图片包含 图示

描述已自动生成**Map Projections**

A map projection is a system in which the spherical surface of Earth is transformed for display on a flat surface. Imagine a transparent globe on which are drawn meridians, parallels, and continental boundaries; also imagine a lightbulb in the center of this globe. A piece of paper, either held flat or rolled into a shape such as a cylinder or cone, is placed over the globe (Figure 2-4). When the bulb is lit, all the lines on the globe are projected outward onto the paper. These lines are then sketched on the paper. When the paper is laid out flat, a map projection has been produced. Few map projections have been made in this way by “optical” projection from a globe onto a piece of paper; instead, map projections are derived by mathematically transferring the features of a sphere onto a flat surface.

Because a flat surface cannot be closely fitted to a sphere without wrinkling or tearing, no matter how a map projection is made, data from a globe (parallels, meridians, continental boundaries, and so forth) cannot be transferred to a map without distortion of shape, relative area, distance, and/or direction. The cartographer can choose to control or reduce one or more of these distortions— although all distortions cannot be eliminated on a single map.

**Map Properties**

Cartographers often strive to maintain accuracy either of size or of shape—map properties known as equivalence and conformality, respectively (Figure 2-5).

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**Equivalence**: In an equivalent map projection (also called ***an equal area map projection***), the correct size ratio of area on the map to the corresponding actual area on Earth’s surface is maintained over the entire map. They are so useful in portraying distributions of the various geographic features we will study.

There are tradeoffs. Equivalence is difficult to achieve on small-scale maps because correct shapes must be sacrificed in order to maintain proper area relationships. Most equivalent world maps (which are necessarily small-scale maps) show distorted shapes of landmasses—especially in the high latitudes. For example, on equivalent maps the shapes of Greenland and Alaska are usually shown as more “squatty” than they actually are (Figure 2-5a).

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**Conformality:** In a conformal map projection, proper angular relationships are maintained across the entire map. Although it is impossible to depict true shapes for large areas such as a continent, in practice for small areas we can say that conformal maps show correct shapes. Conformal projections have meridians and parallels crossing each other at right angles, just as they do on a globe. The main problem with conformal projections is that the size of an area must often be considerably distorted to depict the proper shape. Thus, the scale necessarily changes from one region to another. For example, a conformal map of the world normally greatly enlarges landmasses in the high latitudes (Figure 2-5b).

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地图

描述已自动生成**Compromise Projections:** Except for maps of very small areas (in other words, large-scale maps), where both properties can be closely approximated, equivalence and conformality cannot be maintained on the same projection. Thus the art of mapmaking, like politics, is often an art of compromise. The Robinson projection is one compromise map projection; it is neither equivalent nor conformal but instead balances reasonably accurate shapes with reasonably accurate areas (Figure 2-6). The Robinson projection is a popular choice as a general purpose classroom map.

As a rule of thumb, some map projections are purely conformal, some are purely equivalent, none are both conformal and equivalent, and many are instead a compromise between the two.

**Families of Map Projections**

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描述已自动生成Because there is no way to avoid distortion completely, no map projection is ideal for all uses. So, hundreds of different map projections have been devised for one purpose or another. Most of them can be grouped into just a few families. Projections in the same family generally have similar properties and related distortion characteristics.

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根据分类方式不同，地图投影共有两类：按照投影**变形特点**分类（等角、等面积、任意投影）和按照**投影构成**分类（圆柱、圆锥、方位投影）。通常要较为准确的描述一幅地图投影时，会同时说这两种投影方式。思考，我国制作的中国地图常用哪两种投影方式？等面积圆锥投影。

