



Ptolemy's Revenge: A Critique of Historical Cartography

Persistent URL for citation: <http://purl.oclc.org/coordinates/a3.pdf>

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Date of Publication: 08/29/05
Revised: 11/16/05

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Abstract

This article calls for a new approach to historical cartography. Arguing that cartographic presentism obscures the local geographies of the past, the author reviews the imagery of current historical mapping as geocentric and presentistic. The analysis concentrates on two key images: the ubiquitous image of the globe as the icon of the present and David Harvey's "time-space compression" chart. Harvey's paradigmatic diagram and an earlier data map by Eugene Staley are discussed as misleading representations of globalization. The article envisions the alternative of a richer historical cartography that would combine the scientific purview of modern reference maps with historical maps and preglobal perspectives of space.

Keywords: global history; preglobal geography; globalization; historical cartography; cartographic presentism; historical maps; modern world map; time-space-compression.

we need a narrative cartography
J.B. Harley, 1989[1]

Introduction

The terrestrial globe provides the logo of our age if not the fetish of our time.[2] The most popular (non-pornographic) image after the arrival of the World Wide Web in the early 1990s was the earth and not the sun. Earth you find everywhere, on websites, posters, buttons, banners and backgrounds; for images of the sun, you have to go to the technical pages of astronomy. A majority of webmasters and designers has voted with countless globes and world maps for the earth as the

key image of the global age.[\[3\]](#) Watching TV[\[4\]](#) or browsing the Web, one is tempted to think that Ptolemy and the geocentric cosmology got a belated revenge on Copernicus and the heliocentric revolution.[\[5\]](#)

There are of course many good reasons to refocus on the earth as the still most important place for humankind and life in the twenty-first century: concerns about the environment and the power of unfettered globalizations are prominent among them. The problem with the contemporary focus on the geobody is therefore not that people pay too much attention to the ecological health of the planet or scrutinize globalization too much; it is that they have learned to view the modern map of the world as a naturalistic and self-evident thing. Saturated with contemporary world maps and easily available images of the globe, people are forgetting (if they ever knew) that the geography of the whole planet was a sketchy and fragmented affair throughout human history, and has become comprehensive only quite recently

Modern science and technology have gained an interpretive monopoly about all things physical. High-resolution photography and computer-enhanced satellite imagery deliver brilliant hemispheric panoramas. Profoundly iconic and imprinted in the collective brain, the spinning geobody and its cartographic representation have become a “natural” sight. Yet our map of the world and photorealistic globe are anything but natural; produced by modern geography and “imagineered”[\[6\]](#) by technoscience, they only appear to be natural because they are firmly embedded in the present worldview. Earlier pictures of the earth were disjointed and incomplete, sacred and imaginary, myopic and symbolic; falsely universalistic perhaps but also local to a fault.

This article proceeds from the assumption that the current global perspective obscures the manifold geographies of the past and the protoglobalization of the planet—the discovery, exploration and exploitation of the *whole* earth in the last five hundred years. I will argue that the universal success of the modern world map has effectively displaced all preglobal geographies in the public mind so that we must ask now, what does it mean to project the novelty of the global world back in time? What are the hidden costs of framing global history in the context of the modern geographical consensus?[\[7\]](#)

The Icon of the Present

The World Civilizations home page at Washington State University (WSU) greets its visitors with the icon of the blue planet (Figure 1). The page leads instructors and students of World Civilizations 110 and 111 to important information and regulations: the WSU “covenant” for example, which decrees that the two courses must be “divided at 1500” and that the introductory course should pay attention “to geography and world cultures before civilizations arose.”[\[8\]](#)

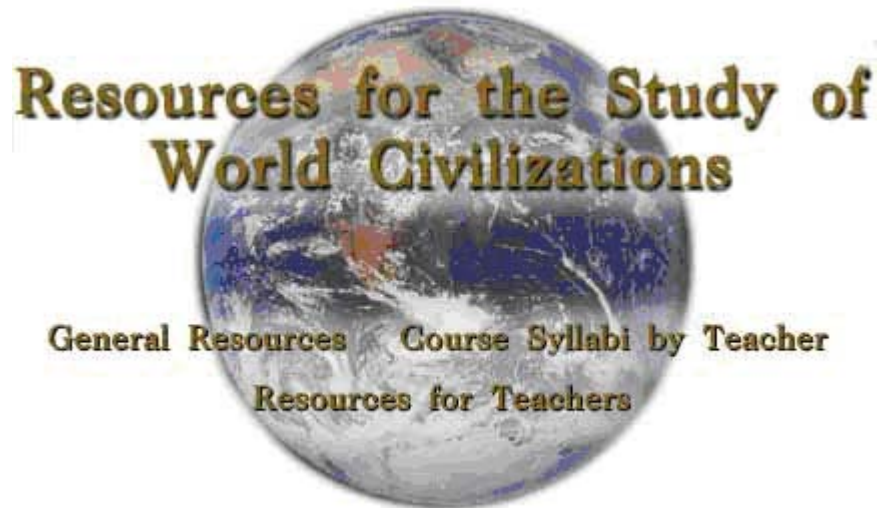


Figure 1. Resources for the Study of World Civilizations.

Source: <http://www.wsu.edu/~wldciv/index.html>.

Courtesy Washington State University

Using a contemporary portal image is not dangerous *per se* and could even serve the purpose to indicate a particular historical method explicitly (the conscious approach to the past in the light of the present). Yet this popular image is bound to distort and mislead when no attempt is made to lift the veil of its tacit presentism.

Another WSU page (Figure 2) combines the title “World Civilizations” with a spectacular “Earthrise” photo from the Apollo missions of the late-1960s. The extraordinary image of planet earth rising “above”^[9] the lunar horizon features the global technoscientific civilization of the present and not the local civilizations of the past. Introducing the past with a couple of empty words (“world civilizations”) and the present with as loaded an image as “Earthrise,” however, is not going to jolt the historical consciousness of today’s students. Worse, it reinforces the everyday-wisdom that says, what really matters is the bright present and not the dull past. The hidden curriculum of this message works against the official goal to counteract “the shrinking frames of historical or cultural reference which students are currently bringing to higher education.”^[10]

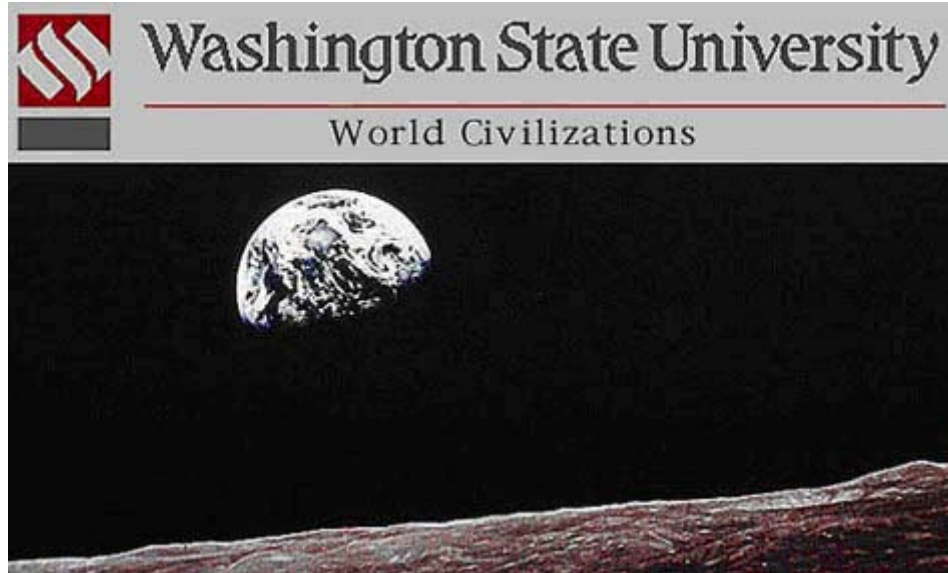


Figure 2. World Civilizations

Source: http://www.wsu.edu:8001/vwsu/gened/learn-modules/top_longfor.

Courtesy Washington State University

History professors have to familiarize their students with *past* presents, not just the *present* present, and in order to do so they have to *defamiliarize* their audience with the contemporary world map. Ubiquitous and frequent media-exposure to the cartographic rendition of the unveiled face of the earth (the modern world map) has not yet made anybody especially knowledgeable about global geography although it has given everybody a fuzzy template of the entire planet. Furthermore, the very success of this world map has become an obstacle to the understanding of history and geography in preglobal times. It may not be obvious, but the modern world map that is supposed to support the global history teachers addressed in Figure 1 is in fact more often than not undermining their efforts.

A crude world map by Harald and Ruth Bukor, which I consulted during my student days, employed the outline of the world familiar to European eyes and seemed to serve its main purpose, namely to show the whereabouts of six *Hochkulturen* or world civilizations.^[11] Such maps are not uncommon—although permission could not be obtained to reproduce this particular map, a similar “[Map of Ancient Civilizations](#)” can be found on the Web site of the Department of Behavioral Sciences at Palomar College. Area distortion was not the main problem of the Bukor map. The exaggerated size of Greenland (which has only 28 percent of the area of Australia) or the diminution of Madagascar (which appeared to have roughly the area of Great Britain even though it is about two and one half the size of England, Scotland, and Wales together) were linked to the underlying conformal projection. Yet no projection of a spherical surface onto a flat plane is without distortion of area, angle, shape, or distance. Eastern New Guinea and Australia were cut off and Antarctica, the Pacific Ocean, New Zealand and Oceania did not exist at all. Editorial omissions of this kind are revealing. They told me that these parts of the world were forgettable in terms of “world civilization.” However, what matters also is something else, namely the fact that none of these cultural centers would have been able to locate itself on this map. World maps that are supposed to convey preglobal historical information should therefore carry a cautionary label:

“This is a modern reference map—historical knowledge of the entire planet is not implied—the world of early world civilizations was not global but local.”

Most historical cartography uses modern reference maps without ever saying so; it not only flattens the earth but also the past by simply projecting it onto maps of the present. Consult any atlas of world history and look for notable exceptions. Yet even though the common practice of historical mapping can be ruled presentistic and anachronistic, the problem of how to provide a richer and more accurate historical account of seeing the past through modern eyes cannot be solved by warning labels. We have to reinvent historical cartography.

Historical mapping could become much better and a lot more interesting if it would retain—and show—the complexity of history and the difficulties of its reconstruction. It could approach the past from the present and combine original historical perspectives with modern accounts. Historical maps and other sources of spatial knowledge and conceptions from preglobal times are readily available^[12], and this information could be delineated in hybrid world maps by foregrounding ancient and backgrounding modern geography and knowledge. Figure 3 provides a suggestive example.



Figure 3. The Known World About 250 B.C

Source: H. G. Wells, *The Outline of History: Being a Plain History of Life and Mankind* (2 vols. New York: Macmillan, 1920), vol. 1, p. 406.
Map by J(ames) F(rancis) Horrabin.

James Francis Horrabin (1884-1962), the creative illustrator of H. G. Wells' *Outline of History*, allowed the viewer of his world map to situate the "known world" of ca. 250 BCE in the context of the unknown globe. By combining both old and new perspectives, Horrabin's hemispheric map created a straightforward and yet sophisticated exemplar of historical cartography.^[13]

Horrabin sketched the "absolutely unknown" parts of the geobody in the dark zones of Figure 3. He hatched the "vaguely known" regions of the world in a gray and fuzzy frontier that stretched all

over Eurasia and included the outlines of Africa (vaguely known to “Carthaginian sailors”), Australia and Indonesia. Two lighter if not enlightened sections distinguished between the “area known to the western mind” (ranging from Spain to India and Sri Lanka) and the “area known to the eastern mind” (roughly covering China, Korea, Japan and Taiwan). Locating these largely disconnected civilizational regions on the globe and drawing the time-sensitive boundary between preglobal and global views of the earth, Horrabin successfully combined the geographic information of a modern reference map with Wells’ understanding of the historical record, in this case, the geography of two distinct local knowledge systems. For the time, the Wells-Horrabin map from 1920 showed historical cartography at its non-Eurocentric best.[\[14\]](#) It is unfortunate that this advanced form of historical cartography is still waiting for the honor of improvement and widespread imitation, a few notable exceptions notwithstanding.[\[15\]](#)

The Image of Globalization

A strong light casts a deep shadow observed Goethe’s Götz von Berlichingen.[\[16\]](#) What casts such a strong light and deep shadow these days is globalization.

Globalization is in the limelight of the present time and draws everybody and everything into its circle. Nobody can escape the blinding light of the present, but historians should reason like Berlichingen and look for the deep shadows surrounding the focus of the present. Is globalization leaving its history in the dark? How does the elimination of preglobal geographies affect the image of globalization? Is the icon of the globe creating a presentistic image of globalization? What is the image of globalization? If the *imago mundi* of the present time is the globe, the image of globalization, I would argue, must be a shrinking globe—an ever smaller world with increasingly faster and denser connections all across the planet. A well-known chart by David Harvey supports this conjecture (Figure 4); it shows the image of globalization with its bright light and unintended shadows.

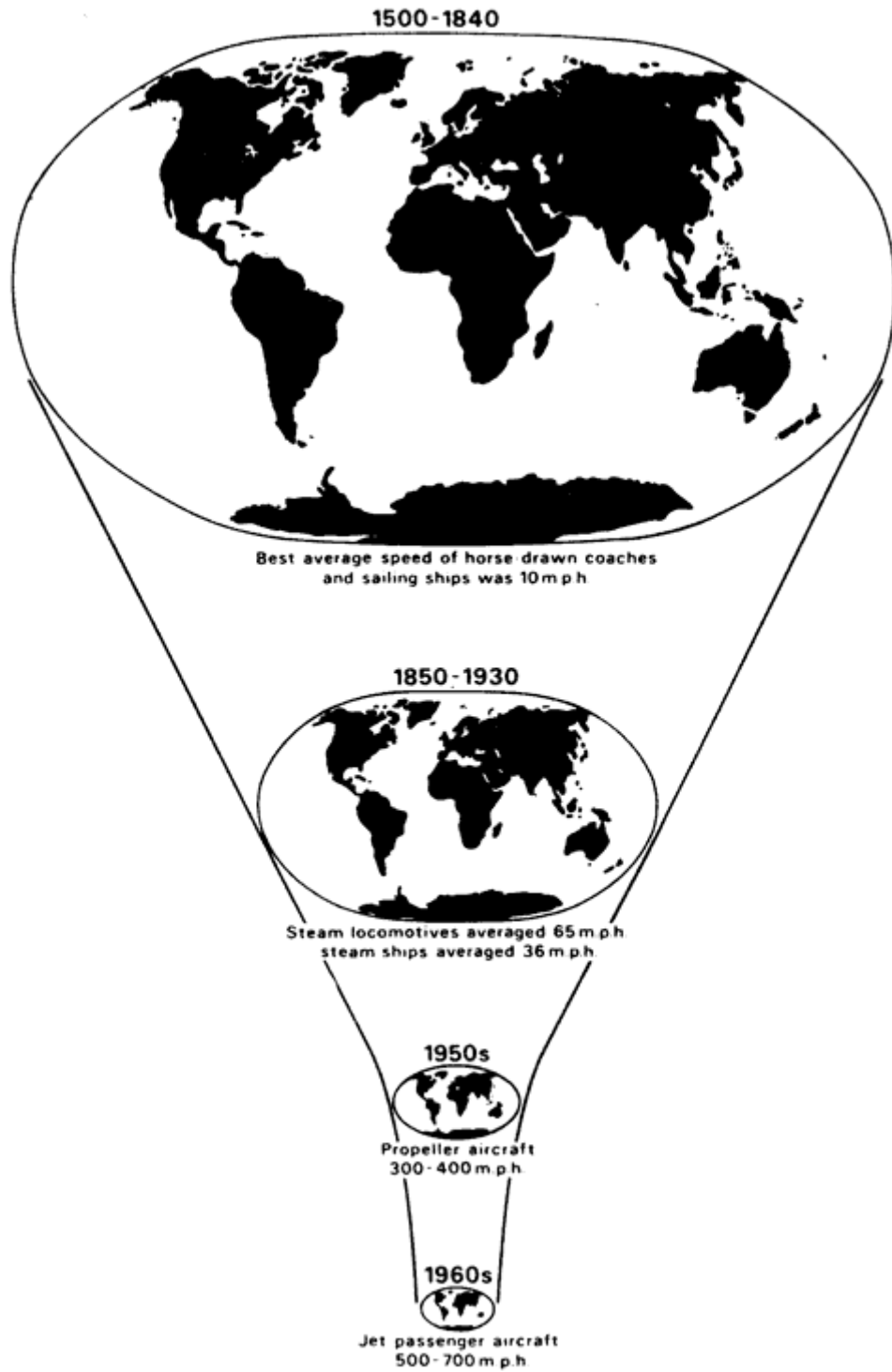


Figure 4. The Shrinking Map of the World

Source: David Harvey, *The Condition of Postmodernity* (Oxford and Cambridge, Mass.: Basil Blackwell, 1989), p. 241, plate 3.1. Reproduced by permission of Basil Blackwell.

“The shrinking map of the world through innovations in transport which ‘annihilate space through time’,” reads Harvey’s caption; he explains, “space appears to shrink to a ‘global village’ of telecommunications and a ‘spaceship earth’ of economic and ecological interdependencies” and “time horizons shorten to the point where the present is all there is (the world of the schizophrenic).”[\[17\]](#)

For Harvey, the “time-space compression” of the shrinking globe is rooted in the history of capitalism since 1500 CE, which, one could add, is rooted in a history that started well before. Lesser issues could be brought up too; for instance the relatively small amount of “data-ink”[\[18\]](#) in Harvey’s four world maps. One could wish that the progressively shorter time intervals between the various transportation revolutions had been visualized, or one could criticize that the author did not mention the “inherent inaccuracy”[\[19\]](#) of this kind of map, but these are quibbles. Harvey’s cartogram brought an important point across, namely that the time to traverse the geobody shrank dramatically in the last five hundred years. Following Harvey, the compression of space and time became a major theme of globalization studies in the 1990s, though Figure 5 may remind us that the shrinking-globe phenomenon was well-understood and charted at least half a century earlier.

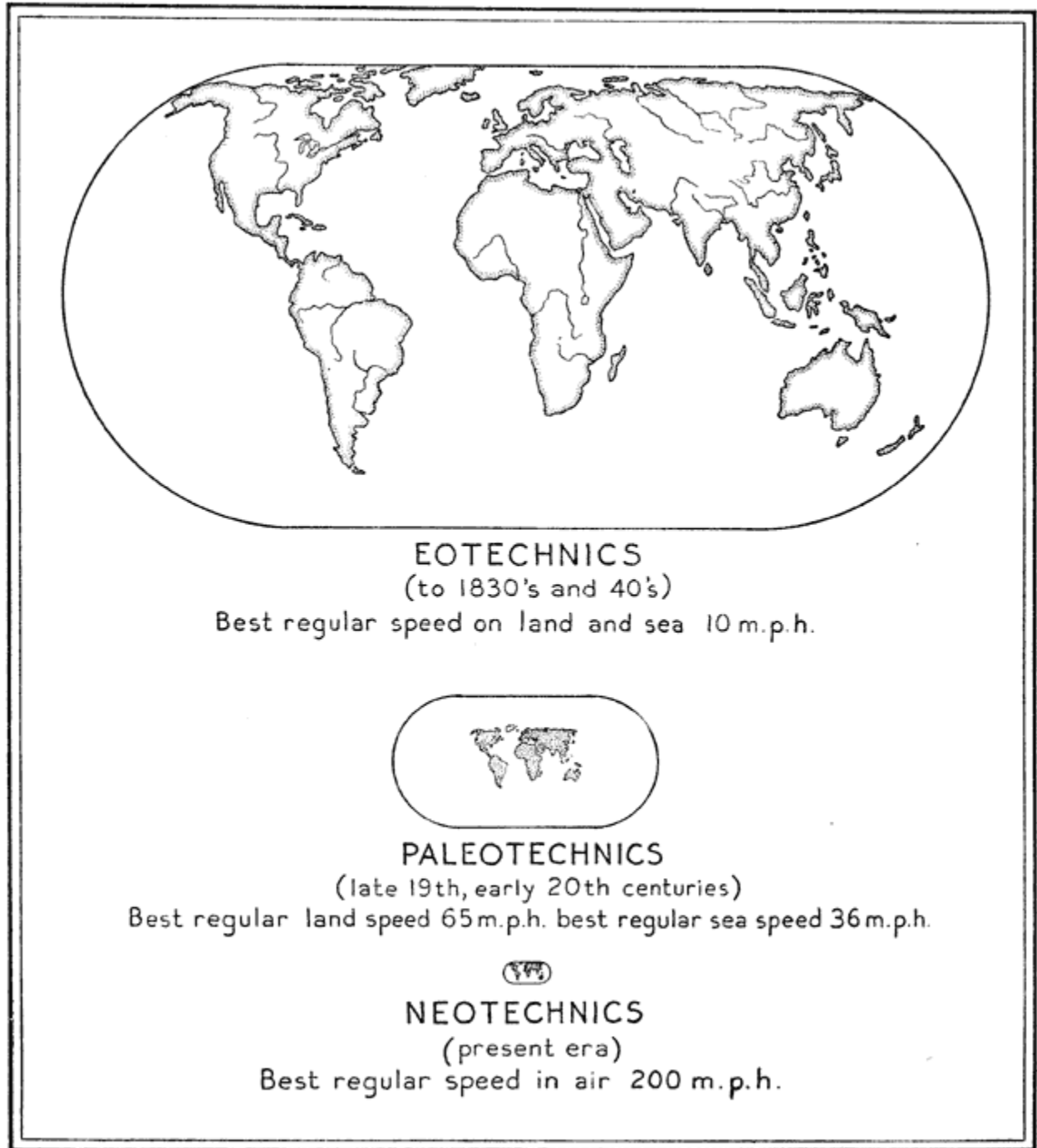


Figure 5. Technical Progress in Travel Time

Source: Eugene Staley, *World Economy in Transition* (New York: Council on Foreign Relations, 1939), p. 6.

Courtesy of the [Council on Foreign Relations](#)

In 1939, Eugene Staley explained: “Eotechnics, or the dawn age of modern technics, stretched roughly from the year 1000 to the latter part of the eighteenth century, and in some respects into the mid-nineteenth century. It was a water-wind-and-wood complex. The express mail coach on land

and the perfected sailing vessel on the sea were its highest achievements in the field of travel and transport. Paleotechnics dominated the nineteenth and early twentieth centuries. It was a coal-and-iron complex, and produced the steam railway and the steamship. Neotechnics, of which we have been experiencing the beginnings since the late nineteenth century, is an electricity-and-alloy complex. It has produced radio communication, the modern automobile, the Diesel-electric streamlined train, and the airplane.”[20]

Staley’s epochal categories (eotechnics, paleotechnics, and neotechnics) prefigure Harvey’s periodization, and had been provided a few years earlier by Lewis Mumford, who had been inspired and “shaken to the core” by the work of Patrick Geddes.[21] The heady recognition, however, that modern technical ingenuity was shrinking the globe can be traced back to the transcontinental reach of the electrical telegraph. In 1868, Samuel Morse was honored in New York for having “annihilated both space and time in the transmission of intelligence.”[22] Figures 4 and 5 thus illustrate the protracted cartographic recognition of globalization in the “long” nineteenth century (lasting until ca. 1950) and first half of the “real” twentieth century (starting about 1950).

Now, if globalization is appropriately defined as a “process in which the constraints of geography on social and cultural arrangements recede and in which people become increasingly aware that they are receding,”[23] then we can rest assured that the shriveling world maps and the shrinking globe are the paradigmatic images of globalization that illuminate the present time—so where are the predicted shadows and what do they hide?

Let us look at the shrinking world maps of Figure 4 again. We see four increasingly smaller yet identical outlines of the Americas, Eurasia, Africa, Australia, and Antarctica. Focusing on the map on top, dated 1500 to 1840, which informs us that ten miles per hour was the average speed during that time,[24] we are allowed to wonder: was this the world Columbus had in mind when he set sail for the “East” Indies? And you are right: the answer is negative. Harvey’s quasi-isochronic[25] world map does not represent the world as it was known and/or imagined around 1500 CE. The geographer is playing with the current reference map of the world to make his point about time-space compression. Columbus’ picture of the globe is absent. What you do not see (Columbus’ worldview) is hidden in the shade, obscured by the presentistic image of globalization. Later knowledge has eclipsed earlier knowledge.

Does it matter for Harvey’s argument how Columbus and his contemporaries pictured the world in the past present of their time? Obviously not. What Harvey wants to get across is something else, namely the geographic and metageographic effects of ever shorter travel times. And this is all true: the political, social, and cultural properties of space do change with increasing speed averages; jet space is different from steam ship and horse-drawn carriage space. The explicit argument of Harvey’s chart is correct; what must become a matter of concern, however, are the implicit and unintended consequences of the powerful imagery of the shriveling world map and the shrinking globe.

It was Harvey’s intent to illuminate the progressive compaction of the world up to the “schizophrenic” moment “where the present is all there is.” But the telling irony of his illustration is that Harvey’s map of departure is the map of the present present, which he iterates back until the modern world map becomes the image of the world from “1500-1840.” We can be sure that Harvey

knows all about the protoglobalization of the planet and does not want to obscure it—yet there is no trace of what was happening with the earth between 1500 and 1840. Did he want to say that the world map of the present moment is all there is? Of course not, but we do not get anything else.

So, what happened between 1500 and 1840? In the long and tortuous history of the discovery of the entire earth, these three hundred and forty years were arguably the golden years; the earth was not shrinking but growing at an unprecedented rate. In 1957, George Sarton wrote, “The Renaissance was truly the golden age of geographical discovery. By the year 1600 the surface of the known earth was doubled. Was not that an achievement of incredible significance? The earth was doubled! It was not only a matter of quantity, but one of quality as well. New climates, new aspects of nature were revealed, new plants, new animals, new men and women.”^[26] And after this period, packed with exploration, information, conquest and slaughter, instead of shrinking, the knowledge of the earth kept growing in leaps and bounds. Consider aboriginal Australia for example.^[27] It was *terra incognita* in the sixteenth century, not to be found on any European map. Then the coastline of *Hollandia Nova* emerged gradually on seventeenth and eighteenth century maps. The late eighteenth and early nineteenth centuries added rivers and mountains (together with British convicts), and the twentieth century continued the mapping of Australia without finishing it. In 1982, Thomas Melville Perry noted, “The mapping of Australia is not yet complete. Large-scale maps exist only for the more closely settled parts of the continent, and despite the aid of modern instruments, topographical mapping is slow and expensive for a nation with a small population.”^[28]

Conclusion

The mapping of all landmasses, islands, and oceans in the last five hundred years has ended the protoglobalization of the planet, however incomplete the detailed mapping of some parts of the skin of the geobody may be. Of course, nobody can be sure that all geography-changing discoveries have been made, but it is probably safe to expect that what is still hidden under water or on the ground will not be utterly surprising. The cartography of the surface of the planet has matured into a normal Kuhnian science expertly handled by geographical information systems (GIS). Revolutionary mapping is moving into new spaces and bodies: farther away into outer space and deeper inward into the depths of the earth and the human body. The mapping of the human genome, for example, has already produced the genetic counterpart of the modern world map. An equivalent map of the brain of *Homo sapiens* cannot be too far off. And if history could be used as a guide, we could safely predict that future mapping will eventually serve the colonization of extraterrestrial space as well as the domestication of the earth and the human body.

Turning around and looking backward, the historian can see another set of problems emerging from the current position: the overpowering and outshining of all preglobal geographies by the global imagery of the present. The iconic globe and its presentism overpower the local geographies of the past, and the modern world map and its false transtemporal ubiquity outshine the original history of globalization. This is not a good constellation for historical cartography. Plastering the global present indiscriminately over all local pasts re-imagines and disowns the past.

We have to try to step back from the iconic pressures of the present and ask about the local historical foundations upon which present-day globalization was built. How did the

protoglobalization of the planet come about? Globalization without full knowledge of the globe is phantasmagoric, and knowledge of the globe without the local histories of globalization is hegemonic. So how has humankind moved from myriad local spaces to the Pangaeian unity of global space? To retrieve that history is the task ahead. Answering this question may take some time but the answering strategy should be clear from the start: we have to chart the past as a foreign country again and reconstitute the splintered and fragmented puzzle of the human habitats out of which the full picture of the face of the earth was eventually formed.

We could begin by going back in time via historical maps but our goal has to be a new historical cartography that would tell the stories, portray the processes and reveal the growing interconnectedness of humanity in space. Turning the pages of an historical atlas and imagining that change is not enough — the historical map itself has to tell a story of change.

Acknowledgements

The author would like to thank one of the anonymous reviewers of this article for particularly generous and helpful suggestions and comments.

Notes

1. J.B. Harley's 1989 call for an "alternative cartography" (see note 7 below) goes far beyond this article and its critical aim. The critique can only show that historians are badly served by the presentistic and static nature of traditional modern cartography; it cannot reach the ambitious goal of a *narrative* historical cartography that would show history as change over time.

2. See Denis Cosgrove, *Apollo's Eye: A Cartographic Genealogy of the Earth in the Western Imagination* (Baltimore and London: The Johns Hopkins University Press, 2001). It is a bit ironic that this excellent study of the "genealogy of global images and meanings from ancient Greece and Rome to the twentieth century" features a famous NASA-photo ("Earthrise") on its title page without ever realizing that the familiar horizontal perspective of this iconic image is deceiving; see note 8 below.

3. I am ready to plead guilty too. Globes and world maps have figured prominently on my web pages for global history since 1994. However, I once used an image of the sun to counterpoint the Ptolemaic "revenge" and have always argued that global history should be approached with a clearly and proactively announced reflective presentism.

4. Note for example the enormous blue globes framing the "News Hour with Jim Lehrer" on the American Public Broadcasting Service (PBS).

5. Considering this peculiar rehabilitation of the geocentric world view, one may also want to note that these well-rounded globes would please all Peripatetics for another reason as well: they are perfect spheres and thus conform to the classic prejudice about the shape of heavenly bodies. I wonder, what has happened to Newton's insight that the shape of a rotating earth cannot be a perfect sphere but must be slightly flattened at the poles and thicker around the middle? Why is it

so hard to appreciate that the earth is actually an irregularly shaped ellipsoid of revolution?

6. I have appropriated this word from Walt Disney; it was defined in the context of Disney's EPCOT as "a blending of creative maginations with technical know-how." See Wolf Schäfer, "The Uneven Globality of Children," *Journal of Social History* 38, no. 4 (Summer 2005): 1037, note 6.

7. It is not encouraging that traditional historical cartography has "remained such an unexamined aspect of our creative scholarship." These were the words of J. Brian Harley in "Historical Geography and the Cartographic Illusion," *Journal of Historical Geography* 15, no. 1 (1989): 80-91. Noting the unwillingness to tackle historical cartography at the epistemological level, Harley criticized the "illusion of cartographic objectivity" (especially in data maps) and wrote in 1989, "A radical critique of academic cartography as it bears on historical geography is overdue." Yet alas, the "glimpses of a theory of an alternative cartography" (ibid., p. 88) shared by Matthew Edney, Dennis Wood, David Woodward and Brian Harley have remained an unmet challenge to this day.

8. See <http://www.wsu.edu/~wldciv/covenant.html> (accessed August 8 , 2005).

9. The two American astronauts who captured "Earthrise" in December 1968, Frank Borman and William Anders, shot three photographs: first, a black-and-white photograph (Borman), and then two color shots (Anders). The black-and-white photo took its cue from the experience of a moonrise on earth and thus showed a *horizontal* lunar surface above which the earth was "rising." The two color shots reflected the orbit around the lunar equator in which the astronauts were traveling and thus introduced an unfamiliar perspective: Now the earth was no longer *rising* above the lunar horizon but *emerging next to the vertical edge of the moon*. What one normally sees is one of these prettier color images (often in grayscale). The image, however, is usually rotated 90 degrees clockwise to accommodate the conventional terrestrial viewpoint of a "rising" heavenly body; see <http://www.abc.net.au/science/moon/earthrise.htm> (accessed August 8 , 2005) and Robert Zimmerman, *Genesis: The Story of Apollo 8: The First Manned Flight to Another World* (New York and London: Four Walls Eight Windows, 1998), p. 171-172.

10. See <http://www.wsu.edu/~wldciv/rationale.html> (accessed August 8 , 2005).

11. See Hermann Kinder and Werner Hilgemann, *DTV-Atlas zur Weltgeschichte* (Munich: Deutscher Taschenbuch Verlag, [1964] 6th ed. 1970), vol. 1, p.16; map by Harald and Ruth Bukor. The author of this article and the editor of *Coordinates* tried unsuccessfully to gain permission from DTV Press to show this map. Quoting copyright concerns with respect to an online publication, DTV refused granting us this permission. The map in question is hardly original, however. For an online map that comes close, see http://anthro.palomar.edu/political/images/map_of_ancient_civilizations.gif (accessed August 4, 2005).

The German word *Hochkultur* would literally translate as "high culture." For a discussion of the semantic history of civilization and culture in different linguistic contexts and an attempt to rethink civilization, see Wolf Schäfer, "Global Civilization and Local Cultures," *Rethinking Civilizational Analysis*, ed. Said Amir Arjomand and Edward A. Tiryakian (London: SAGE Publications, 2004), p. 71-86.

12. The outstanding multi-volume *History of Cartography* series, founding editors J. B. Harley and David Woodward, published by the University of Chicago Press since 1987, provides the best history of maps and mapping. The first two volumes (in four books) cover preglobal cartography in traditional societies including Europe; see <http://feature.geography.wisc.edu/histcart> (accessed April 27, 2005). For thorough but somewhat limited historie of historical atlases, see Walter Goffart, *Historical Atlases: The First Three Hundred Years, 1570-1870* (Chicago: University of Chicago Press, 2003) and Jeremy Black, *Maps and History: Constructing Images of the Past* (New Haven and London: Yale University Press, 1997).

13. For Horrabin, a versatile book illustrator and newspaper cartoonist (“Dot and Carrie”), see http://www.lambiek.net/horrabin_jf.htm (accessed August 8 , 2005).

14. This does not mean that the image presents a timeless achievement; it carries the shades of its ideological heritage and we can see them clearly. For example, Horrabin’s “absolutely unknown” African and Australian parts of the world were of course only *relatively* unknown. We can therefore say that a more circumspect historical cartography would have to take indigenous knowledge and conceptions of space into account.

15. A fine example of thoughtful and sophisticated historical cartography is the *Bateman New Zealand Historical Atlas (Ko Papatuanuku e Takoto Nei)*, ed. by Malcolm McKinnon (Albany, Auckland, N.Z.: David Bateman, 1997). The prominent incorporation of Māori perspectives, experience and history is superb. Felipe Fernández-Armesto, ed., *The Times Atlas of World Exploration* (London: Harper Collins, 1991) is also excellent; it presents historical and modern maps as well as maps that indicate the known, vaguely known and unknown world around 1500 CE for eight exploring cultures (p. 16f).

16. *Wo viel Licht ist, ist starker Schatten*. Götz von Berlichingen (1480-1562) was a German Imperial knight and adventurer. The quotation comes from Goethe’s *Götz von Berlichingen* (I, 24).

17. David Harvey, *The Condition of Postmodernity: An Enquiry into the Origins of Cultural Change* (Oxford and Cambridge, Mass.: Basil Blackwell, 1989), p. 240.

18. See Edward R. Tufte, *The Visual Display of Quantitative Information* (Cheshire, Connecticut: Graphics Press, 1983), p. 91-105.

19. Erwin Raisz expressed professional concern in 1948 about equal-time maps: “Although such maps powerfully convey the underlying idea, their use should be restricted on account of their inherent inaccuracy.” See Erwin Raisz, *General Cartography* (New York: McGraw-Hill, 1948), p. 263.

20. Eugene Staley, *World Economy in Transition: Technology vs. Politics, Laissez Faire vs. Planning, Power vs. Welfare* (New York: Council on Foreign Relations, 1939), p. 4f.

21. See Staley, *ibid.* p. 4, note 2; Lewis Mumford, *Technics and Civilization* (New York: Harcourt, Brace and Company, 1934), p. 109; and Patrick Geddes, *Cities in Evolution* (London: Williams and

Norgate, 1915).

22. See Tom Standage, *The Victorian Internet: The Remarkable Story of the Telegraph and the Nineteenth Century's on-Line Pioneers* (New York: Berkley Books, 1998), p. 90.

23. See Malcolm Waters, *Globalization* (London and New York: Routledge, 1995), p. 3 (in italics).

24. Since Harvey's map closely resembles Staley's map, let me note that Staley was rather circumspect about speed-averages: "A word is needed on the speeds used in this chart to represent the best consistent performance of each of the three technological epochs. The land speed of 10 miles an hour for eotechnics is that of the best mail-coach routes in England in the 1838's. Travel speeds on the Continent, even in the more progressive countries and on the main roads, were only about half as fast... On the Sea, the full possibilities of eotechnics were not attained until the 1840's and 1850's, when the famous American clipper ships were still holding their own against the competition of early steam navigation" (Staley, *World Economy in Transition*, p. 5).

25. Isochronic maps plot equal-time distances (iso- means equal and chronos stands for time). "These maps show the possible progress of travel in all directions from a given center in certain specified time intervals. A century ago the distances that could be reached in a day, week, or month were much closer than at present. This 'shrinkage' of the world is one of the most significant facts of modern history" (Raisz, *General Cartography*, p. 262).

26. George Sarton, *Six Wings: Men of Science in the Renaissance* (Bloomington: Indiana University Press, 1957), p. 5.

27. See Paul Carter, *The Road to Botany Bay: An Exploration of Landscape and History* (New York: Alfred A. Knopf, 1988). First published in London by Faber and Faber, 1987.

28. Thomas Melville Perry, *The Discovery of Australia: The Charts and Maps of the Navigators and Explorers* (London: Hamish Hamilton, 1982), p. 145.

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