lumpur than the official Southern Ocean search set up shop for four years. By early 2017, Canberra appears to have privately concluded that the plane had indeed crashed far

to the north of its nominal four-year search location facetiously labeled "Penguinville" for its proximity to Antarctica.

In late 2016 and early 2017, when it became increasingly clear that MH370 had indeed crashed near Zenith Plateau — as satellite imagery suggested within days of the crash — Australia and Malaysia tried to prevent the news from hitting the street. Social media disinformation squads were assembled, and Canberra, in particular, preemptively announced that it would suspend the official search for the plane "until further credible evidence becomes available that could identify the specific location of the aircraft." The ***Freudian Slip*** to end all Freudian Slips? [How would Australia or Malaysia or anyone else have known if someone gave them "the specific location of the aircraft" unless they already knew exactly where that happened to be?]

Then, in April 2017, immediately before Geomar scanned Zenith Abyss, Greg Hood made two announcements eleven days apart that further helped confirm for tea leaf readers worldwide that Australia knew exactly where MH370 crashed.

The first announcement was delivered on April 17, 2017: "any [Australian Government] employee who provides information about ATSB's search for missing Malaysia Airlines Flight MH370 to the public or a court [will] face criminal prosecution and two years in jail."

Some may find it hard to believe that a bona fide "democracy" can or would deny free speech with impunity. But Australia is not hampered by free speech issues.

Mr. Hood's second announcement eleven days later was a strongly worded editorial that denounced Ean Higgins and Higgins's employer, *The Australian* newspaper. It was titled: "*Correcting the Record, MH370*

Reporting by The Australian" and was published on April 28, 2017. It included the following observation:

> "It is particularly regrettable that Mr. Higgins's articles have now led to some of the MH370 next of kin expressing doubts about the ATSB's conduct of the search and, by implication, our commitment to finding the aircraft. The ATSB's search team, and the experts from many organizations both in Australia and overseas supporting the search, have worked with absolute commitment, dedication, and a single-minded focus on finding the aircraft to provide the answers for the families of those on board and to improve transport safety. It is extraordinarily difficult and challenging work."

Finally, Ean Higgins made the following observations in his 2019 book just before he vanished. His appeal to Australian government employees may very well have been his death sentence within a few short months of publication.

> "To all those at the ATSB, the JACC, Defense, the Search Strategy Working Group, the organizations making up the panel of Annex 13 accredited representatives, and of course, the Malaysian investigation itself: if you have been discouraged from revealing the truth, it is not too late to do so. I will continue to investigate MH370, write stories about it in The Australian, and there may be a second edition of this book. I encourage those who know more to come forward. It's an invitation to get on the right side of history and democracy." [Ean Higgins, 2019, The Hunt for MH370.]

> "As with the Pentagon Papers, government agencies can try to restrict and threaten the press, but the pattern is that the press prevails, and the truth finally comes out. Anyone who has watched the excellent movie The Post, about The Washington Post's courageous campaign to publish the Pentagon Papers against legal action from the Nixon administration, can see the analogy. Ultimately, the US Supreme Court upheld freedom of the press." [Ean Higgins, 2019, The Hunt for MH370.]

Now, three years after Ean Higgins vanished, his home State of New South Wales, Australia, is in the process of conducting a Coroner's Review to determine if a more formal investigation is warranted.

Chapter 14

Final Thoughts

The author accidentally learned of his role in locating MH370 in late 2019 when the Scripps Institution of Oceanography (SIO) — part of the University of California at San Diego — published a Google Earth plugin that remains freely available as *SRTM15_V2.4*. Various pieces of correspondence and related events confirm that Geomar's Chief Scientist did not intend for the MH370 debris field to be published, much less associated with the Institution that employed him. But, as chance would have it, the plugin included all of Geomar's 2017 sonar from Zenith Abyss. It appears that someone either failed to ask Scripps to remove the debris field or hoped it would go unnoticed, or Scripps had a lot of good old-fashioned integrity. Take your pick. There has been no clarification.

At the time the plugin was published in late 2019, most of those who used it would have been unlikely to notice the highly reflective debris field situated near the far edge of the abyssal floor southwest of Zenith Seamount. There would have been little reason for users to drill down to that abyssal fracture — a barely noticeable irregularity in the earth's crust. Moreover, the plane's remains are highly concentrated in an area that is a mere 150 meters wide.

But if one first goes to the trouble of using telemetry to map MH370‘s flight path, the endpoint is precisely where the debris field is on impact, and its appearance is obvious, unmistakable, and expected. It was so reflective in 2017 that it cannot be mistaken for a geological outcropping or formation. Perhaps what is most surprising is that the plane’s reflection is shaped like a largely-intact airframe. It is not a scrap metal scene that sometimes appears in horrific disaster-related imagery. Geological anomalies do not reflect sonar the way polished aluminum surfaces reflect sonar, and geological features seldom appear to be airframes, largely because geological features are rarely reflective.

LIght Detection And Ranging (LIDAR)

The Scripps plugin noted here blends satellite-derived LIDAR with traditional sonar bathymetry. As a result, MH370's debris field appears to be boxy in Scripps' renditions, somewhat like a very large shipping container lost at sea. But when the bathymetry is processed with Kongsberg software, as Kongsberg bathymetry is intended to be processed, Malaysia’s ‘lost’ MH370 emerges seven kilometers below the surface. The nose of the plane even has a red "beauty mark" where the plane’s livery originally included a red stripe just below the forward windows of the cockpit.

It is unknown if that beauty mark really is part of the plane's livery or something else. It looks authentic, it is in the correct location, and it reappears each time the image is recomposed. But as a rule, sonar tends to be black and white unless enhanced with specialized software. That appears to be a possibility, but the author played no role in those kinds of efforts and was not advised that had been done. He believes its appearance is unrelated to the plane's livery. In any event, it is merely an oddity.

More recent sonar acquired four years later in May 2021 with Victor Vescovo's tricked-out *DSSV Pressure Drop* continues to show a recognizable fuselage, left-side wing, and left-side engine. That 2021 image is included near the end of this chapter. Most of the reflection was somewhat diminished by 2021. That may have been due to Pressure Drop's EM124 Multibeam. Specular reflection is generally undesirable in sonar. It may also be due to nine years of saltwater corrosion.

Tragically, Australia, Germany, and Malaysia suppressed the plane's location for two years before Scripps' Google Earth plugin was published in late 2019. As of January 2023, the plane's terminal location had been suppressed for six years. The author has not found a precedent for that in all of civil aviation history. Three nations took it upon themselves to conceal the location of a non-military tragedy. The International Civil Aviation Organization (ICAO) was formed in 1944 for the express purpose of helping to ensure such abuses do not occur. ICAO lacks enforcement power at the present time, but perhaps it is time to give it a whip and a chair.

Durban

At the same time Germany was helping confirm MH370's terminal location at Zenith Abyss in 2017, a self-proclaimed aviation expert living in Durban, South Africa, introduced himself via Twitter. His pitch was that he was the author of several articles and books on South African airline tragedies during the Apartheid years. He further indicated that he believed the author's widely circulated Zenith endpoint made sense, and he wanted to help confirm the location.

The author did not know at the time that Geomar was already at Zenith. Nor did he sense that the Durban offer was yet another ploy to derail independent efforts to locate MH370.

The Durban-initiated proposal focused on setting up a cooperative strategy to form a non-profit to help raise funds to confirm the crash site. The author slowly learned that the individual knew all along that Germany had been to Zenith and confirmed the crash site. In retrospect, Germany was a clever choice for an interloper extraordinaire. Dozens of MH370 watchers monitored every move Australia and Kuala Lumpur made that might be related to MH370. But few paid attention to anything Germany did because it was perceived to be minding its own business. Ha!

WSPR

Beginning in early 2021 and extending into 2022, a new ploy emerged that proponents hoped would take the focus off of Zenith Abyss long enough to thoroughly document MH370's debris field with more advanced tools than Geomar's geriatric EM122 Multibeam. Interest in such a voyage seemed to revolve around the possibility that the plane's location was slowly getting around, and some thought it conceivable that someone might eventually insist on a little accountability.

The WSPR hoax, as it came to be known, was placed in motion by a British pensioner living in Germany. He claimed to be a retired aerospace engineer, and he also claimed to have come up with a breakthrough in tracking commercial airliners.

The pensioner's claim evolved as follows. He had observed that certain kinds of Ham Radio waves, such as those known as *Weak Signal Propagation Reporter,* acronym "WSPR," are everywhere. Once in motion, WSPR waves often bounce harmlessly off of anything that gets in their way. Moreover, the pensioner also noted that WSPR collisions are recorded and kept on file. He deduced from collisions alone that deflection archives might be useful in tracking objects that cause deflections, especially airliners since he had been on the periphery of the MH370 search for years.

What the engineer neglected to tell others was that neither he nor anyone else could distinguish between a WSPR wave deflected by a bug from a wave deflected by a bird from a wave deflected by a taxicab parked in a rooftop garage from a wave deflected by an airliner. WSPR waves are not stamped for identification purposes by the objects that deflect them. In other words, WSPR waves have no distinguishing characteristics. They are all anonymous.

The WSPR argument was and remains moronic, but it was never intended to do anything but divert attention from the ten-day reconnaissance voyage Victor Vescovo's vessel made to Zenith to complete the final scan of MH370's debris field in May 2021. It was a relatively successful ploy in that tabloids were full of WSPR, not on DSSV Pressure Drop's voyage to Zenith.

Other

Geomar appears to have *unpublished* some of Reinhard Werner's material from the June 2017 voyage to Zenith during which MH370 was confirmed. If true, it's a big deal and may be related in some way to his untimely death at 63. The entire voyage may be headed to a trash bin. The altered bathymetric dataset Werner posted for public consumption is no longer available. No explanation and no alternative sources are listed. It seems likely, given the amount of interest in articles on the Zenith voyage, that Geomar is not pleased with its own performance. It has not formally objected to anything to the author's knowledge so far, but that may not mean much.

Moreover, the Zenith voyage was quickly deleted from NOAA's online compendium of bathymetric-related voyages worldwide. It is certainly possible that NOAA is just reinventing some of its websites. But when these kinds of changes follow incidents that have a high probability of

harboring a modicum of impropriety, it often means losses are being cut. Time alone will tell.

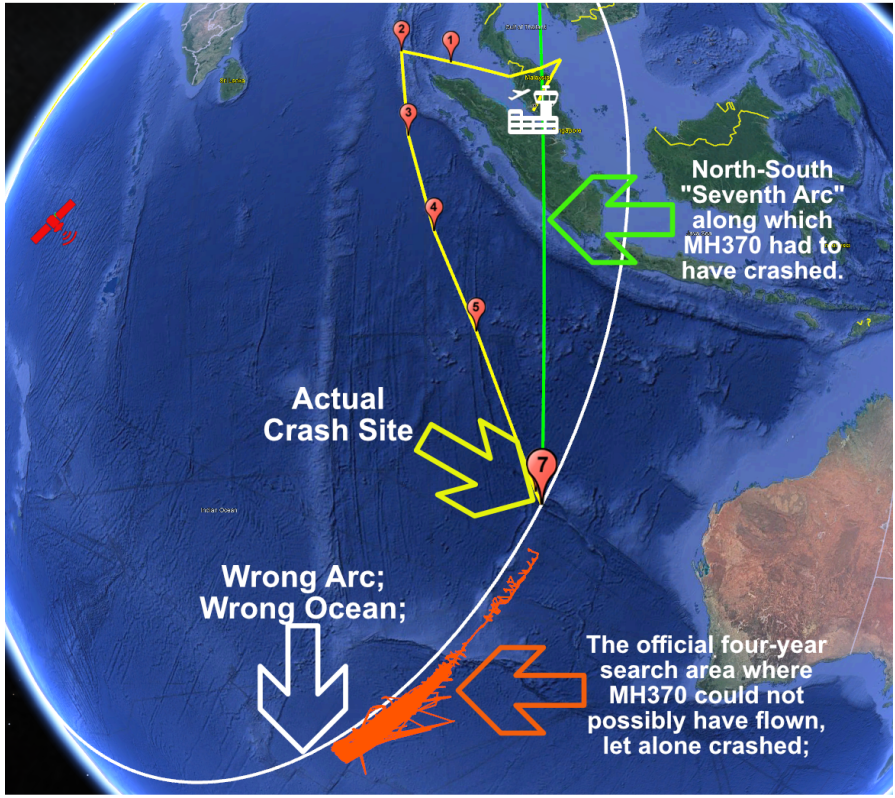
Bayes

One of the earliest statistical techniques considered as a possible silver bullet in the search for MH370 was Bayesian probability. It is often credited with successfully locating Air France 447's debris field in 2011. It uses conditional probability and can be quite powerful. But Bayes can also be vindictive if used with abandon. One danger is throwing disparate arguments at Bayes and hoping it and a PC will be able to sort everything out (because you, the researcher, have no clue.)

The author used Bayes to confirm his MH370 telemetry. But he did not use Bayes to try to track the plane. Why? Because if Bayes is set up properly, it locates MH370 before the math is applied. The reason for that is that Bayes needs parameters known as *priors*, and the only prior needed for MH370 is the radius of the final ping. It's that simple.

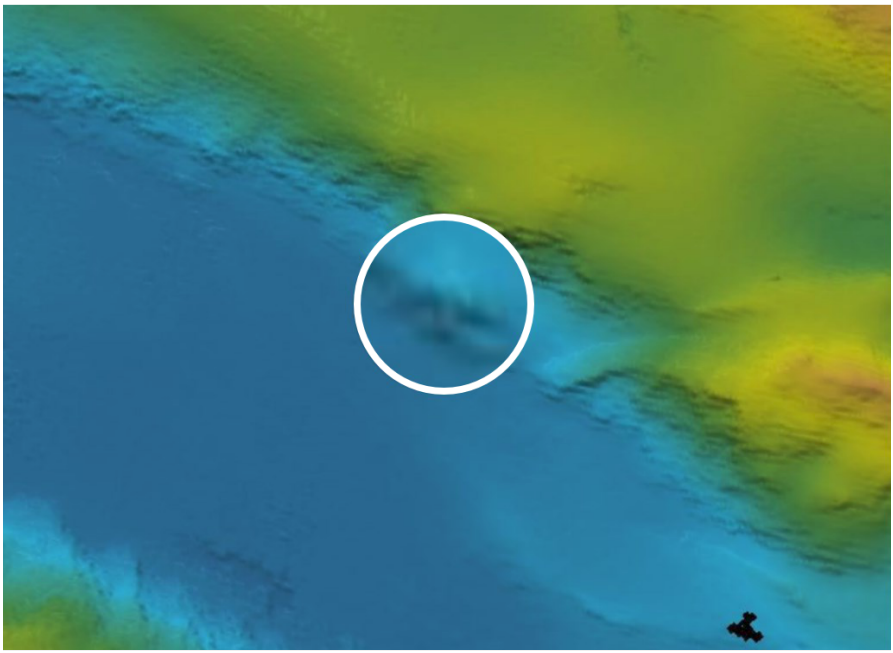
Two Arcs; Both Essential

Over the life of the multiyear search, a great deal was made of "the Seventh Arc," but the arc that was mentioned in that context was usually part of the circumference of the final ping, which was the wrong arc. There were always two arcs, as the illustration below shows. They were both important. There was little chance the plane could have been located without properly defining both arcs: one passed through the earth's core; the other was part of the final ping.



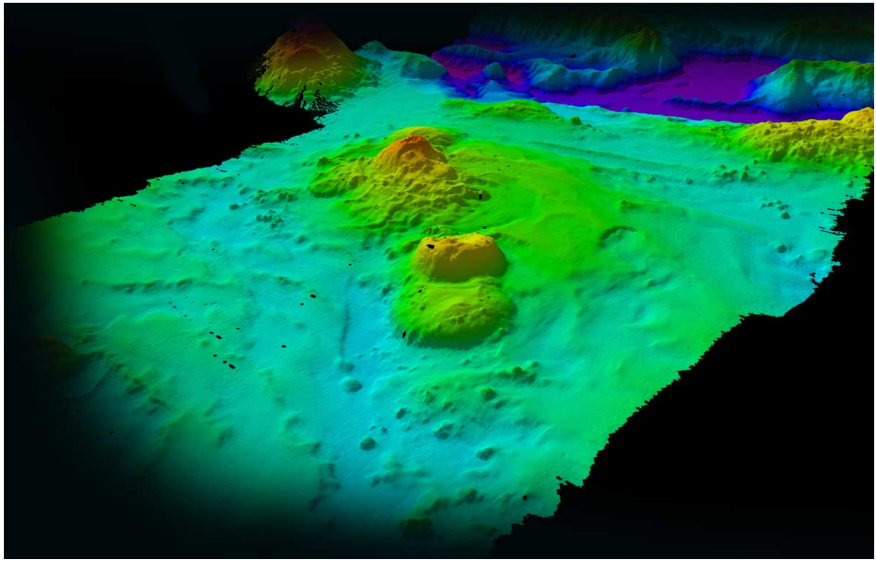
The green vertical arc in this illustration is the arc that was seldom used or understood. It is an imaginary slice of earth that extends from the planet's core to its surface. It is the arc that defines the "flyable" portion of the final ping ring, and it is the arc that made all early predictions of a crash in the Southern Ocean untenable. The white arc, on the other hand, was simply part of the circumference of the final ping. Without parameters for the green arc, Bayes pointed to locations the plane could not possibly have flown. A curious thing about the Bayes approach is that when Priors are correctly defined, the plane's location is a byproduct of setting up the model. Therefore, there is no further need for the sometimes cumbersome Bayes equations.

The green and white Arcs can be considered the spherical equivalent of XY axes in two-dimensional charts. Both are needed to get useful answers.



In this May 2021 image of the MH370 debris field, some of the intense reflection remains, but a lot of it is diminished, perhaps due to corrosive salt water which is likely to be more concentrated at -7,000 meters than it is at the surface. Some of the MH370 victims' next-of-kin have reportedly been told that the plane is at Zenith Abyss. But that has not been independently confirmed.

This image was acquired in May 2021 using Victor Vescovo's DSSV Pressure Drop and its EM124 Multibeam Echosounder on a ten-day voyage to document the crash site. The fuselage, left-side wing, and left-side engine are easily recognized, but the intensity of the reflection has diminished, probably from salt water exposure.



This image is what Kongsberg uses as an example of the capabilities of its EM124 Multibeam Echosounder. It was acquired by Victor Vescovo's DSSV Pressure Drop during one of his "Five Deeps" expeditions. It is also the same vessel and the same sonar array that acquired the much fuzzier 2021 image of MH370 in 2021.

For further reading on the MH370 tragedy:

MH370: Mystery Solved. Larry Vance, 2018.

The Hunt for MH370: The Mystery, the Cover-up, The Truth; Ean Higgins, 2019.

About The Author

Michael Chillit is a pen name.

As one of the hundreds of volunteer analysts who gave time freely to the MH370 mystery, I began work on it shortly after it was reported missing on March 8, 2014. The tragedy was close to home, personally, although I did not know any of the passengers or crew. Rather, I lost a friend in the World Trade Center attack on September 11, 2001. September 11 remained a painful reminder that our destinies are intertwined and complicated. Perhaps the greatest similarity between the two events for me, more than a decade apart, was the enormous unfairness of the indiscriminate loss of so many innocents.

I have never worked in aviation. I have never worked as a flight crew member in any capacity. My primary qualification for embarking on an informal search for MH370's terminal location is that I once held the title "Chief of Statistics" for seven years as a member of New Jersey's Administrative Office of the Courts in Trenton. That stint hardly qualified me for anything as complex as tracking MH370, but sometimes it’s what we don’t know that matters. Looking back, it was

arrogant of me to believe I might have had a chance of succeeding where so many others eminently more qualified were struggling or had given up.

Persistence doesn't necessarily ensure success, but it helps.

MH370 crashed at Zenith Abyss. It appears to have been dropped there by its Captain, Zaharie Ahmad Shah, for reasons now known to no one. If Captain Shah was indeed responsible for the loss of so many innocent lives, I could not say anything others have not already said, and I would not attempt to try.

Whoever was at the controls on March 8, 2014, managed to drop a large commercial airliner into a relatively small hole seven kilometers below the ocean surface without help from Air Traffic Control, radar, or any of the other tools pilots routinely rely upon.

From the imagery I have seen, the plane appears to have been helped along by slippery slopes during the final two kilometers of its descent as it neared the abyssal floor. In other words, it might have missed the abyss if not for the pelagic goo that covers almost everything below -5,000 meters. Nevertheless, the airframe came to rest squarely on the bottom, upright at -7,000 meters.

To forensic investigator Larry Vance and an incredibly talented team: nobody does it better. The analyses provided on MH370 are exceptional in all respects.