University of Anbar

College of Science

Department of Applied Geology

Field Geology

Title of the lecture

Topographic Map

Assistant Prof. Dr. Abdulkhaleq A. Alhadithi

2022

Topographic Map

Contour Lines

Topographic maps use contour lines to portray the shape and elevation of the land. Contour lines are the curved, usually brown lines that connect points of equal elevation and make it possible for a topographic map to represent three-dimensional shapes on a two-dimensional surface. The space between the contour lines represents a set distance, called the contour interval. If the contour interval is 80 feet, for example, the vertical distance between two adjacent contour lines is 80 feet. Contour lines closer together on the map represent steeper terrain and lines farther apart represent flatter terrain. The elevation, in feet or meters, is written on darker or thicker contour lines, known as “index” contour lines. The contour interval can usually be found near the scale, in the map legend.

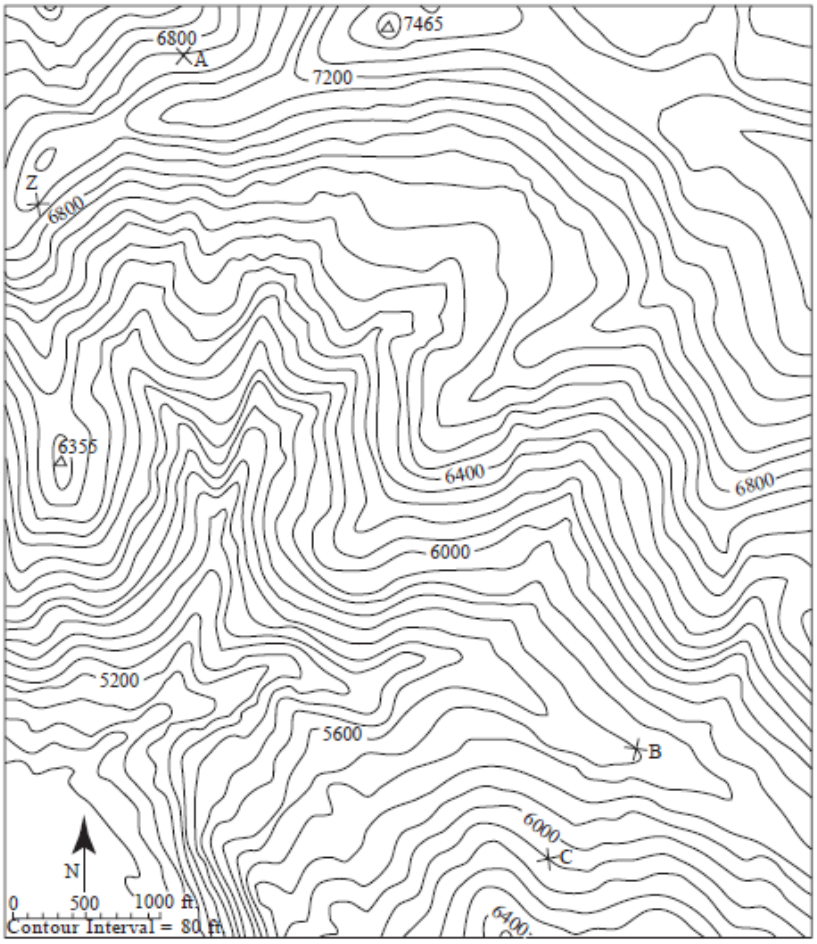

Figure (1) Contour lines represent topography.

Symbols

By using symbols, lines and colors, topographic maps illustrate both natural and human-made features. In order to read a map, it is important to understand what these symbols, lines and colors represent. Topographic maps identify land-use areas by using different colors of shading to represent each type of area. Typically, these shadings are identified on the legend. Trails Illustrated maps use many colors to make features easy to identify and to aid in readability. Areas shaded green usually represent vegetation, such as wooded cover (trees) or brush. Areas of blue and blue lines indicate bodies of water. Areas that are white

or pale in tone are usually areas with little or no vegetation, such as desert or rocky alpine areas. Wilderness, national park, and national forest boundaries are shown with black, dashed-dotted lines tinted with colored bands. Consult the map legend for specific tint representations. Symbols are defined in the map legend, which is found in the map margin or on the map itself. Symbols, or icons, point out features such as buildings, trailheads, visitor centers, trail use information, springs, highway numbers, or points of interest. The legend shows a symbol and defines, in words, the feature that the symbol represents. For example, the legend will show a double, dashed black line, and next to this symbol it will read 4WD Road. Another example would be a picture of a bike that reads, “Mountain Biking.” If you see a mountain bike icon next to a trail on a map, it means that mountain biking is allowed on that trail.

Scale

Each topographic map is drawn to a specific scale. A scale is the ratio of a distance between two points on a map and the actual distance of the same two points on the ground. Scale is the amount that an area or distance has been reduced in order to be included on a map. A scale of 1:250,000 means that one inch on the map is equal to 250,000 inches on the ground, or approximately four miles. Scales used on National Geographic Trails Illustrated maps vary from map to map, but most fall into the range of 1:40,000 to 1:70,000. National Geographic Maps strives to use a scale which optimizes the user's needs with a sheet size that is easy to use and to carry.

The larger scale, the smaller the area that is covered, is usually in greater detail. Its showing this relatively small area in fine detail. A smaller scale map covers a larger area of land, and usually shows the land in less detail.

Figure (2) Map with greater detail

Coordinate Systems

For recreational navigation purposes, Latitude and Longitude and the Universal Transverse Mercator (UTM) are the main coordinate systems to know.

First/ Latitude and Longitude, the True Coordinate System

The Earth is divided into a grid of circular segments which are perpendicular to one another, called latitude and longitude. Latitude lines run horizontally, and are parallel to the equator. Degrees of latitude are numbered from 0° to 90° north and south. Zero degrees (0°) is the equator, 90° north is the North Pole, and 90° south is the South Pole. Latitude is commonly the first number expressed in a lat / long coordinate and is often expressed in the form of degrees, minutes, and seconds, for instance: N38°47'30".

Longitude lines (also called meridians) run perpendicular to latitude lines. Their spacing is widest at the equator, and converges at the Poles. The prime meridian or Greenwich Meridian (0° longitude) runs through

Greenwich, England. Half way around the Earth, the degrees meet (180° east and west) in the Pacific Ocean, just west of the Midway Islands, and just East of the Fiji Islands and New Zealand. Longitude is commonly the second number expressed in a lat/long coordinate, and is often expressed in the form of degrees, minutes, and seconds. Degrees are often divided into minutes (') and seconds ("). Each degree has 60 minutes and each minute has 60 seconds. Seconds can be divided Latitude and Longitude lines (Lat/Long) further in tenths, hundredths, etc. for greater and greater precision. An example of using lat/long to describe a specific point is that the National Geographic Society in Washington, DC is located at 38°54'19" N, 77°02'14" W (38 degrees, 54 minutes, 19 seconds north of the equator, and 77 degrees 2 minutes, 14 seconds west of the prime meridian).

I. Using Degrees, Minutes, and Seconds in latitude and longitude coordinate system.

Around the perimeter of most topographic maps are small numbers showing latitude and longitude, (lat/long), with corresponding tiny lines, or ticks. By referring to the ticks and lat/long numbers you can find the exact place on the planet where you are located. The numbers on the top and bottom of the map are degrees longitude; numbers on the sides of the maps are degrees latitude. To determine the location on the map, connect the tick marks, north to south and east to west, drawing a line through your exact position on the map, and read the corresponding lat/long degrees figure (3).

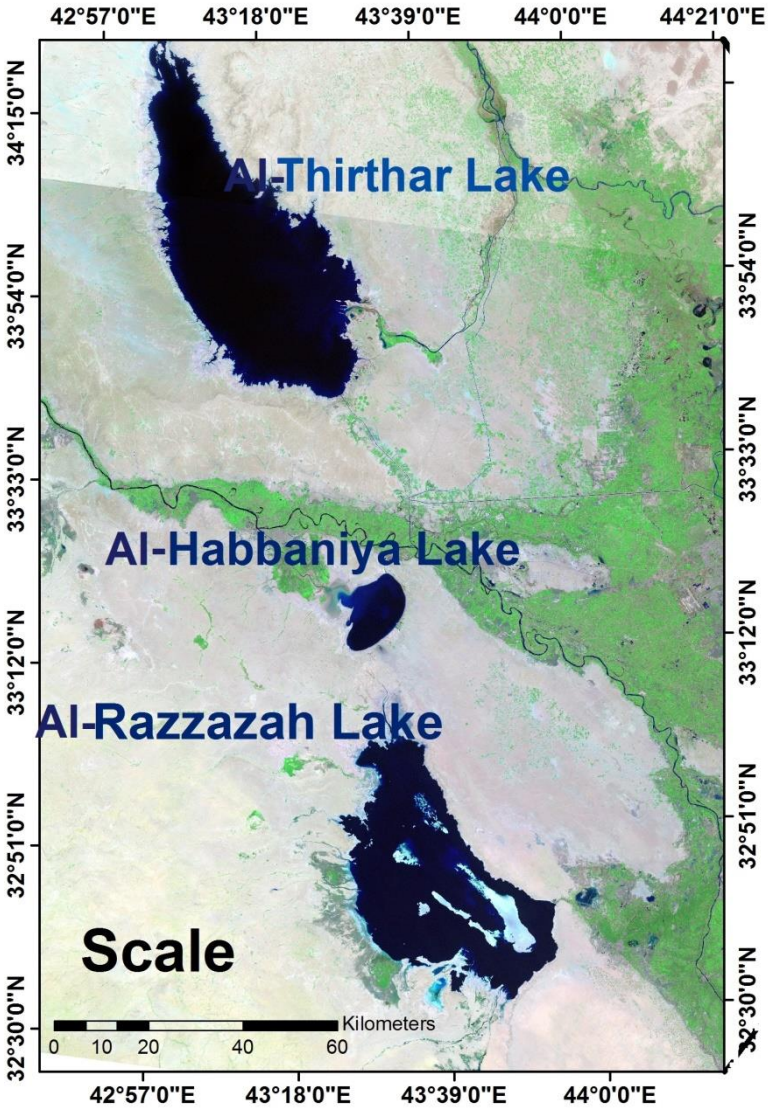

Figure (3) Latitude and Longitude Coordinate System

Reference

Angela L. Coe Tom W. Argles David A. Rothery Robert A. Spicer. 2010 GEOLOGICAL FIELD TECHNIQUES, Department of Earth and Environmental Sciences, The Open University, Walton Hall, Milton Keynes, UK