History of Cartography

World's oldest map ?
Babylonia, 6th century BC

https://www.geographyrealm.com/oldest-known-map-world/

https://www.gislounge.com/mapping-through-the-ages/

Eras of World cartography
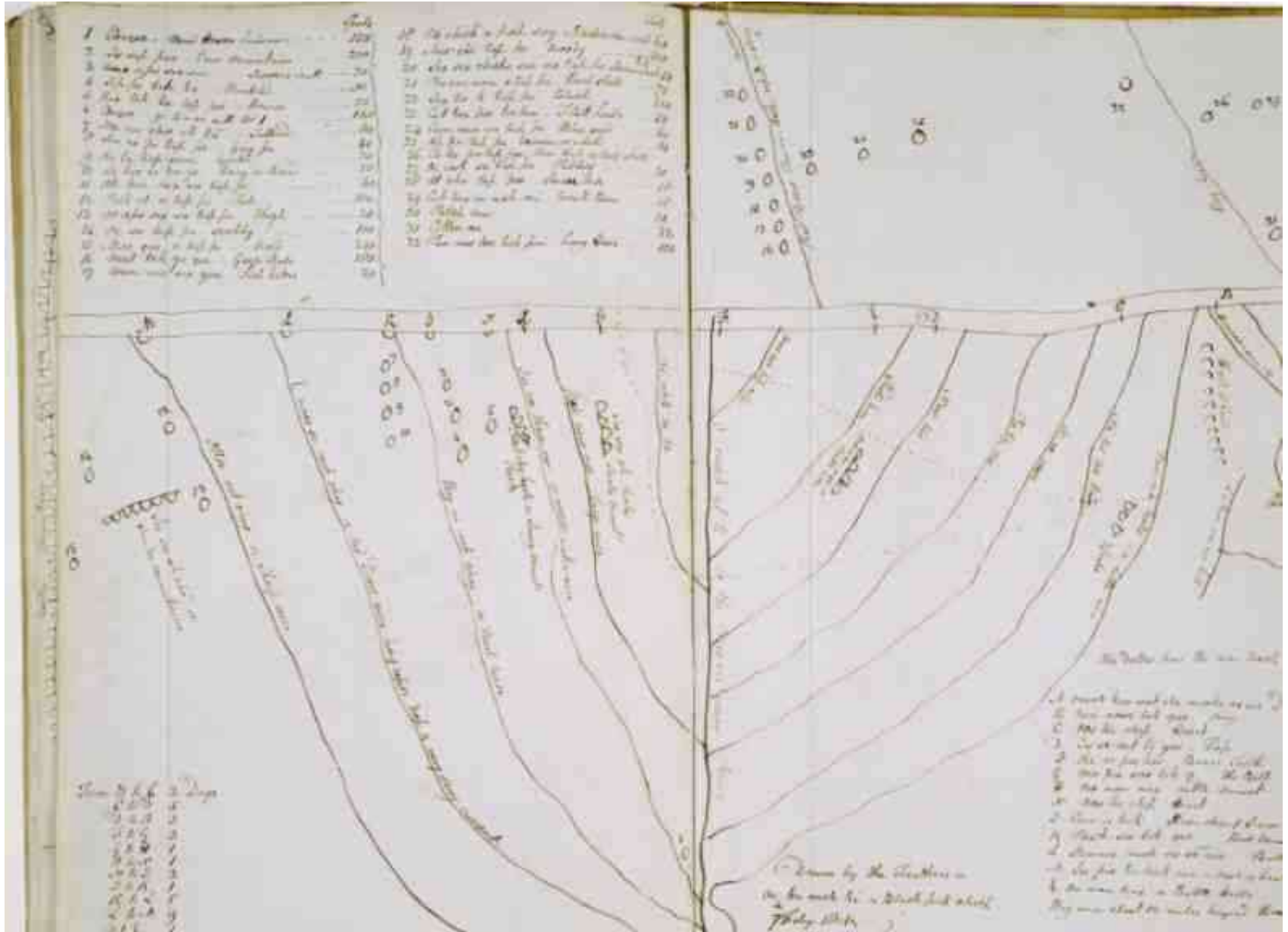500BC-500 AD Ancient Greeks
500-1450   Middle Ages
1450-1700 Renaissance
1700-1950 Scientific Era
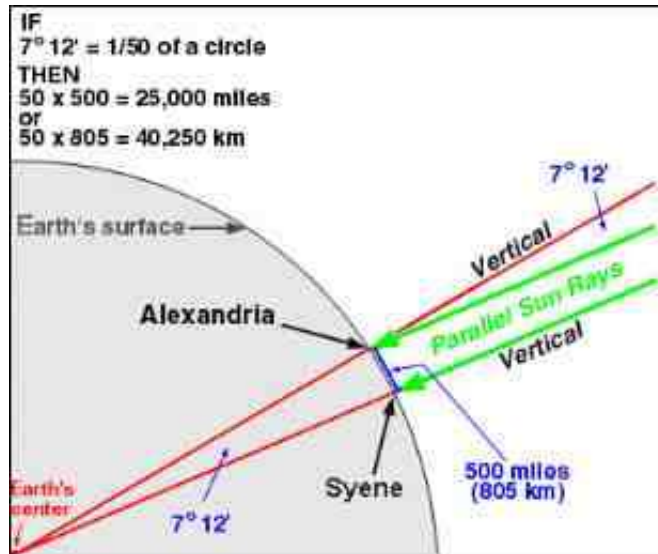1950-1975 Modern era
1975-> Digital era

In 1801, a Blackfoot named '**Ac ko mo ki**' drew a map in the snow or dirt for **Peter Fidler** of the Hudson's Bay Company.
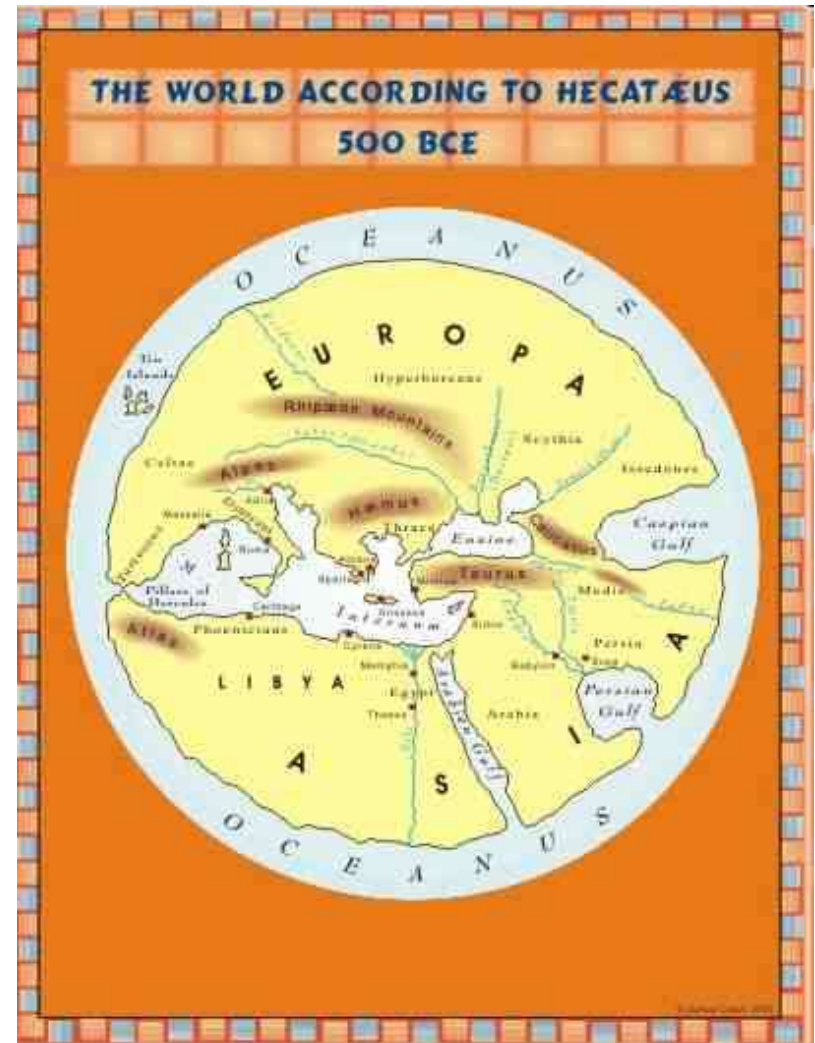
Ancient Greeks   500BC – 500AD

Eratosthenes (275-195 BC)
  - circumference of earth

IF
7° 12' = 1/50 of a circle
THEN
50 x 500 = 25,000 miles
or
50 x 805 = 40,250 km

Earth's surface →

Alexandria

7° 12'

Vertical

Parallel Sun Rays

Vertical

500 miles
(805 km)

Earth's center

Syene

7° 12'

Hipparchus (190-120 BC)
– latitude / longitude

First map projections
  - azimuthal -Thales, etc.)



THE WORLD ACCORDING TO HECATÆUS
500 BCE

Ptolemy (AD 90-168) compiled
all known world locations

Romans: Tabula Peutingeriana (4th century)

The Tabula Peutingeriana (*Peutinger table*) shows the road network in the Roman Empire. It is a 13th-century copy of an original map dating from the 4th century, covering Europe, parts of Asia (India) and North-Africa.
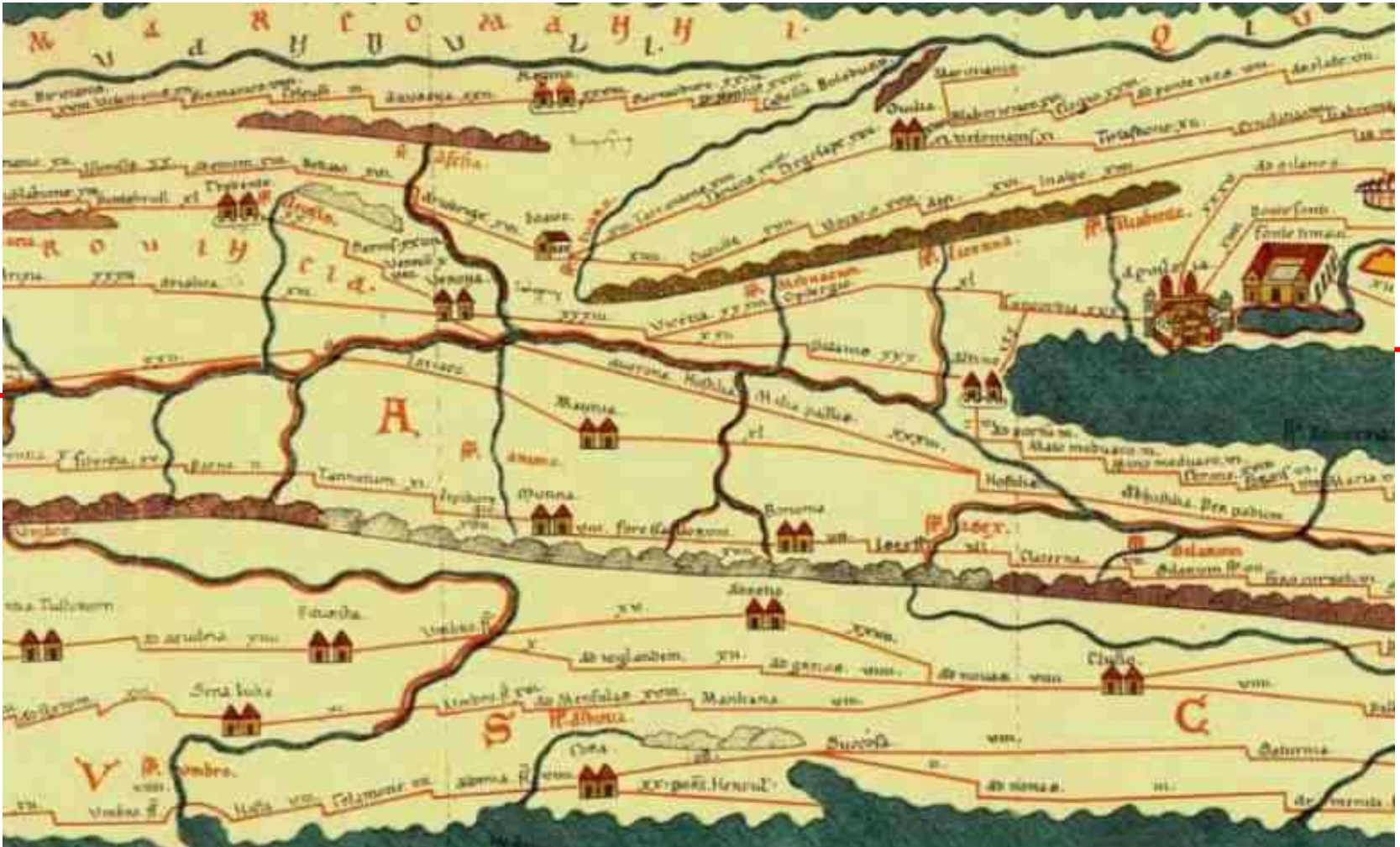
Overestimation of longitude extent contributed to Columbus 'bumping' into America

THE WORLD ACCORDING TO CHRISTOPHER COLUMBUS c.1490
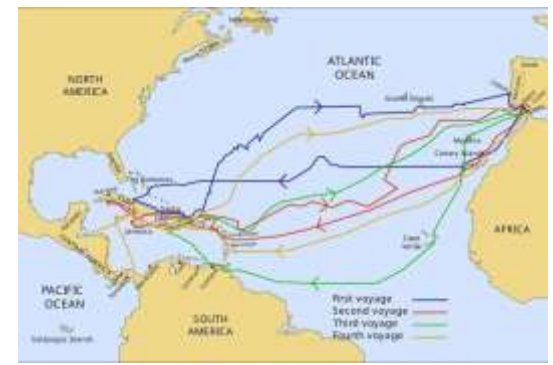
The Medieval Dark Ages: "T-in-O" maps

T is the Mediterranean and Nile/Don Rivers; O is the extent of the known world:
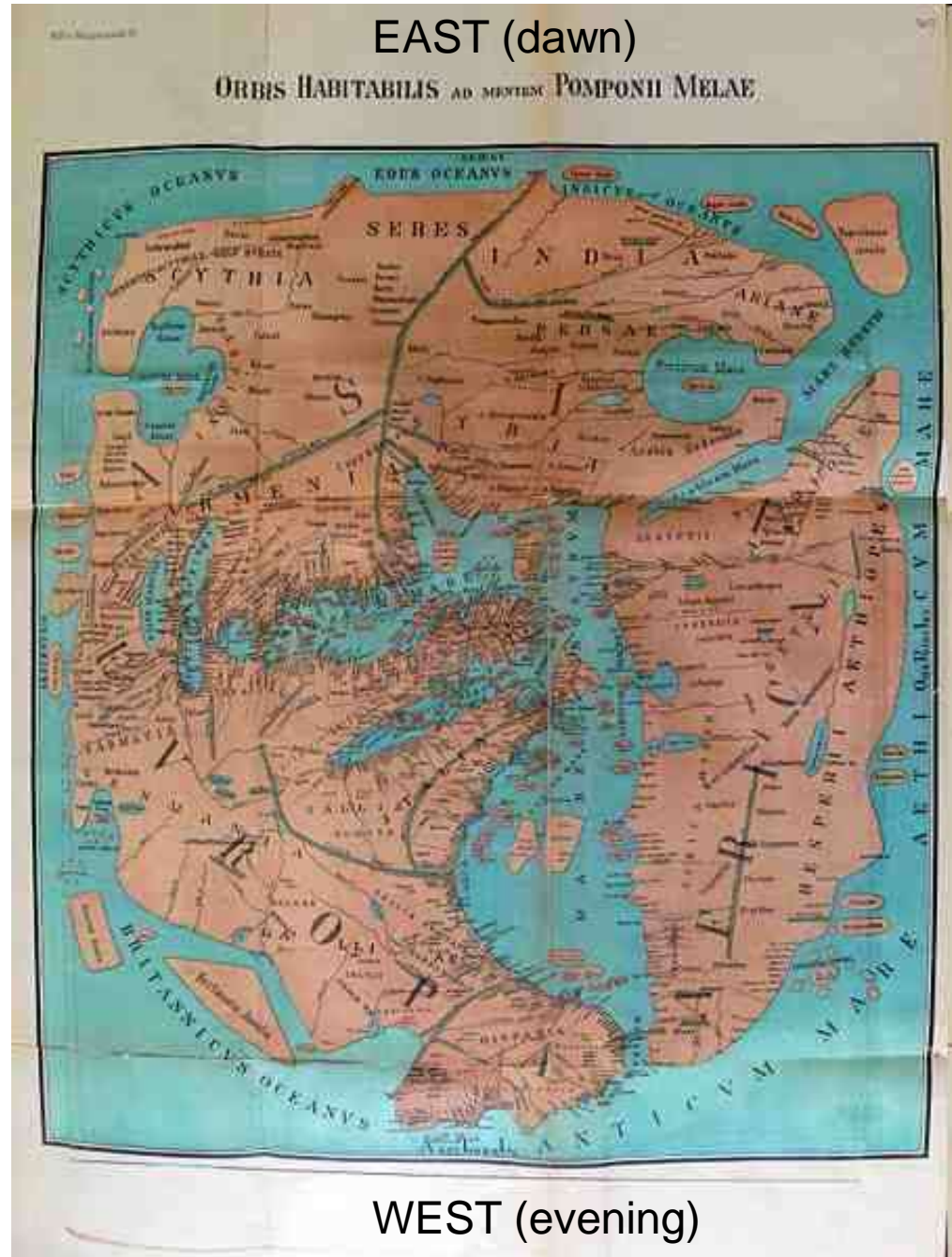
One continent for each of Noah's sons

Anglo-Saxon map 1050AD

Roman world map reconstruction in the medieval ages

East (Orient) to top

EAST (dawn)

ORBIS HABITABILIS AD MENTEM POMPONII MELAE

NORTH (Left)

SOUTH

Sol

Sun

WEST (evening)

**Hereford
Mappa Mundi
~1300**

'T in O' map

R. Don

R. Nile

Mediterranean

Viking voyages of 'exploration' : 793-1066 AD

Faroes 825   (510: St. Brendan)

Iceland 874   (Irish monks earlier)

Greenland 980

Newfoundland 986   (proven in the 1960s)

L'Anse aux meadows, NL
Leif Erikson ~ 995 (1000) AD

Map 1 — National Historic Sites of Canada, Regional Setting

1. Cape Spear Lighthouse
2. Signal Hill
3. Hawthorne Cottage
4. Castle Hill
5. Ryan Premises
6. Port au Choix
7. L'Anse aux Meadows
8. Red Bay

Vinland map: Discovered 1957, dated to ~1440

contained 1920s inks and radioactive elements from 1950s showed it to be a likely fake – did Europeans know about America before 1492 ?
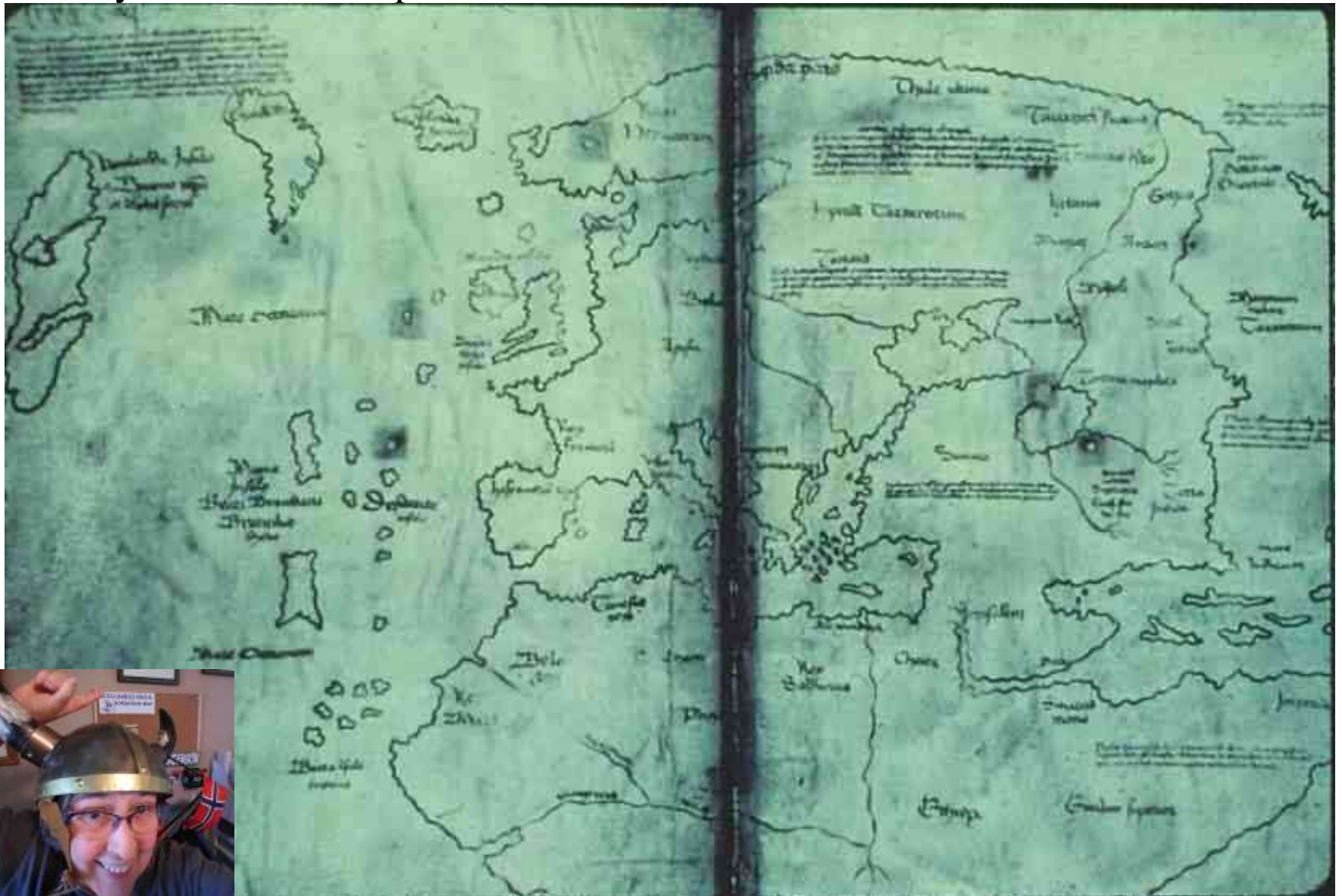
Chinese map, 1763 copied from 1418 ?

Arabic cartography: Al-Idrisi 12th century

The *Tabula Rogeriana*, by Muhammad al-Idrisi for Roger II of Sicily 1154.

Reflecting Ptolemy's data from 1000 years before

Renaissance post 1450: rediscovering Ptolemy's Geography

A medieval depiction of the Ecumene (1482, Johannes Schnitzer, engraver), constructed after the coordinates in Ptolemy's *Geography* and using his second map projection. The translation into Latin and ...

1. Voyages of discovery, 2. rediscovering the Greek cartography …..
But the biggest change in the renaissance and the 2nd millennium was 3.

Invention of the printing press by Gutenberg, 1440

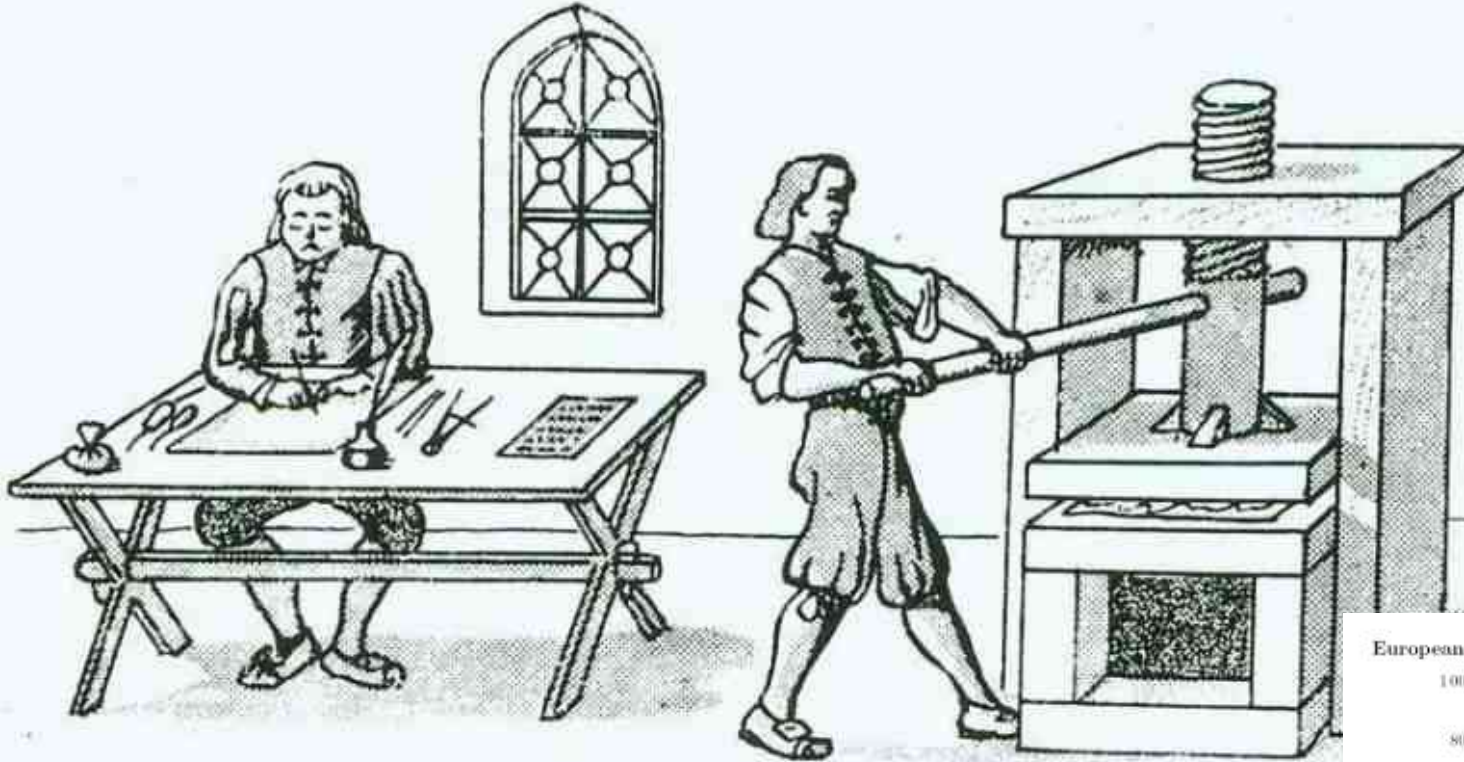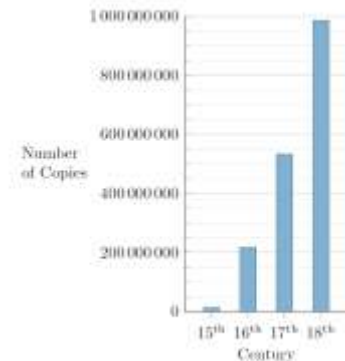- though movable type was developed in China in 1041

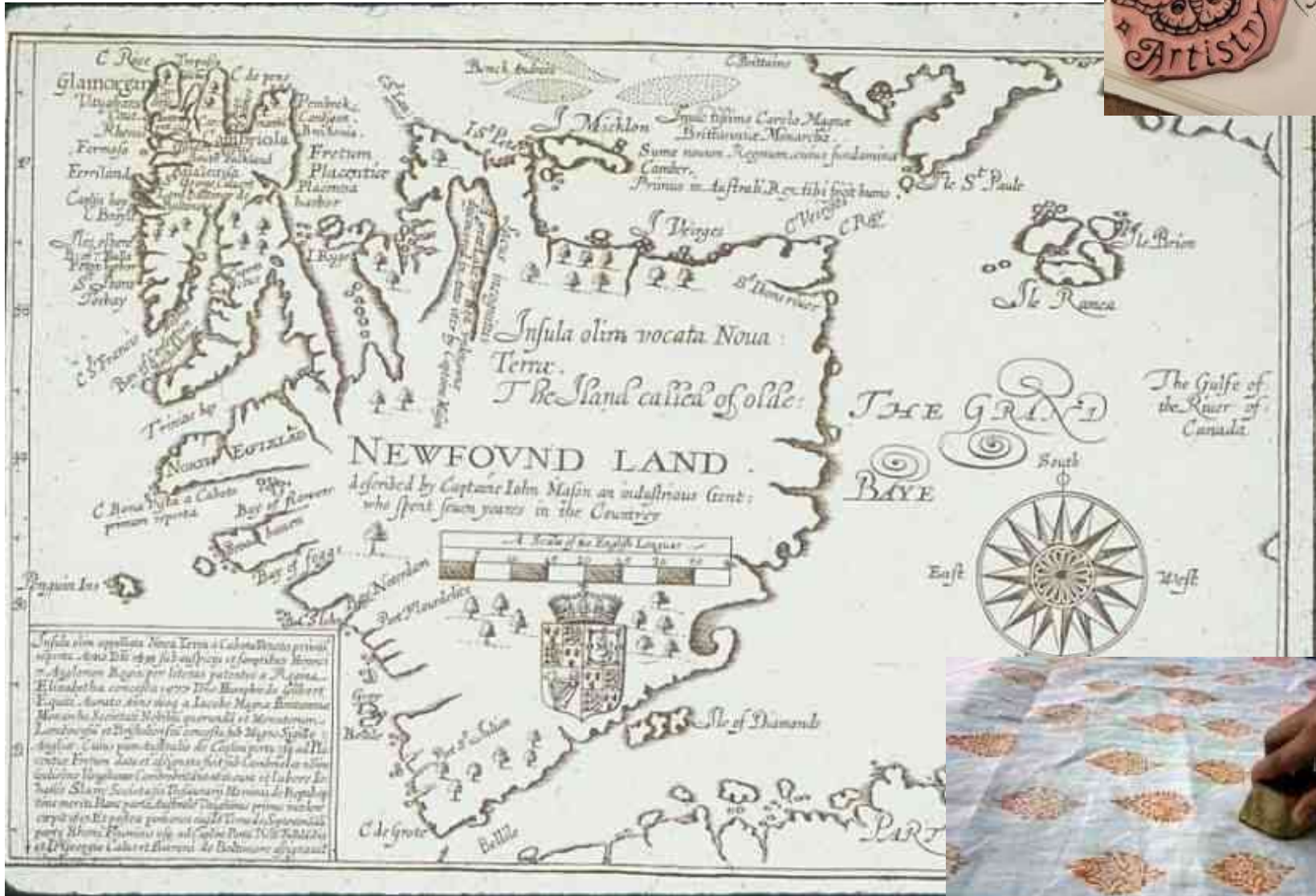Fig. 20. Map maker and printer of the sixteenth century

European Output of Printed Books ca. 1450–1800

Number of Copies

15th 16th 17th 18th Century

Maps (and books) could now be printed in quantity

Printing technology: 16th century woodcut (centuries earlier in China)

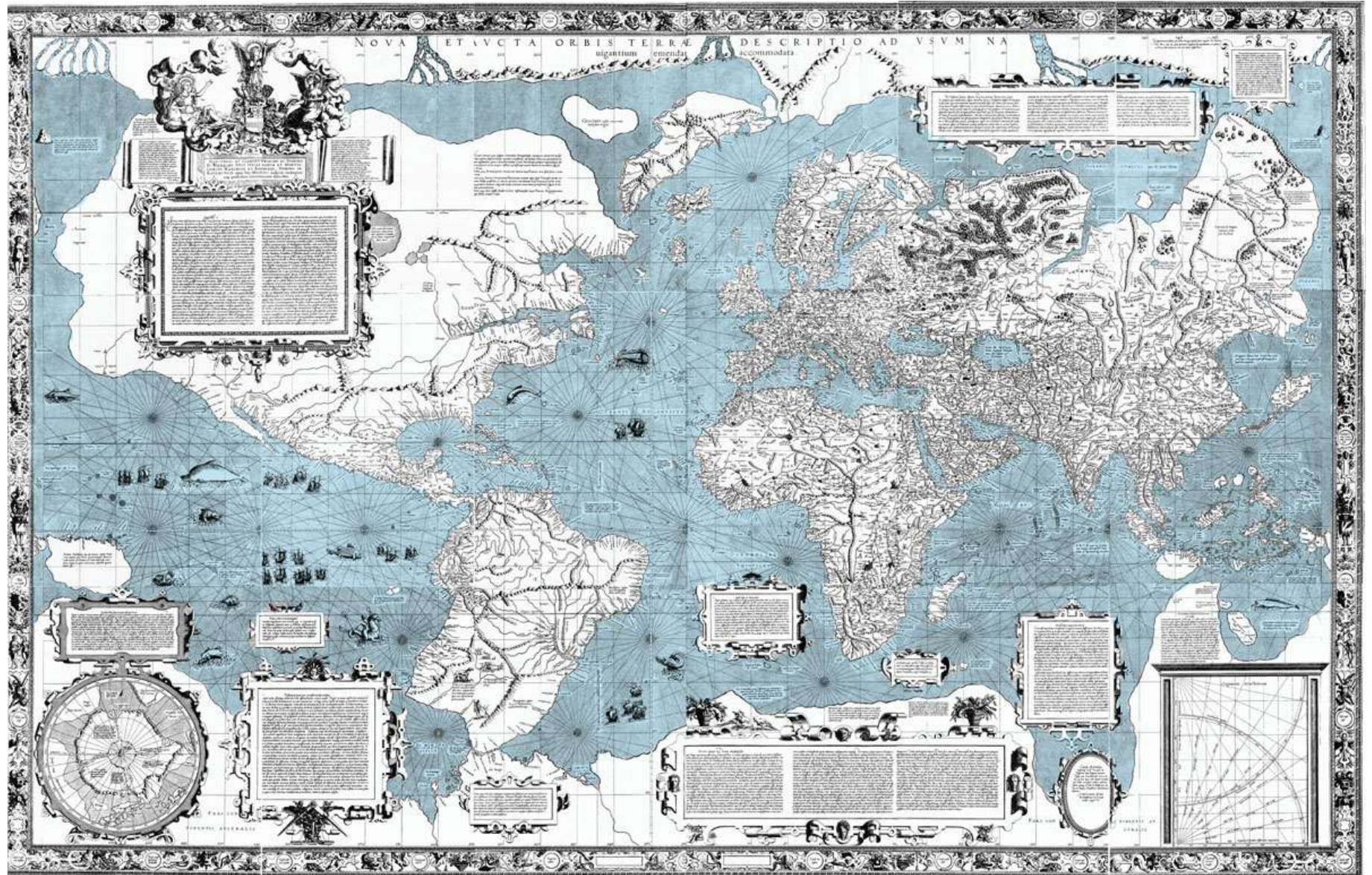**Wrong-reading plate – mirror image**

Copper engraving ('intaglio') 1596:

More detail possible than woodcut, but also reverse image

The Indian Ocean, engraved by Hendrik van Langeren. In Linschoten's *Itinerario* (Amsterdam, 1596)
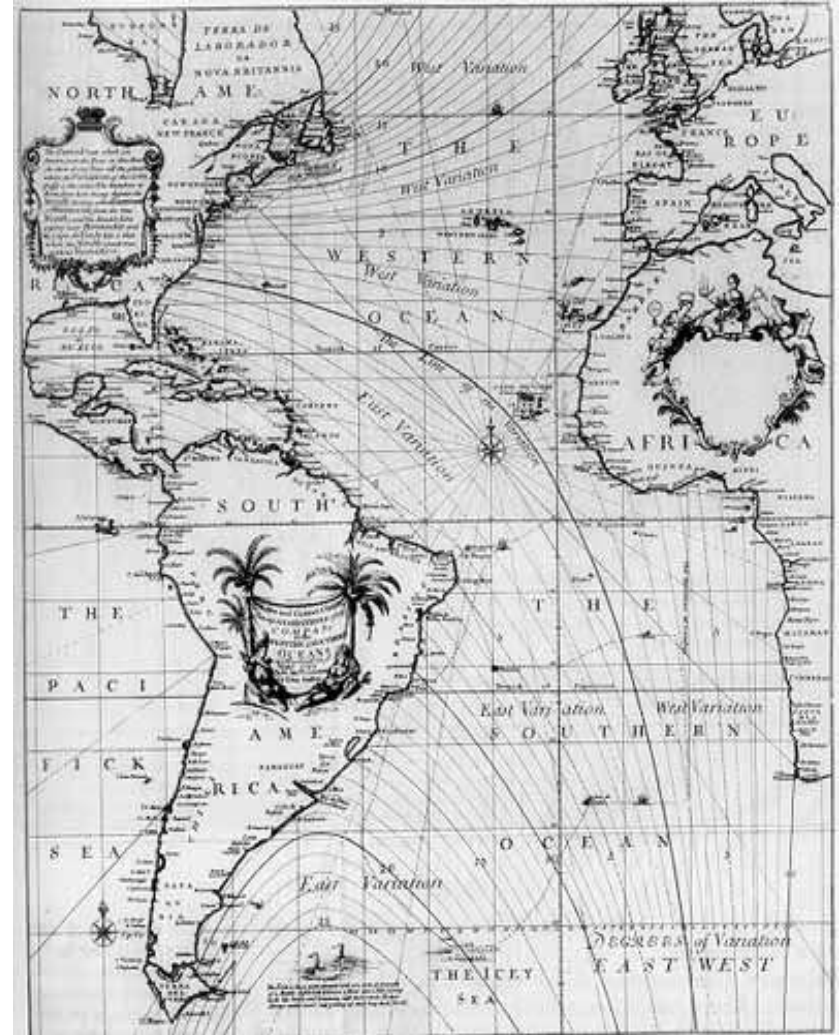
Mercator's map, 1569

The development of the sciences   1700->

➤Division into topographic and thematic mapping

Data collection e.g. census

➤Development of surveying

➤Geodesy: first calculation of earth's ellipsoid 1817

➤ few elevations pre-1800s

➤George Everest Ellipsoid 1830

Halley's 'isogonic' map – lines of equal compass Declination (from true north)

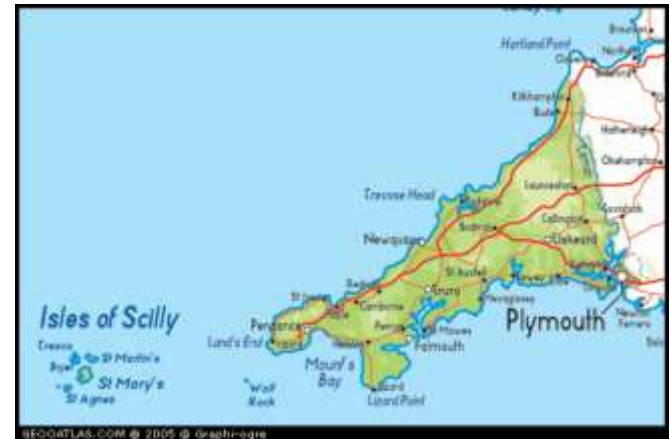# Early 18th century colour map (hand coloured until 20ᵗʰ century)

'Cartouche' -> ->

Latitude was easy to measure but
Longitude ??

Sir Cloudsley
Shovell and grave
Scilly Isles, 1707

Longitude 1759
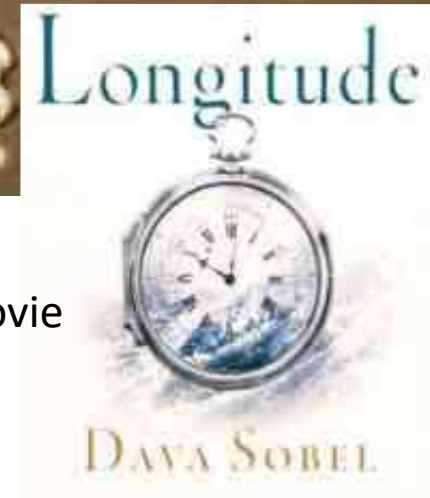
John Harrison's chronometer

Accurately measured time to compare with local time and east/west compared to starting point

Time zones (1883) – Sandford Fleming (Canada)

1 hour = 15° longitude

Also made into a movie

Longitude

DAVA SOBEL

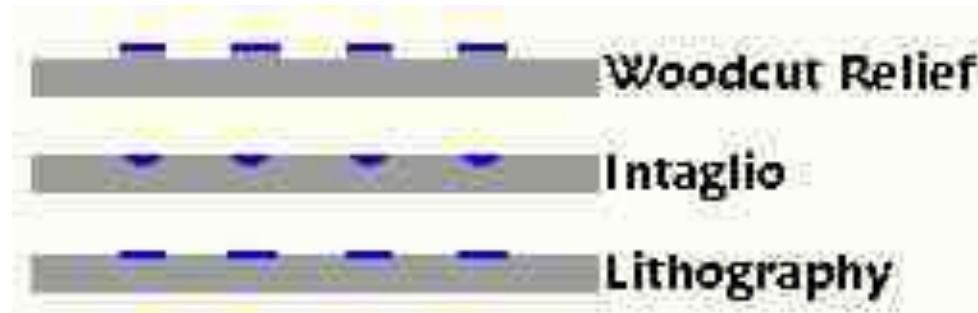# Lithographic (stone) printing plate (1796)
Based on water and oil not mixing –Alois Senefelder

Plate is still created 'wrong-reading'
= mirror image
'Transfer lithography' came later

Printing methods

- Woodcut: image area is raised and holds ink

- Intaglio engraving: incised cuts hold ink

- Lithography: surface texture (grease) holds ink

These methods could NOT show continuous shading or colour registration (for layers), and were mirror images
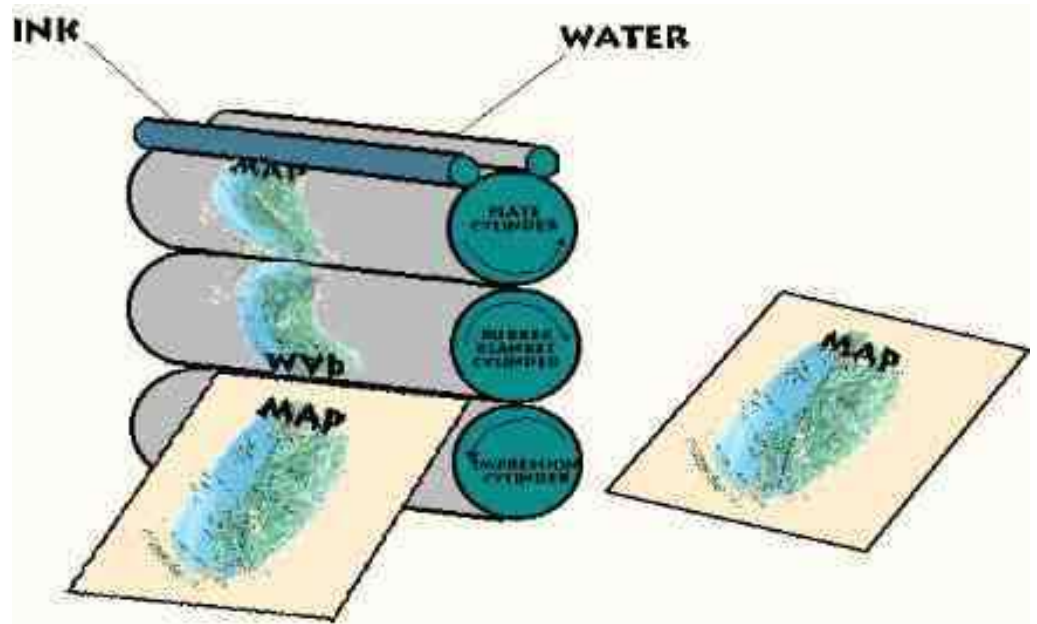
Photo-lithography & offset printing (1870)

With photo-lithography, full colour map prints were possible.

Thin copper plates are produced from photo negatives.

Plates wrap around drums, therefore printing was continuous.

An intermediate drum added ... to avoid a wrong reading plate.

Offset Cylinder

Impact of offset printing and improved survey technology

**Dufour hachures
Switzerland, 1845-65**

**Bernina Pass,
Switzerland 1877**

http://map.geodataviewer.admin.ch/geodatenviewer.php

During the 20th century, maps became more abundant due to improvements in printing and photography that made production cheaper and easier.

1920 ->

**20th century
Technology**

Aerial photography

Photogrammetry

Post- war (1945)
Mapping of Canada

Return of pilots and planes
from World War 2 …

Vancouver - Stanley Park, downtown, west Vancouver, UBC

Postwar (1950) society changes affecting mapping

➢ Increased leisure time and travel – road maps, park maps

> Addition of hillshading (still costly before computers)

➢ Increased attention to non-scientific users

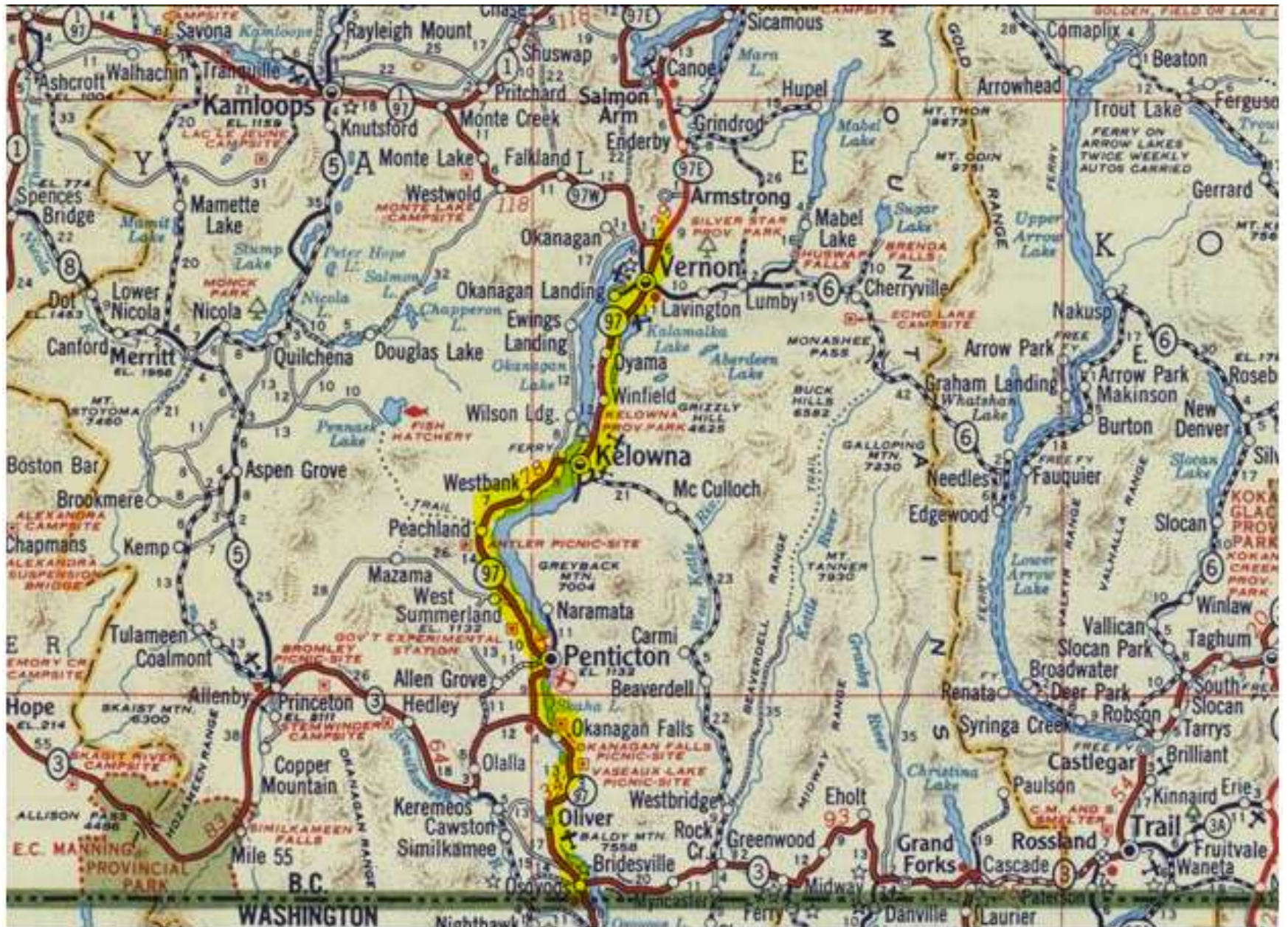➢ Maps for new groups, e.g. visually impaired

Society changes after ~1950

a. leisure time–> road maps (and more cars)
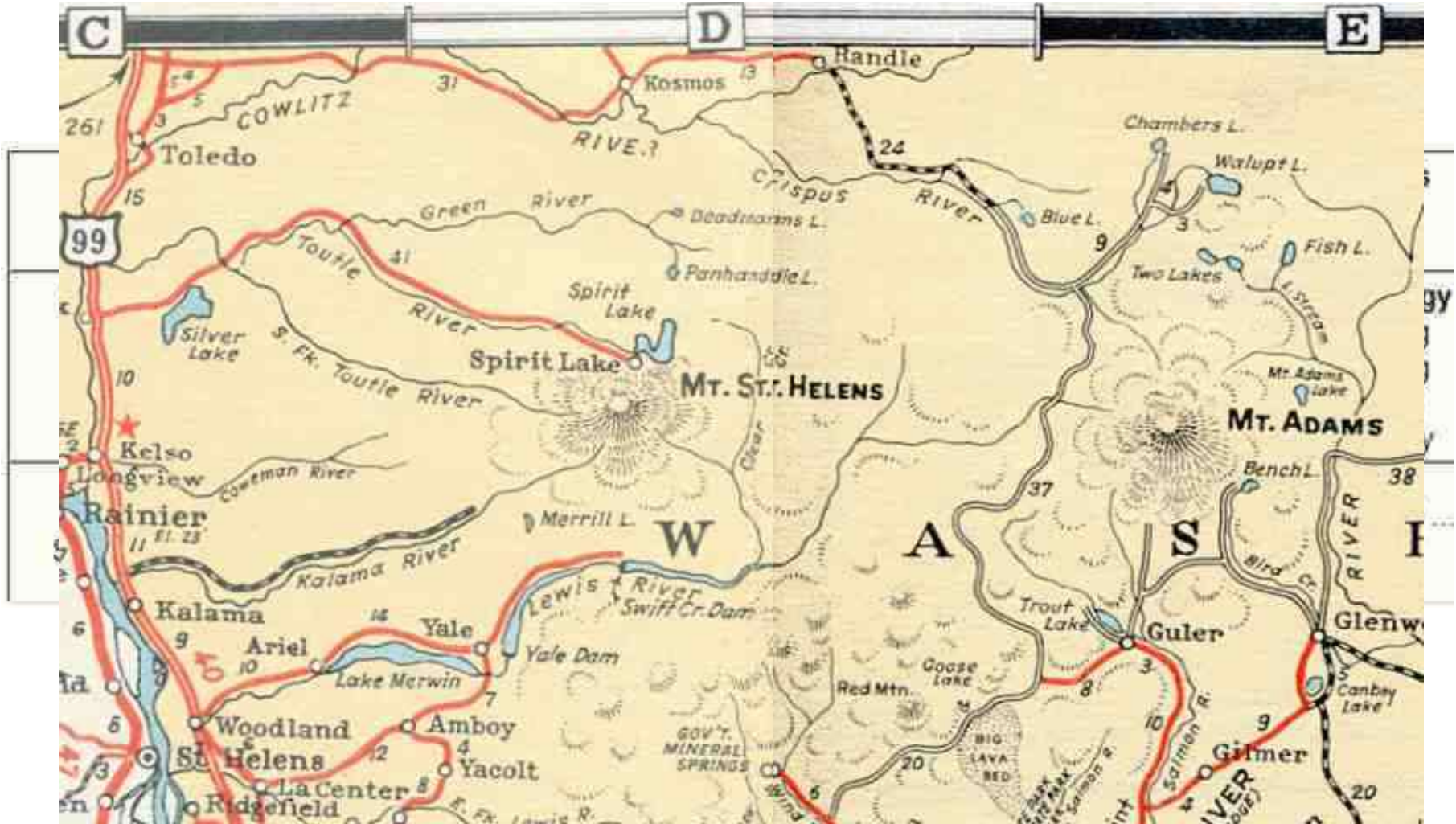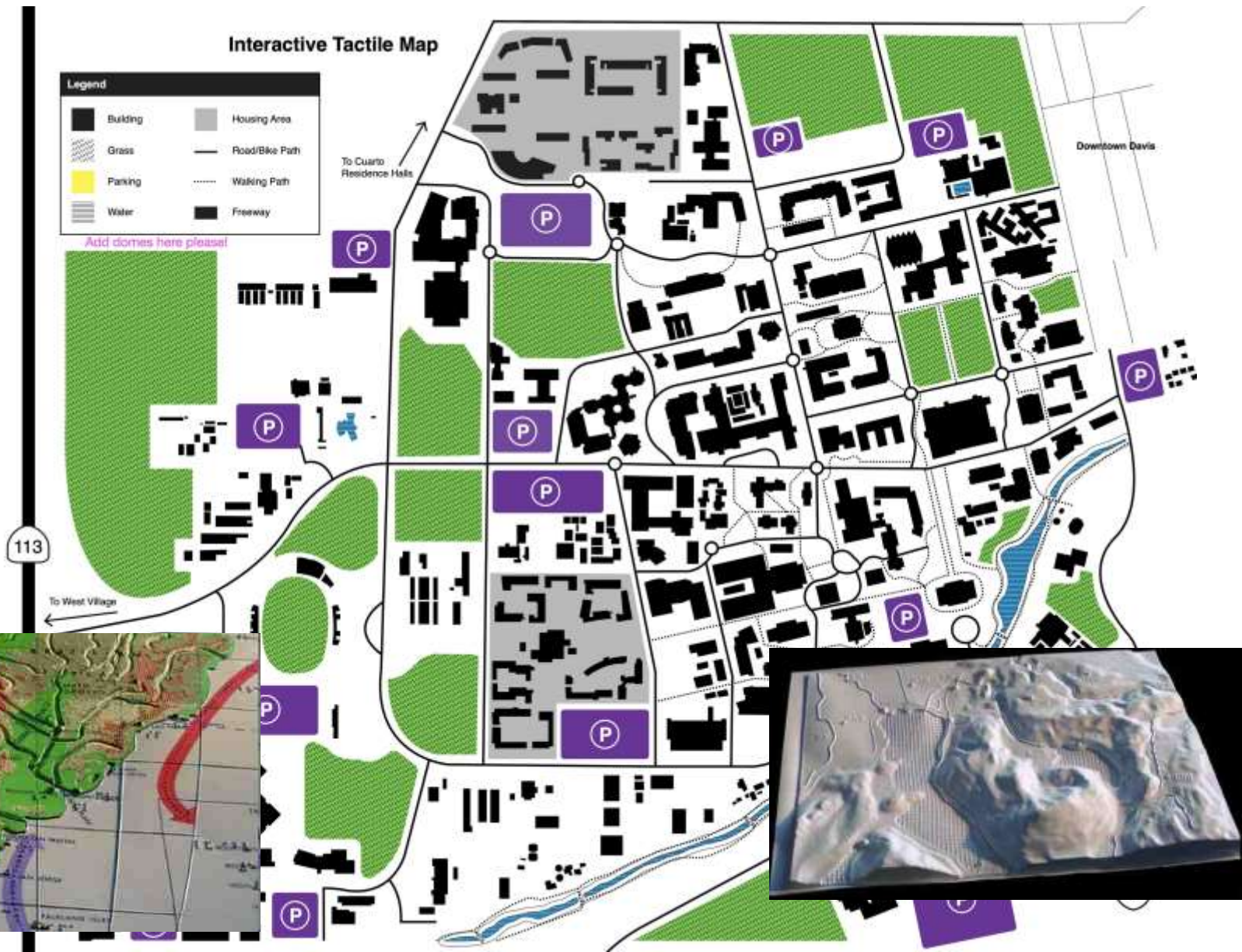
BC 1966 road map

b. More users
e.g. Parks / recreation maps

1960s / 70s ->

Addition of hillshading to

recognize broader range of users,

not just engineers and scientists –

(but expensive to produce)

c. Maps for new groups, e.g. visually impaired

Summary: Pre-digital (analogue) map making

BLUE PLATE Points: dams, waterfalls Lines: rivers, coastlines, lake outlines Areas: lakes, oceans Lettering: names	BLACK PLATE Points: buildings Lines: railways
LIGHT BLUE (screened) PLATE Lines: UTM lines Lettering: UTM co-ordinates	GREEN PLATE Areas: vegetation
BROWN PLATE Lines: contours Lettering: elevations	RED PLATE Points: important buildings, names Lines: roads Areas: urban areas

1 plate for each colour ink produced by exposure to negatives for each layer.
This principle of map layers for printing, is the basis for modern mapping / GIS.

Although computers have changed map printing,
large colour print runs still need printing plates, now produced digitally.

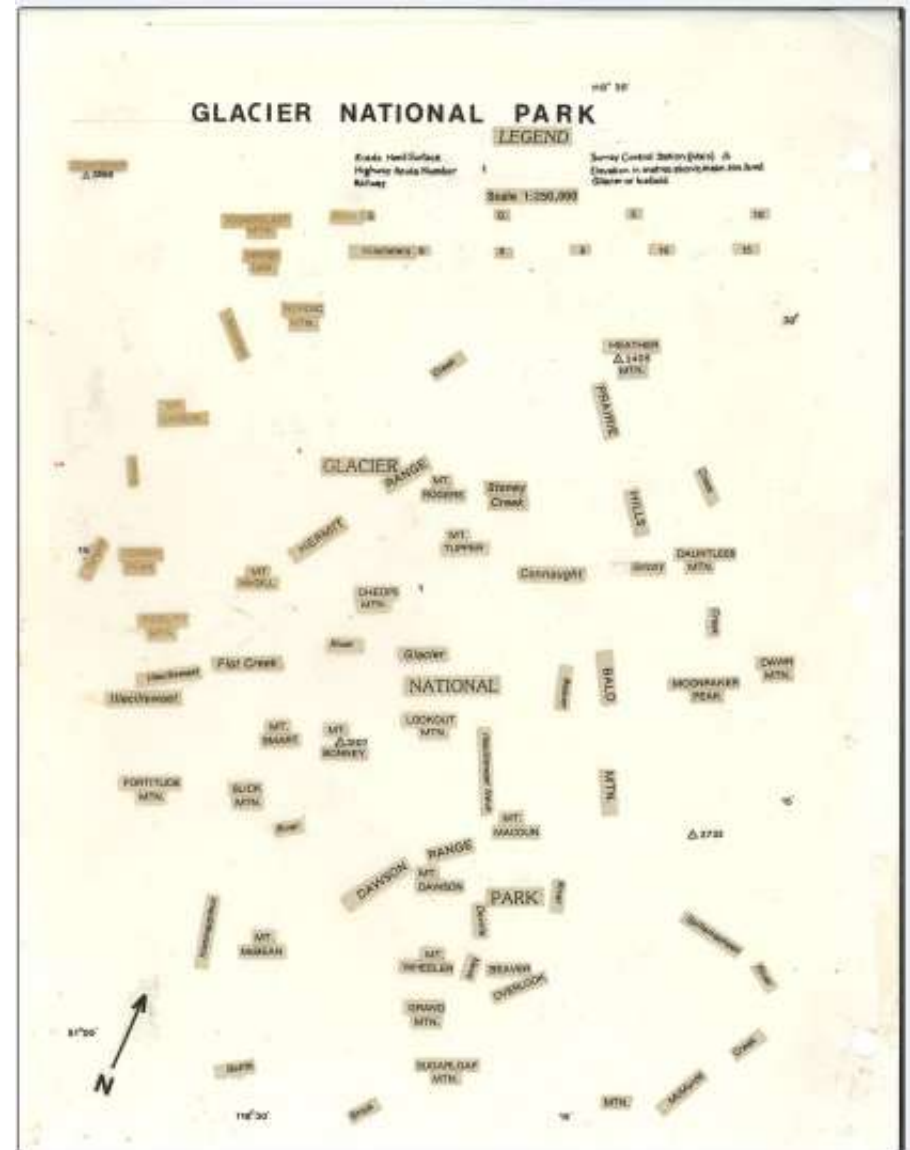Analogue -> Negative artwork -> exposed to printing plate

Digital   -> e-file e.g. shapefile -> transmitted to printing plate

Sample artwork for printing

Scribecoat for linework

Typeset lettering (then reversed to a negative)

GLACIER NATIONAL PARK

MONDAY JUNE 23 1997

...ory wall tiles and Red Cross jelly played their part in preparing for liberation

JAMES FRASER

...W tells of escape maps ...nted on secret press

Captain Heath in 1944, and the area of the map

maps of the area came at a moment of crisis in the camp in 1944. There had been an attempt on Hitler's life and the SS and Gestapo began to tighten their grip. The day after the assassination attempt on Hitler an SS general visited the camp, causing fear among the prisoners.

Mr Heath, of St Andrews, Fife, said: "People began to realise that the final scenes of liberation might not quite follow the stage directions, and if these forces of unrestrained evil were let loose throughout Germany, all of us might find ourselves in conditions of complete anarchy."

It was decided that arrangements should be made to get all the prisoners out of the camp as soon as the war was over, each armed with a map to make his way across Germany. Mr Heath said: "Maps were constantly being copied laboriously by hand for individual escape efforts, but this was a camp of some 3,000 souls."

The escape committee came up with the idea of forming a prisoners' press and word went round for PoWs with printing experience to come forward. Mr Heath, with Pip Evans and Ken Whitworth, formed what became known as the Brunswick Printers.

Mr Heath said: "We found that if we took some large unglazed tiles off the walls of the passages and lavatories and ground them together, face to face, with Vim, we could get a smooth, clean receptive surface from which to make a printing plate."

They then took a tracing from the Waddingtons silk map and, using a piece of carbon, transferred it on to the tile. Separate tracings were made of the different colours on the map, such as black for placenames and railways, red for roads and blue for rivers.

Mr Heath and his fellow printers improved the quality of the tracing by going over the details with a fine mapping pen dipped in boiled margarine. Each tile was then coated with gelatine from jellies sent in Red Cross food parcels to render its surface insensitive to any further grease or oil.

Mr Heath said: "We then had a printing plate which we could damp with a sponge and ink by rolling it over with a greasy-based ink which we'd got from the Red Cross. The map design on the plate repelled any moisture from the sponge because it had been drawn with our margarine."

For an hour and a half a day over several weeks, the Brunswick printers applied the map impression on to the makeshift printing plates on to paper, until there were 3,000 imprints covering the areas of Bremen, Hamburg and Braunschweig.

The maps were ready for the day of liberation, but they were never needed. Despite their earlier fears, they were liberated by an American cavalry unit and told to stay in the camp for a further 11 days because there was "mayhem" in the country.

Mr Heath kept a few copies of the maps, which he believes may be the only ones to have survived.
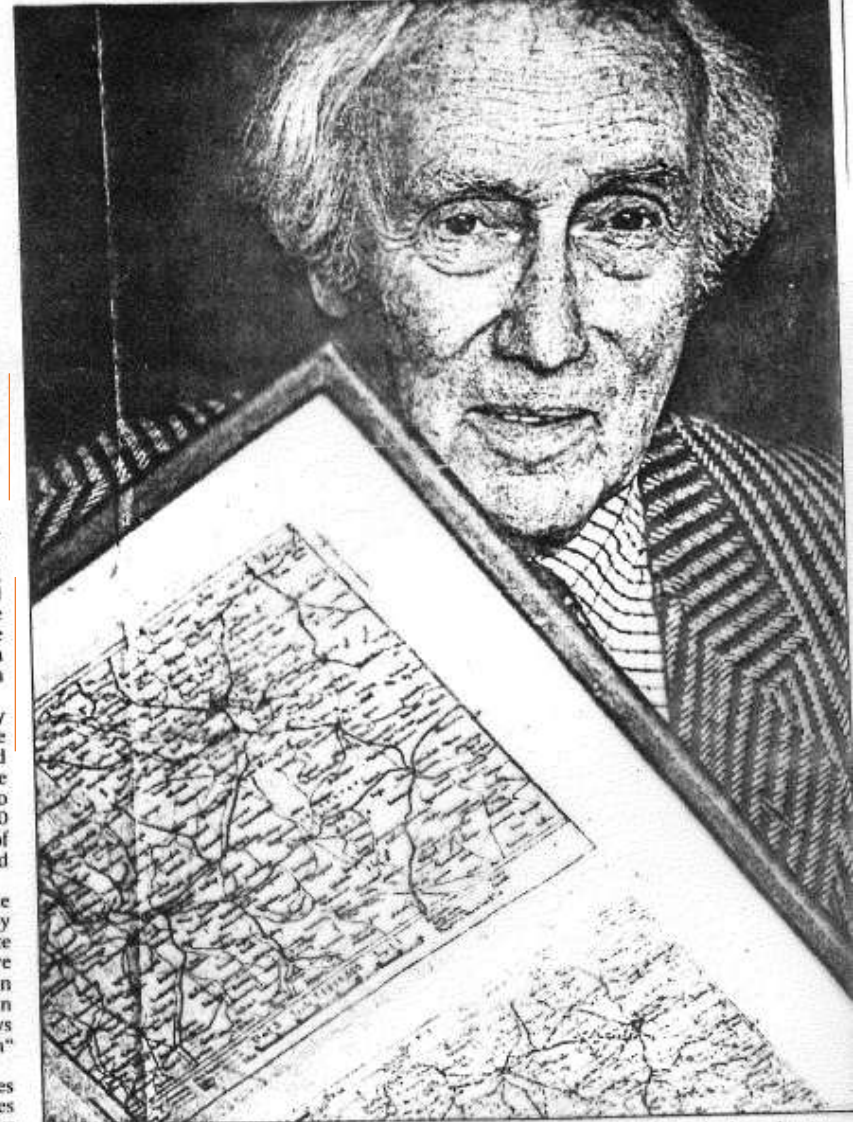
Wallis Heath with a map that he helped to make on makeshift printing plates

Thursday - History of mapping II (1975->): digital developments