



SOIL-PLANT-ATMOSPHERE INTERACTIONS IN A CHANGING TROPICAL LANDSCAPE

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Terrestrial ecosystems are major contributors to the global environment as they control significant exchanges of energy, water and other resources between the atmosphere, land surfaces and belowground. Detailed information on ecosystem function, including internal ecological processes, seasonal dynamics, vulnerability to perturbation and response to climate variability, is urgently needed, on several timescales for a range of end uses. With the backdrop of concerns over loss of habitat and biodiversity and disruption to carbon and water cycles and related environmental impacts, the key thrust of this proposal will be to harness cutting edge technologies to gather fine-grained information on intact versus disturbed mountain forest systems, to learn how land management practices can safeguard the functioning of the whole category sequence of vegetation types, land forms and land uses which begin in the delicate upper slopes of mountains. The key approaches will be to 1) combine novel suites of sensors to capture complimentary/synergistic information about plants and their environment (e.g. simultaneous measurement of plant growth, water use and atmospheric conditions) and 2) do this in an end-to-end sensing system that can provide detailed and reliable real-time coverage of contrasting environments. We will monitor intact forest, cleared areas, and the transition/boundary zones between them, using a broad suite of monitoring tools. By analyzing soil water dynamics, whole-plant behavior and atmospheric conditions, we will be able to examine the links between plant ecology and wider biogeochemical cycles and ecosystem functioning. Applying these new tools across gradients in land-use and climate will enable us to robustly test the hypothesis about fragmentation effects on water and carbon dynamics from plant to stand level that are needed to predict large-scale climate feedbacks.



*Cloud-forest interior, where the project will be developed
(photo by Rafael Silva Oliveira)*

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