World Maps and the Dawn of Globalisation

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Illus. opening screen of Google Earth

From a distance of 11,000 kilometres above its surface, the planet earth sits in the black void of the cosmos. It appears free of clouds and water, although its ocean floors still sparkle ultramarine blue, the continents a beguiling patchwork of greens, browns and pinks. North Africa, Europe, the Middle East and Central Asia curve round in a crescent through the right-hand half of the globe. The Atlantic Ocean dominates the bottom left, giving way to the tip of North America, with the brilliant white sheet of Greenland nearly crowning the planet's apex, looming over the North Pole. This is a version of the world as Plato imagined it nearly two and a half thousand years ago in the *Phaedo*, a gleaming, perfect sphere, 'marvelous for its beauty'. It is the *ecumene* that Ptolemy projected on his geometrical grid in the second century AD, the globe that Mercator plotted onto a rectangle fifteen hundred years ago, and the earth that NASA finally captured in the first extra-terrestrial photograph of the whole planet taken the 1970s. This is the geographer's ultimate object of study, a graphic image of the earth (or at least that part of it turned towards the viewer).

This is of course the virtual image of the earth as seen from the homepage of Google Earth, the world's most popular geospatial application. Since its launch in 2005, the application has rapidly come to dominate online mapping. Of an estimated 1.5 billion people currently online globally, over half a billion have downloaded Goggle Earth.

Google Earth offers its users a level of interaction with the earth unimaginable on printed paper maps or atlases. The application's display allows the world to be tilted, panned and rotated; geographical places and physical objects can be clicked to provide more information, and even introduce time in the form of video streaming; other data can be integrated and 'layered' onto its surface, from political boundaries to historical maps depicting the same region; and users can zoom down through its layers of data, or enter any location on the planet (including their home address), and

within seconds they can go from 11,000 kilometres above the earth to within a few metres of its surface, confronted with photo-real, three-dimensional images of immediately recognisable neighbourhoods, streets, buildings and houses.

The sheer scale of the data that stands behind that first image of the earth is quite staggering. What the viewer is looking at is an extraordinary ten Petabytes of potential geographical information distributed across the globe's surface. A Byte is the smallest unit of data representing a single alphanumerical symbol in a computer's memory. A standard 80 Gigabyte hard drive contains approximately 80 billion bytes. Just one Petabyte represents one million Gigabytes, with a capacity to store 500 billion pages of printed text. Multiplied by ten, Google Earth is able to call on a volume of digital data equivalent to more than six month's worth of the BBC's total programming output, any Byte of which can be retrieved in seconds as the online viewer enters their coordinates and hurtles down towards the earth. As the computer screen refreshes itself at 50 hertz, Google Earth's technology is able to produce the highest definition of all its online competitors, giving a crisp, flicker-free image simulating flight, ensuring its dominance in the world of geospatial applications.

In less than a decade, Google Earth has not just redefined online mapping, but has led to a complete re-evaluation of the status of maps and the future of mapmaking. Drawing on the now established definition of a map as a graphic representation facilitating a spatial understanding of the world, many geographers would not even categorise Google Earth as a map, and even its creators are cautious about using the term. Drawing on satellite and aerial imagery, the application aspires to a photographic realism free of the usual graphic signs and symbols that now define modern scientific maps. For those who want to work in virtual mapping, training in geography is irrelevant, and their title will usually be 'geospatial technologist', rather than 'cartographer'.

But Google Earth is also the ultimate manifestation of our current moment of globalisation. As information and capital flows instantaneously and invisibly across the surface of an ever-shrinking earth, geospatial applications like Google Earth appear to reproduce this shrinkage of space, where the *speed* of connectivity replaces the measurement of distance, and every place that 'pops up' is invariably followed by

something to buy. One of the great ironies of Google Earth's claims to present a democratic, interactive world of mapping free from state interference is that it is the creation of one the world's largest online companies: Google. With current assets of over $40 billion, Google utilises its 'Earth' and 'Maps' applications to support 34,000 searches each second, 3 billion a day on its search engine, driving its annual revenue of $23 billion, 97% of which comes from advertising. Google has successfully straddled the divide between the early language of the Internet, defined by fearful talk of fragmented communities and disembodied individuals, to the new global emphasis on social connections, embodied interactivity and collaborative creativity. And at the heart of its stated mission to 'to organize the world's information and make it universally accessible and useful', stands its geospatial applications, linking everything and everywhere in one enormous global geographical information system.

What interests me as a cultural historian is how significant is this new online global mapping. Is it the revolution that many claim, signalling a democratic transformation in mapmaking? Or is it a baleful step into political censorship, state surveillance, the invasion of privacy, and the surrender of established standards in cartography? The history of cartography suggests that we are, perhaps sadly, somewhere in the middle.

Much of the recent talk of globalisation has paid little attention to how its apparent subject, the globe itself, has been mapped in response to the new economic imperatives. But for many years historians have argued that our current situation has its basis in the emergence of Europe as a world power five hundred years ago. I want to follow that suggestion by also examining how the globe was mapped in that early moment of European expansion, to suggest that there are uncanny echoes between then and now.

It seems obvious to start by looking at the impact of a defining moment of early modern globalisation: Ferdinand Magellan's first European circumnavigation of the globe between 1519 and 1522. The inspirations for Magellan's voyage go back several decades to Columbus's first voyage to the New World in 1492. Most people now appreciate that Columbus's plan to sail west to reach the East was based on erroneous classical geography.

Ptolemy's *Geography* (150 AD), had underestimated the earth's circumference by about 18%, or nearly 10,000 kilometres. But because the centre of its world (the so-called *ecumene*, or living space) was focussed on Asia, his calculations *overestimated* the east-west dimensions of the globe from Greece to Southeast Asia. The result, as you can see, leaves little room for the discovery of the Americas or the Pacific. It's also worth pointing out that Ptolemy's *ecumene* is *not* a global: there is an understanding of the globe as a sphere, but not of land on the other side of this image as it were.

When Columbus returned from his first voyage and claimed his new lands on behalf of Spain (or Castile), it caused a serious diplomatic confrontation with Portugal, who claimed all previous Atlantic discoveries. The result was the 1494 Treaty of Todesillas, which drew a line through the Atlantic, apportioning everything to the west to Spain, everything to the east to Portugal. The Cantino Planisphere (1502) shows the line. It is a world image still influenced by Ptolemy but also showing the latest discoveries—New World, circumnavigation of Africa, etc—nevertheless Asia still extends too far eastwards.

By the second decade of the sixteenth century, as Portugal and Spain pushed the western and eastern limits of the Tordesillas line, the question was—where would this line fall if it went right round the earth—on a globe? Painters even began to offer tantalising clues. As the Portuguese pushed further east through the Indonesian archipelago in an attempt to monopolise the region's spice trade, some of its sailors began to question just where the line fell between Portugal and Spain. One of them was Magellan. Born and trained in Portugal, he began to have serious misgivings about Portuguese influence over the region. In 1517 Magellan defected to Spain and its Habsburg emperor, Charles V. One of Charles's advisers later recalled Magellan's motives:

> Ferdinand Magellan, a distinguished Portuguese who had for many years sailed about the Eastern Seas as admiral of the Portuguese fleet, … pointed out to the Emperor [Charles V] that it was not yet clearly ascertained whether Malacca [in the southern region of the Malay Peninsula] was within the boundaries of the Portuguese or the Castilians, because hitherto its longitude had not been definitely known; but it was an undoubted fact that the Great Gulf [the Pacific] and the Chinese nations were within the Castilian limits. He asserted also that it was absolutely certain that the islands

called the Moluccas, in which all sorts of spices grow, and from which they were brought to Malacca, were contained in the western, or Castilian division, and that it would be possible to sail to them and bring the spices at less trouble and expense from their native soil to Castile.

As Magellan prepared to set off on his voyage westwards, round Cape Horn, he drew on a wide range of cartographic material. The surviving documentation reveals that the one mapmaker that Magellan kept invoking was Martin Behaim.

Behaim was a German merchant (not a geographer), who traded along the West African coast throughout the 1480s. When he returned to his home town of Nuremberg in 1492 he produced the first known terrestrial globe. Note the date: it shows Portuguese circumnavigation of Africa, but after that, once again, the geography is Ptolemaic the further east you look; and there's no America or Pacific Ocean, as it's produced on the eve of Columbus's first voyage.

On Behaim's globe the space between the west coast of Portugal and the east coast of China travelling *west*, via the Atlantic, was just 130 degrees. The actual distance is nearer double that figure, a daunting 230 degrees. Looking at Behaim's globe, Magellan was clearly convinced that the voyage to the Moluccas via South America was shorter than the Portuguese sea route to Malacca via South Africa. Such a global venture required a global image, and that's what Behaim provided Magellan. But its outdated classical geography also justified Magellan's route.

Two things are very interesting about the venture. Firstly, it was purely commercial. Secondly, nothing in any of the surviving documentation suggests Magellan planned the voyage as a circumnavigation of the globe. The plan was go via Cape Horn and presumably return the same way, and avoid sailing back via India and Southern Africa, police by the Portuguese.

The story of Magellan's voyage has been told before, but in brief, the voyage took nearly three years (1519-1522); the expedition managed to negotiate Cape Horn, in the spring of 1521 Magellan was killed in a skirmish with locals in the eastern Philippines. The remnants of the fleet took the decision to sail back home via Southern Africa, reaching Spain in September 1522 (18 survivors from a crew of

240). The return of the voyage had two immediate and related results. The first was a diplomatic crisis between Spain and Portugal, as the former claimed the Moluccas as falling in their half of the globe. The second was a spectacular increase in global cartography in the shape of terrestrial globes. Prior to 1520, Behaim's globe was one of no more than half a dozen other globes available. From 1520 onwards, virtually any serious mapmaker was required to turn his hand to the creation of a globe (including Mercator, and it's suggested as one of the reasons for the creation of his famous 1569 world map projection).

Illus. Franciscus Monachus, *De orbis*…, 1527

Even geographers used to flat maps began to imagine the diplomatic dispute between Spain and Portugal globally. Maps from the 1520s showed a world divided into a western (Spanish) hemisphere and an eastern (Portuguese) hemisphere. It was this mentality which shaped the subsequent diplomatic negotiations between the two empires, which went on for over seven years.

When the two sides first met in 1524, both sides were desperately buying off mapmakers to support their claims to the Moluccas. On the Spanish aide, the emperor Charles V gave his team a clear brief. He:

> Urged, that by mathematical demonstration, and the judgment of men learned in that faculty, it appeared, that the Moluccas were within the limits of Castile, as were all others, as far as Malacca, and even beyond it.

The geographical battle lines were soon drawn. Initially the only agreement was on starting from the line of demarcation drawn at Tordesillas, 370 leagues west of the Cape Verde Islands. But even this became contested. Lawyers argued; Spanish delegates tried to use astronomy, the Portuguese protested; others brought out blank maps. The Castilian delegation complained, saying they 'preferred a spherical body', although grudgingly admitting that but 'the maps and other proper instruments should not be debarred'. When challenged on particularly difficult points, some delegates feigned illness; others said they were too tired to answer and asked for an adjournment.

What's interesting is that when the 1494 Treaty of Tordesillas was drawn, there was no question that it should be on a flat map. But by 1524, the dispute over the Moluccas ensured that both sides accepted the need for a global dimension in resolving the conflict. Globes were still too small to record the minutiae of the two sides' geographical differences, so finally they each produced a map defining their respective claims. The Spanish presented theirs, claiming the Moluccas were 150 degrees west of the Treaty of Tordesillas line, or 30 degrees within the Spanish half of the globe. The Portuguese responded with a world map showing the Moluccas to be 134 degrees east of the Tordesillas line, or 46 degrees within the Portuguese hemisphere. Both sides were claiming the authority to possess two halves of the known world, and yet their geographical knowledge put them over 70 degrees apart in locating the Moluccas on a world map. Both sides had reached a deadlock. Spain made one last effort to argue for using terrestrial globes in a binding agreement, but the Portuguese refused. It was stalemate.

The talks collapsed, with both sides agreeing to despatch voyages to the Moluccas with the express intention of measuring the distance. But without scientifically accurate methods of determining longitude or the length of a degree, this also offered little hope of a resolution. But it did make the Spanish realise privately that the logistical difficulties of even reaching the Moluccas, never mind transporting its precious cargo of spices, made little financial sense.

In 1529 the two sides reconvened at Saragossa to hammer out a final agreement. The Spaniards now had one final card to play. Diego Ribeiro was a Portuguese mapmaker in the pay of the Spanish since the early planning stages of Magellan's voyage. He sat on the Spanish negotiating team, and throughout the late 1520s he produced a series of beautiful hand-drawn maps in support of Spain's claim to the Moluccas. His work culminated in his 1529 world map. It's often used as a summary of geographical knowledge at the time, showing the extent of seaborne discoveries, and gradually diminishing the power of Ptolemy in the far east (as you can see). What is unprecedented is the space it allocates to the western coast of the Americas (in particularly South America), and the Pacific, which covers nearly a third of the earth's surface (which is quite accurate: it actually covers 32%).

But there was a very specific political motivation behind Ribeiro's map. In the far left-hand corner of the map, Ribeiro locates the Molucas just over 172 degrees *west* of the Tordesillas line--7½ degrees *inside* the Spanish half of the globe. Ribeiro actually overestimates the distance from the South American coast to the Moluccas at 134 degrees, enabling him to push them just into the Spanish hemisphere.

What's also forgotten about maps like Ribeiro's is that they do try for the first time to show the *whole* globe in 360 degrees. Ptolemy's *Geography* only projected a partial image of the globe, the *ecumene* centred on the Mediterranean. Even though it manipulated geographical knowledge, it did so within the context of a new global perspective. So it's *both* a piece of highly political cartography, *and* an important step forward in mapping the globe.

It's unclear what part Ribeiro's map played in the conclusion of the dispute over the Moluccas. The 1529 Saragossa conference simply rubber-stamped behind-the-scenes agreements. These led to Spain officially giving up its claim to the Moluccas, in exchange for Portugal paying a massive 350,000 ducats compensation. But the Spanish retained the right to renew their claim at any point, if compelling cartographic evidence emerged to place the Moluccas in the Spanish half of the globe.

Both sides acknowledged for the first time the global dimensions of the earth as a political and geographical space. They also established the map as a legally binding document and object able to define and uphold an enduring political settlement. The final Treaty of Saragossa stipulated that both sides should draw up identical maps placing the Moluccas seventeen degrees east of the dividing line, 'and they shall be signed by the said sovereigns and sealed with their seals, so that each one will keep his own chart; and the said line shall remain fixed henceforth at the point and place so designated'. This was far than just the royal seal of approval: it was a way of establishing the map as a fixed material object, a means of communication between competing political factions. The treaty concluded that the agreed map 'shall also designate the spot in which the said vassals of the said Emperor and King of Castile shall situate and locate Molucca, which during the time of this contract shall be regarded as situated in such place'. The agreed map bound the two empires in

agreement over the location of the Moluccas, or at least until it became necessary to relocate for them, for whatever diplomatic or political reason.

Much of this should be taken with a pinch of salt. These standard maps were never drawn up (or there is certainly no record of them). Similarly, Ribeiro seems to have deliberately relocated the Moluccas because he was sure nobody could challenge him for a very specific reason: it would take centuries for an accurate measurement of longitude to be discovered and therefore accurately pinpoint the position of the Moluccas. Claims to police these global lines of division were a complete mirage: when pilots rarely knew exactly they were on a seaborne voyage, the claims to be able to demarcate the two hemispheres were pure imperial fantasy.

Is Ribeiro's map a harbinger of globalisation – a prefiguration of Google Earth? Well, yes and no. Certainly this is cutting-edge mapmaking shaped by political and highly specific commercial considerations.

But of course it's far more imaginative—I'd suggest it represent an early defining moment of 'imaginative globalism', a culture of mapping, rather than the economic imperative of *globalisation*.

Perhaps the difference is that with Google Earth, despite the initial compelling image of the earth, the globe as a logo has lost its power. The contradiction of globalisation today is that the globe becomes an object to be overcome, a symbol of the ability to move objects, capital and bodies across its surface regardless of its size.

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