Collaborative Proposal: MSB-ENSA: Combining Gradients of Space and Time to Understand Biodiversity Dynamics in the Hawaiian Islands

Synopsis
1   Background

Earth systems are nearing or already past a global tipping point past which the biological diversity, fundamentally important to the functioning of all natural and human-engineered ecosystems [?]. Beyond this phase transition, the processes regulating biodiversity will change, and the dynamics of their resultant biological systems, from clades to ecosystems, will become non-equilibrial [?   ?]. Despite the pressing need to better understand biodiversity dynamics, we still have only a very rudimentary predictive capacity; we must be able to address how has biodiversity been shaped in the past, what are the expectations as we move into the future and how will associated ecosystems adapt to global change? We must be able to tackle these questions from plots to biomes, as by their nature, phase transitions affect all scales of organization. Advances in our understanding of specific ecosystem components is also idiosyncratic. Remote sensing and distributed biogeochemical monitoring [? ?] rapidly advancing ecosystem modeling, while similar large scale study of organismal processes, from genetics to populations and communities, lags behind, especially for "dark taxa" such as arthropods and microbes.