Introduction to coding with

Workshop 4 – 29-09-2023

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Today

- Making maps with cartopy
- Making a small numerical model

Cartopy

- The world is not flat!

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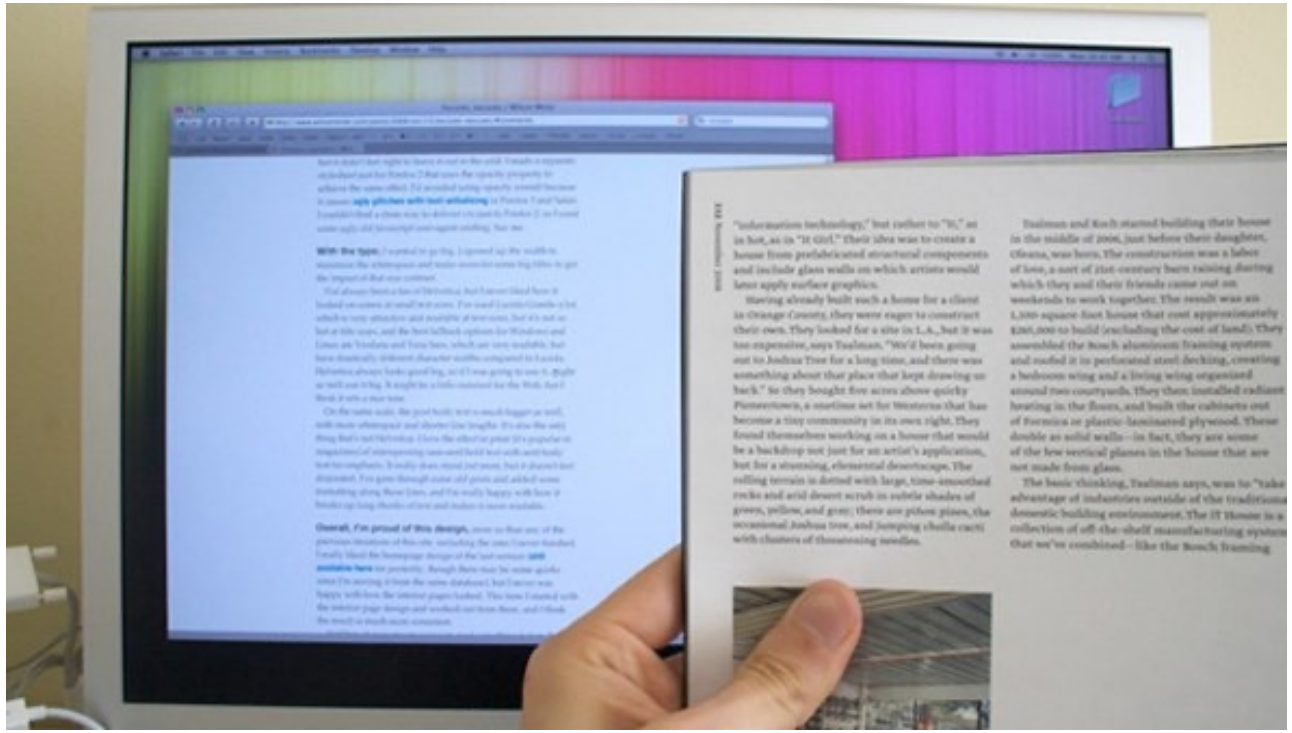
- But our media (usually) are



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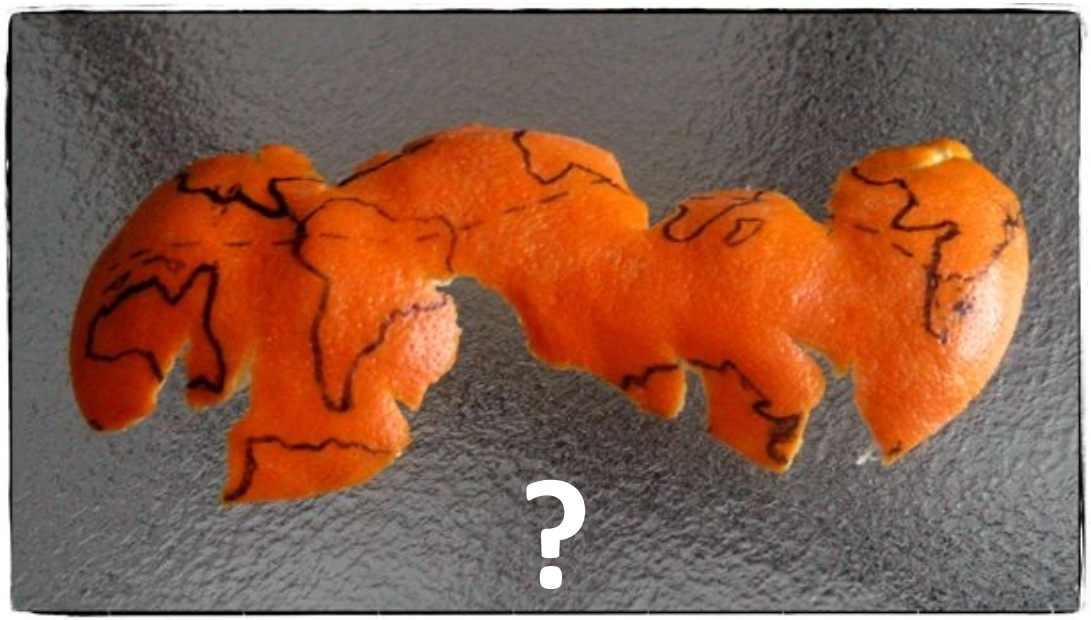
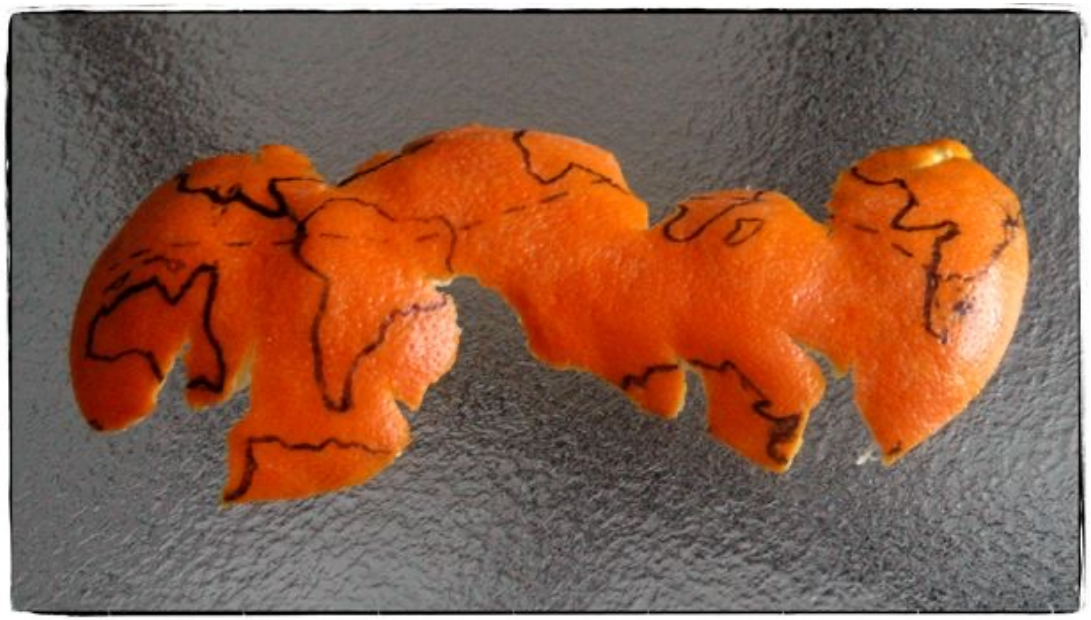


Projection

- Wikipedia:

  “a systematic transformation of latitudes and longitudes of locations from surface of a sphere into locations on a plane”



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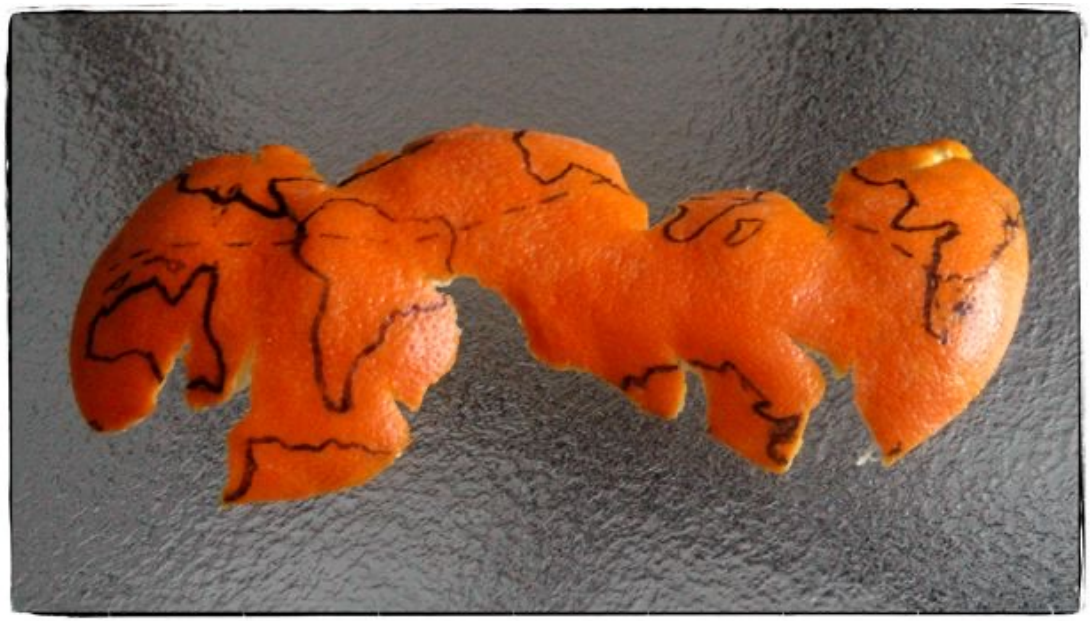
- So there will be distortion



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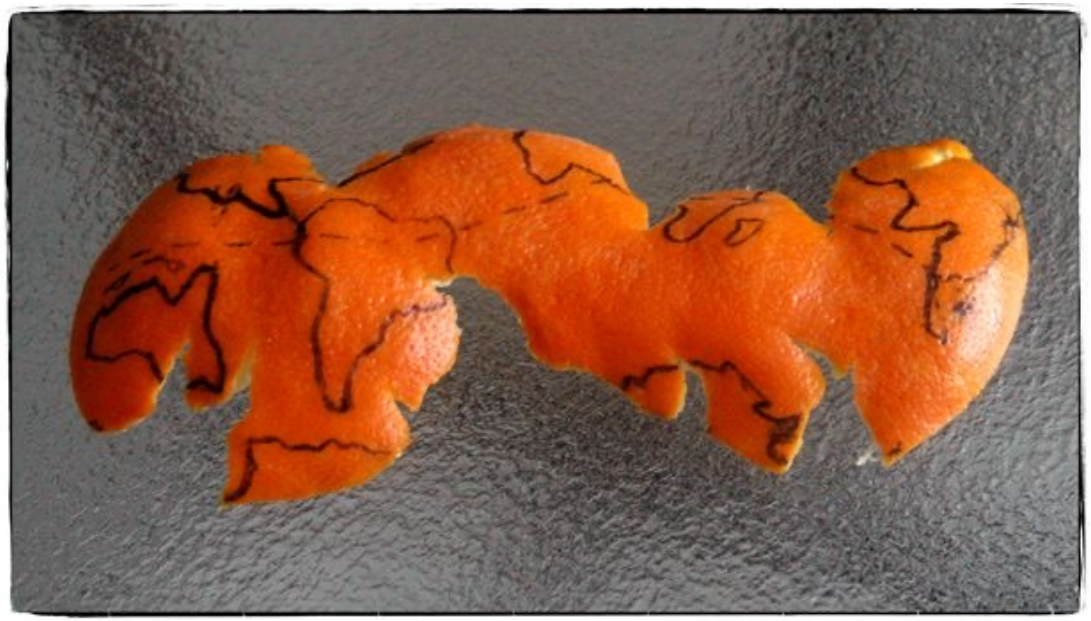
- Often not conserved:
  - area
  - shape
  - direction
  - scale



Projections

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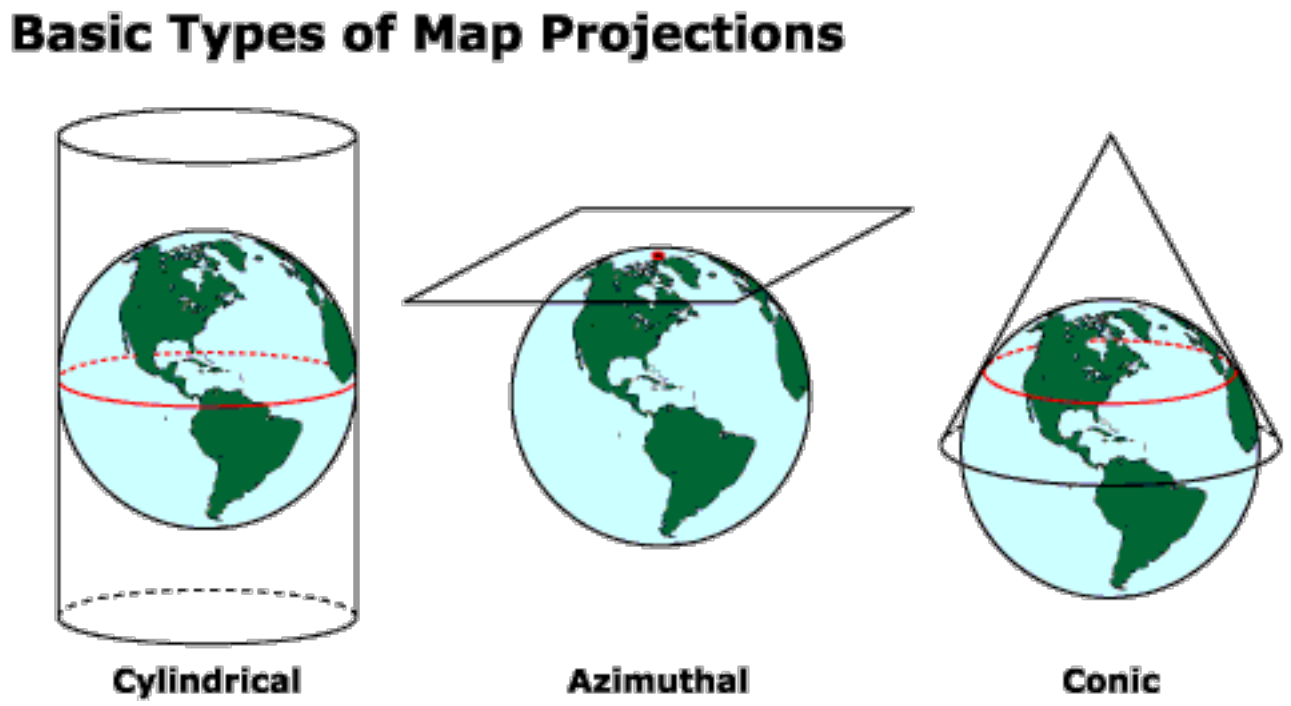

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- Example: Mercator
  preserves local angles (orthomorphic)

  a circle on the earth maps to a circle of varying size on the projected plane

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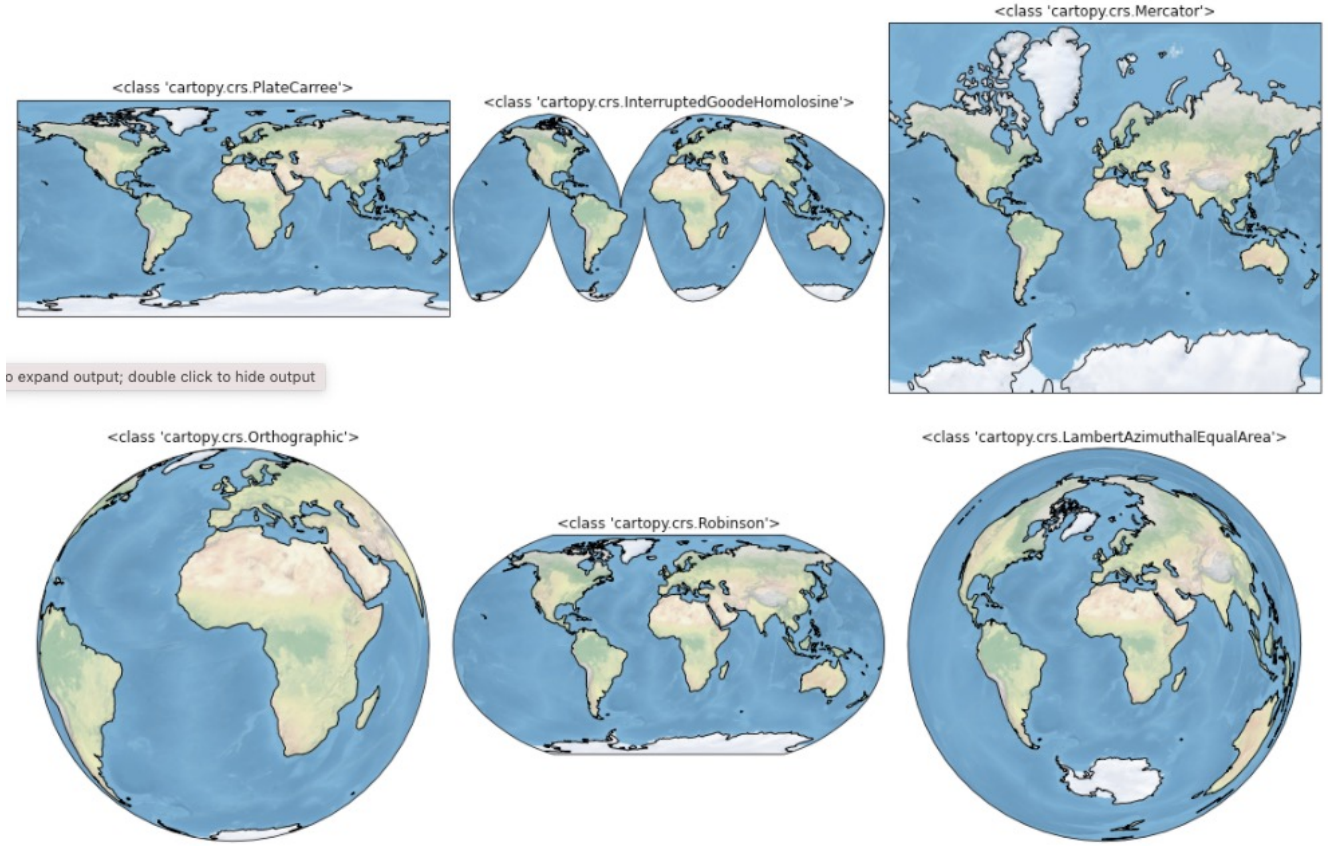

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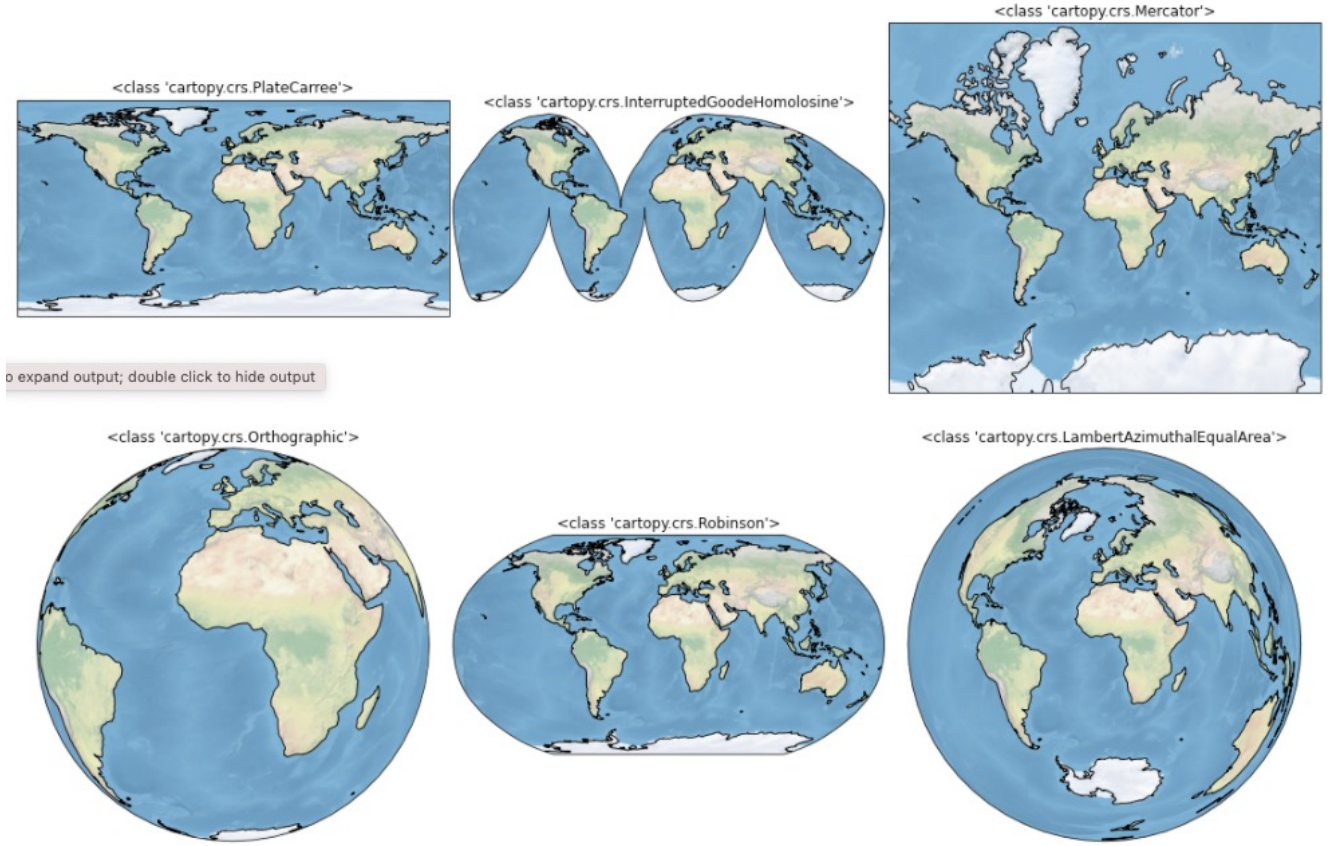
- Xarray and matplotlib are integrated!



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1. Create a time array
2. Create arrays for x, y and z
3. Fill the first entry with a certain initial value
4. Loop over time and calculate all the derivatives
5. Update x, y, and z with Euler forward:

$$x[i+1] = x[i] + dt\frac{dx}{dt}$$