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Digital Elevation Model (DEM) and it's Use

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Digital Elevation Model (DEM) is a collection of discrete elevation points at regularly spaced intervals. The model reflects abrupt changes in relief such as incised streams, ridge lines and slope breaks. There are two methods of obtaining DEM: First is to direct extraction of topographic information using well established photogrammetric techniques. This method has evolved from manual interactive collection of breaklines and masspoints to a fully automated method and second is using laser and radar based sensors to automatically derive elevation information.

The DEM is directly used for the generation of numerous products, including Triangular Irregular Networks, ortho-rectification of aerial and satellite imagery, and the production of topographic maps, terrain models, transportation infrastructure planning and design base maps, and land use management. DEMs are used for modelling of hydrologic functions, energy flux and forest fires, also used in finding features on the terrain, such as drainage basins and channels, peaks and pits and other landforms.

Digital surface model represents the earth's surface and includes all objects on it. For most of the parts of the earth's surface, elevation data exist in analogue form as contour maps. These contour maps are converted into digital contour files and spatial interpolation procedures are applied to interpolate elevation values from irregularly spaced points to regular grid points. As a result, elevations are available as a matrix of points equally spaced in horizontal and vertical directions and is called as digital elevation model. A DEM can be represented as a raster (a grid of squares, also known as a height map when representing elevation) or as a vector-based triangular irregular network (TIN). The TIN DEM dataset is also referred to as a primary (measured) DEM, whereas the Raster DEM is referred to as a secondary (computed) DEM. The DEM could be acquired through techniques such as photogrammetry, LIDAR, IFSAR, land surveying, etc. (Li et al. 2005). DEMs are commonly built using data collected using remote sensing techniques, but they may also be built from land surveying. DEMs are used often in geographic information systems, and are the most common basis for digitally-

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produced relief maps. While a DTM is often required for flood or drainage modelling, land-use studies, geological applications, and other applications. These tools are relatively computer-intensive but require little analyst intervention, thus minimizing analyst time. In addition, the resultant products have the advantage of precise registration with the DEM. While the algorithms are essentially raster based, the products (watershed polygons, drainage line networks, and tabular attribute information defining watershed linkages) can readily be converted to vector form.