

Map Projections and Distortions

Case: Cylindrical Projections



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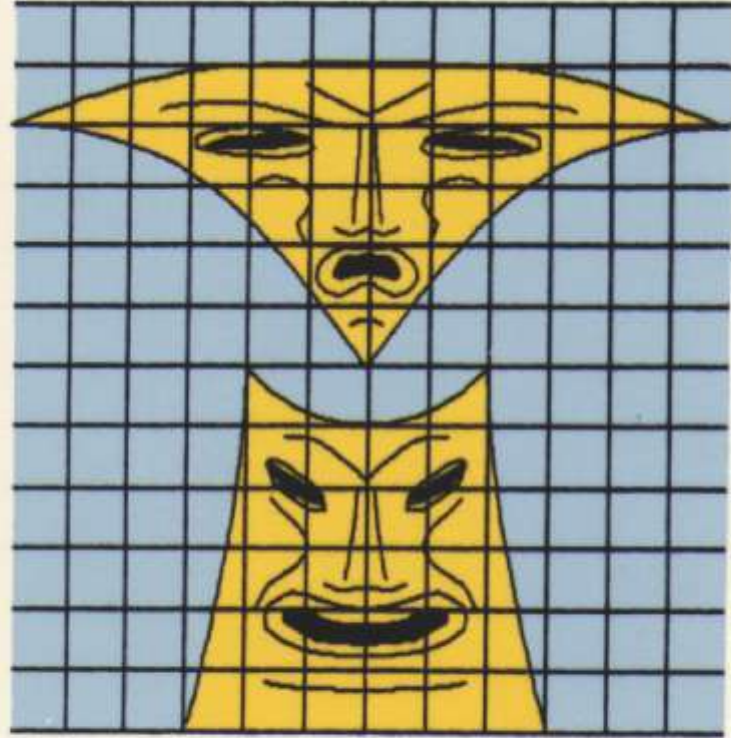


The Earth = A Flate Plate

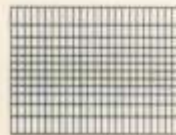
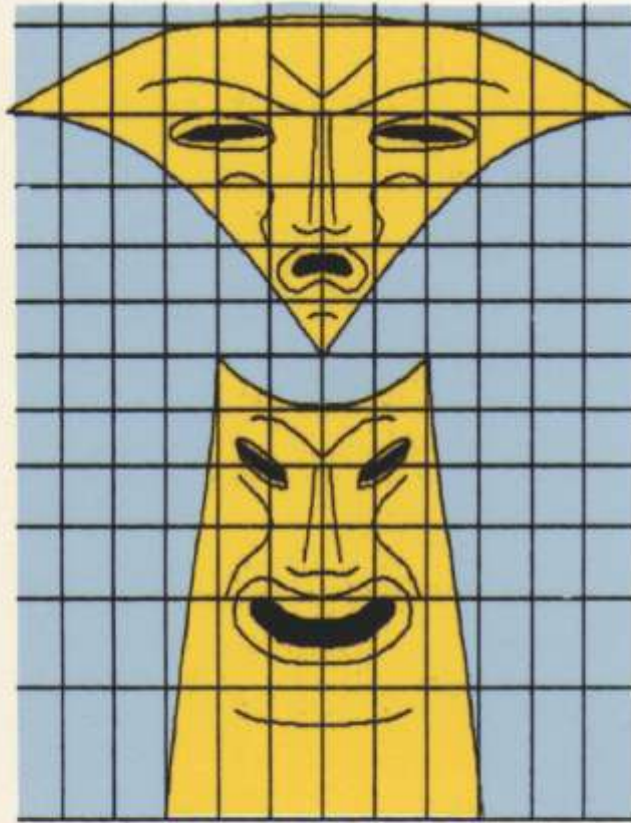


<http://theflatearthsociety.org/cms/>

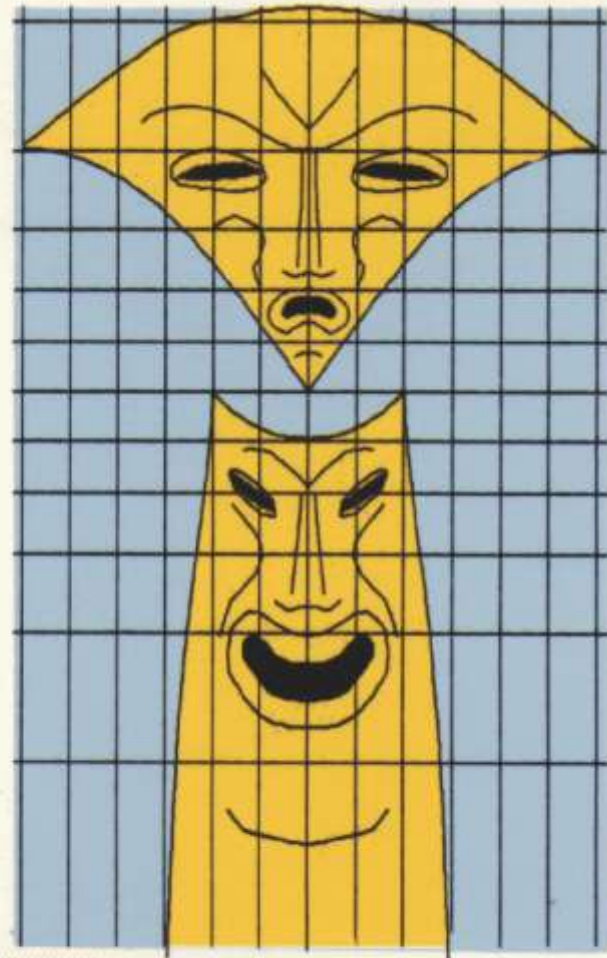




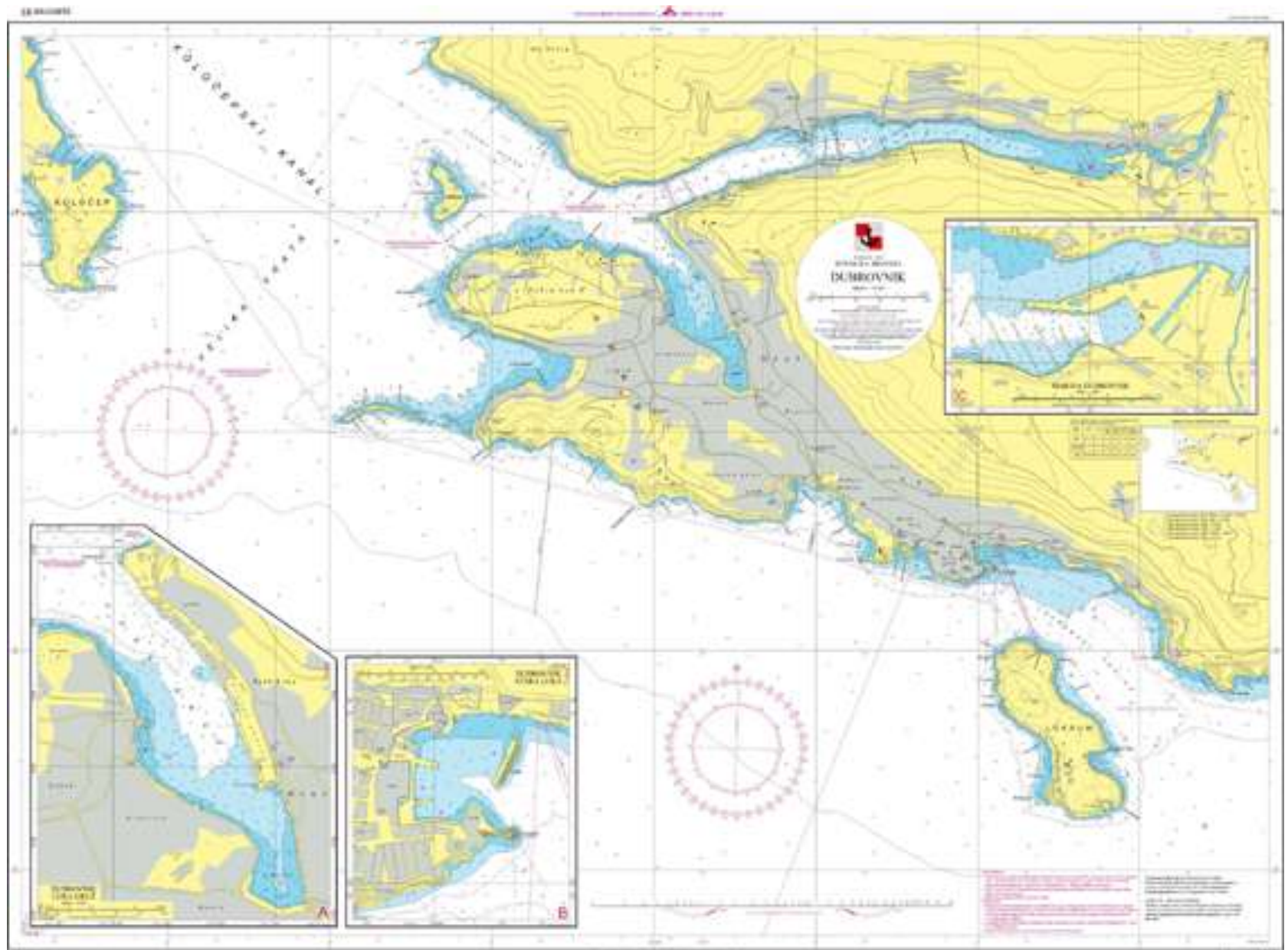
Simple Cylindrical

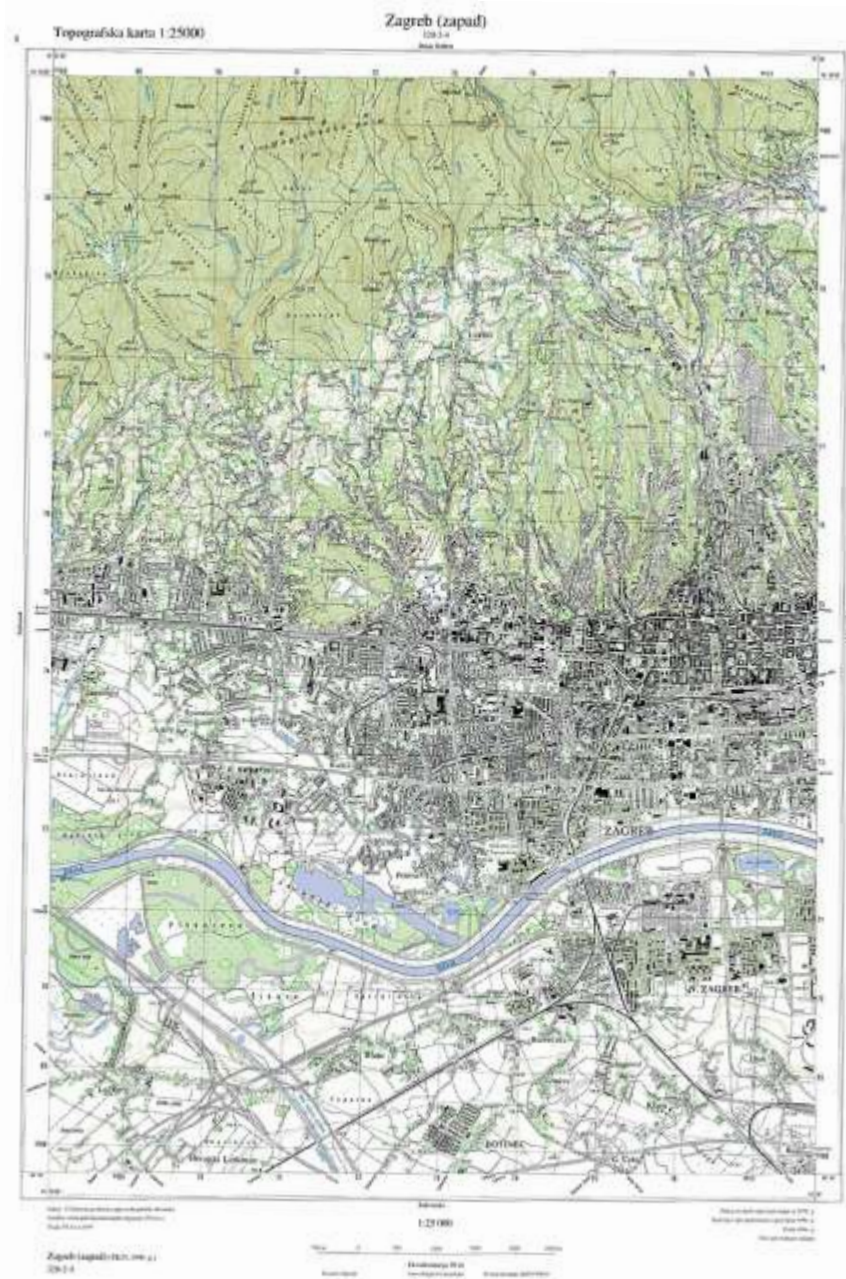


Miller Cylindrical



Mercator





Normal aspect cylindrical projection

$$x = x(\varphi)$$

$$y = k(\lambda - \lambda_0)$$

k ... constant

λ_0 ... longitude of the central meridian

Linear scales

$$m = m(\varphi) = \frac{\sqrt{E}}{R} = \frac{1}{R} \frac{dx}{d\varphi} \qquad n = n(\varphi) = \frac{\sqrt{G}}{R \cos \varphi} = \frac{k}{R \cos \varphi}$$

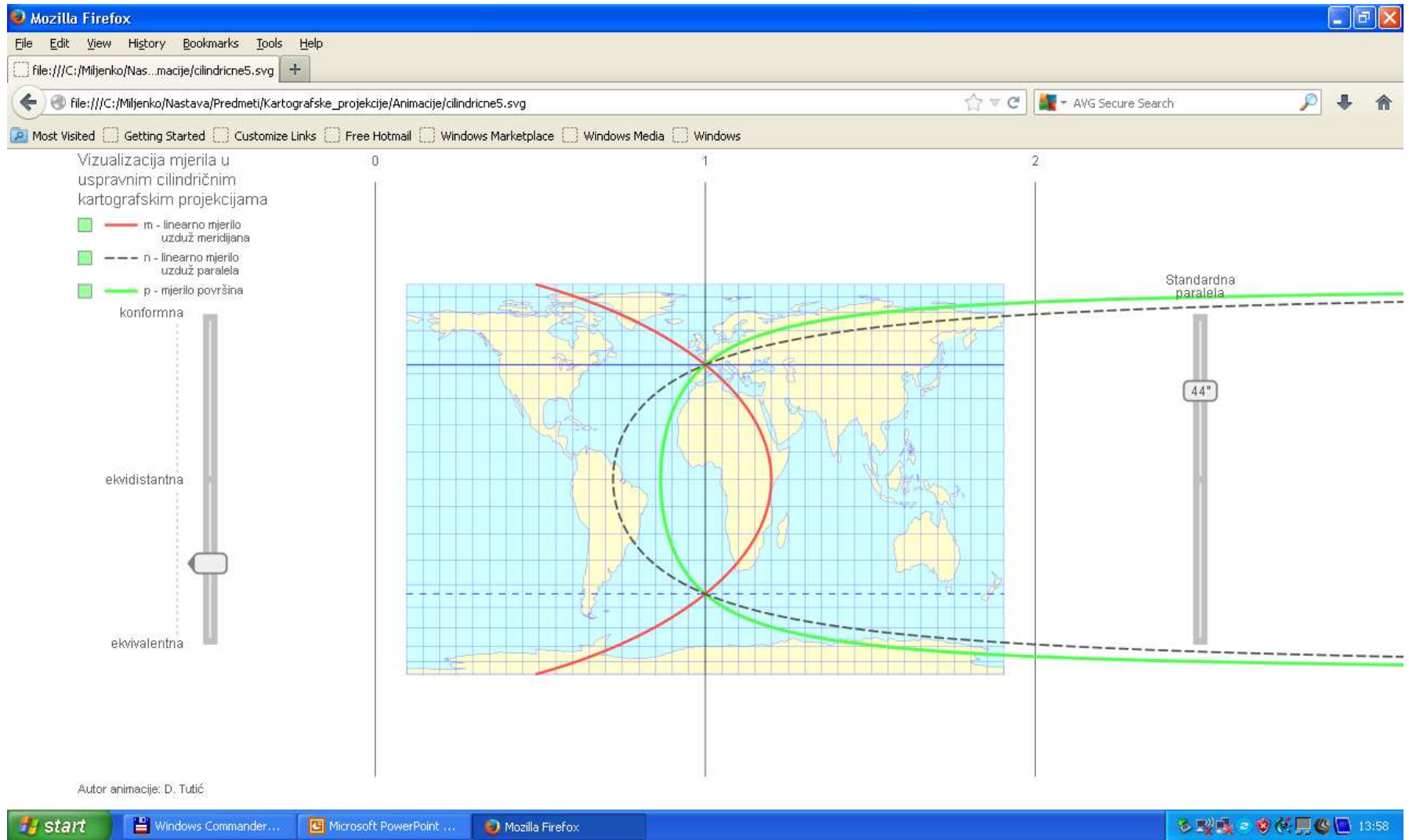
$$n(\varphi_0) = n(-\varphi_0) = 1$$

$$k = R \cos \varphi_0 \qquad n = n(\varphi) = \frac{\cos \varphi_0}{\cos \varphi}$$

Area scale

$$p = mn$$

Visualization of cylindrical projections and their distortions



Conclusions

Generally speaking:

- Distortions are unavoidable and cannot be neglected
- We (should) know their distributions and values, and how to take them into account
- Cylindrical projections are not suitable for world maps
- Cylindrical projections have large application in navigational charts and topographic maps
- Cylindrical projections are not projections on the cylindrical surface !



Thank you for your
attention