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## Master Thesis Defense

Entitled

*RISING TEMPERATURES IN HOT REGIONS – HOW MANY SPECIES WOULD BE ABLE TO SURVIVE?*

by

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Abstract

Temperatures are rising throughout the world but not uniformly. Different latitudes have varying degrees of temperature rise and the most rapid changes are happening in the higher northern latitudes while only minor warming is taking place in the hot tropical regions. It has been widely assumed that the biggest ecological impacts will be seen in the cooler northern latitudes and that the impacts in hot tropical regions will be much smaller. However, it may be that small temperature increases in hot regions where species are already close to their thermal limits may be more damaging than large temperature increases in regions where species are still far below them. Here by compiling data from 726 studies which have measured  $CT_{max}$  in a wide range of ectothermic animal species I examined the distribution of these upper thermal limits and compared them with temperatures in hot and cold regions. My results indicate that very few species reach their  $CT_{max}$  below 30°C. The vast majority of species reach their  $CT_{max}$  between 30°C-50°C. Cold regions are far below the upper critical temperatures of most species whereas the hot regions are nearer or exceeding the upper critical temperatures of many species. I modelled the impact of a 3°C temperature increase in hot and in cold regions. I found that a 3°C temperature increase in cold regions would result in almost no species being pushed beyond their upper thermal limits. As temperatures reach 30°C, I found that a 3°C temperature increase could push an appreciable number of species over their upper critical temperature. The magnitude of this impact then increased steadily, being much higher in hot regions. In regions where temperatures are reaching 45°C, a 3°C temperature increase could push the majority of the remaining species over their thermal limits. My results suggest that even though temperature increases in hot regions are much smaller than temperature increases in cold regions, the ecological impacts could be much greater, and many more species could be pushed over their upper thermal limits.

**Keywords:** Climate Change, Upper Critical Temperature ( $CT_{max}$ ), Tropics, Ectotherms.