Digital elevation models

Digital elevation models (DEMs) have become a widely used tool and product in the last 20 years. They provide a representation of the landscape and landscape features which includes values of elevation. DEMs enable better visualisation and interrogation of topographic features.

A DEM is generically described as a spatially geo-referenced dataset that is a popular way of encoding the topography for environmental modelling purposes. DEMs are also directly compatible with remotely sensed data sources and can be used to represent complex terrain units, given an adequate resolution.

Generally, DEMs have been derived from topographic data using contour data, spot heights, hydrology and boundaries (shore line, state, 1:100 000 tile). The Victorian 1:25 000 DEMs have been formulated using this topographic information and the software package called ANUDEM (developed at the Australian National University by Michael Hutchinson).

DEMs developed using ANUDEM contain a derived value for elevation. They differ from a Digital Terrain Model (DTM) due to their hydrologic correction (stream enforcement) with respect to flow direction and scale of hydrologic features.

Creation of DEMs

For the 1:25 000 DEMs, the interpolation of topographic data is to a 20 x 20 m grid. The planimetric accuracy of DEMs is the direct result of a sum of errors from two sources of topographic data, these being:

Source data (NRE - Land Victoria)
Due to use of 1:25 000 topographic maps. Horizontal accuracy: 90% of well defined points will fall within +/– 12.5 m of true position. Vertical accuracy: 90% of elevations will fall within +/– 0.5 of a contour interval (which are at 10 m).

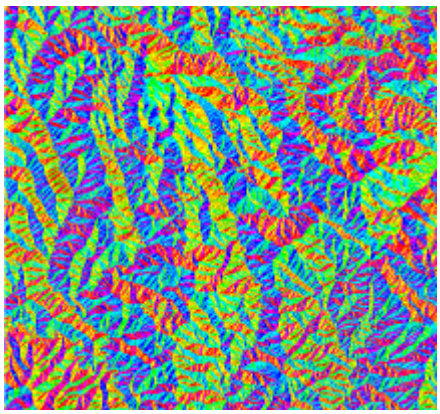
Digital data (NRE - Land Victoria)
Any departure between the digital and source material (measured between centrelines) will not exceed 0.5 mm at map scale (i.e. 12.5 m at 1:25 000) with a root mean square of 0.12 mm for any random sample.

Some general derivatives from DEMs include:

- Slope, slope length and slope position
- Aspect
- Drainage network/catchment boundaries
- Hydrological indices and watertable indices
- Climate variables
- Input to estimation of soil parameters
- Input to land component and soil type mapping
- Viewshed analysis and visualisation
- Visualisation

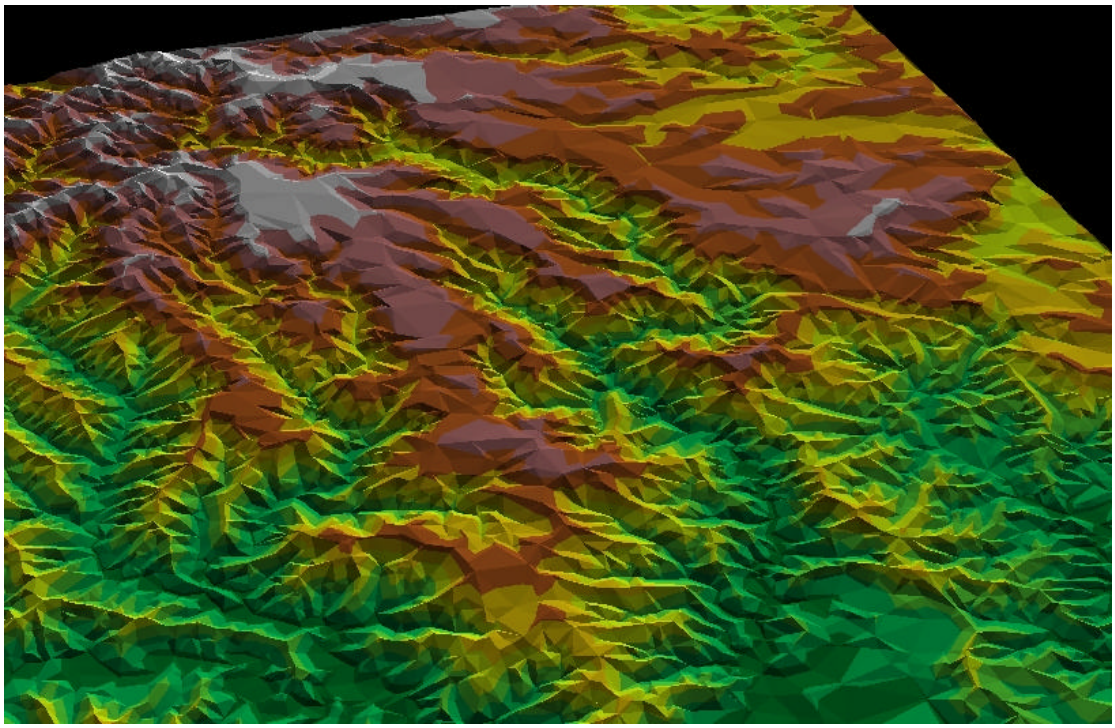
- Environment modelling including salinity, species distribution, spread models, etc.

One of the most useful properties of DEMs is the ability to reclassify datasets. For example, slope, aspect and elevation can be classified to meet requirements or parameters of landscape components (as seen in Figure 1 below)



Aspect classification

Slope classification



Elevation classification

Figure 1 Three dimensional classification of DEM to three different data sets (aspect, slope and elevation.