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# Links between the Annual, Milankovitch, and Continuum of Temperature Variability

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Climatic processes are intimately coupled so that understanding variability at any one time-scale requires some understanding of the whole. Spectra of Earth's surface temperature exemplify this interdependence, having a continuum of energy at all time-scales, but whose origins remain poorly understood. One clue is that the power-law associated with the continuum breaks at centennial time-scales, midway (in log-frequency space) between the annual and Milankovitch insolation forcing bands. From globally distributed instrumental temperature records we show that power-laws between monthly and centennial periods correlate with the annual period energy. At longer time-scales, proxy estimates of high-latitude and tropical temperature spectra indicate that power-laws correlate with the Milankovitch band energy. The distribution of energy is such that the ratio of high-latitude to tropical variability is largest near the annual and Milankovitch insolation forcing bands and diminishes toward centennial time-scales. Apparently, insolation forcing not only controls annual and Milankovitch band temperature responses but also influences the magnitude and power-laws of the intervening continuum.