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**Tropical Ecology and Society  
Reconciling Conservation and  
Sustainable Use of Biodiversity**

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**PROGRAM  
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ABSTRACTS**

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**O58-01 – S58** *Monitoring and mapping tropical biodiversity and ecosystem services with remote sensing*  
Thursday 23 June / 10:30-12:00 – Sully I

## **Projections of the future distributions of páramo and subalpine Neotropical forests from satellite image interpretation and climate data**

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**Background:** The UN Intergovernmental Platform on Biodiversity and Ecosystem Services (IPBES) is supporting global and regional reports and capacity building aimed at assessing biodiversity, ecosystem services, drivers of change in ecosystems and the present and projected future relationships among ecosystems, human health and well-being, and policy. Remotely sensed imagery from satellite or air borne sensors will be important to characterizing these relationships. We present an example of how new remote sensing products can help quantify the present and projected future extent of the tropical alpine ecosystem known as Páramo.

**Methods:** We mapped average number of frost days per year and annual average relative humidity for the Neotropics from hourly climate station data and existing climate maps and then compared these data to existing Landsat image composites for the region.

**Results:** We found that we could visually compare the Landsat imagery with maps of frost days to find regional thresholds in the average number of frost days per year that defined páramo and subalpine Neotropical forests, and that we could integrate our mapping model of frost days with future climate projections to predict changes in climate that define the extent of these ecosystems.

**Discussion:** Under some projected climate scenarios, we can expect that the extent of lands with the climate that currently supports páramo will decrease, and it will disappear in many places. Subalpine forest climate will expand in some places and disappear in others.

**O58-02 – S58** *Monitoring and mapping tropical biodiversity and ecosystem services with remote sensing*  
Thursday 23 June / 10:30-12:00 – Sully I

## **Mapping ecosystem services at the regional scale: the contribution of an up-scaling approach. The case of the Amazon pioneer front**

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**Background:** Large-scale ecosystem services (ES) mapping is a challenge for environmental management. A possible and low-cost method is the up-scaling approach, which we tested on Pará State, Brazil.

**Method:** We mapped four ES indicators (vegetation carbon stocks, rates of water infiltration into soil and a biodiversity and a chemical quality index) at the regional scale, from field and remote sensing data. To do so, we first classified the land cover from MODIS images. Then, we averaged the ES indicators (field data) per MODIS land cover class. Finally, we evaluated regional maps' accuracy through three different procedures: first, we mapped the variability of the ES indicators per land cover type. Secondly, we compared, statistically and visually, the regional ES indicators maps with local scale maps made from statistical models that linked remote sensing (Landsat and DEM Aster) and field (ES indicators) data. Finally, we calculated the correlations between our predicted values and independent datasets.

**Results:** Our results showed the spatial distribution of some ES indicators for Pará State. ES indicators providing is the highest in the forest, except the soil chemical quality index. Yet, Pará State, still mainly covered by forests, has known a large movement of deforestation from the east to the west, despite the creation of protected areas. The western part, marginally affected by deforestation, is thus characterized by high ES providing. On the contrary, the eastern part, severely damaged by deforestation, is associated with poor ES providing. Our results also showed the unequal capacity to get reliable ES maps at the regional scale. In other words, our results show the additional complexity of modeling ES whose variations are very partially based on land cover changes, such as the biodiversity index.

**Discussion:** Up-scaling approaches should bridge the gap between the spatial scales. These approaches complete large-scale maps by local knowledge and enable the estimation of the uncertainty of the maps and ES spatial representation at different spatial scales. They then may help to justify conservation actions by targeting the areas greatly damaged. Regional maps for other indicators of ES at the regional scale should be investigated. From this study, one could also decide to implement the proposed methodology to map ES indicators at a larger scale, even up to the global scale, if one possesses sampling data all over the world.