The water budget of a subtropical coastal lagoon:

traditional and opportunistic measurements

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MEASUREMENTS AND OBSERVATIONS IN THE 21° CENTURY

MOXXI 2019 Topical Conference

Citizen and Hydrology (CandHy) Kickoff Meeting

New York, 13 March 2019

FLORIANÓPOLIS - SC

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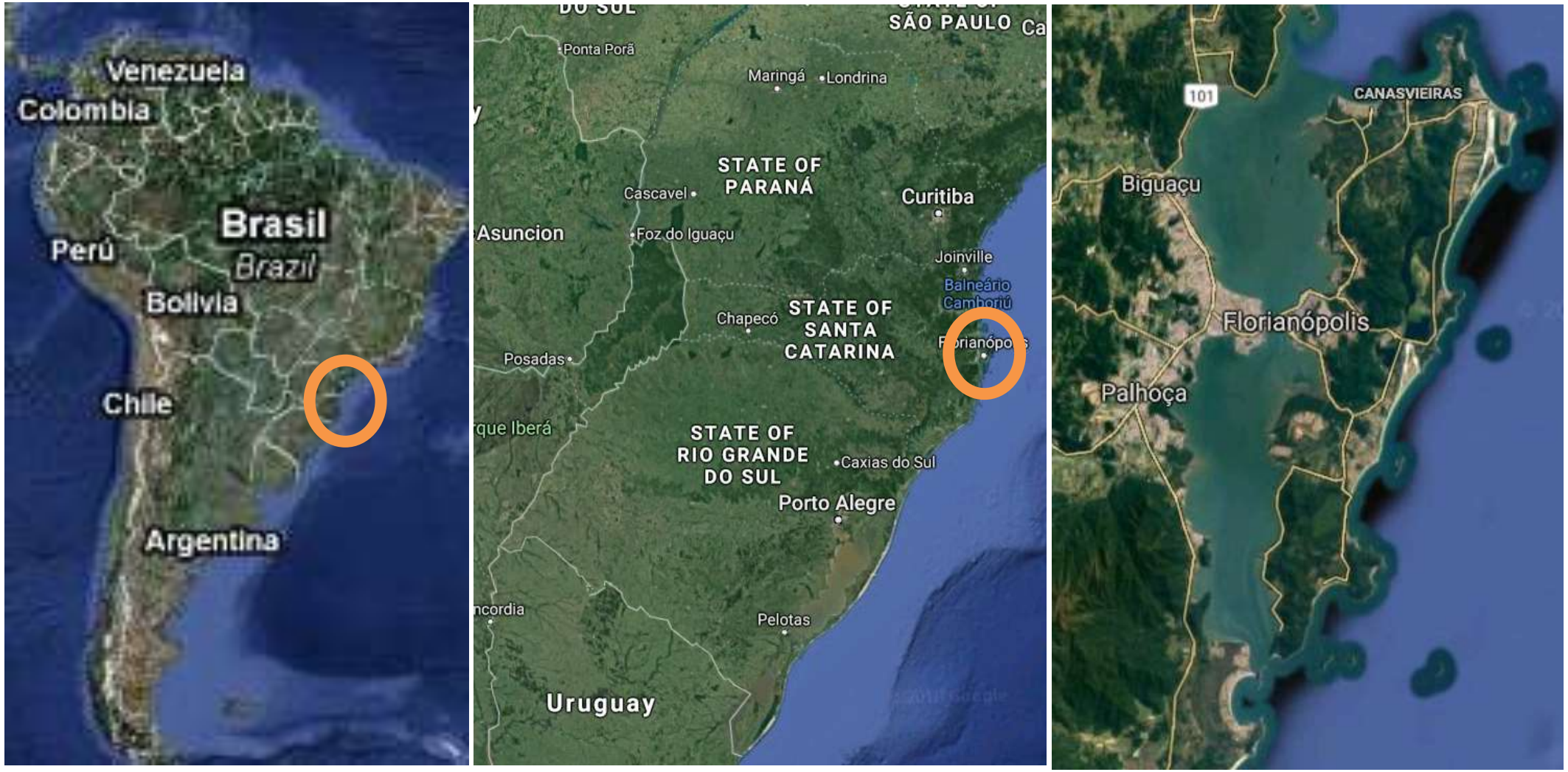

FLORIANÓPOLIS - SC

500 km² (10x Manhattan)

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500 km² (10x Manhattan)

population 500.000

FLORIANÓPOLIS - SC

FEDERAL UNIVERSITY OF SANTA CATARINA

Watershed Hydrology Lab

www.labhidro.ufsc.br

THE TEAM!















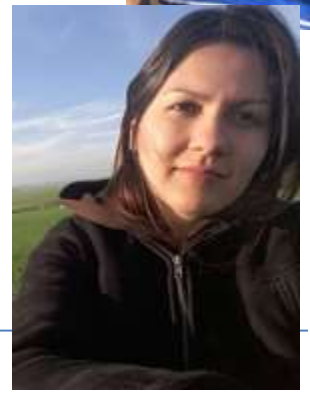

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LABORATÓRIO DE HIDROLOGIA

PEOPLE

PUBLICATIONS

PROJECTS

RECENT PUBLICATIONS

BARTIKO, D.; CHAFFE, P. L. B.; BONUMÁ, N. B. Nonstationarity in maximum annual daily streamflow series from Southern Brazil. Brazilian Journal of Water Resources, v.22, e48, 2017.

NEWS

Aberdeen Catchment Science Summer School

Camyla Innocente, master's student at the Laboratory of Hydrology, participated in the 'Aberdeen Catchment Science Summer School'. The course was held in the University of Aberdeen, UK, on August 20-25

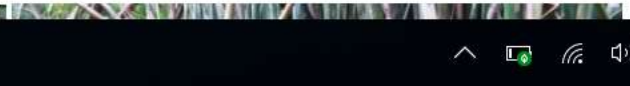
Em busca de nascentes

Colhendo bananas

Marcando a hidrografia

Levantamento topográfico

Medição de vazão na Lagoa do Peri: método volumétrico, flutuador e diluição



FLORIANÓPOLIS - SC

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Around 50 beaches...

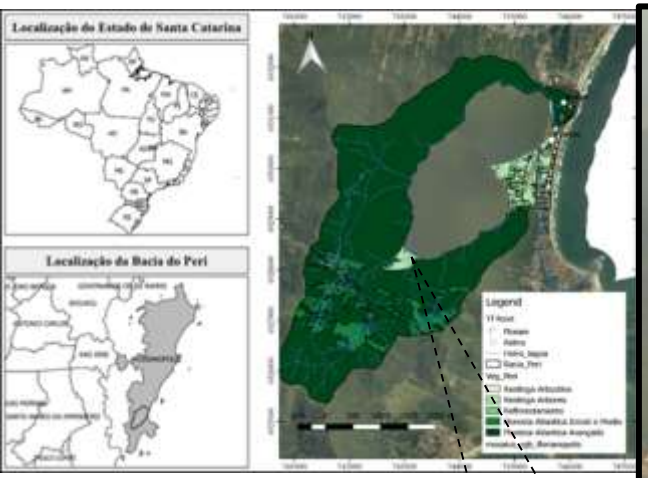
FLORIANÓPOLIS - SC

Around 50 beaches...

Good place for tourism!!

The Peri Lagoon Watershed

The Peri Lagoon Watershed



Anual Rainfall: 1500mm
Area: 20 km²
Water supply
Native Atlantic Forest

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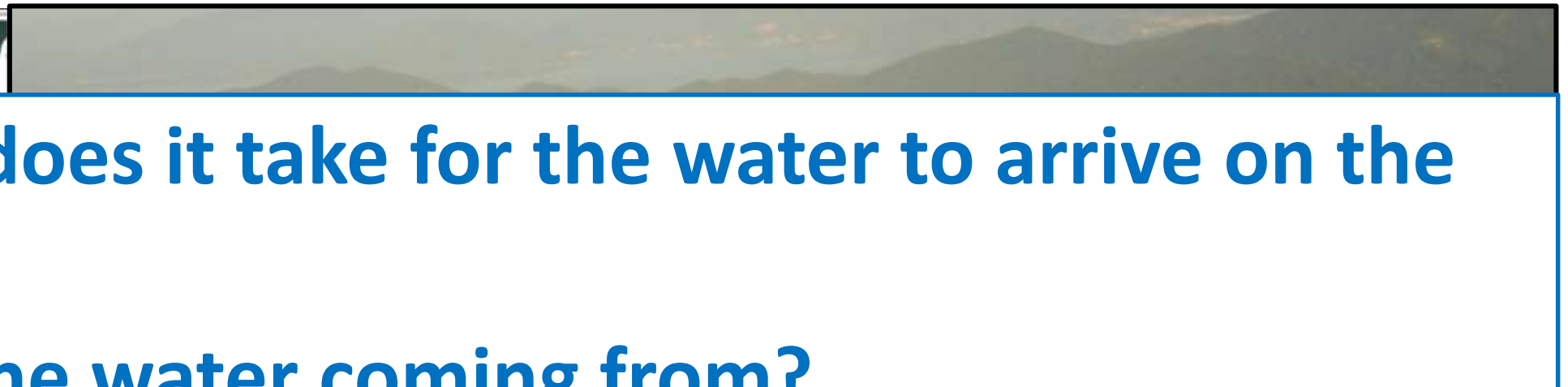
The Peri Lagoon Watershed



- How long does it take for the water to arrive on the lagoon?
- Where is the water coming from?
- How do catchments store and release water?
- What is the water budget (streamflow, evapo, use)?

Area: 20 km²
Water supply
Native Atlantic Forest

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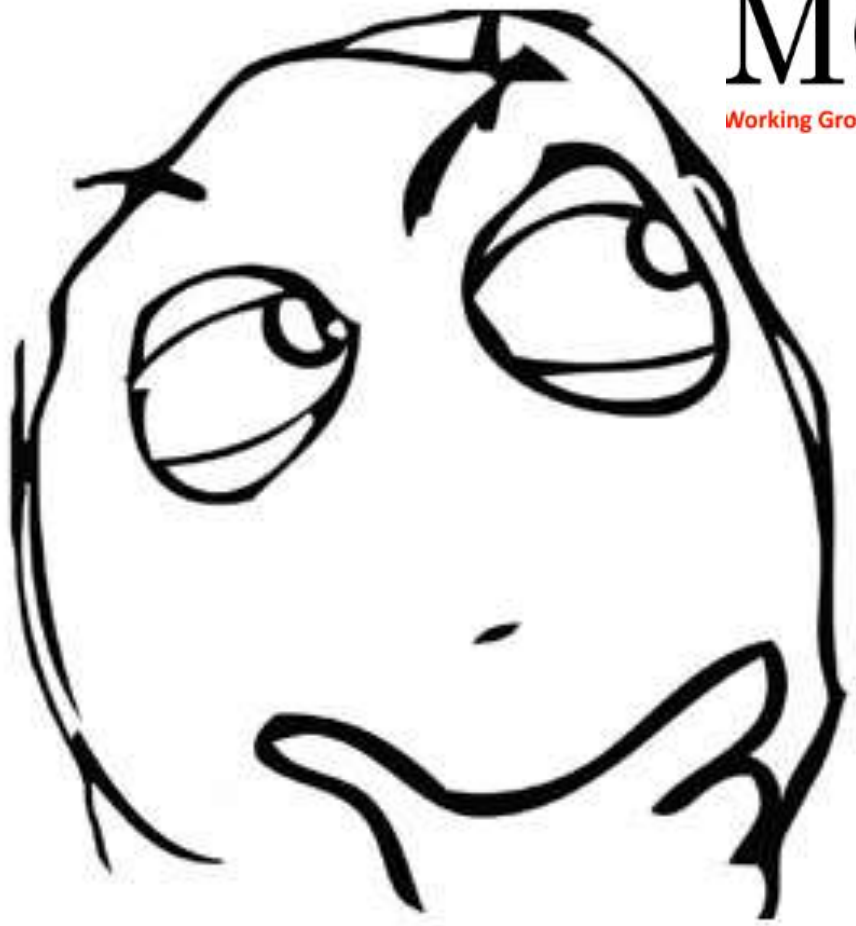
The Peri Lagoon Watershed

- How long
- Where is t
- How do ca
- What is th

on the

, use)?

: Forest



MOXXI Measurements & Observations in the 21st Century
Working Group - International Association of Hydrological Sciences

HMM...

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THE TALK TODAY...

How can we learn the most, in the shortest amount of time without much money?

- **Rainfall interception** measurements;
- Ephemeral streams and **runoff generation** in a hillslope;
- **Baseflow** patterns in small catchments;

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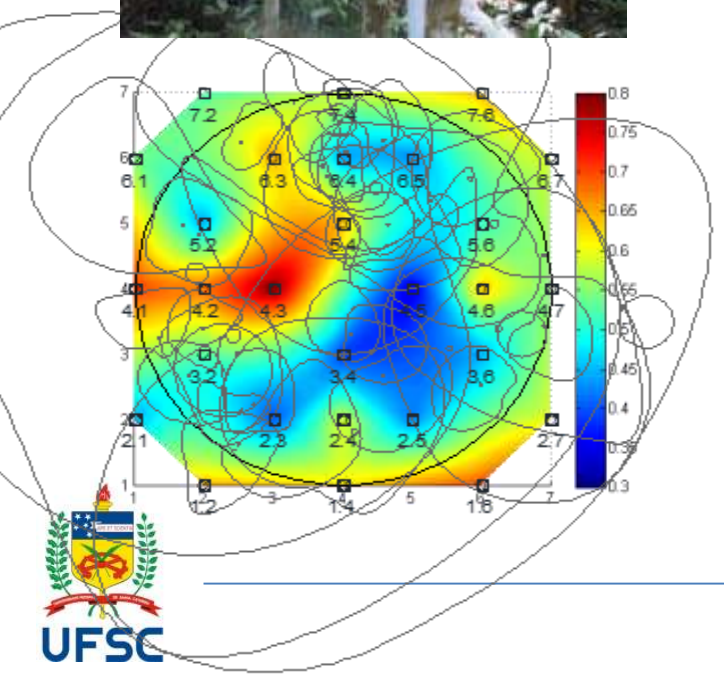
Spatial Scales...

from point...



to hillslope...

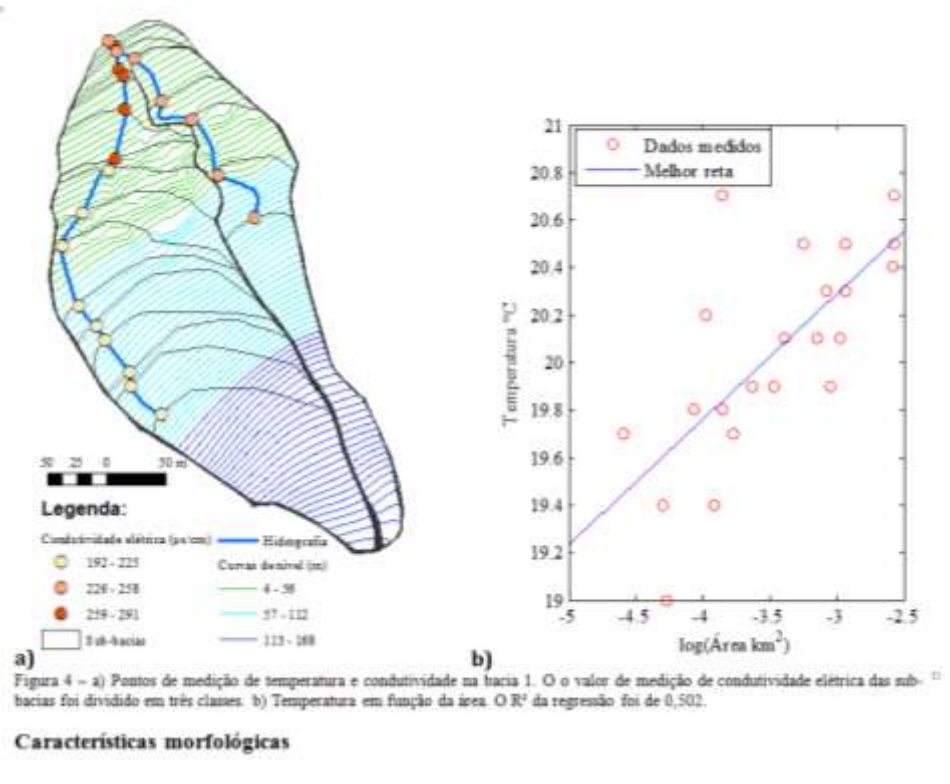
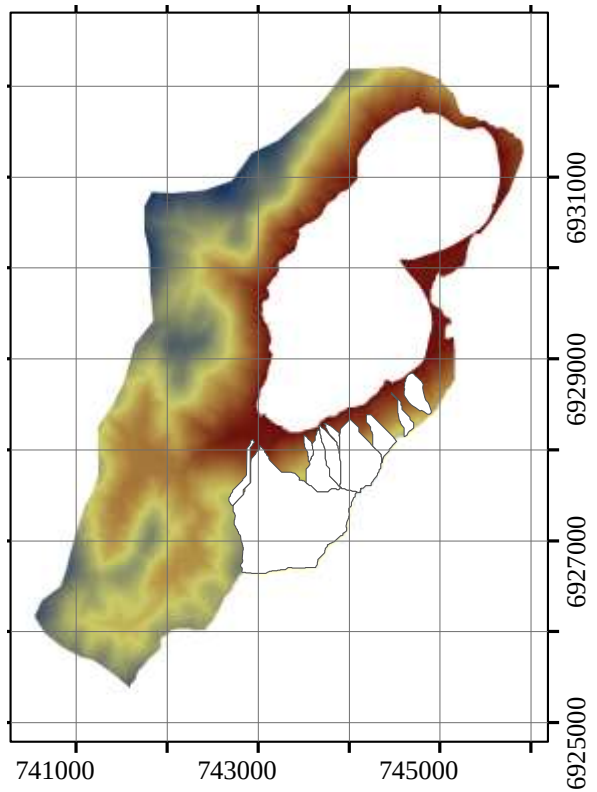


Figura 4 – a) Pontos de medição de temperatura e condutividade na bacia 1. O o valor de medição de condutividade elétrica das sub-bacias foi dividido em três classes. b) Temperatura em função da área. O R^2 da regressão foi de 0,502.

Características morfológicas

to catchments.



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Time Scales...

Continuous...

event based...

field campaigns.

About low cost sensors...

- Students are excited to use Arduino+sensors...
- Its cool to be able to program some hardware to execute stuff....
- It could lead to great science for very few money.

But...

- Usually they lack the jeweler skills;
  - Welding is not properly done;
  - Casing is not properly done;
- Sensors do not last, nor do their love for it.

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Hacksaw and pvc pipes

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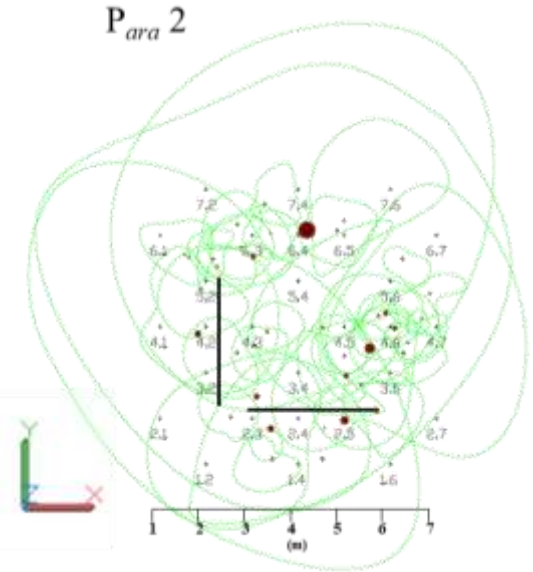
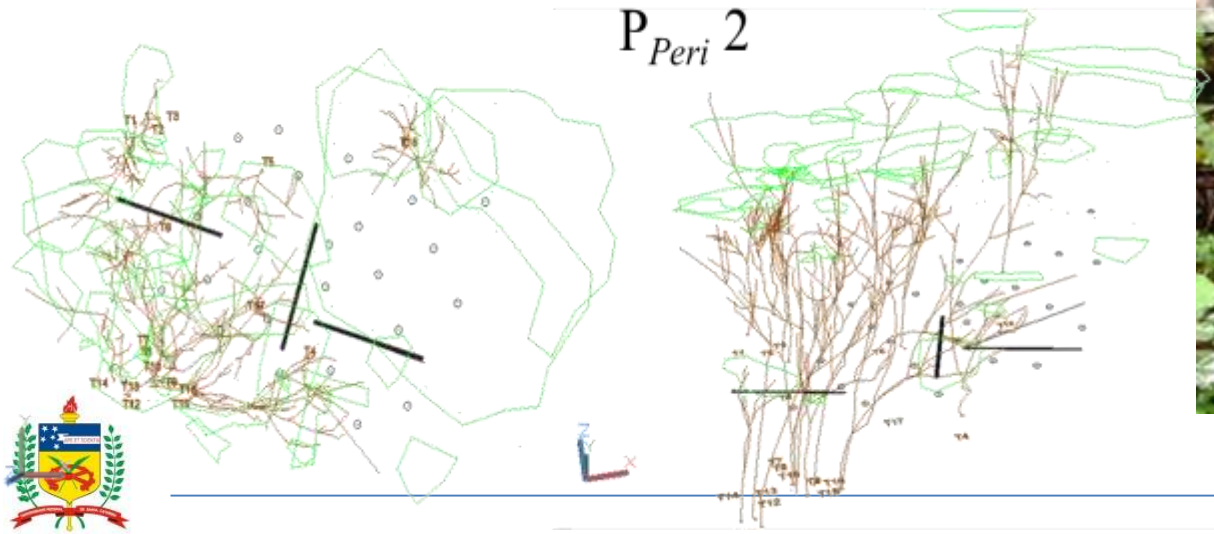
Rainfall Interception

RAINFALL INTERCEPTION





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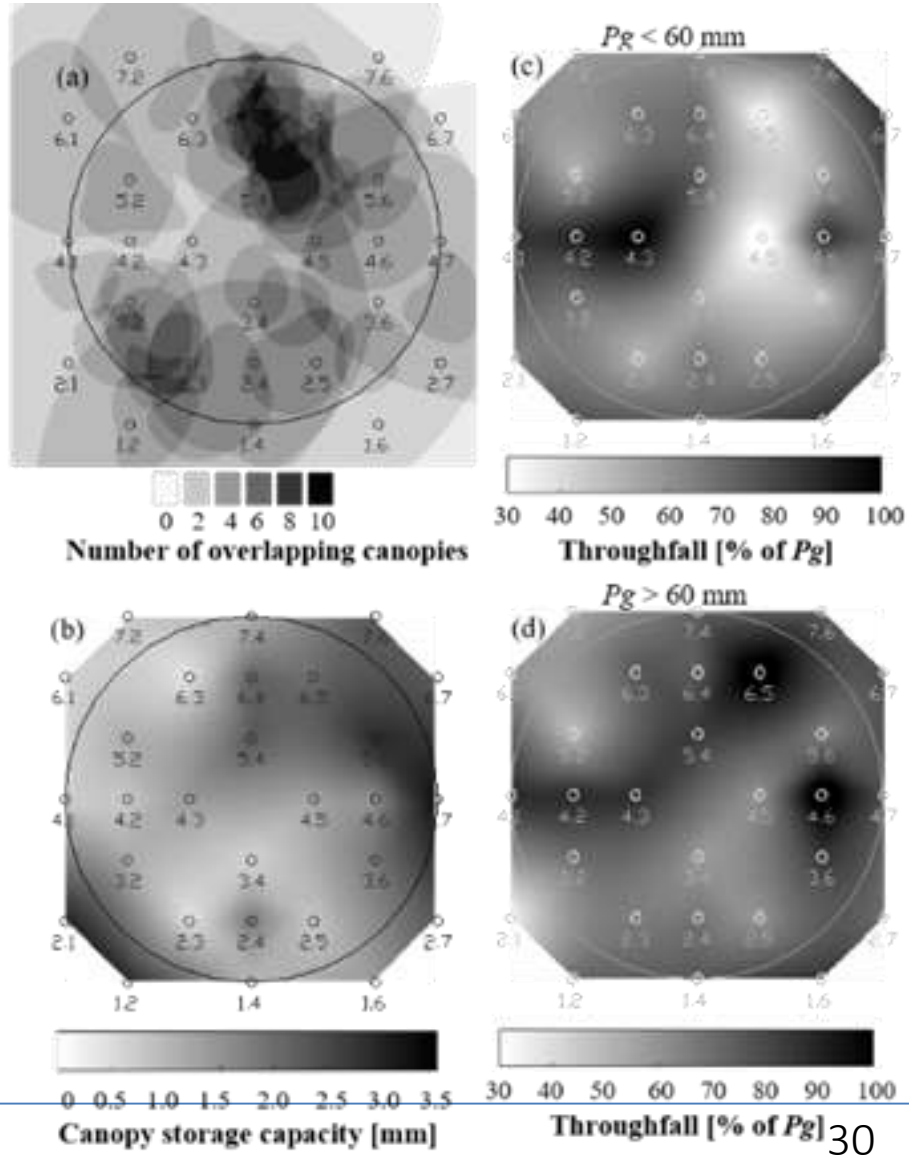
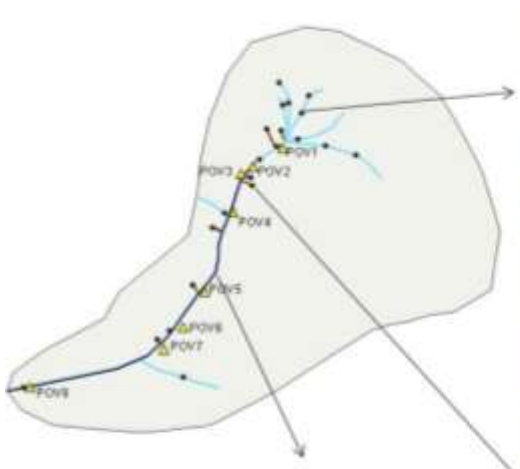
RAINFALL INTERCEPTION

- Interception loss ~30%
- We **did not observe** a direct relationship between the usual **Canopy Cover Indices** and Throughfall
- Overlapping canopy controls variability of throughfall.



Runoff generation on a hillslope

RUNOFF GENERATION ON A HILLSLOPE



RUNOFF GENERATION ON A HILLSLOPE

- Active drainage network can vary up to **80%**

(huge importance for mapping permanent preservation areas)

- Dominant runoff mechanism was **saturation excess**
- Frequency of activation of each sensor increases with contributing area (logarithmic function)

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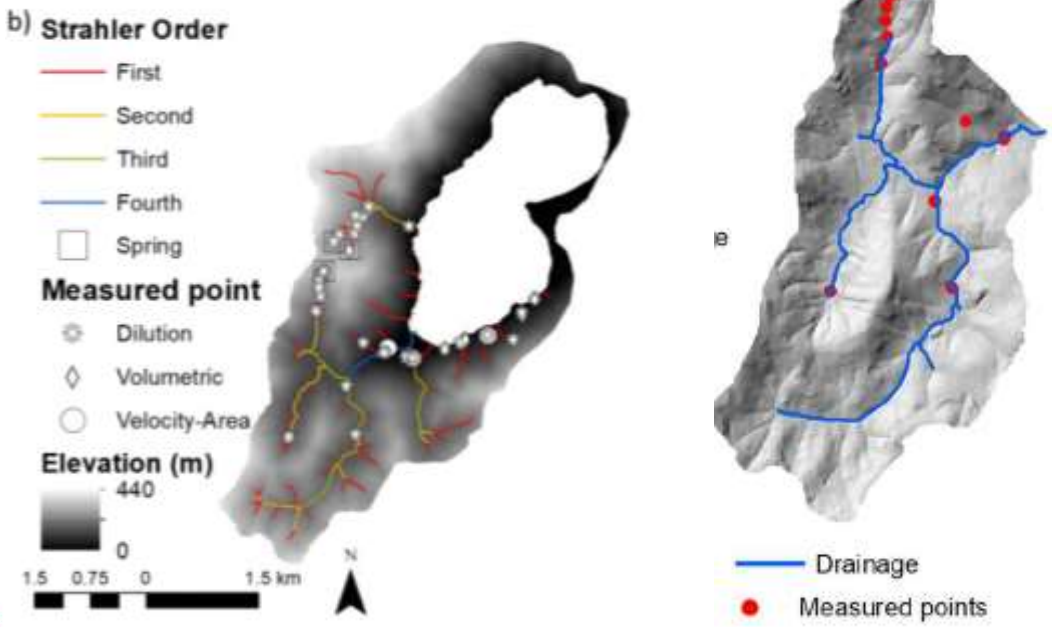
Baseflow patterns

THE RATIONALE

- We cannot measure discharges all the time;
- Let's go out on the field and measure discharge everywhere.



The Problem

- Nature couldn’t care less about our plan!

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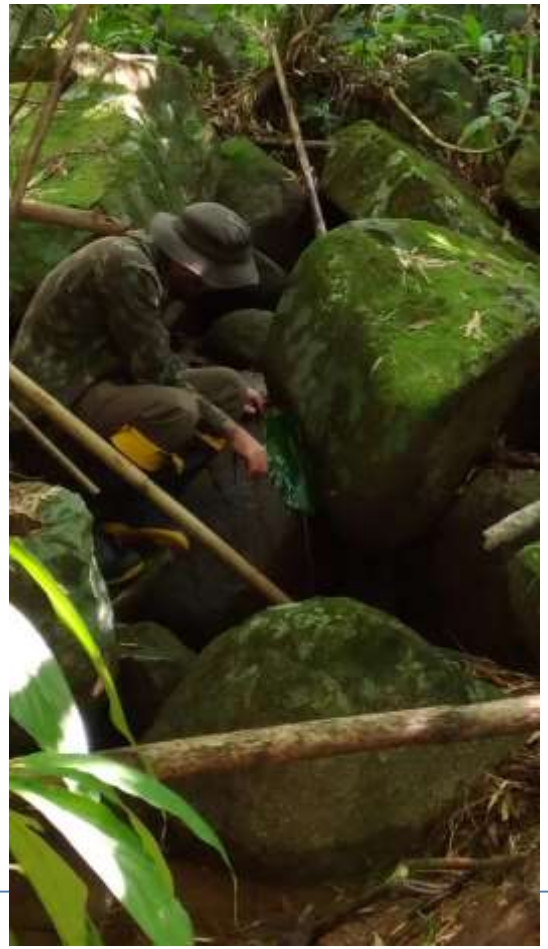

“Solving” The Problem

- Combination of different gauging methods...

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In Conclusion...

- **low cost sensors** need good building skills;
- Sometimes **cheaper than low cost** can be useful;
- We should measure as much as possible;
- Nature does not care much about our expectation;

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A call for scientific tourism:

Take your sensors on a tour!!!

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Thank you very much!!

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