

How do maps create a physical space for us to use?

a cognitive—and historical—question



Dan Brownstein

March 1, 2011

dabrownstein@gmail.com

What did Wood teach us about maps?

- As much as maps reflect cartographic science, they accumulate, encode, and synthesize information
- Synthesize existing knowledges
- Labor-saving devices
- They do not represent the world, but “effect” a relation to space that we cannot see

Maps Idealize a Relation to the Space They Represent

- ◆ Maps show the reality we *know*, and its history—not the reality that we see and feel. They are removed from our lived experience—even if we depend on them to live
- ◆ How maps synthesize and embody knowledge is *socially constituted* as much as objective

Two maps of different scales depict different relations to space

Local routes of BART



National weather map



What 'work' does this alternate map fail to do? Maybe it's just too fussy



--too *complicated* to read

--not enough simplification

--stops not clearly marked
in a sequence

--track too detailed and exact

--shows every shift in real
space, as opposed to where
I want to go

--San Francisco a nightmare

--harder to see how I can shift
trains at McArthur Station

How do choices in the design of a BART map “link” its user to an understanding of the territory?

Much is left out of this map, but it shows us our stop and where we need to go. It doesn't Show us what any place is like.

Each stop shown identically, and Without distinction, from Bay Point to Embarcadero to Mission

Whose interests does it serve?



Both Actual Maps Engaged our 'Mental Maps'

“The design used by BART has the function of relating the station information to the “mental map” . . . we all carry with us.” -Gavin

“I have a very poor mental map of the Bay Area. It is blurry, inaccurate and far from straightforward, as is usually the case with mental maps. But the BART map, though contrived and not wholly accurate, links my rough mental map to an oversimplified, tremendously useful map that . . . use to get pretty much anywhere I need to go.” -Samantha

“ In these maps exist unlimited possibilities for the past and future. . . . We can envision our trajectory to our destination . . . the ferry building, the Embarcadero station dot.” -Danae

Several forms of knowledge synthesized in a weather map
by distinct conventions:
temperature, cold fronts, precipitation

“Maps allow us to tap into accumulated knowledge. . . . of a nation’s Weather, or a map of a BART system, and link us with two different types of knowledge.”
-Nik



We all employed mental maps to get to Kroeber Hall:
we adjust our mental map against this map, for
clearer scale, orientation, directionality (Samantha)

UC BERKELEY CAMPUS MAP



“View” Versus “Map”

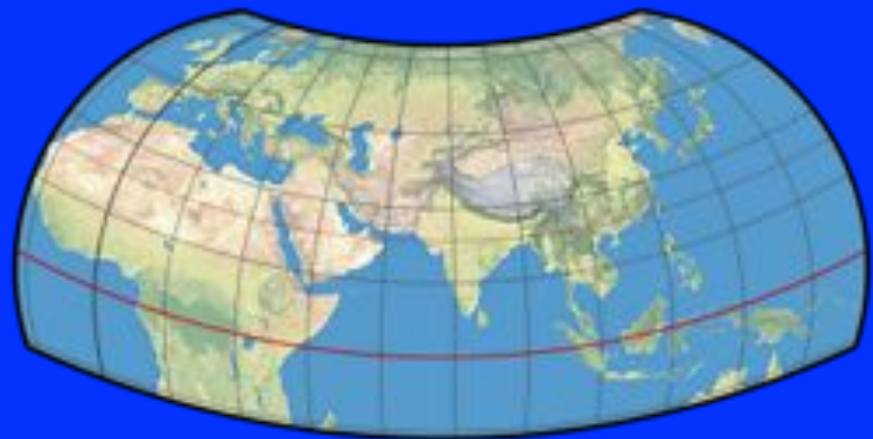
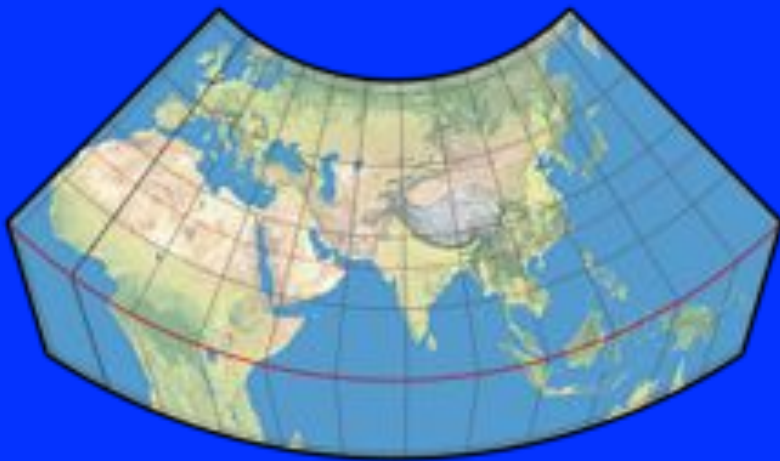


Modern Maps encode and frame “place” by often tacit codes

- **Scale:** compression of spatial relations
- **Projection:** representation or transference of world to a flat surface, usually designed to minimize distortions. *All projections are distortions.*
- **Orientation:** directionality for orienting viewer to map’s contents; implicit or explicit
- **Symbols, map-signs, or plans**

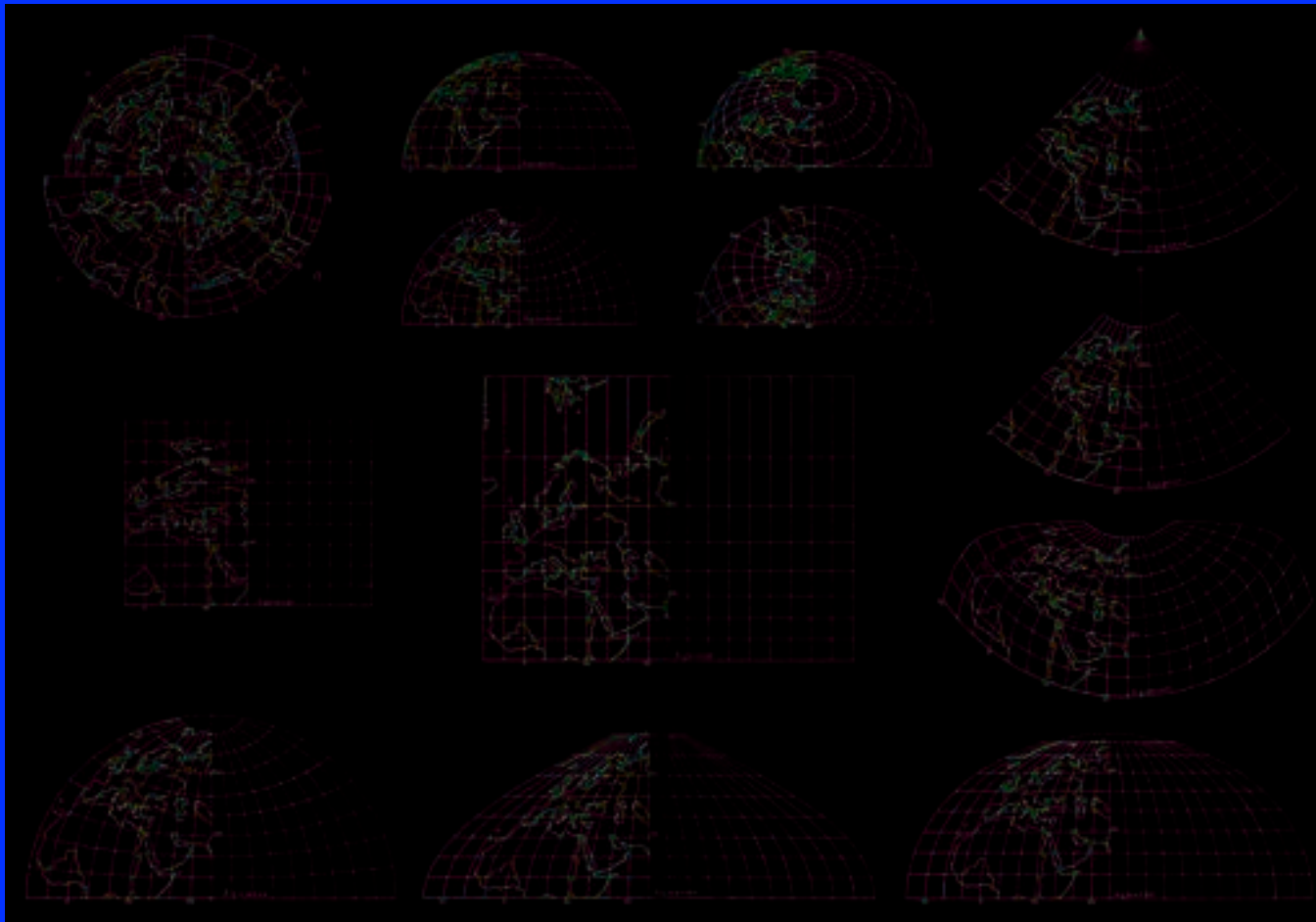
The 1st-century geographer Claudius Ptolemy used geometric models to “view” the earth’s surface on a plane by bearings of longitude and latitude

- All projections will always provide a distorted view of the world
- Distortions can be minimized in various ways, and scale maintained
- Abstract a “coherent view” terrestrial continuity no one can occupy
- Tension between abstract/quantitative and representational/pictorial.

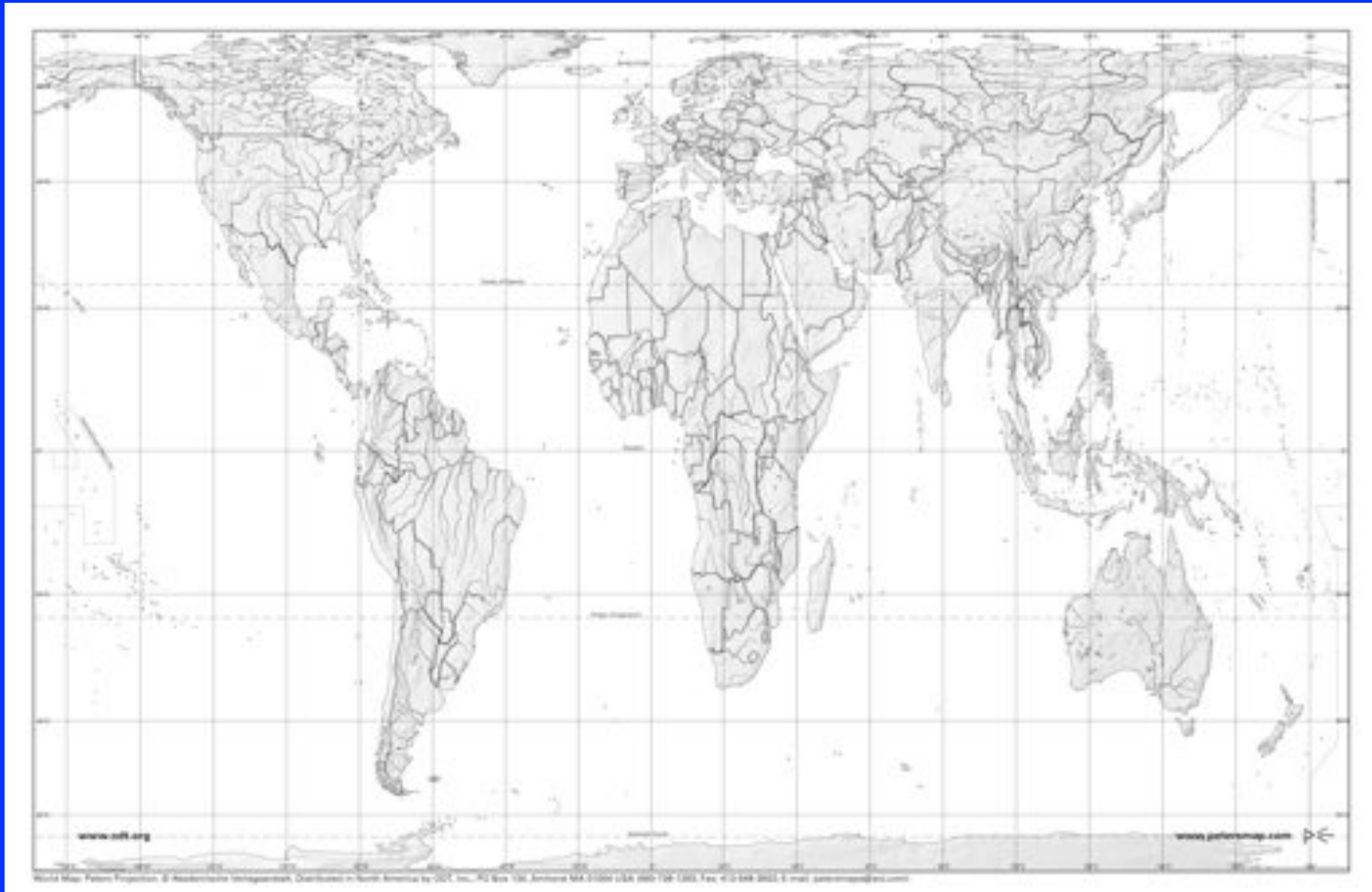


Forms of Map Projection (Germany, 1898)

“There are an infinite number of possible map projections”



In 1974, **Arno Peters** drafted an “Equal Area Projection” to preserve proportional size of land masses in an “objective global concept” by stretching graticule to reflect the greater size of regions near the equator



Abstract signs in map ‘embody’ relation to land in contour map of Angel Island, San Francisco

- ◆ its function is to “make present” the meanings for viewer
- ◆ Notes elevations and scale
- ◆ Works great if you’re biking or planning a hike in Angel Island!
- ◆ Doesn’t show a lot of other information on beaches, roads, or campsites



Maps and GPS/Google Earth

- Both rely on locating techniques that are *borrowed* from maps and conventions of locating and orienting a viewer to expanse
- Both create a *view* that derives from and is designed to imitate the surface projection of a map, and presuppose a concept of *map use*
- Only GoogleEarth *uses* satellite or aerial photographs—omitting the decisions by which mapmakers select features to shape the map

This satellite photo is not *like* a map . . .

It offers no orientational devices we *expect* from maps, and don't do the "work" maps do for the viewer—or reflect a map-maker's interests



The Ordering and Representation of Space in any Map Serves an interest



"United States of America. Compiled from the latest & best Authorities by John Melish " (1820)

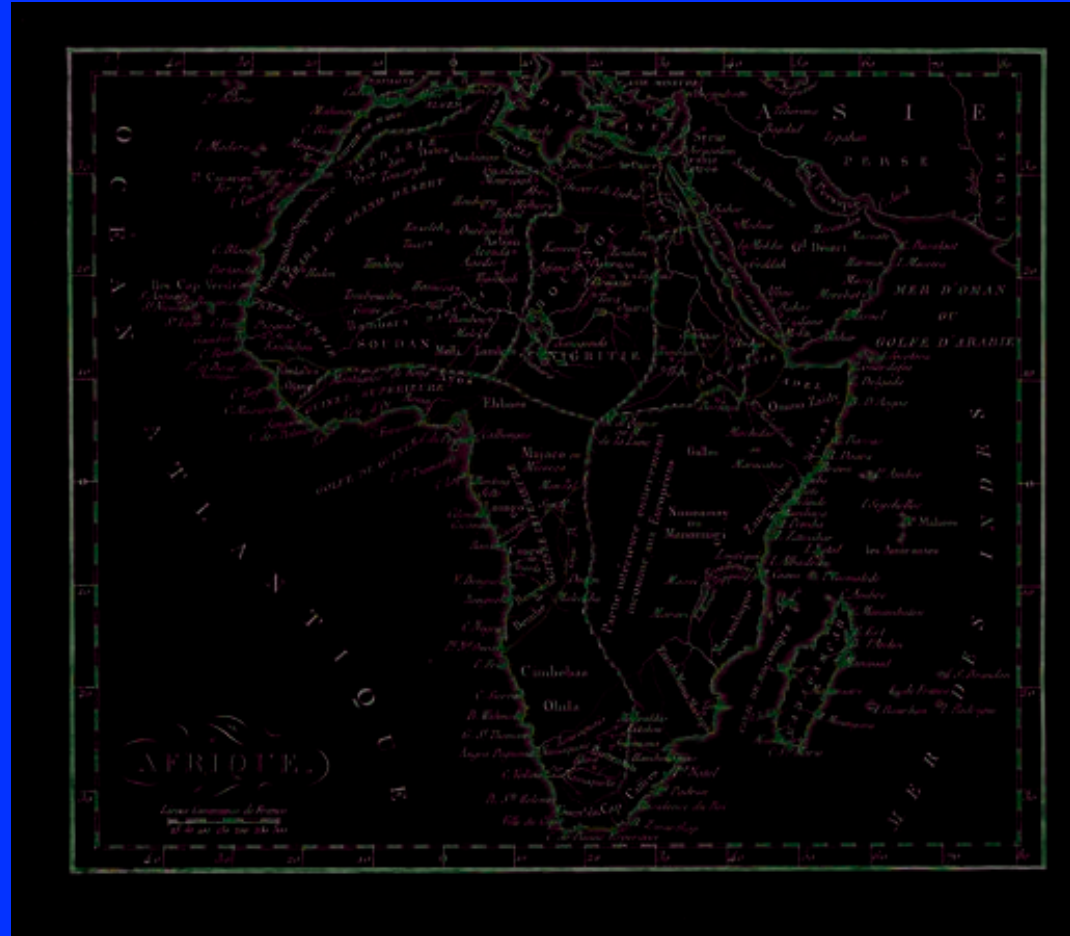
Designed to ensure that every American could have a view by "detailed and accurate surveys" of their country.

Allowed each citizen to know and 'possess nation' through map, indicating the land that remained to be settled to inspire fellow-citizens to migrate West.



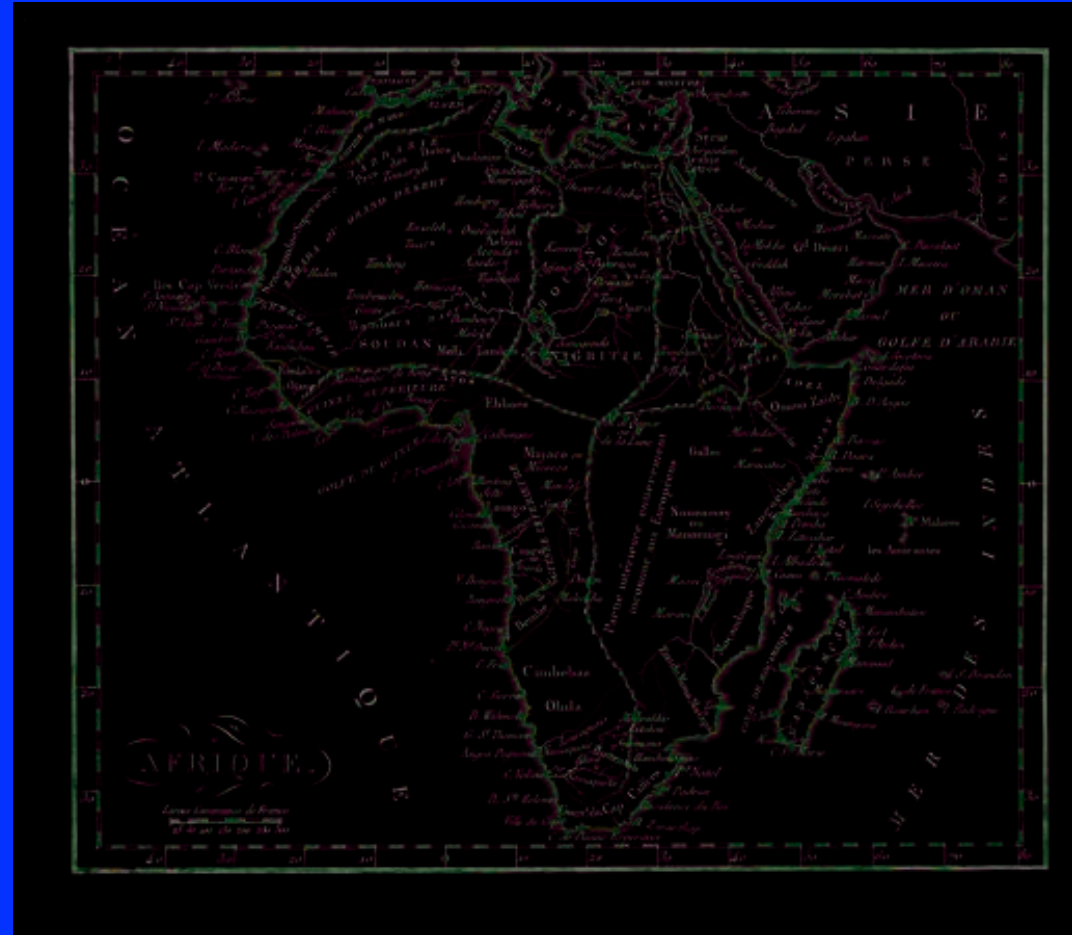
**African continent,
with no toponyms
save on its coastlines**

Did this map embody “open
territory for the imagination
of the Frenchman or
European?”



France, 1819

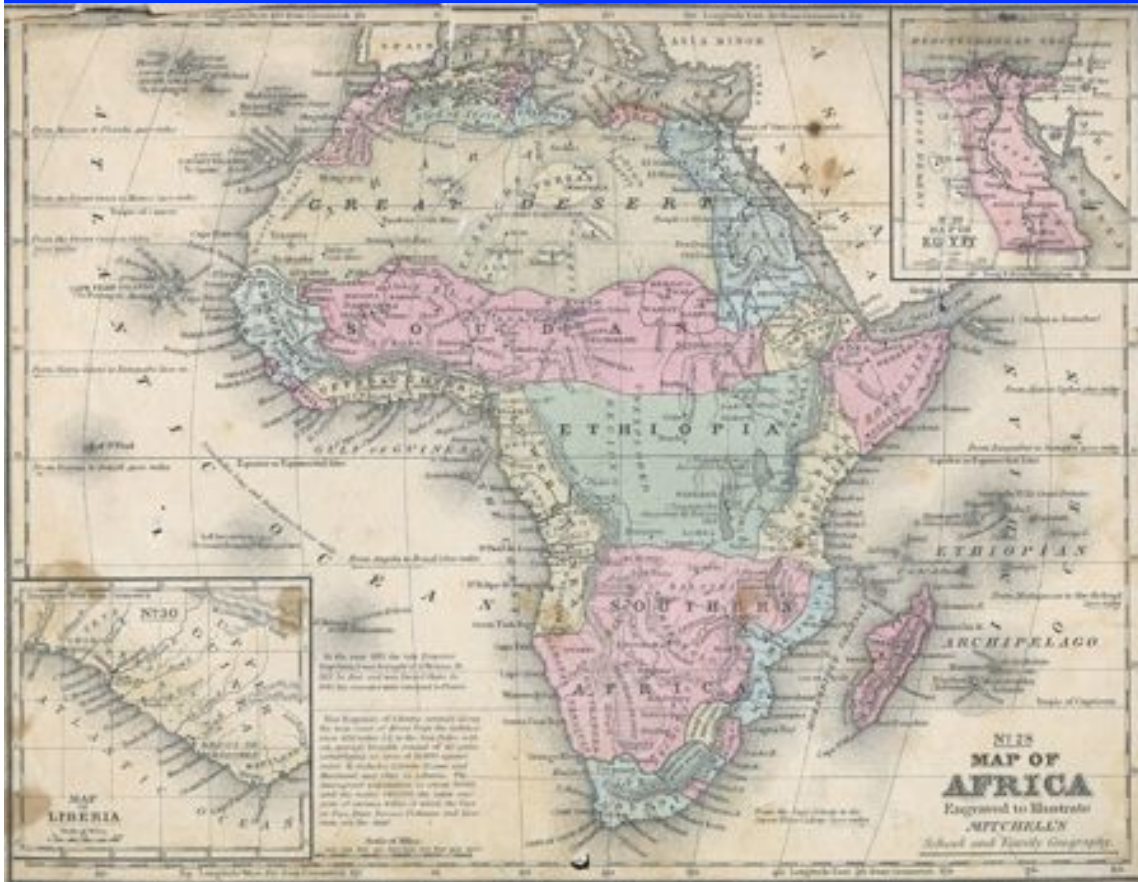
Did the map present
'open territory' to
the spatial
imagination of
European readers?



Marlowe's Revery (1900)

“Now when I was just a little chap, I had a passion for maps. I would look for hours at South America, or Africa, or Australia, and lose myself in all the glories of their exploration. At that time there were many blank spaces on the earth, and when I saw one that looked particularly inviting on a map (but they all look that) I would put my finger on it and say, “When I grow up, I will go there.”

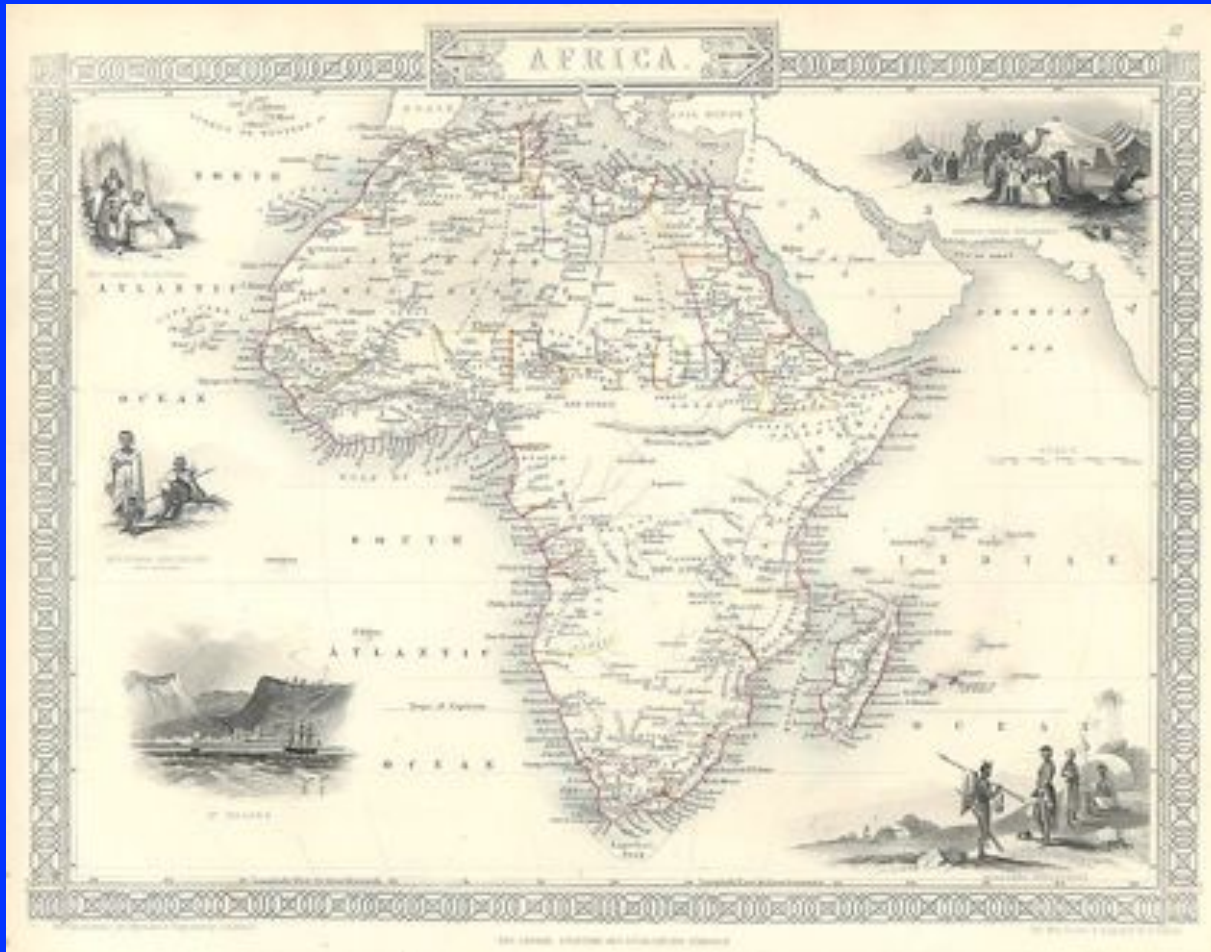
Pre-Colonial Africa: 1858



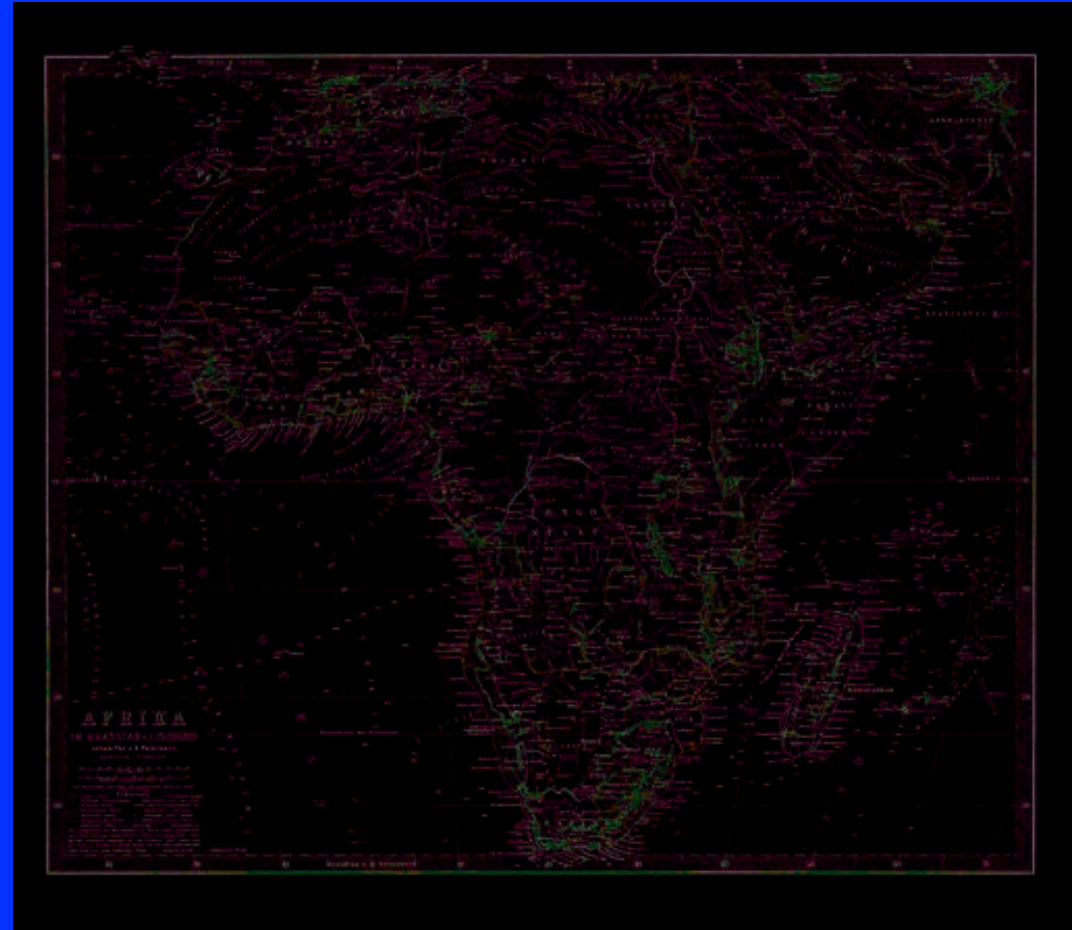
The map of the continent before European colonization displays European possession of Cape Southern Africa, Liberia, Sierra Morocco, Tunis, Tripoli, Barbary, Algeria, Egypt, Darfur, Madagascar, “native state” of Ethiopia and “Republic of Liberia” (inset, with cities ‘Maryland’ and ‘Ohio’)

From: *Mitchell's School Atlas*
(Philadelphia, Pennsylvania: E. H. Butler & Co., 1863)

Decorative Map of Africa (1853), including decorative 'vignettes' of its inhabitants



African continent in a far more detailed early map of interior lands, 1891



Thought- Question for the Day

Are maps a form of literacy? **Wood** argue maps didn't exist before 1500. His point has to do with *map use— and the production and distribution of maps*

- There was limited circulation in print, and a small market in which engravings circulated
- Limited framework to synthesize information in map design
- Importation from texts and spatial imaginaries and constructs *into* maps
- No sense of linking land to ownership or trade, or mapping administrative ties

How maps made claims present from 1500

- ◆ Adoption of Ptolemaic projections to map world's surface to uniform coordinate plane (1480)
- ◆ Printing, letter punches, engraved images increase legibility of 'modern' regional maps (1480-1560)
- ◆ Triangulated surveys of topography (1540-80)
- ◆ Globes (1530s)
- ◆ **First printed atlas** group projections and surveys in one book (1570-1670s)
- ◆ National empirical surveys (1790-1820)
- Statistical distributions in maps (1860s)

Cosmic “map” pre-1500

Babylonian “Map” of the Cosmos on stone tablet, c.
700-500 BC



Korean Ch'Onhado Maps

mid-18th Century Korean
World Map reveals human
impulse to order spatial relations
—but without scale and
orientation

- ◆ no metric scale or encoding
place
- ◆ no geometric forms of
spatial transference



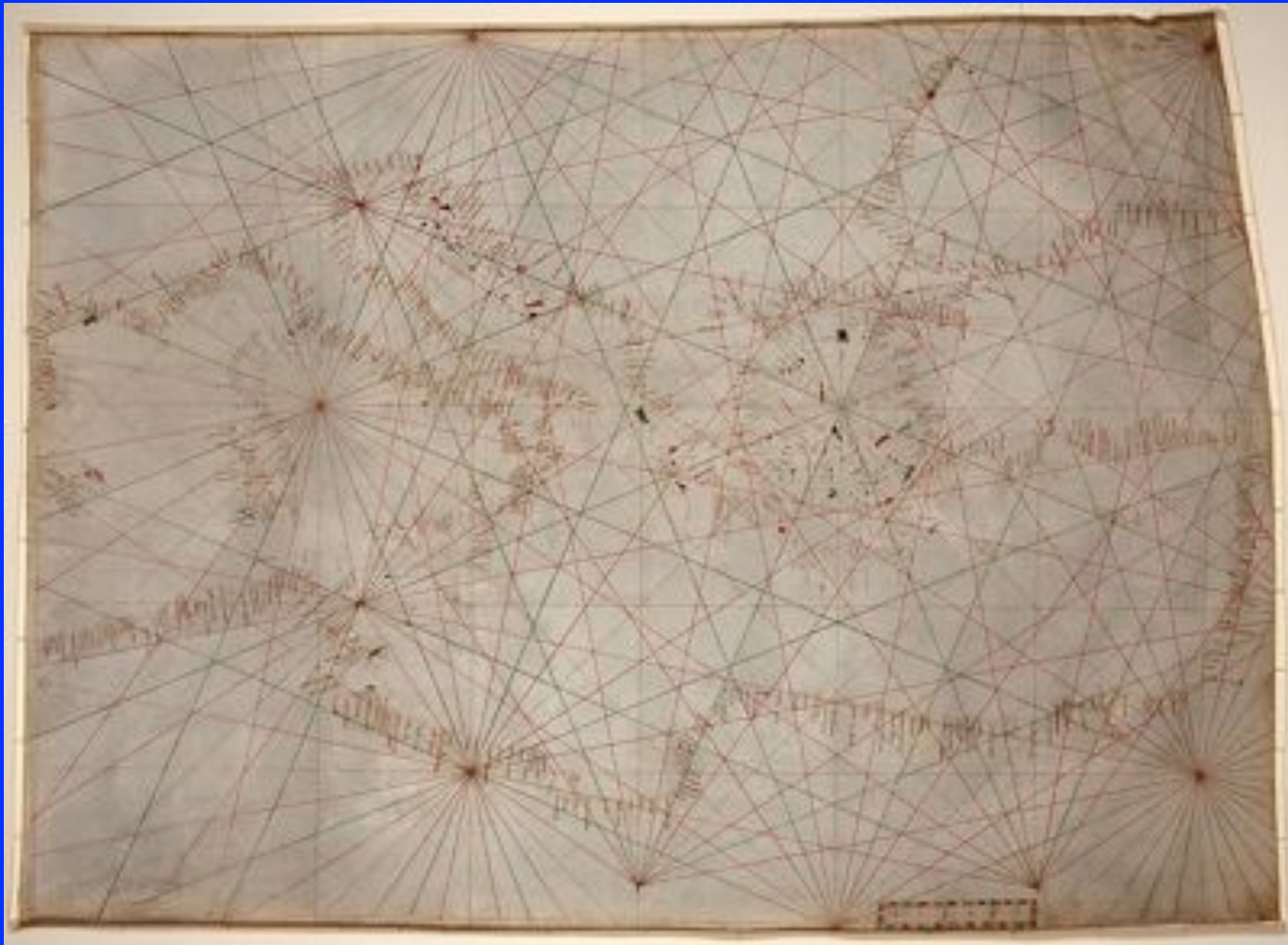
different legibility of place and space

“*Imago Mundi*” (world-map) of Pierre D’Ailly of 1410 does describe world order

- ◆ Divided globe in zones by abstract lines
- ◆ Lists regions and places at Different angles
- ◆ No metric indices or abstract map signs
- ◆ Similar to textual map



Orientation tied to navigation and nautical routes, and increased use of compasses from twelfth century, long before d'Ailly. A **portolan chart** maps ocean routes in Mediterranean, not territory . . . but charts a relation to space



A "Portolan" chart of navigational routes, c. 1450

- notes outlines of coasts and ports
- includes 'rumb' lines echoing compass points, possibly for orienting ships
- probably kept ashore in cabinets



New Codes of Mapping Territories: Took contours from nautical charts to **show readers** Scale, Orientation, Projection

Organized place-names
and regions in ancient
and modern world

→ Three continents
and landmasses ordered
on accurate graticule
In terrestrial distribution

Educated elite; not so
Informative. Stored
in library of court or
chamber of curiosities,
like a luxury item for a
Prince.



Ptolemaic world map (ecumene), 1477

What sort of map-use might this map of c. 1470 provide?

How did could it be read?

- ◆ Exploits indexicality of geometric matrix. Minimal topography; Includes experiences of travel books
- ◆ Has limited “use” as a tool of way-finding or governance
- ◆ Reference tool for court, place-names in Latin
- ◆ Does preparatory **work** by transferring spatial maps to reference frame, in a new hybrid form



Ptolemaic tools divided globe in regional maps a “structure”
to demarcate expanse in a uniform and bounded form

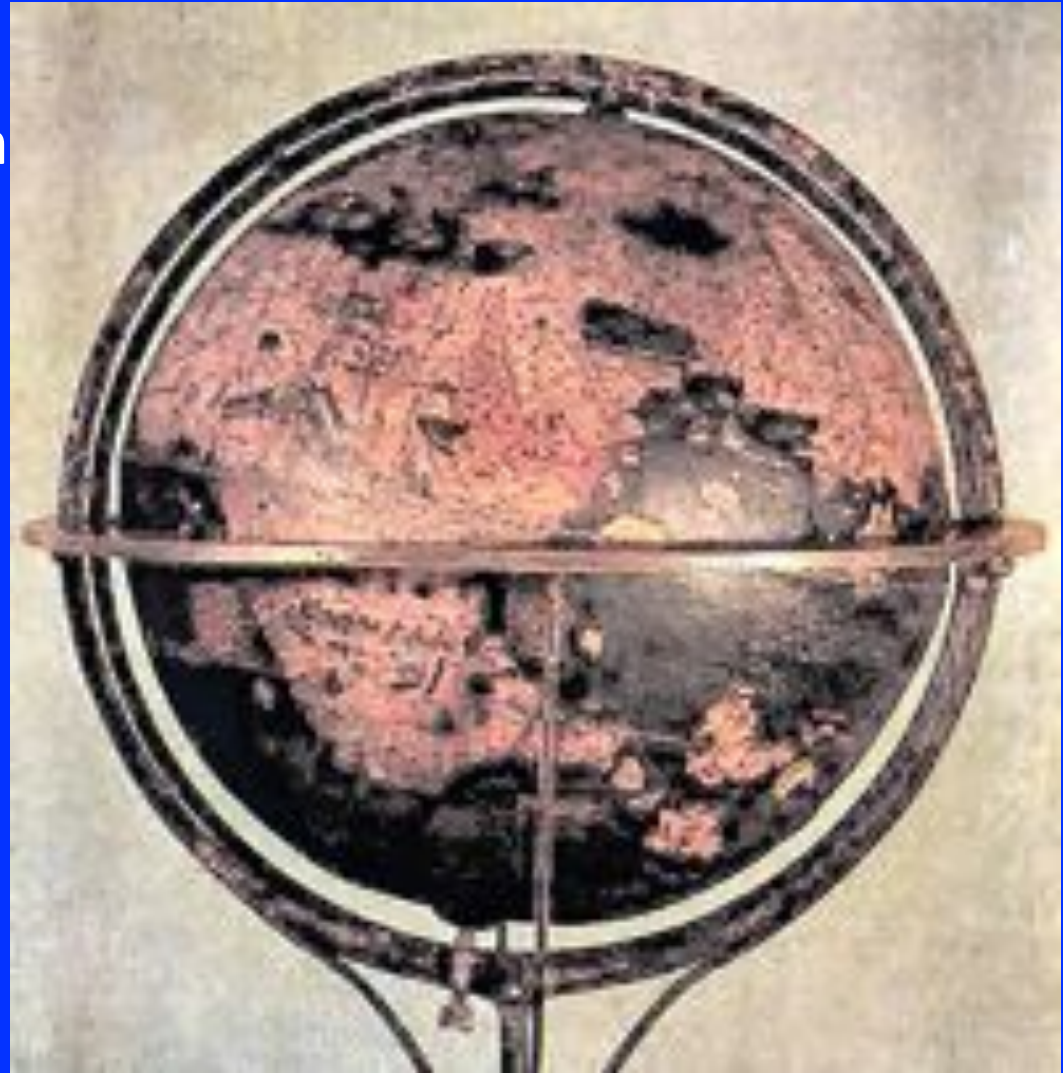


Map of Italy in Latin 1483 Geography by Claudius Ptolemy, printed in Ulm



Printed maps and globes processed relations—both the ‘encounter’ with the “New World” in Americas; and economic overseas relations

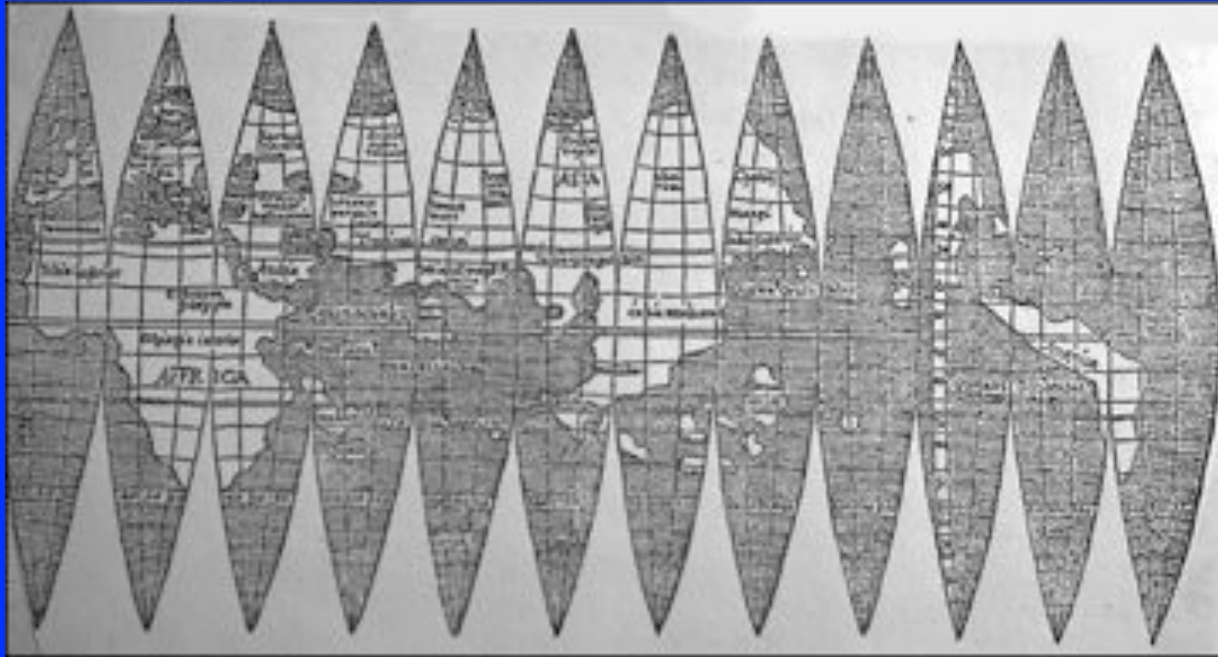
Martin Behaim created globe compiled from Portuguese discoveries in 1492 for mercantile ends, to show spatial distances of spice trade to Holy Roman Emperor



Persuasive Powers of Maps: Literacy

- Printing of books with maps, circa 1480-1750
(Reformers use maps in Bibles)
- Engraving styles integrated places within maps of
expanse with increased density: 1520-1750
- Desire to depict world to viewer: 1560-1700
- Coherent images of polities: c. 1580
- Use as tools of regular way-finding: 1670
- Comprehensive national surveys: 1790-1820
- Statistical variations graphically mapped to
embody space in a variety of modes: c. 1850

1507 printed “gores” map globe on Ptolemaic coordinates



Sold to assemble globe of the world used nautical discoveries to demonstrate limits of ancient geography and America, divided at 30° intervals of longitude

Waldseemüller's 1507 "Novae Insulae"

used printed form to approximate nautical discoveries—
unclear what were its truth claims



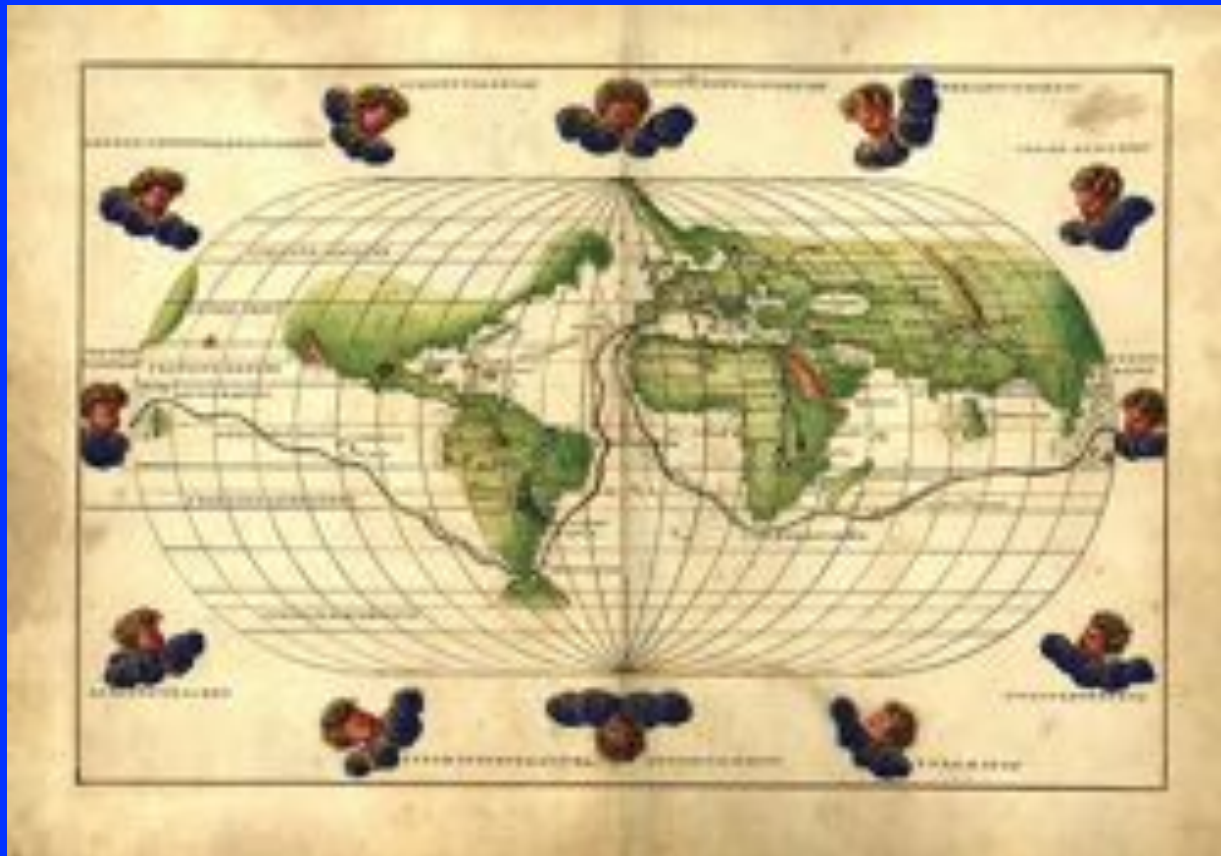
1508 Rosselli World Map of oval form on Ptolemaic graticule: What *expectations* did it address?

- encompasses inhabited world by geometric form
- notes countries often known through books



Naming "America" on a published Map Peter Appian, 1520





Battista Agnese's 1520's world map

Situates route of Magellan's voyage of circumference within the perfectly geometric 'frame of reference' inherited from Renaissance geographers, transposing the nautical chart (Battista was a chart-maker) to a new register for easy understanding of Ptolemaic meridians.

Hans Holbein, “The Ambassadors” (1535)

--Globe depicting ties between world's regions emphasize modern outlook, mediated by instruments into study

-The presence of globe linked to senses of modernity, as well as mediating new discoveries into study of educated, as prized possession and emblem of learning, as much as a way-finding tool

--The globe is not just ‘fashion accessory’ but ties men of state to global affairs inscribed on globe's surface; below instruments of astronomy and surveying



Globe ties Europe, Africa and New World



Gemma Frisius

**Designed world maps and globes from
from 1530's**

“The utility, the enjoyment
and the pleasure of the mounted
globe, which is composed with
such skill, are hard to believe
This is the only one of all
instruments whose frequent usage
delights astronomers, leads
geographers, confirms historians,
enriches and improves legists, . . .
guides pilots, in short [is]
necessary for everything.”



“Map Room” in Florence’s Palazzo Vecchio by Egnazio Danti



Ditchley” Portrait of Elizabeth I, standing atop the Map of England (1585)

by Maurice Gheeraerts the Younger

--Painted as first national map of England printed (1578) by Christopher Saxton with royal privileges

--Symbolic properties of ‘national map’ to describe an independent unit that Elizabeth had enabled as monarch

--Shows religious independence of England as a national territory

--marked the autonomy of England sovereignty from Christian and Spanish challenge





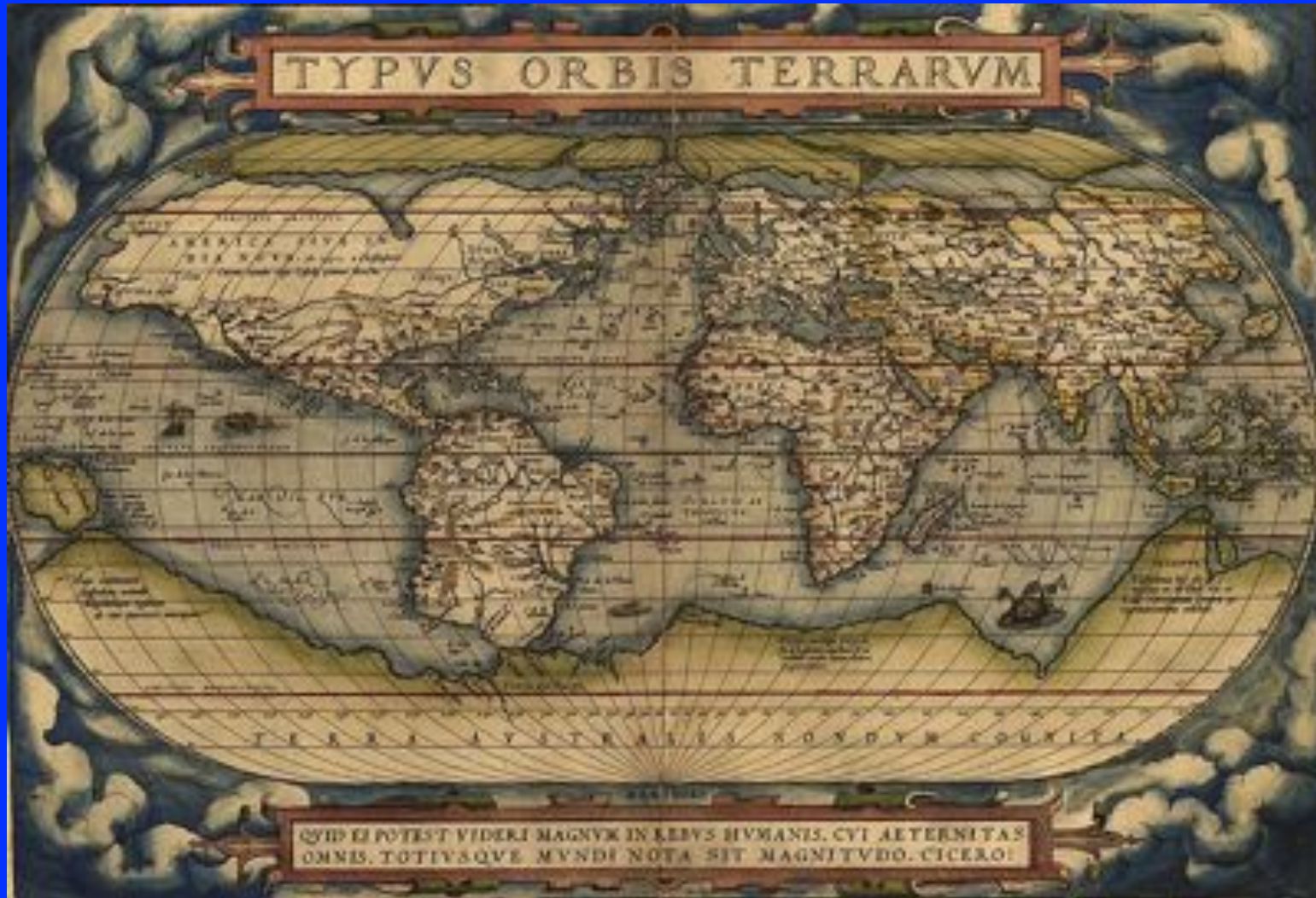
Vischer, “Leo Hollandus” (1648, orig. 1625)

The image of the seventeen united provinces of the Low Countries as a lion derives from 1583; this depiction of the independent Netherlands as a roaring lion was printed the year after the Dutch Republic declared independence from Spain.

III: Did How Maps were *Read* Change?

- 1530, rise of land-surveying from base-line
- 1570: first 'national atlas' in England by Saxton; granted special permissions to enter and survey regions by monarch Elizabeth I
- 1570 Publication of first atlas of maps in Antwerp: the book of maps as a **'theater' of the world, able to be readily consulted by reader**. The map as a **contract** between consumer and engraver to **show and display** a comprehensive image of the inhabited world and its peoples
- 1630, basic treatises of surveying of private lands
- 1670-Cassini undertakes national topographic survey of France from Parisian meridian

First Atlas: Theatrum Orbis (1570) included this 1564 world map, in Latin, Dutch, French, Italian and German editions. It at first included 53 maps, but by 1612 would include 167 maps. Numerous vernacular popular “epitomes” in 17th century.



Synthesized Accumulated Experience

- Ortelius' 1560 engraved map shows lines of navigation as straight meridians to increase legibility at uniform scale of 1:80,000,000
- Compilation both comprehended world and did active work of processing spatial relations and distances that could be consulted, by ordering lines of travel along straight parallels and meridians
- Ortelius prided the legible distribution of place-names for readers: maps had little use by or influence on navigators' practices



TYPVS ORBIS TERRARVM.



QVIVD EI POTEST VIDERI MAGNVM IN REBVS HVMANIS, CVI AETER-
NITAS OMNIS, TOTIVSQVE MVNDI NOTA SIT MAGNITVDO, CICERO.

W. Blaeuw del.



1587 Map of America



Early Geographic Knowledge of Harbors in America (1634)





Jodocus Hondius—atlas-maker and globe-crafter—in his study in 1619

1580: Europe presides over world, flanked by two continents of primitives, naked America naked like below



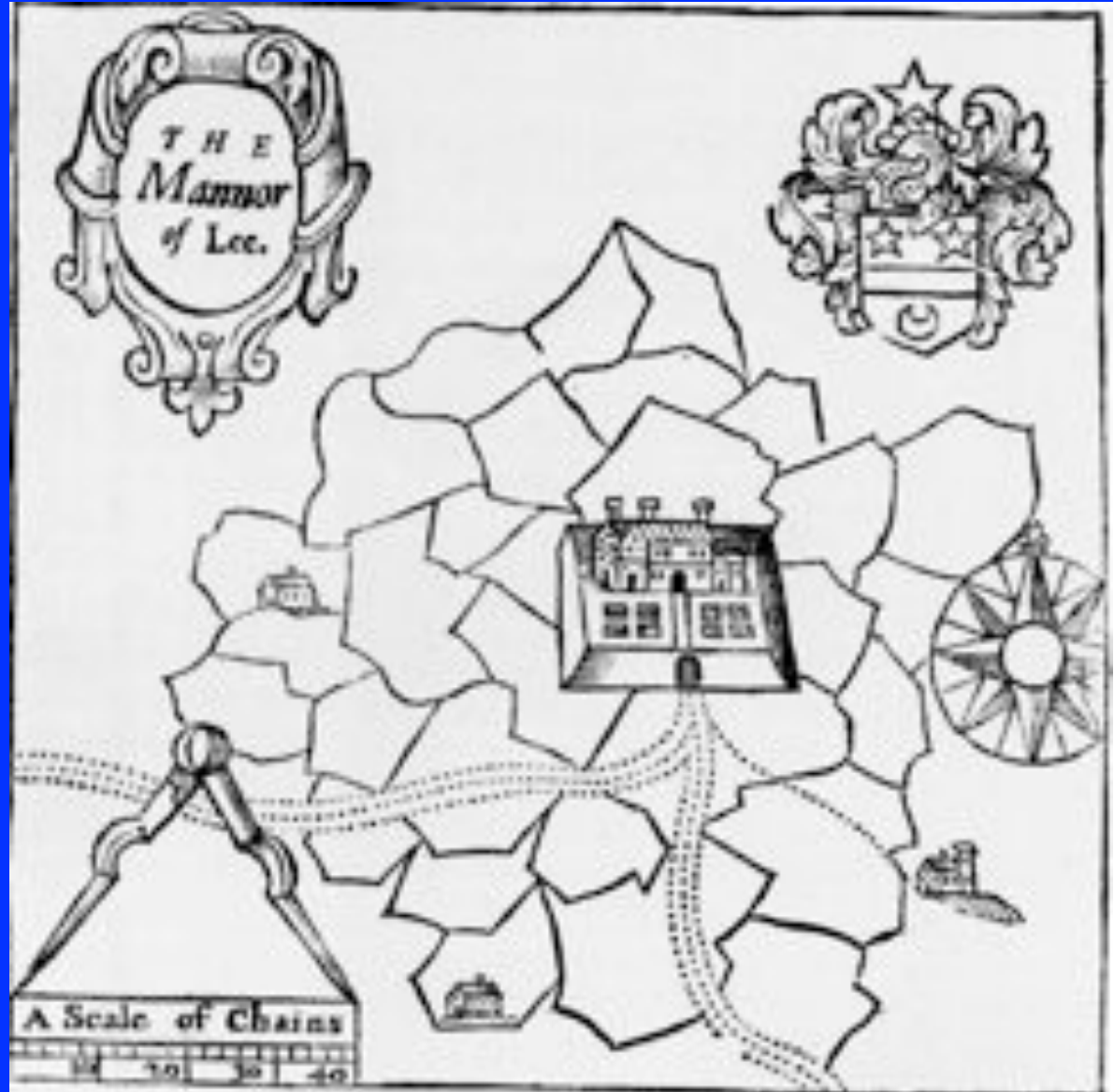
Far Greater Surveyed Local Detail in Netherlands Map



1650s, Leybourne's manual of surveying: Compleat Surveyor

Planometria, \or, The Whole Art of Surveying of Land was a pamphlet written in 1650 by Leybourn and published under the pseudonym Oliver Wallinby.[1] Leybourn expanded this into a full book,

The Compleat Surveyor which was first published in 1653. Provided detailed discussion of the tools of surveying, and necessary inks for property maps.



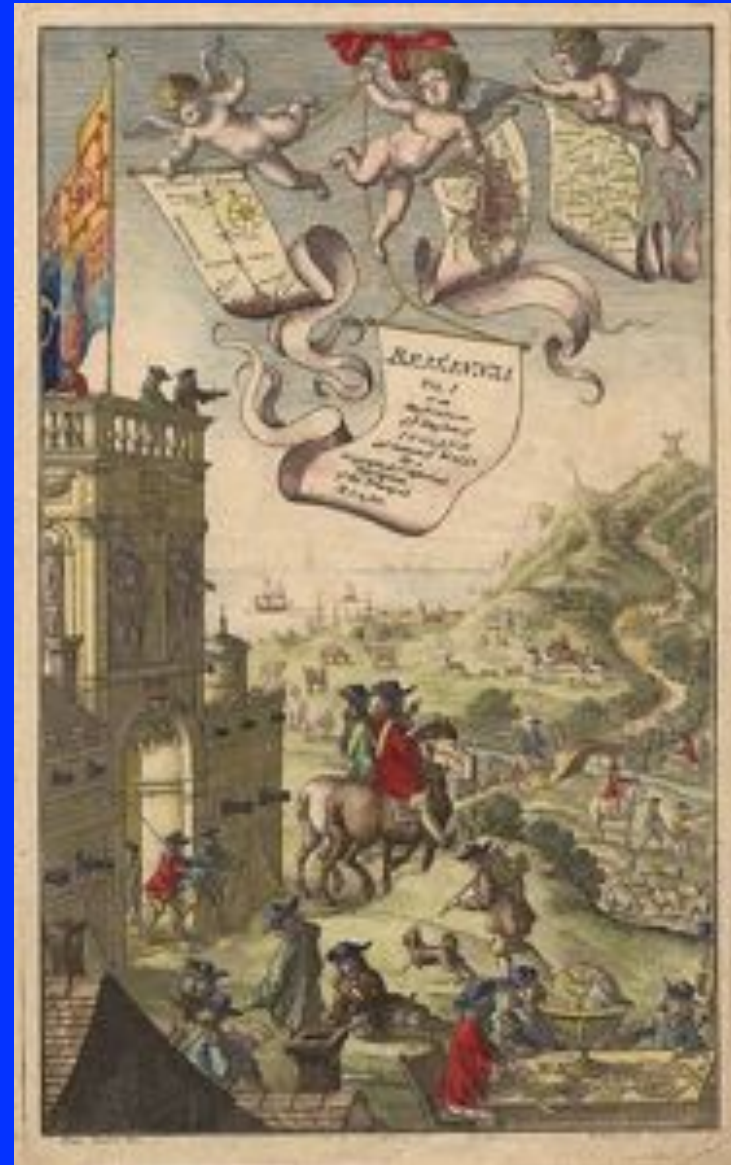
V: MAPPING OF STATES

John Ogilby, frontispiece to 1675_Britannia

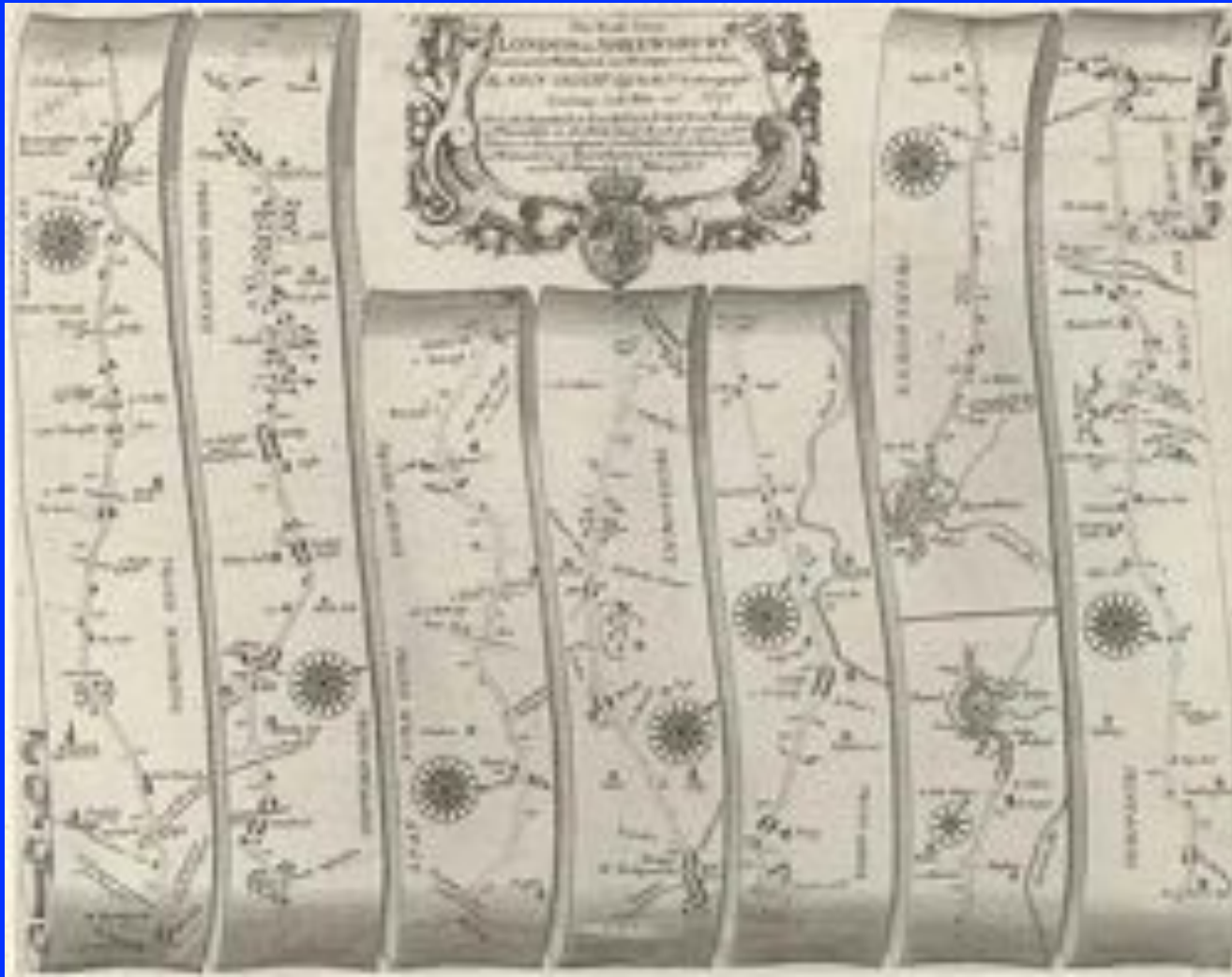
--route maps within national territory linked to one another, as an English Atlas

--men shown riding horseback on roads in the English countryside, using the very maps in Ogilby's volume to guide them on their travels

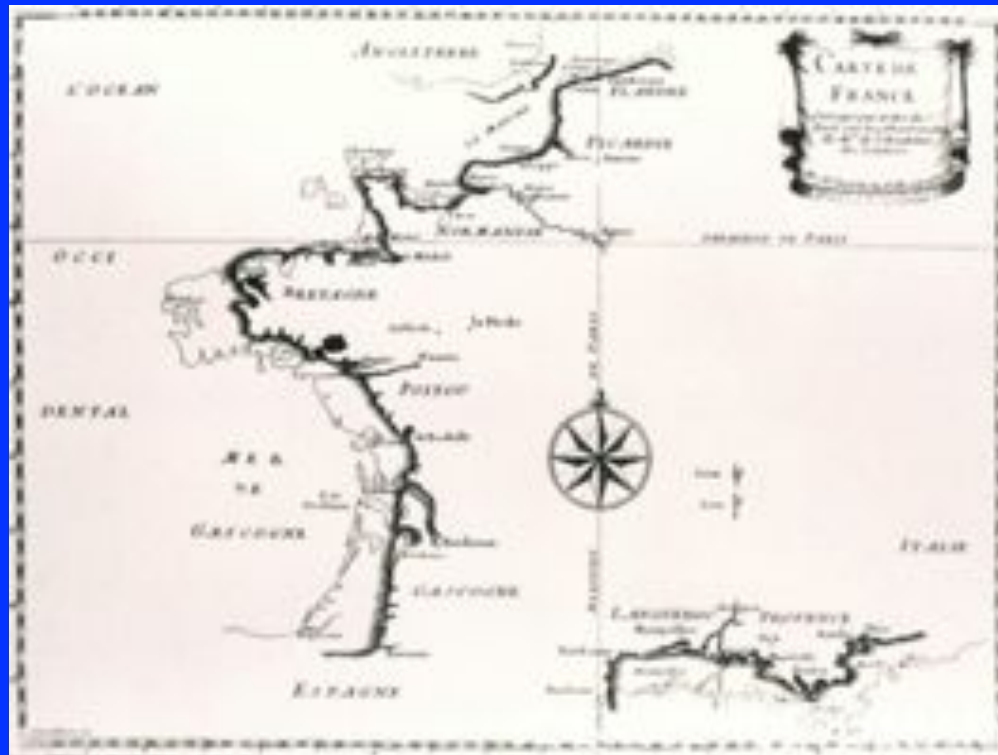
--Each map contains its own compass rose, for easy consultation to establish one's directions



Ogilby's "Road Maps" (1697)



Gian Domenico Cassini's resurvey of France for Louis XIV (1680s)



- The King famously complained that the Royal Astronomer who he had charged to re-triangulate the country had shrunk the territories over which he ruled. Cassini undertook this survey, after he joined Colbert's Academy of Sciences. In 1669.
- The survey lasted three generations of Cassinis, completed in 1744, based on geodesic studies and the patronage of Colbert's Academy of Sciences: a new model for national unity, at 1:80,000.

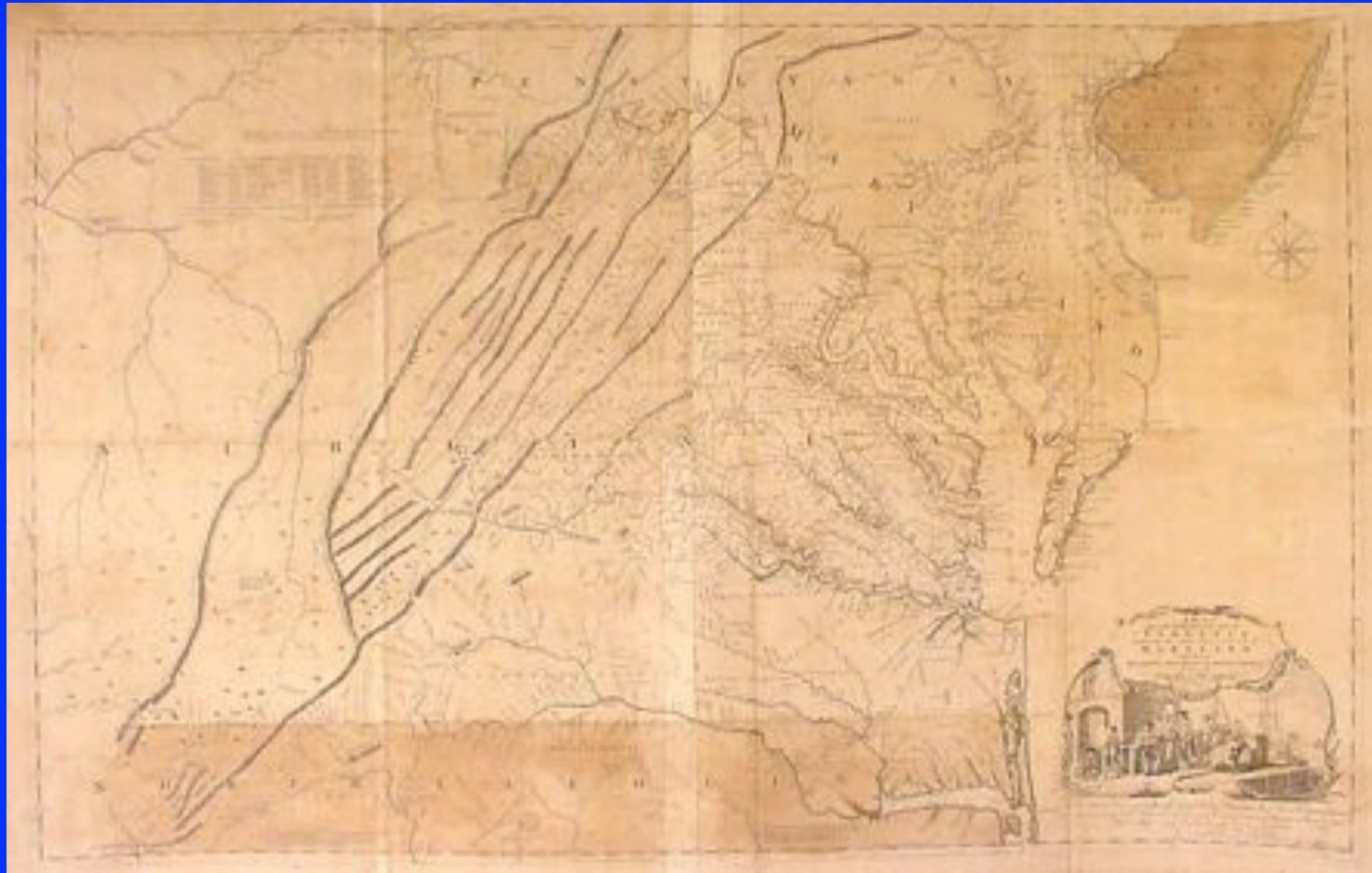
French Academy of Sciences
Founded by Louis XIV Colbert

--brings Cassini to found Paris
Observatory, and ascertain
meridian

--Map *allows* restructuring of
nation's roads and
infrastructure by 1740s
(Turgot's reforms)

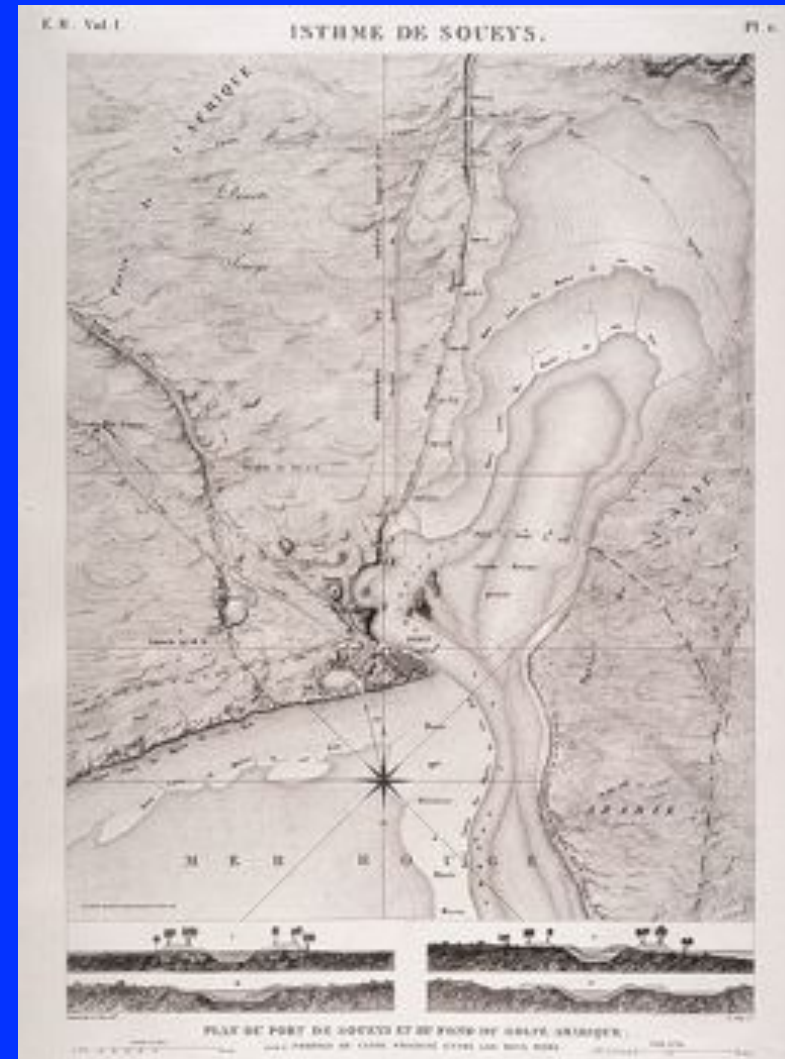


Fry-Jefferson Map of Virginia:
this map by the President's father erases all presence of
Indians in the Maryland and Virginia



Surveyors, Engineers, and New National Maps: England, 1783-1820s; United States Land Ordinance project of 1785 Napoleonic France 1807-Suez Canal

“An ordinance for ascertaining the mode of locating and disposing of lands in the western territories, and for other purposes therein mentioned.”



English mapping of the Eastern Hemisphere, c. 1850



VI: Statistical Maps: New Ways to Embody Expanse

Map use increased as statistical information encoded in order to reach a broad audience in mass-marketed tools, coincident with rise of press (newspapers; news-maps; schoolbooks).

- The synthesis of historical and statistically measurable information created new aids to visualize spatial distributions of populations.
- Exemplified by shading different regions in **choropleth map**, statistics transposed to spatial form, shaded to link distributions to spatial divisions —as the map of “red” and “blue” states
- Allowed ability to envision divisions and distributions in nations, or abstract elements of maps for comparative ends
- Separation from the representational qualities of the map and the content that they process

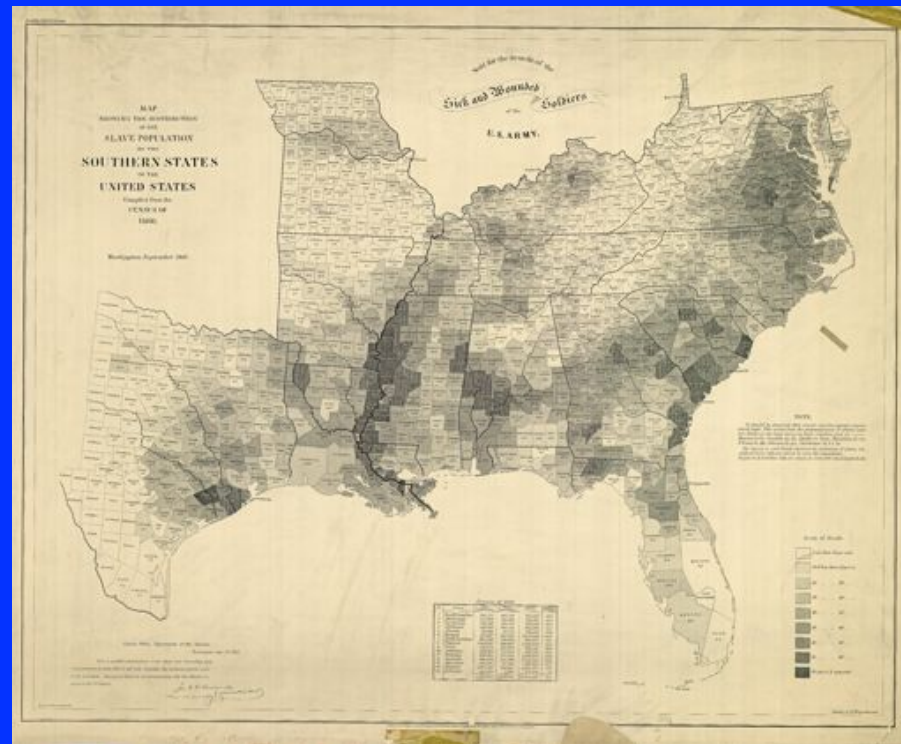
1834 *Tableau comparatif*: a scientific reference tool of world geography



In Books: Walker's Statistical Atlas of U.S. (1860)



Civil War “Map” of Slave-Populations in Southern United States in 1860



Maps place distributions of populations over space:

In his 1869 'map' of the advance and retreat of Napoleon's troops from Paris to Moscow, the route of soldiers Moscow maps horrors of war

