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Geodesy in this book is focused on the definition of the parameters required to configure the reference frame used in a project. Without reference to a framework, observations do not have a significant value. The most commonly known framework is the earth division in hemispheres. The system was developed to enable offshore navigation based on line and celestial angle measurements.

Rectangular coordinate systems

Before the advent of systems and software such as GPS, GIS and Google Earth – the world according to a surveyor was a nearly flat. Of course heights were measured, but always relative to a local rectangular coordinate system. As long as one is working within a relatively small area (the dimensions of a district), there is no objection to this practice, which makes life a lot easier. When working with a geodesic coordinate system one can use more high level mathematics for calculating pressure and distance.

It has been known for a long time that the representation of reality by a level and rectangular surface is an approximation of reality. Every land surveyor takes this into account when performing a level survey. He or she will reduce the maximum measurement distance to 200 meters in order to minimize the effect of the curvature of the earth.

Geodesy

Going deep into the far past, the reality of the Earth's Curvature was that the continents had been single one life. A surveyor or cartographer must have seen this. This ideal was however refuted by two men, a certain Copernicus and Galileo, who were adamant that the earth was not flat but that it was a globe. Nothing had under the Sun however, since the ancient Greeks already knew this.

But even the globe is nothing more than a simplification of reality. Maybe a potato is a better approximation of our planet and bulges over its entire surface. That performing calculations on this potato, or globe as it is called, is not so easy should be obvious. Therefore the globe was soon simplified into a more mathematical model: the spheroid.



Figure 18.1 The earth as a globe: note the distortion from the ellipsoid greatly exaggerated (source: www.gov.dnra.ch)

Globe approximated

The ellipsoid, an ellipse rotated around its short side and which came into full development in the 16th century is today still the basis for all the survey and cartographic work. Although the ellipsoid (or as some like to call it) is a mathematical figure, performing calculations on this figure is so simple as to be

often forgotten though is that a globe in turn approximates the ellipsoid. In the dimension of an approximation, this life does not help the final precision that is to be achieved. For a mathematician approximating the earth would easily be in the region of tens of kilometres if one would enter heights in feet. In cartographic work of navigation a precise ellipsoid are used, there are usually no big problems.