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A4.35 WHEN THE STRESS PILES UP! A SIMPLE MATHEMATICAL APPROACH TO INTEGRATE DURATION AND INTENSITY OF THERMAL STRESS DURING NATURAL THERMAL FLUCTUATIONS

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Temperature is arguably one of the most important abiotic factors determining the distribution and success of ectothermic animals. Accordingly, interspecific studies often find strong correlations between maximal or minimal thermal tolerance limits and maximal or minimal temperature exposure in the natural environment of the species. To understand in detail the connections between thermal tolerance, exposure to stressful temperature and species distribution it is important to consider not just the extreme temperature exposures, but also the duration and frequency of these exposures. Fortunately, it is easy to describe the interaction of duration and intensity of temperature stress in a semi-logarithmic plot as the duration of survival decreases exponentially as temperature is increased. This simple mathematic way of analyzing temperature tolerance has been termed “thermal tolerance landscapes” (TTL). In this talk, I will use data from a range of drosophila species to show how TTL’s can be used to describe species specific tolerance limits. Using these data I will also show how TTL’s can be used to analyse the stress experienced during fluctuating temperatures and finally I will discuss how TTL’s hold promising perspectives to develop a better models to understand the thermal constraints that limit ectotherm distribution.