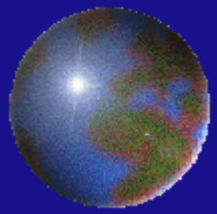
Calibration of SWAT Model in a Small Watershed by Means of Measured Streamflow and Suspended Sediment Data



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UFG

OUTLINE

- OBJECTIVE
- MOTIVATION
- CASE STUDY
- MODEL CALIBRATION
- CONCLUSIONS

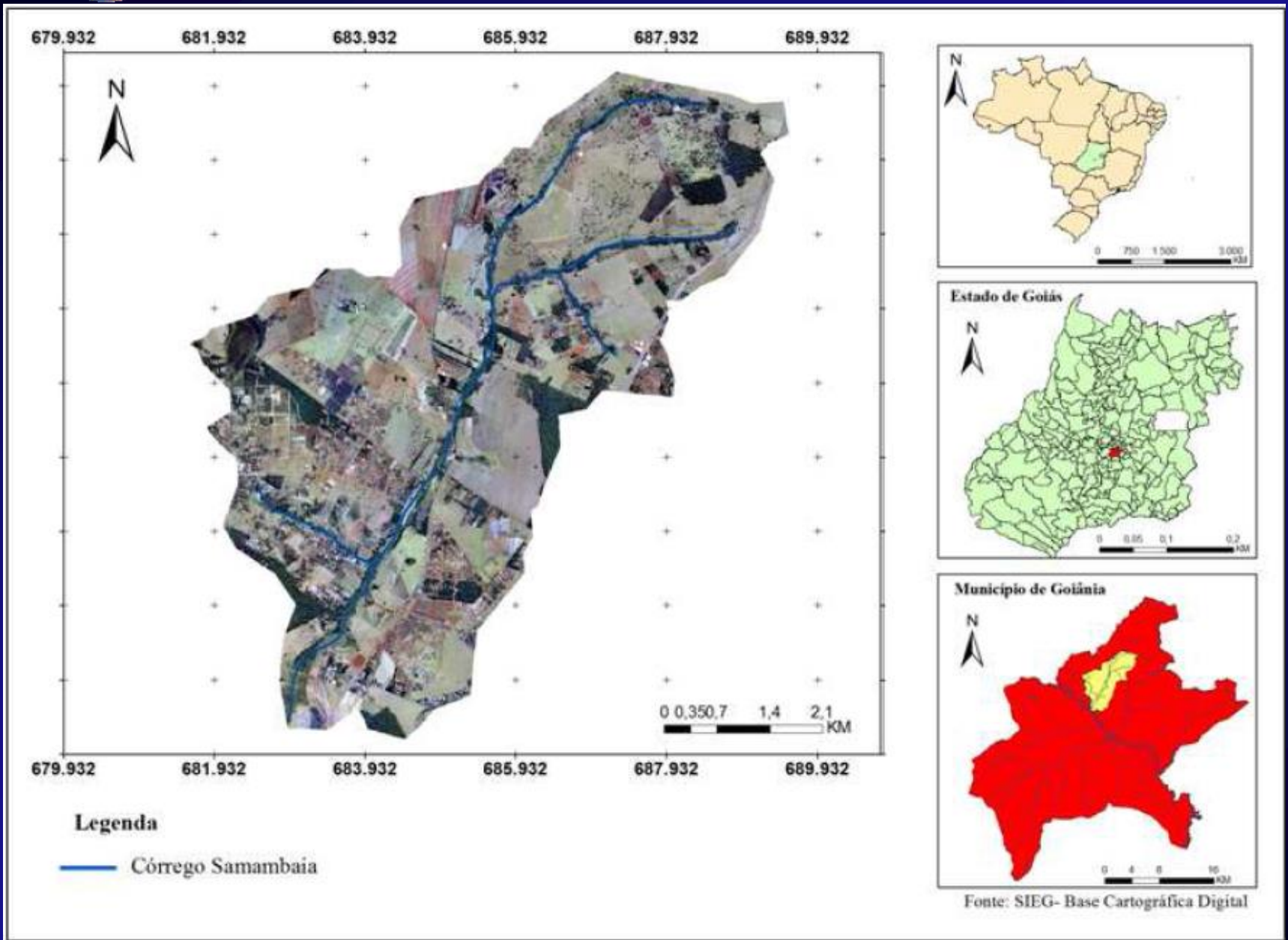
OBJECTIVE

- This research focused on the analysis of SWAT model calibration in terms of flow and sediment in a small watershed (32.78 km^2) located at Goiânia, Brazil
- SWAT and SWAT-CUP softwares

GOIÂNIA, STATE OF GOIÁS, BRAZIL

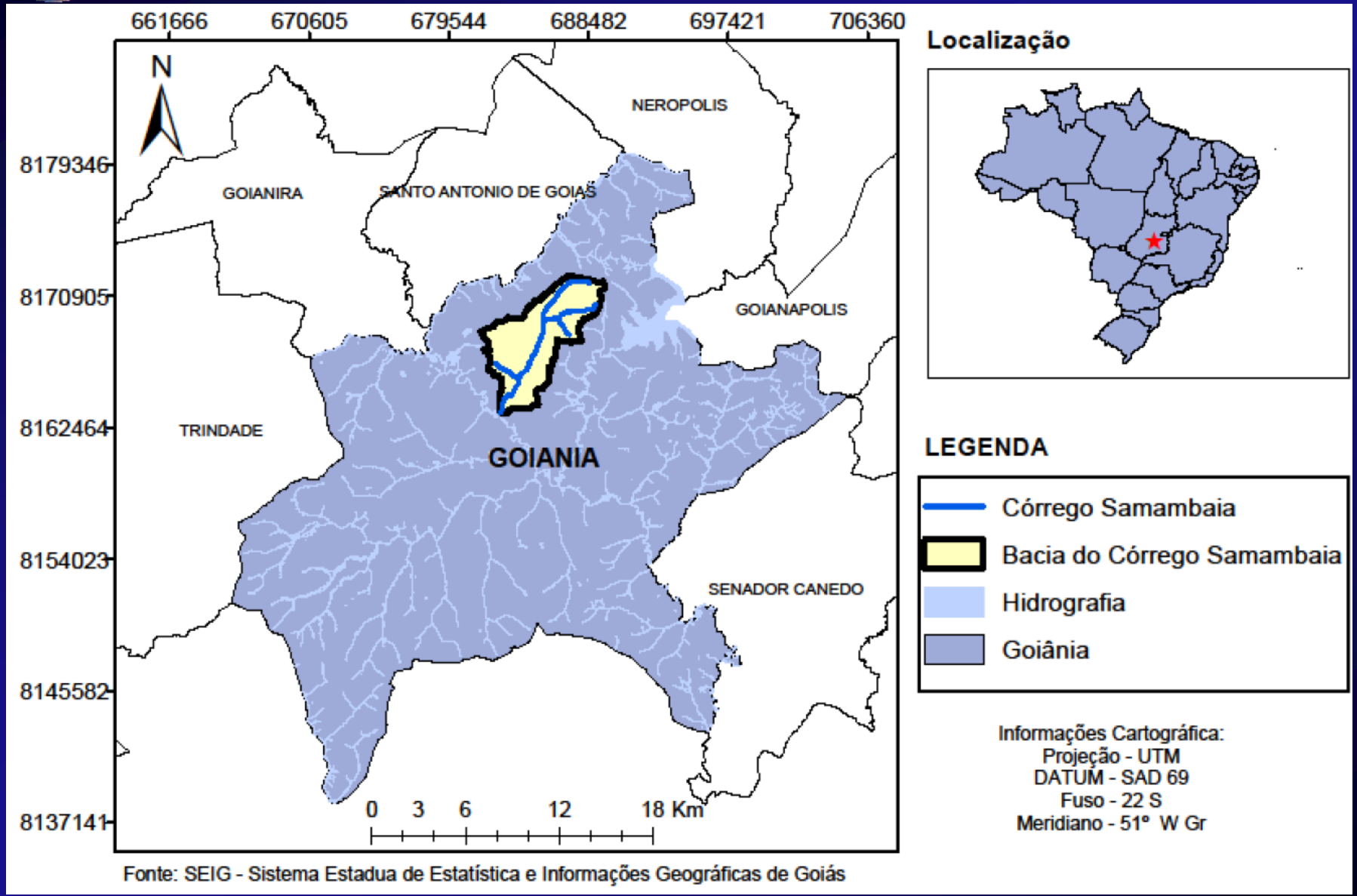
- Central-Western Region
- Population: 1,300,000 (2010)
- Metropolitan area: 2,100,000 (2010)

Samambaia River Basin



Fonte: SIEG- Base Cartográfica Digital

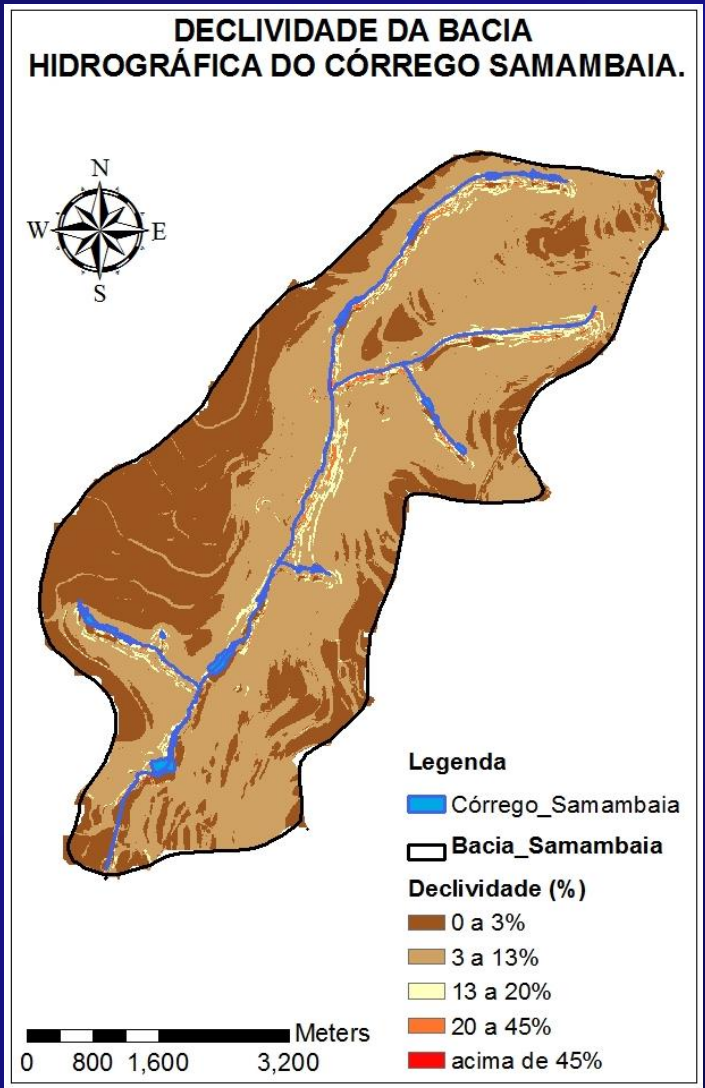
Samambaia River Basin



Fonte: SEIG - Sistema Estadua de Estatística e Informações Geográficas de Goiás

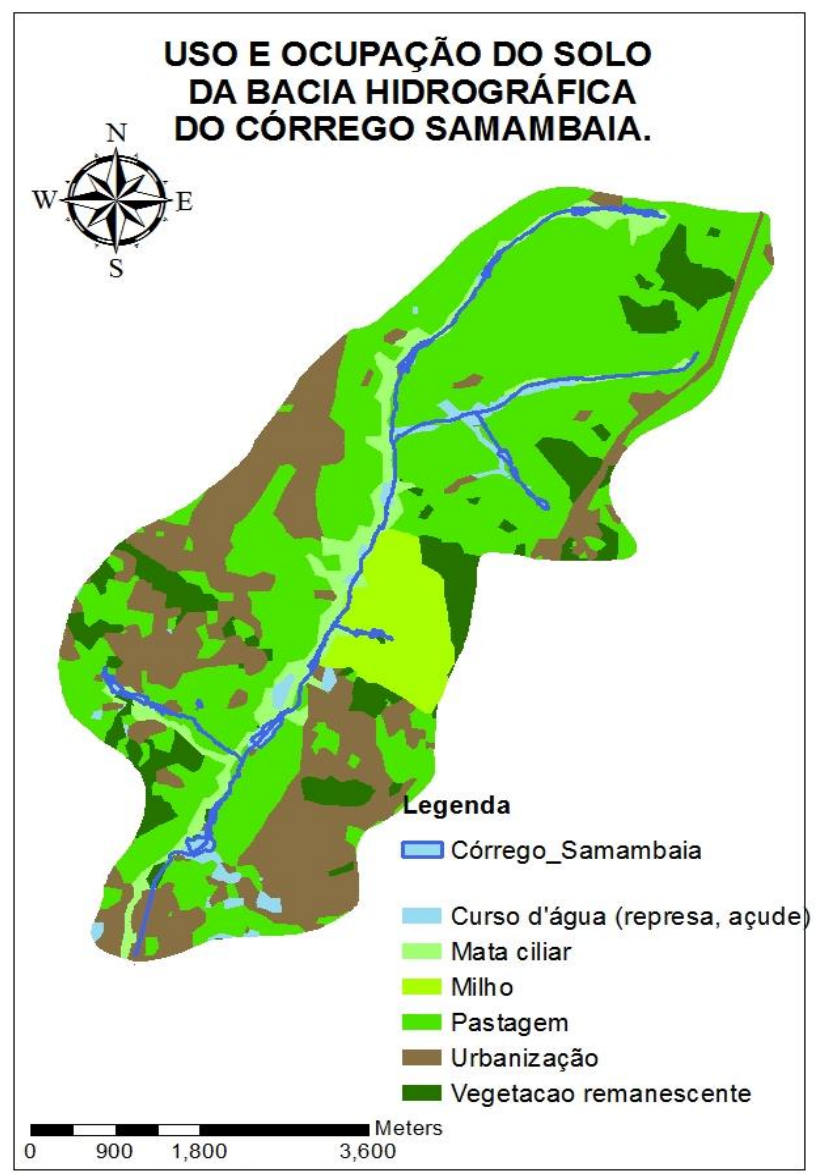
Samambaia River Basin

Slope map:



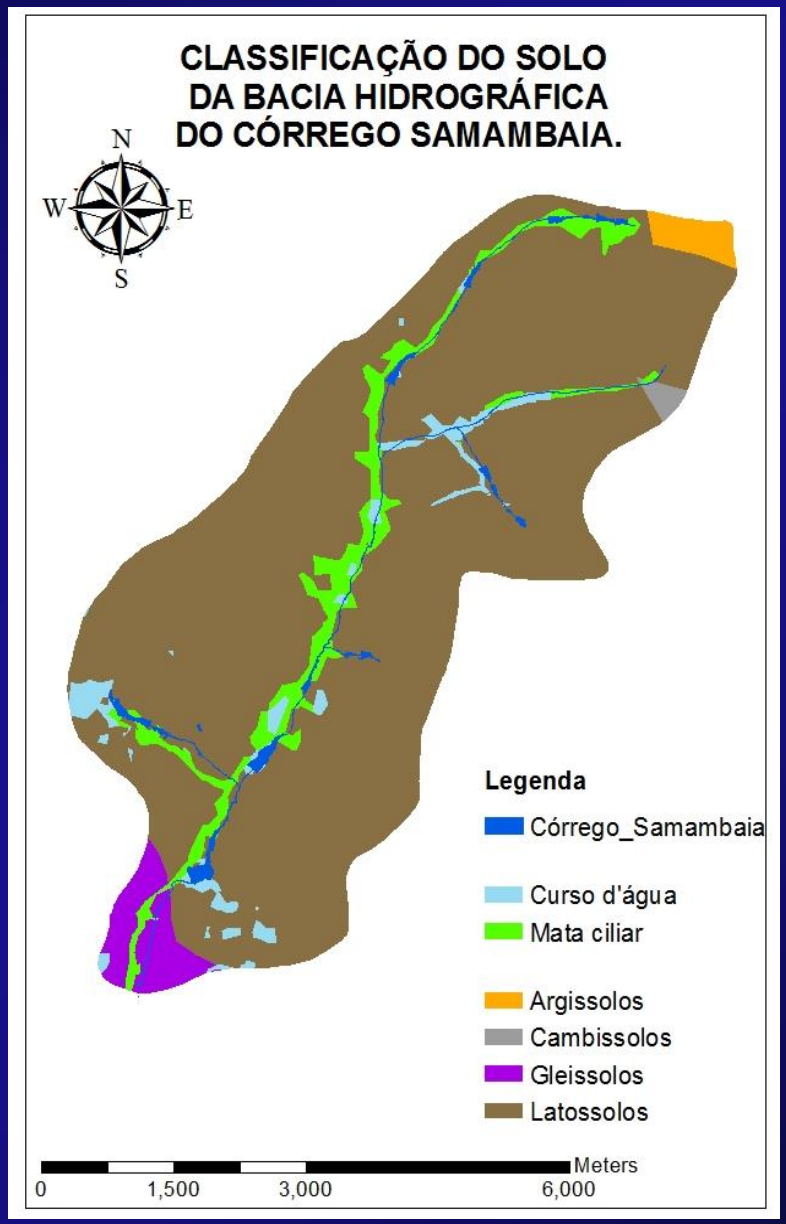
Samambaia River Basin

Land use:



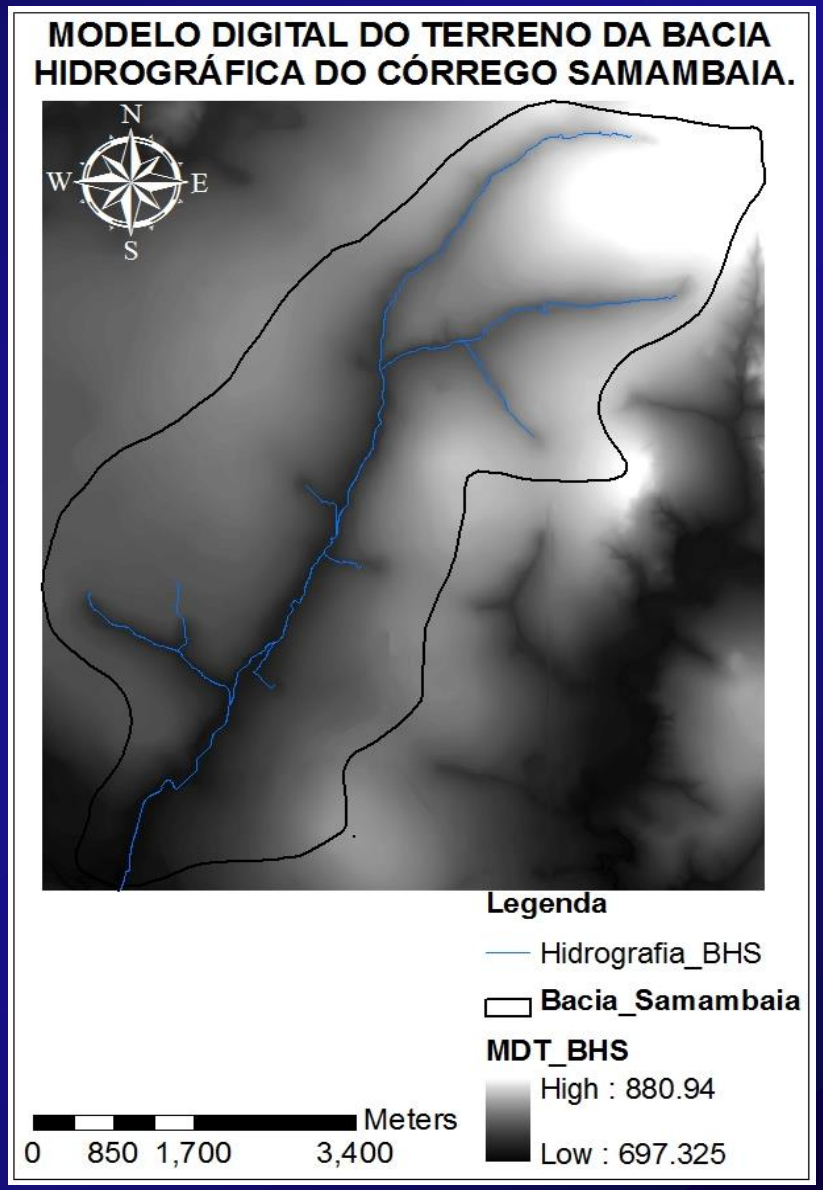
Samambaia River Basin

Soil types:



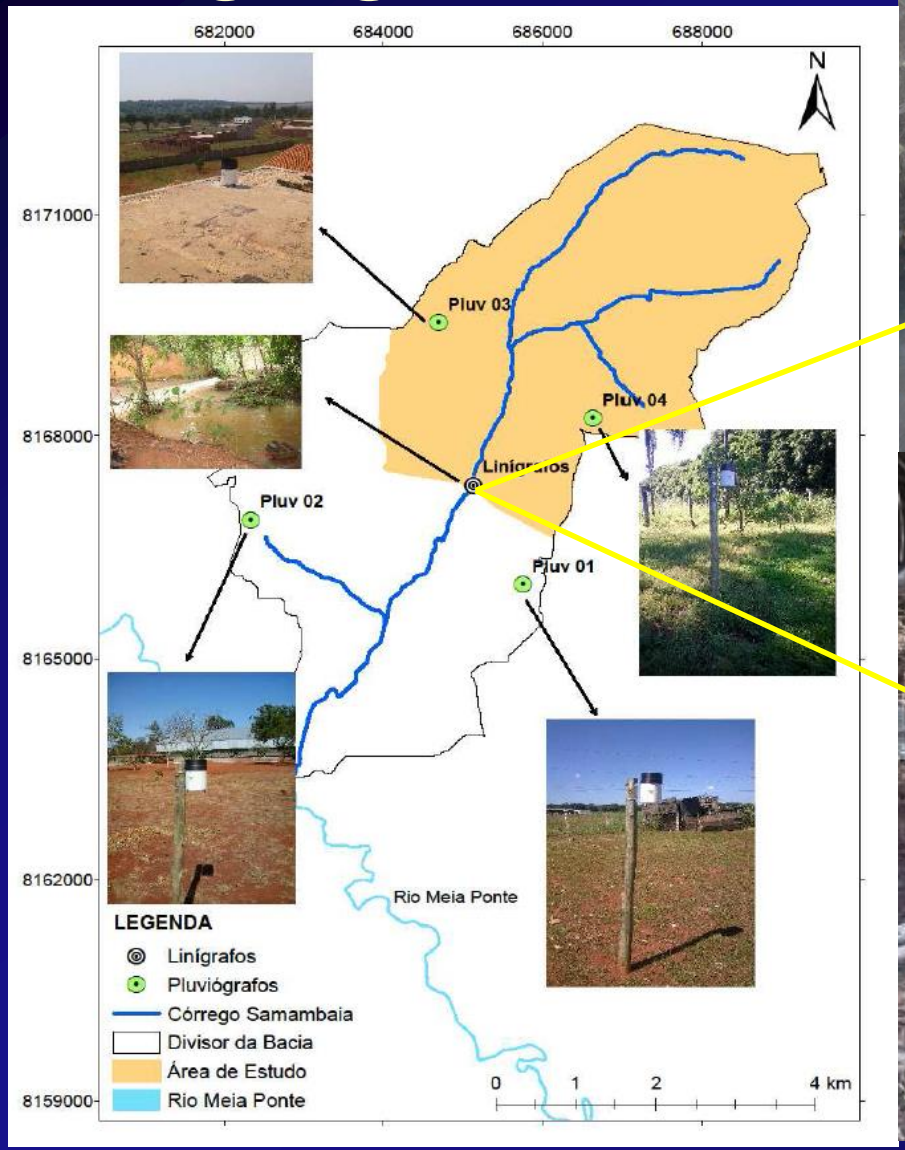
Samambaia River Basin

Digital Terrain Model:



Samambaia River Basin

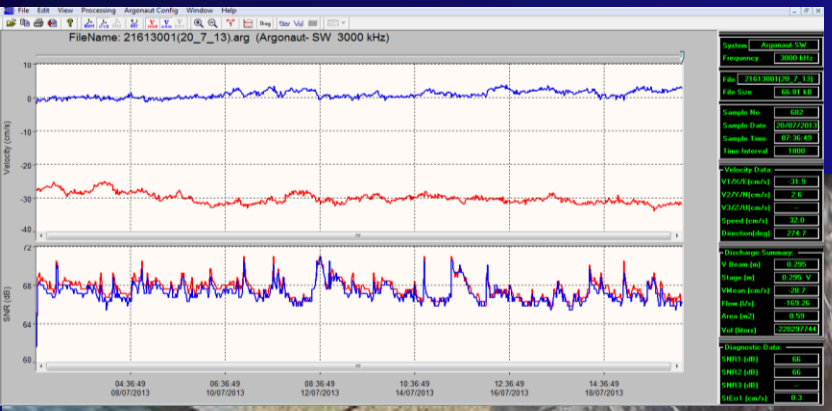
Gauging stations:

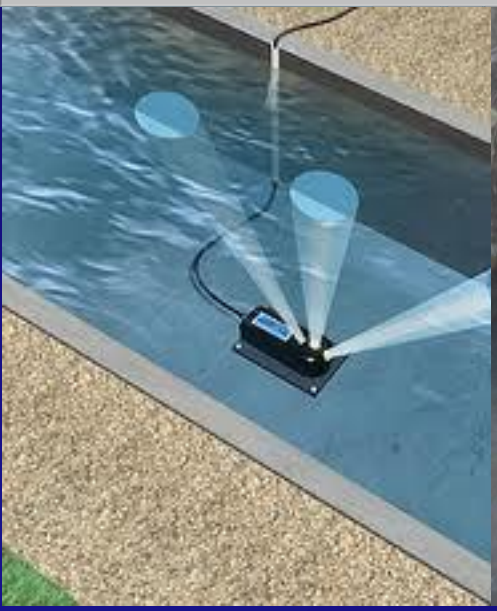


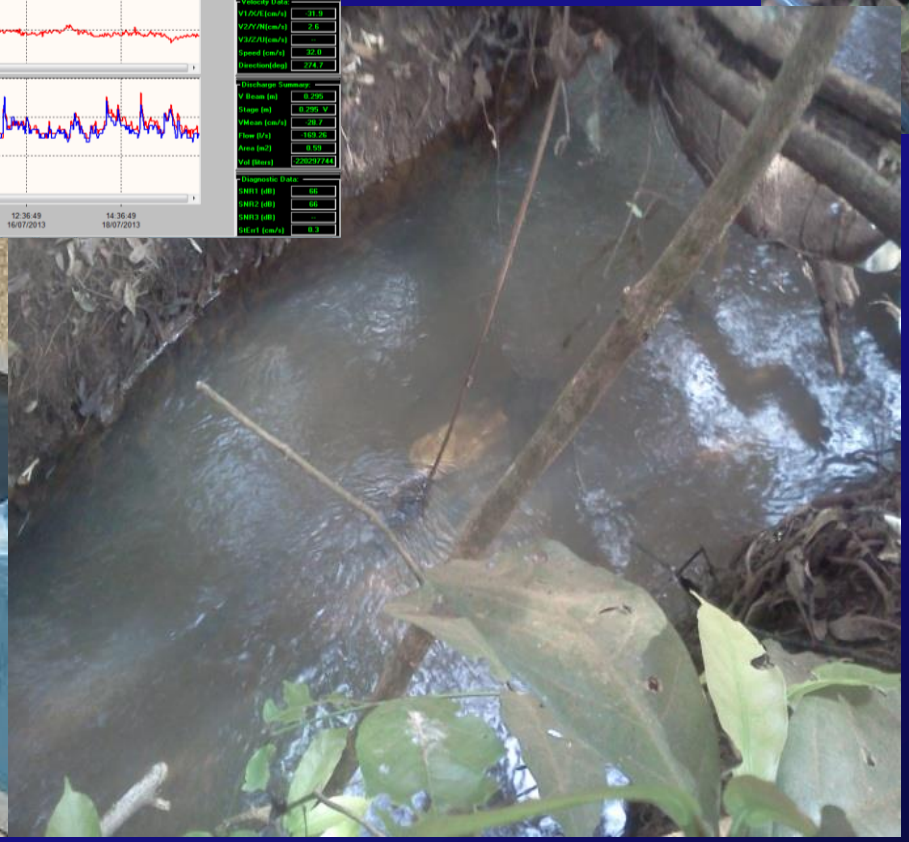
Daily Measurements 2013

Samambaia River Basin

Streamflow discharge: ADCP Argonaut

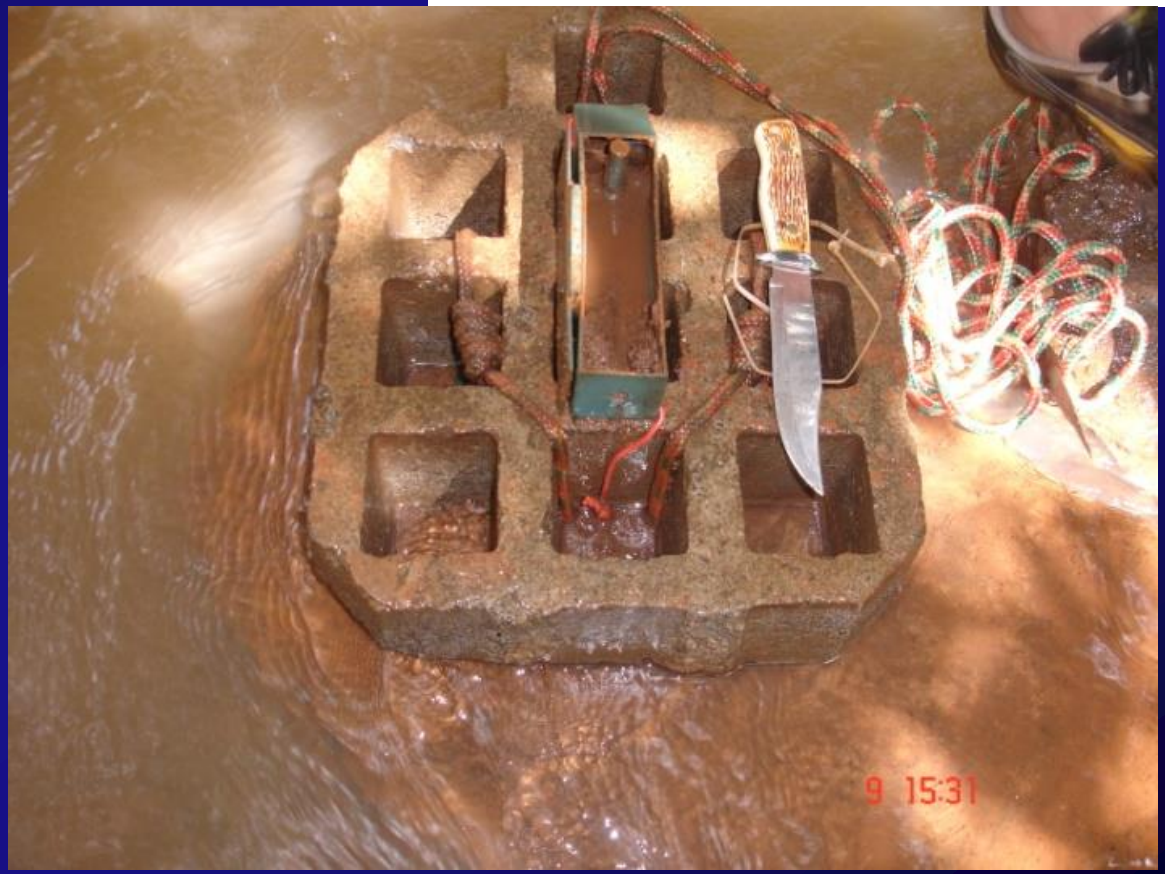






Samambaia River Basin

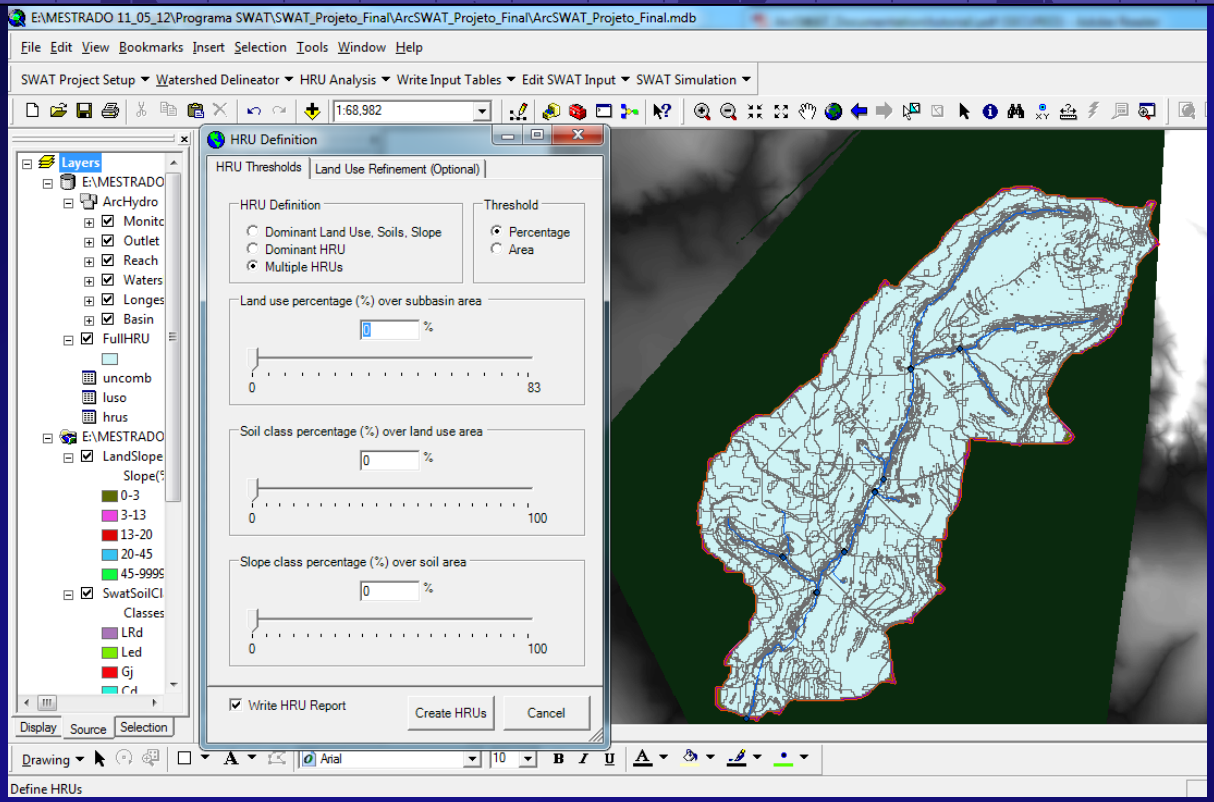
Water level sensor:



Samambaia River Basin

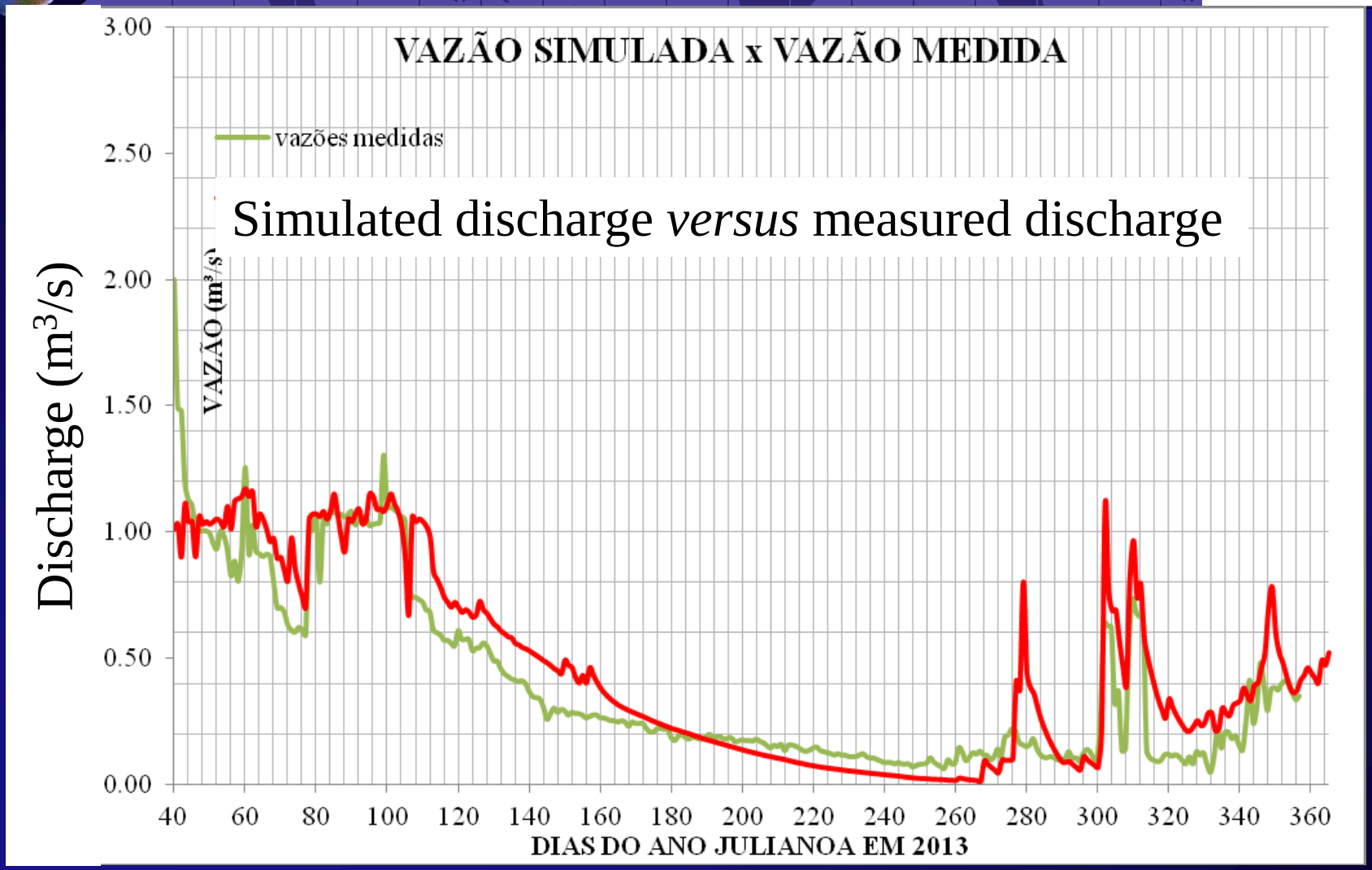
Automatic water sampler: ISCO

SWAT Modeling



- SWAT autocalibration
- SWAT-CUP → GLUE, ParaSol, SUFI-2
- Start with streamflow, than move to sediment

SWAT Modeling

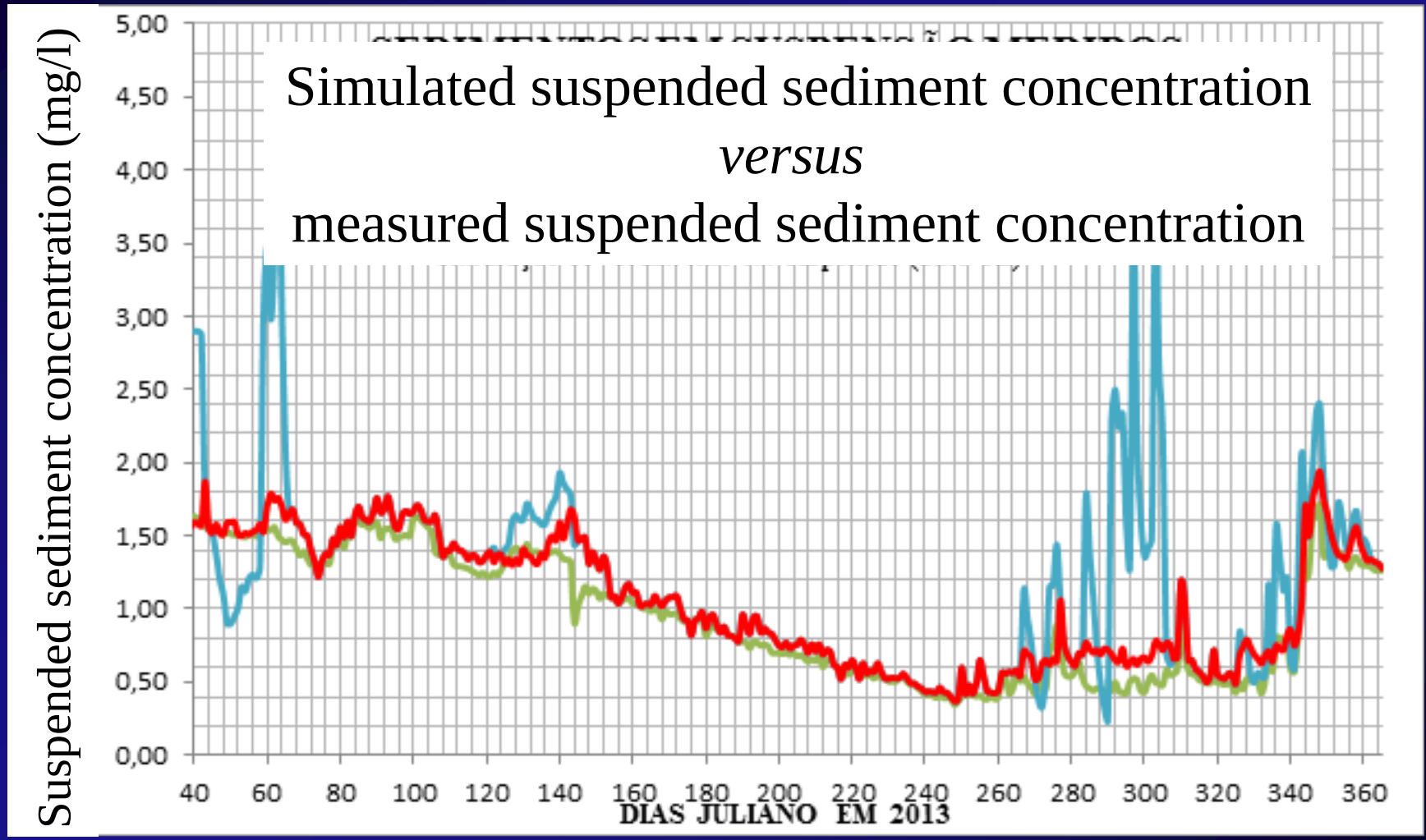


- Nash-Sutcliffe efficiency: COE = 0.80

SWAT Modeling

- The CN parameter, which is related to soil type, land use, and infiltration, showed the highest sensitivity in the calibration. After that, the alpha factor of base flow was another which showed higher sensitivity
- Time of concentration → 24 hours approximately
- Permeable rocks → rapid infiltration and little overland flow → damping on rising limb of hydrograph

SWAT Modeling



- Nash-Sutcliffe efficiency: COE = 0.88

SWAT Modeling

- With regard to sediment calibration, parameters of sediment from landscape (USLE_P and USLE_C) as well as parameters of sediment from channel (SPCON and SPEXP) have shown higher sensibility

CONCLUSIONS AND FUTURE WORKS

- First analysis of calibration: expected parameters
- Improvements:
  - Data series extension
  - Water quality analyses
  - Other optimisation methods
  - Accuracy of each land use category prediction → UAV (seasonal variability?)

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