Working with Geographic Data

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Cartographic Projections

Representations of physical attributes between points – *projections*

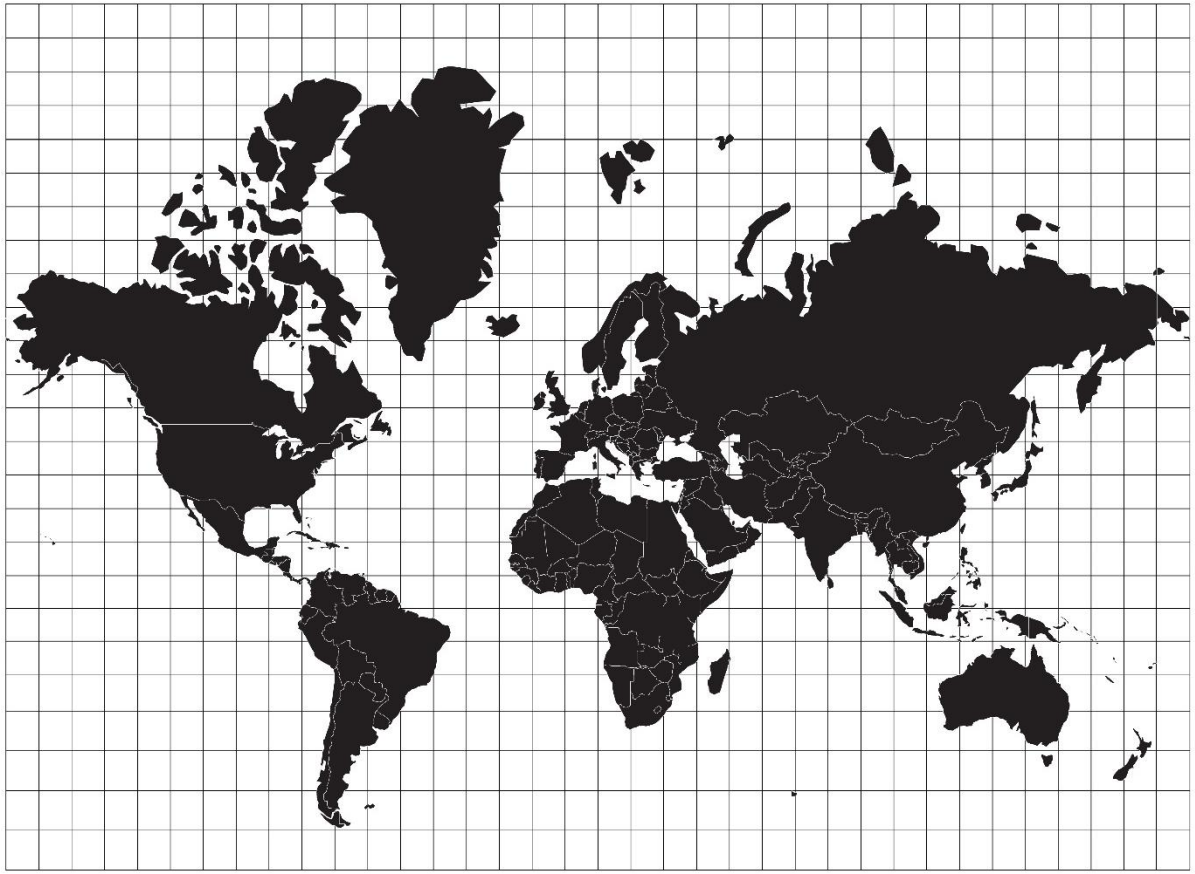
Different projections are different solutions to the distortion inherent to projecting a three-dimensional object onto a two-dimensional surface

Orthographic Projection

A projection which represents a three-dimensional object that is oriented orthogonally to the viewer on a two-dimensional surface

Orthographic Projection

Mercator Projection

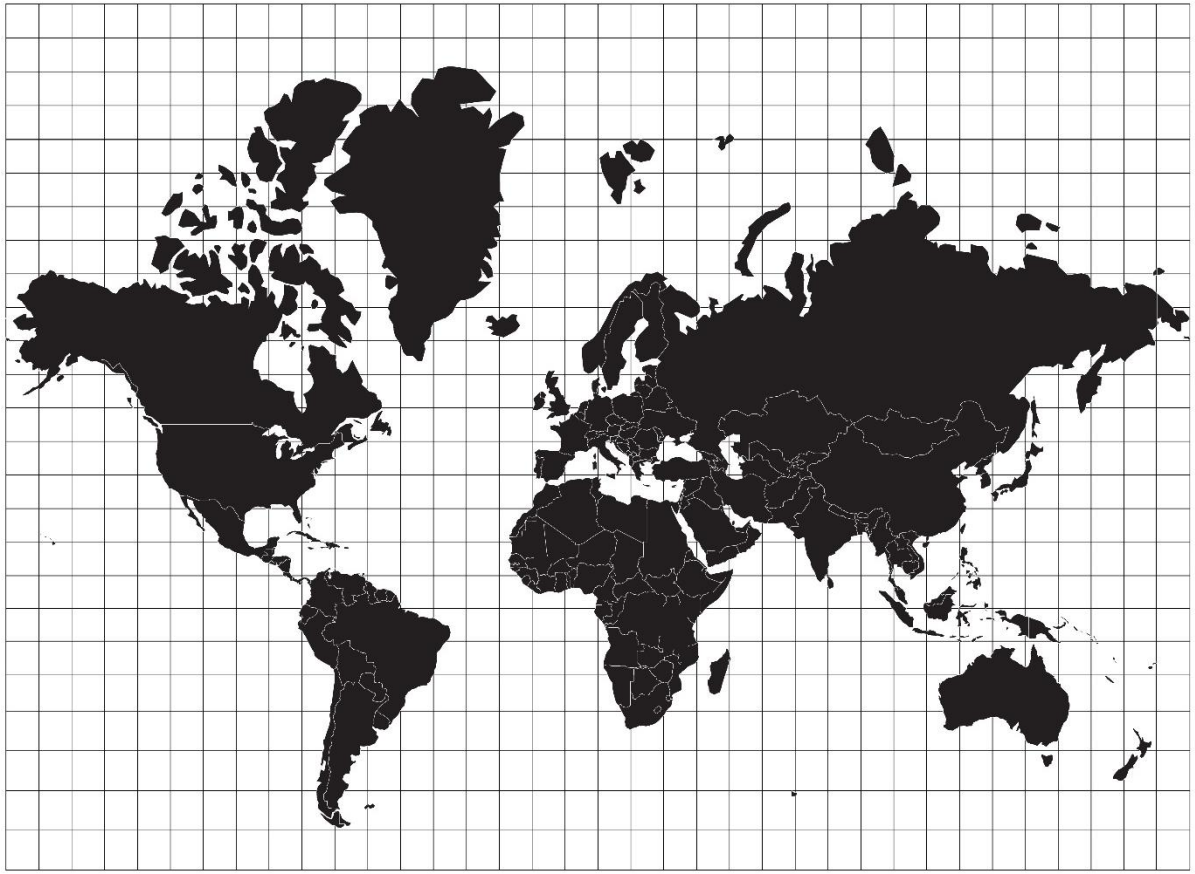


Simple rectangular projection

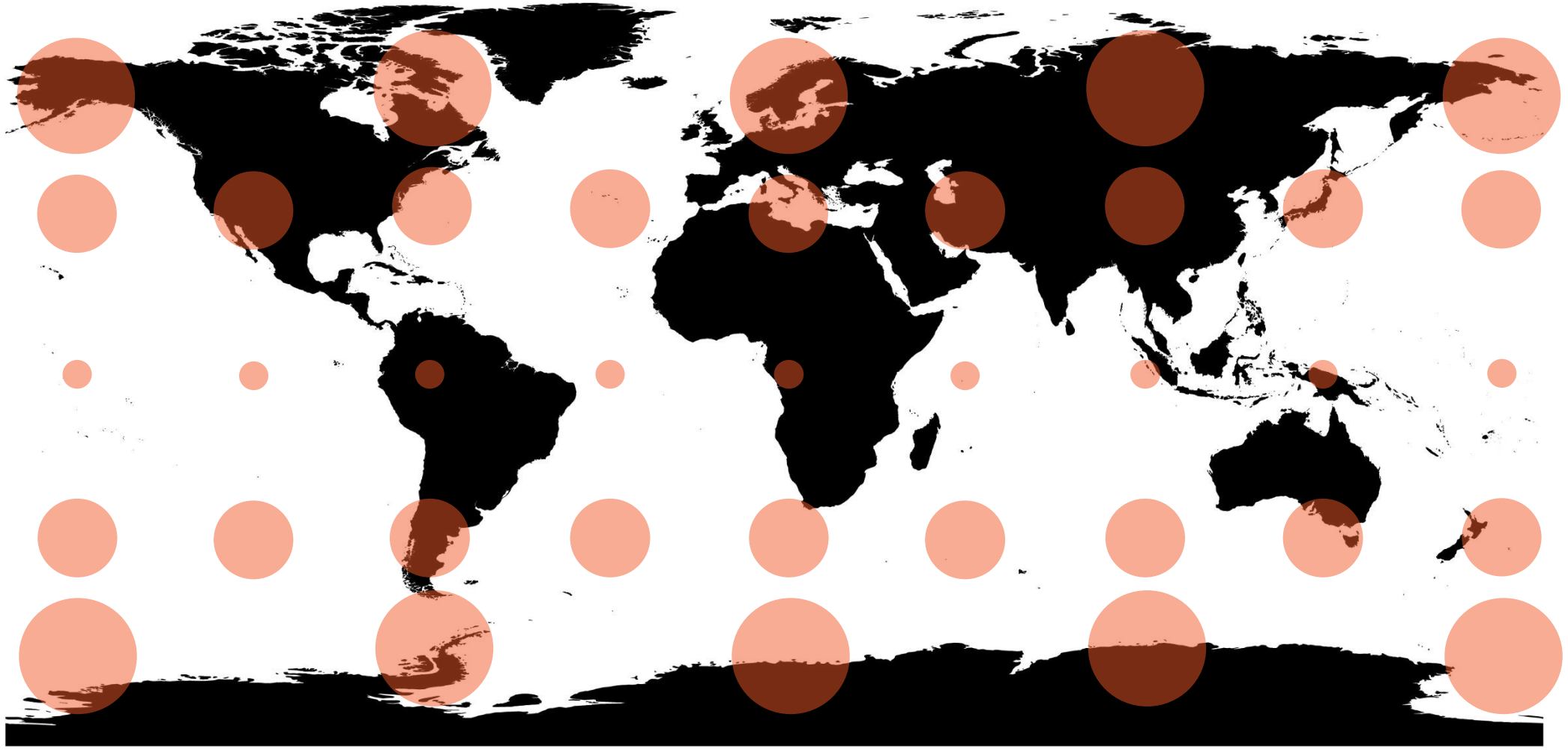
Gerardus Mercator

Developed in 1569

Mercator Scale Distortion



Mercator Scale Distortion



Geographic Data Formats

Geometrically = GeoJSON

Topologically = TopoJSON

Path Strategies

- Draw Texas
- Draw New Mexico
- Simple
- The common border is duplicated
- Bigger file size
- The possibility of errors
- A topological approach solves these problems

GeoJson


```
{
  "type": "FeatureCollection",
  "features": [
    {
      "type": "Feature",
      "id": "ARG",
      "properties": { "name": "Argentina" },
      "geometry": {
        "type": "MultiPolygon",
        "coordinates": [
          [
            [
              [ -65.5, -55.2 ],
              [ -66.45, -55.25 ],
              [ -66.95992, -54.89681 ],
              [ -67.56244, -54.87001 ],
              [ -68.63335, -54.8695 ],
              [ -68.63401, -52.63637 ],
              [ -68.25, -53.1 ],
              [ -67.75, -53.85 ],
…
```

TopoJSON


```
{
  "type": "Topology",
  "transform": {
    "scale": [ 0.0036000360003600037, 0.0016925586033320111 ],
    "translate": [ -180, -85.60903777459777 ]
  },
  "objects": {
    "land": {
      "type": "MultiPolygon",
      "arcs": [
        [ [ 0 ] ],
        [ [ 1 ] ],
        [ [ 2 ] ],
        [ [ 3 ] ],
        [ [ 4 ] ],
        [ [ 5 ] ],
        [ [ 6 ] ],
        [ [ 7, 8, 9 ] ],
        [ [ 10, 11 ] ],
        [ [ 12 ] ],
...
```

Summary

Creating a first-class line chart

Simpler circle visualizations

Illustrate more complex aspects

- Interactivity
- Animation and easing

Pie Charts

Force-Directed Layouts

- for complex hierarchical data

Geographic Visualizations

- Some light cartography
- Choropleth
  - Population data
- Orthographic projection
  - Population data
  - A mystery to solve

THANK YOU VERY MUCH FOR WATCHING!!!