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Topographic Residual Filtering (TRF): A Structural Geology Geomorphological Tool

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Topographic residual filtering (TRF) is an algorithm to remove gross regional topographic effects, enabling a greater contrast of local topographic scarps and lineal features produced through faulting and folding. This tool uses high resolution Digital Elevation Models (DEM) with an inverse Geographical Information System (GIS) hydrology accumulation model to produce a regional trend surface. The regional trend is then removed from the original high resolution topography. The residual, regionally hydrological unfolded surface shows features such as faults scarps and folds with more prominence, having reduced the masking effect of the regional topography. The presented tool was developed in ArcGIS; however the principles and work flow can be replicated in any GIS software. Within the presented ArcGIS format it is easily possible to alter the inner modules of the tool to allow for various spatial scale and resolution adjustments. The filter is designed to be used in conjunction with geomorphological knowledge of the selected study region so structural anomalies can be quantitatively distinguished from natural erosional or depositional processes. A brief case study of the application of the filter for targeted field work in the Southern Coalfields of Sydney, New South Wales, Australia is presented.

Key Words: Structural Geology, GIS, Geomorphology, Southern Coal Fields