

## sDiv Workshop Summary

# “Unifying marine and terrestrial biodiversity at the interplay of macroecology, macroevolution and macrophysiology – sWEEP” 21<sup>st</sup> – 24<sup>th</sup> October 2014

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### Focal areas of discussion

#### Workshop goals

1. **Assemble** a large dataset containing the geographic distributions, associated physiological traits (i.e. body size and climatic tolerances) and phylogenetic relationships for taxa in both terrestrial and marine systems.
2. Perform **cross-species analyses** to disentangle the relative importance of phylogenetic relationships and macrophysiological traits to species distributions to compare whether similar processes of climatic niche conservatism occur on land and sea; and
3. **Identify differences between realized and fundamental climatic niches** for a large set of multi-taxa species across marine and terrestrial biomes to assess their vulnerability to climate change.

#### Conclusions and open questions (relating to goals)

1. Different sampling units are commonly used in marine and terrestrial systems (e.g. community structure is often measured in marine systems using body size, while in terrestrial systems species richness is more commonly used). It was concluded that physiological and morphological traits may be more comparable between the systems. A breakaway group established a criteria for data collection (data mining). It was agreed that once compiled, that data will be published in a data paper.
2. Analysis problems with species range data received much attention as did the need to define habitat unities that are comparable between marine and terrestrial systems. Scale was also identified as a potential problem as pelagic distributions are thought to be less constrained than benthic and terrestrial distributions. The group agreed that these issues should be discussed in a meeting report paper.
3. Breakaway groups identified specific questions, aims and hypothesis for 3 primary research papers (discussed in detail below).

## **Presentations**

### **Opening**

**Miguel Ángel Olalla-Tárraga:** "Unifying marine and terrestrial biodiversity at the interplay of macroecology, macrophysiology and macroevolution"

**Ignacio Morales-Castilla:** "State of the art: Defining the basis to unify marine and terrestrial biodiversity at the interplay of macroecology, macroevolution and macrophysiology"

### **Macrophysiology**

**Susana Clusella-Trullas:** "Macrophysiology - Global patterns in physiology"

**Piero calosi:** "Physiological Diversity - Evolution and Climate Change"

**Jennifer Sunday:** "Global patterns of thermal tolerance and range limits in ectotherms - What can they tell us about responses to climate change?"

**Brezo Martínez:** "Combining physiological knowledge and SDMs in better predictions to Climate Change"

### **Macroecology**

**Carsten Rahbek:** "Terrestrial marine research: macroecology & macroevolution"

**Miguel Ángel Olalla-Tárraga:** "Biogeography in a changing world"

**Sally Keith:** "Revealing the processes underlying biogeographic patterns"

**Joanne Bennett:** "Changes in forest-bird assemblage structure in response to multiple pressures"

### **Macroevolution**

**Adam Algar:** "An anole's eye view of Mevo & Meco"

**Ignacio Morales-Castilla:** "Biodiversity & Niche Conservatism - Using the past to understand the present and the future"

**Fabricio Villalobos:** "Phylogenetic fields of species: Integrating distributional, phylogenetic, and morphological information"

### **Methods**

**Bradford Hawkins:** "Evaluating the role of intrinsic properties as drivers of community diversity and structure in geographical space"

**Ingolf Kühn:** "Analyzing of traits distributions at intermediate scales"

**Alexander Singer:** "Dynamic range projections of interacting species - managing uncertainties"

### **Public Seminar**

**Bradford Hawkins:** "Niche conservatism and diversity gradients"

### **Outputs and work plan**

1. Data paper – Distributional, phylogenetic and macrophysiological traits (i.e. thermal tolerances) for a set of marine and terrestrial plant and animal taxa. Lead Joanne Bennett
2. Meeting report paper – Share perspectives and discussions from the workshop with the scientific community. Lead Joanne Bennett
3. Analysis papers
  - I. Does thermal regime of clade origin predict variability in CTmax or CTmin and can this explain diversity gradients? Lead: Joanne Bennett
  - II. Does fundamental niche under filling increase with trophic level on land and in the ocean? Leaders: Miguel Ángel Olalla-Tárraga and Jennifer Sunday
  - III. Are the rates of trait evolution more heterogeneous in terrestrial than marine systems? Leaders: Ignacio Morales-Castilla and Adam Algar
4. A poster will be presented at the International Biogeography Society conference in January 2015, outlining the goals and outcomes of the workshop. Further results will be presented at an international conferences to be determined in the future.

The priority moving forward is the construction of the dataset which we estimate will take approximately four months.

### **Collaboration**

The workshop facilitated collaboration between macroecology, macroevolution and macrophysiology researchers working in marine and terrestrial systems. We identified common goals and discussed comparable methods between these fields. Future collaboration may also be possible, as to fill data gaps in may be necessary to invite new members to the group.

### **Working balance**

Whole group discussions: 20%  
Working in breakaway groups: 40%  
Presentations: 40%

### **sDiv support**

The facilities provided by sDiv promoted discussion and innovation, which was a major factor leading to workshop achieving its goals.