Australian Government
Geoscience Australia

MEDIA RELEASE

TRACKING WATER EASIER WITH NEW NATIONAL ELEVATION DATABASE

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Understanding how Australia's precious water drains across the surface of the continent will be dramatically improved thanks to a new national Digital Elevation Model (DEM). The new data will contribute significantly to water accounting, catchment management, modelling the impacts of climate change projections and a broad range of other applications.

Researchers from The Australian National University (ANU) and Geoscience Australia have just finalised a new version of their GEODATA 9 Second Digital Elevation Model (DEM-9S). Version 3 marks the culmination of more than a decade of work, providing a grid of ground-level elevation points covering the whole of Australia, with a grid spacing of nine seconds in longitude and latitude, or roughly every 250 metres.

Professor Michael Hutchinson from ANU says "the core data underpinning the new database include revised versions of elevation points, streamlines, cliff lines and water-bodies; trigonometric points from the National Geodetic Database; and, additional elevation, streamline and sink point data digitised from source material. The procedure also incorporated major upgrades to the ANUDEM modelling software to improve the representation of streamlines, lakes, cliff lines and the coastline. While there are many locations where higher accuracy data are available, the new product provides the only nationally consistent data for modelling across the entire continent".

The new database also includes a corresponding Flow Direction Grid (D8-9S), which describes the principal directions of surface drainage across the whole of Australia. It can be used to delineate streamlines and associated catchment boundaries. This is particularly useful in low-relief areas where drainage structure is not reliably defined by elevations alone. Phil Tickle from Geoscience Australia says "the new data shows that only around 50% of Australia's drainage basins actually flow to the sea".

This work is going to underpin the Australian Governments Water for the Future program and the Australian Water Resources Information System being developed by the Bureau of Meteorology. Work has begun already on the next generation of national DEM which will improve the resolution from 250m to less than 90m.

For more information or interviews contact Professor Michael Hutchinson on 02 6125 4783, or the Geoscience Australia Media Hotline 1800 882 035, or visit www.ga.gov.au.

Additional Technical Information

The DEM-9S Version 3 is a model of the terrain in which each data point represents the approximate elevation at the centre of each 9 second by 9 second cell. The density and positional accuracy of the source point elevation data generalises the local terrain, resulting in limited representation of some high points. Version 3 incorporates the improvements made in Version 2 by including with the source data national trigonometric points from the National Geodetic Data Base.
The representation of abrupt changes in landform has been comprehensively upgraded in Version 3 by incorporating, for the first time, the GEODATA TOPO-250K national cliff line data and by upgrading the modelling of cliff lines by the ANUDEM procedure to minimise conflicts between streamlines and cliff lines. The upgraded procedure maximises the accuracy of the representation of surface shape within the limits imposed by the 9 second grid spacing.

Of central importance for the accurate representation of surface drainage structure is the upgrading of the modelling of streamlines by ANUDEM. This improves the positional accuracy of streamlines and explicitly incorporates, also for the first time, the extensive distributary streamline networks that occur in low relief areas of the Australian continent. ANUDEM has also been upgraded to improve the positional accuracy of the coastline and to ensure a smooth transition between land and seabed away from areas with coastal cliffs.

Elevation errors in the DEM-9S are closely related to terrain complexity. Tests of the DEM-9S against 1:25 000 scale elevation data, not used as source data, indicate that the standard error of the DEM is no more than 10 metres in lower relief areas that make up around half of the continent. The standard error increases up to around 60 metres in highland areas with steep and complex terrain. In such areas there is significant variation in elevation across each 9 second grid cell. Maximum errors are naturally larger than standard errors. These range from around 20-40 metres in the lower relief half of the continent up to around 200-300 metres in complex highland areas.

The rasterised drainage structure embodied in the 9 Second Flow Direction Grid respects the positional accuracy of the corrected GEODATA TOPO 250K streamline data and their distributary connections, to within the limits of accuracy achievable at the 9 second scale. The average positional error of the gridded streamlines is around 1/4 of one grid cell (approx 60 metres). Approximately 95% of the gridded streamlines lie within 125 metres of the mapped streamline network and almost all are within 270 metres.

The density of source data points used to create the DEM and its horizontal resolution, warrant that the DEM be considered to have a scale of approximately 1:250 000. This makes the DEM useful for national, state-wide and regional applications, particularly those applications that depend on an accurate representation of surface drainage and catchment structure.
For more information contact Geoscience Australia Media Hotline 1800 882 035 or visit www.ga.gov.au/nmd/products/digidat/dem_9s.jsp