

Investigating secular changes in peak metamorphic conditions through time

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Temporal and spatial variations in regional metamorphic P-T conditions provide evidence for changing conditions associated with the cooling of the Earth through time, supercontinent cyclicity; collisional and accretionary episodes. Higher temperatures can be associated with regional underplating or overall higher heat flow, while increases in pressure reflect deeper burial or compression linked to collision or accretion. Recent compilations of data for secular change in P-T-t conditions have been limited to those three principal parameters and have not included information on the uncertainties associated with the peak condition estimates, nor of the specific dating methods utilized. It is therefore difficult to assess the relative merits of the compiled data, particularly as information on metamorphic facies, mineral parageneses, calculation workspace, etc. have not been presented by any of the published studies. This fundamentally limits options to assess the applicability of individual data points. This presentation provides initial details of the design and construction of a new database aimed at capturing additional information that will permit users to investigate differences in quality or relevance of P-T-t measurements while also building a more comprehensive and spatially exhaustive review of metamorphism. Initial insights into the limitations and strengths of individual compiled data and how these might influence assessments of geodynamic setting and long-term variations will be provided. Initial data compilation demonstrates that high dt/dP situations are due to a variety of factors, not all of which are directly relevant to regional to global changes in geodynamic process and setting. Low and intermediate dT/dP appear better representative of temporal and spatial variations but existing data are all focused on only peak conditions, often for unusual metamorphic parageneses, while more common Buchan and Barrovian assemblages are not captured. A broader picture of tectonometamorphic conditions throughout P-T-t paths will be significant to assessing temporal changes, particularly with the lower dT/dP blueschist conditions which may be restricted to the Neopterozoic and Phanerozoic.