UNIVERSIDADE FEDERAL DE SANTA CATARINA – UFSC
CENTRO TECNOLÓGICO – CTC
PROGRAMA DE PÓS-GRADUAÇÃO EM ENGENHARIA AMBIENTAL - PPGEA

Universidade Federal de Santa Catarina

Analysis of the Rainfall Interception Model used in SWAT

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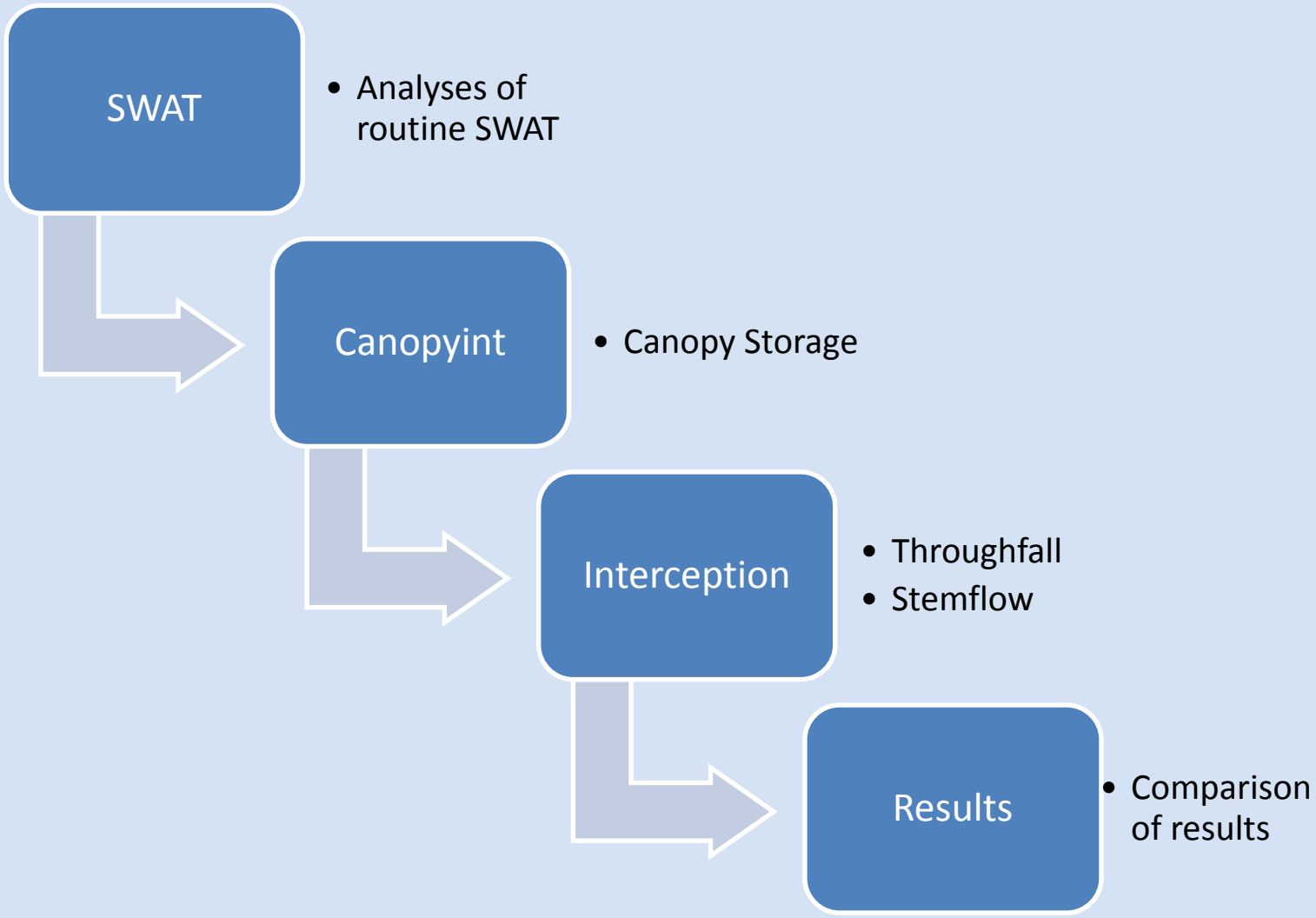
INTRODUCTION



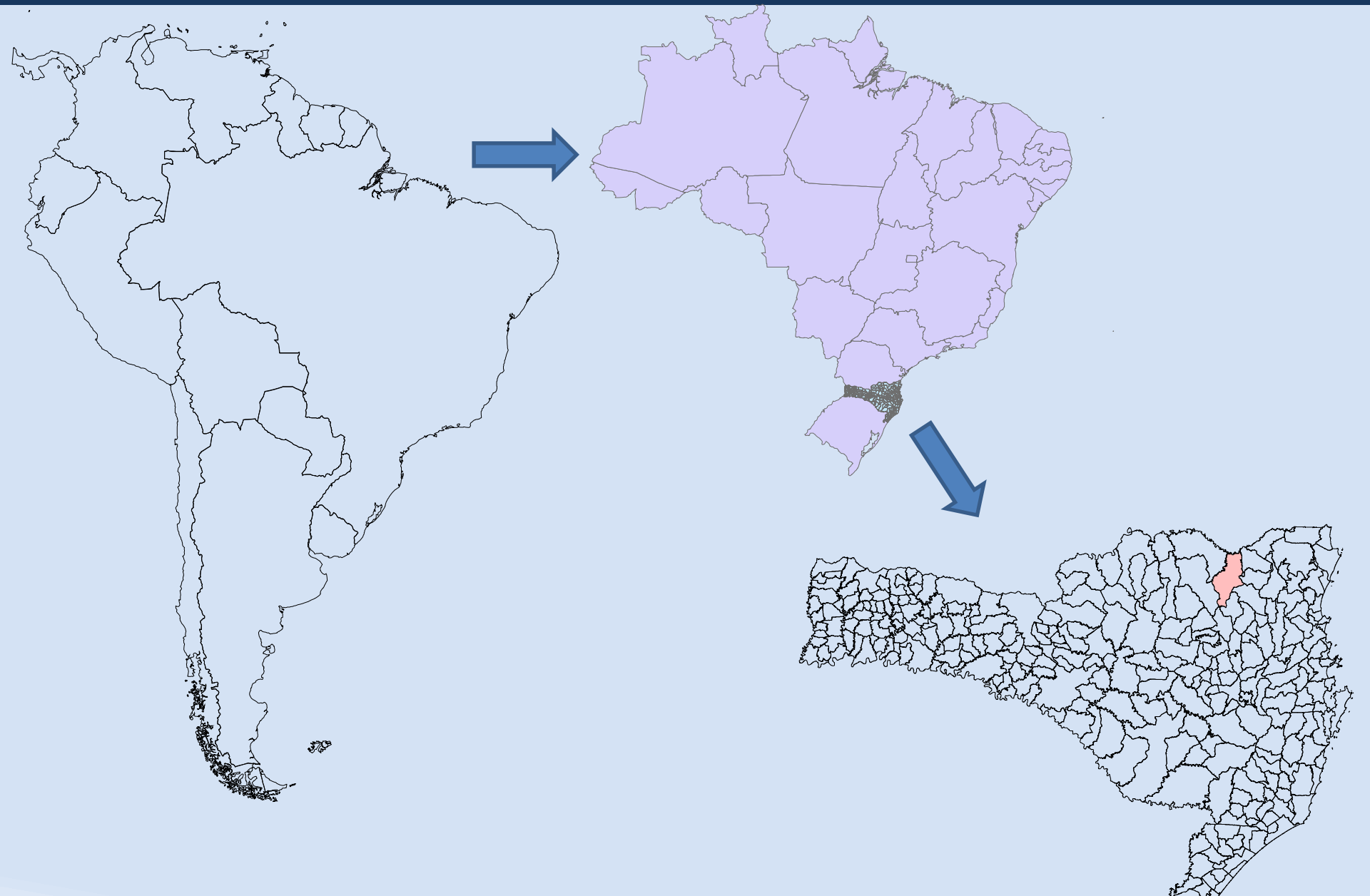
OBJECTIVES

Analyze the interception process in the SWAT model by using observed interception data of an Mixed Ombrophilous Forest, subtropical Atlantic Forest.

Specific Objectives

- Quantify Throughfall, Stemflow and the loss interception in the experimental basin;
- Verify the relationship between the components of interception (througfall and stewflow) and the caracteristics of the rain;
- Compare the SWAT model with monitoring.

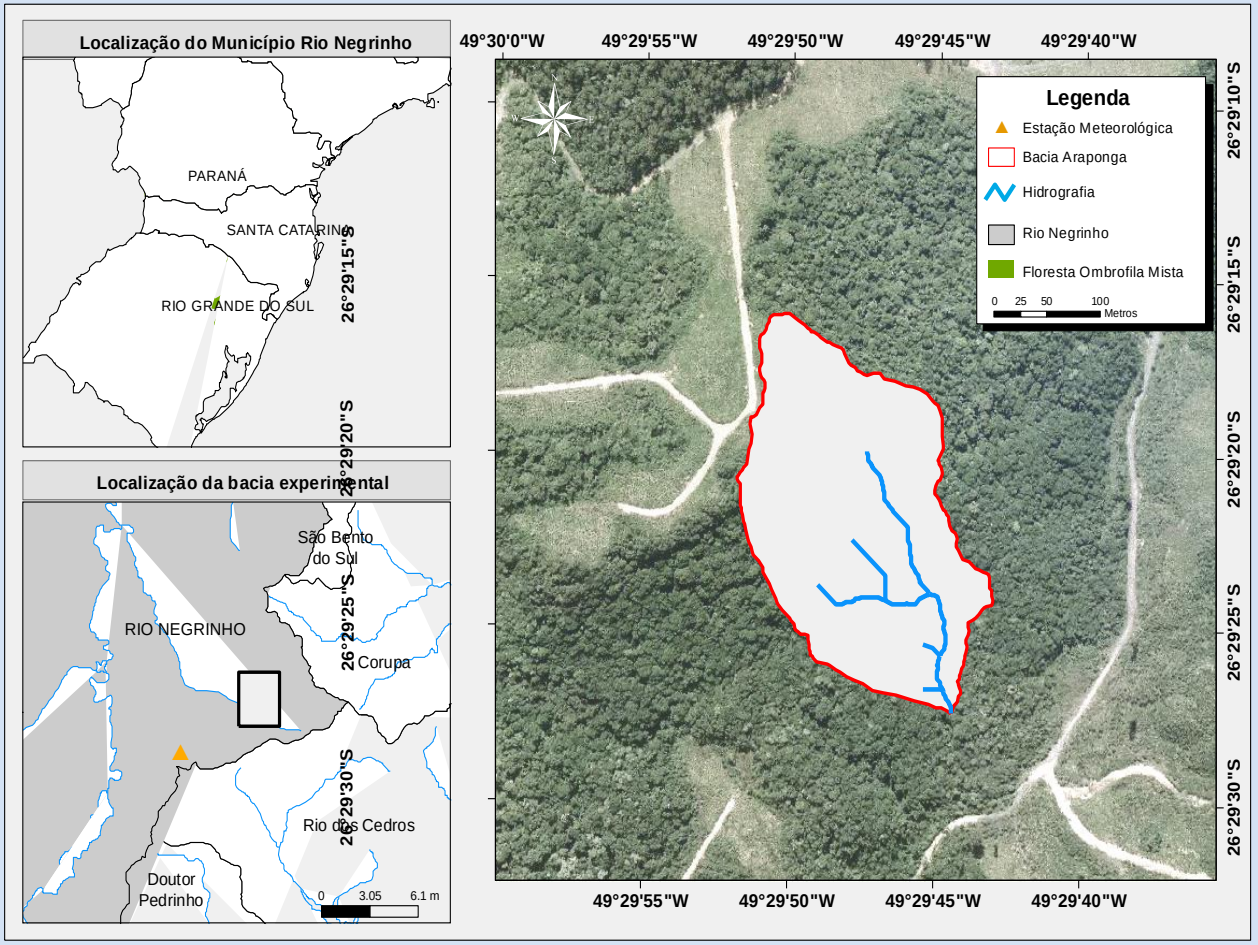
STUDY AREA



STUDY AREA

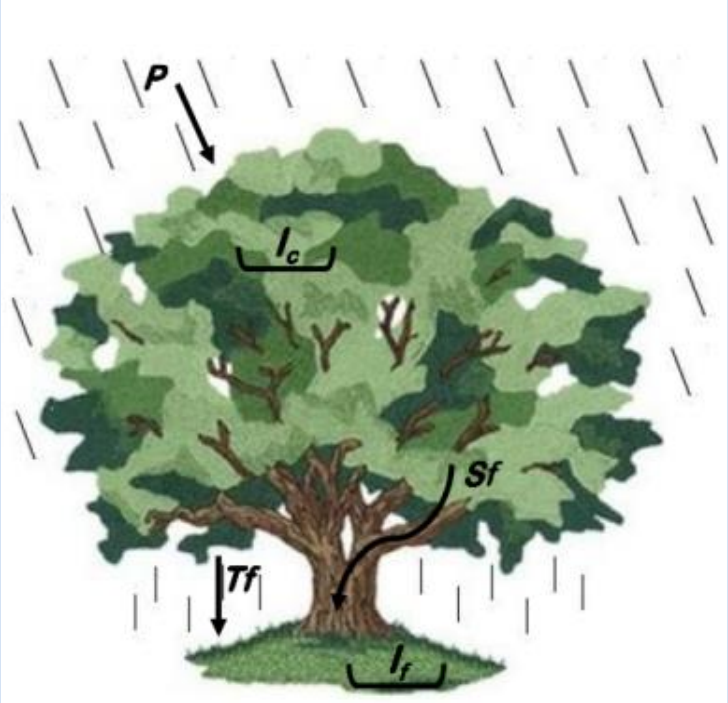
The study area is the river ARAPONGA

- Region predominates Amazon and Atlantic Forest;
- Mixed Ombrophilous Forest;
- 5,4 ha;
- Native forest



MONITORING

- INTERCEPTION PROCESS



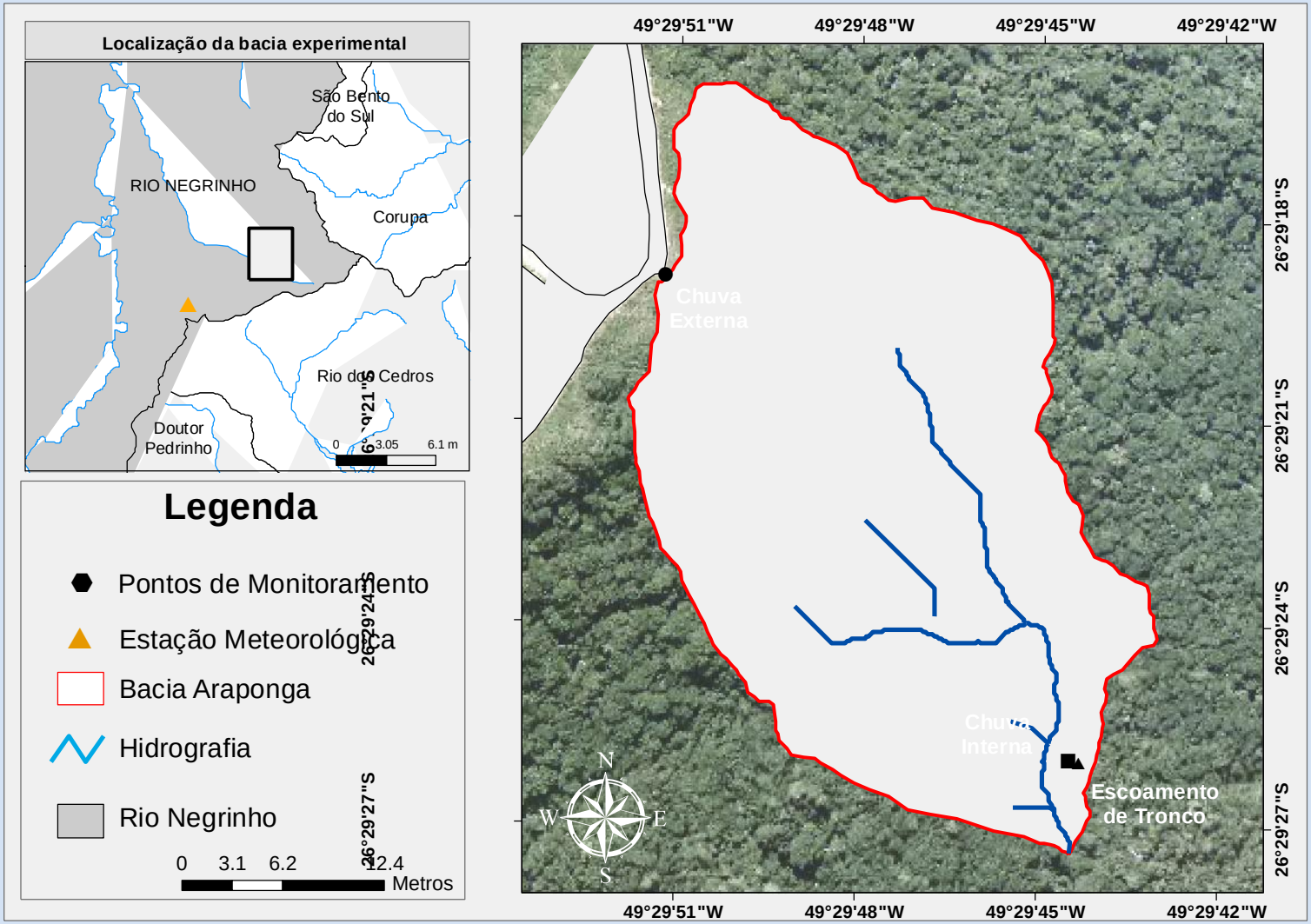
Giglio, 2013

$$I = I_c + I_f$$

$$I_c = P - (Tf + Sf)$$

$$I = P - Tf - Sf + I_f$$

MONITORING


Localização da bacia experimental
São Bento do Sul
RIO NEGRINHO
Corupa
Rio dos Cedros
Doutor Pedrinho
0 3.05 6.1 m
Legenda
Pontos de Monitoramento
Estação Meteorológica
Bacia Araponga
Hidrografia
Rio Negrinho
0 3.1 6.2 12.4
Metros
49°29'51"W
49°29'48"W
49°29'45"W
49°29'42"W
26°29'18"S
26°29'21"S
26°29'24"S
26°29'27"S
Chuva Externa
Chuva Interna
Escoamento de Tronco
N
W
E
S

MONITORING

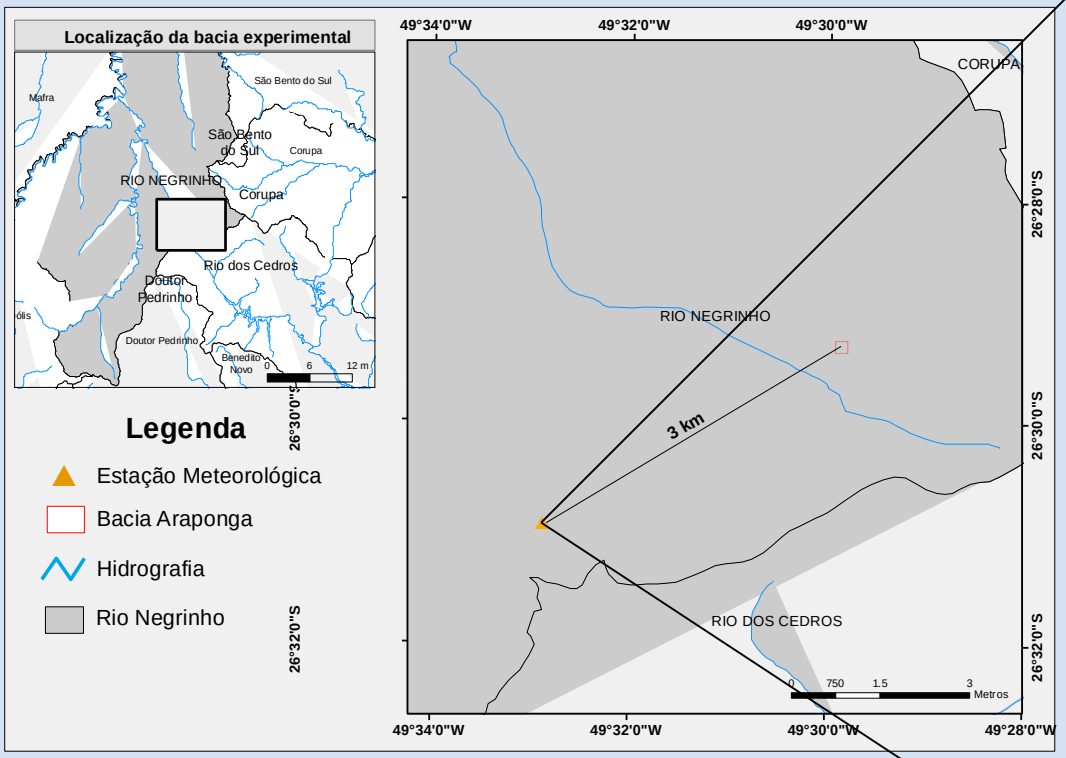
- PRECIPITATION

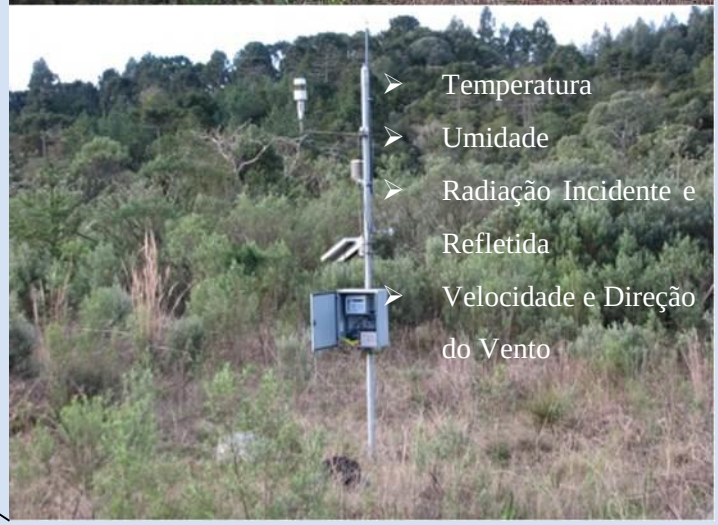
MONITORING

- THROUGHFALL AND STEMFLOW

MONITORAMENTO

- CALCULATION OF EVAPOTRANSPIRATION





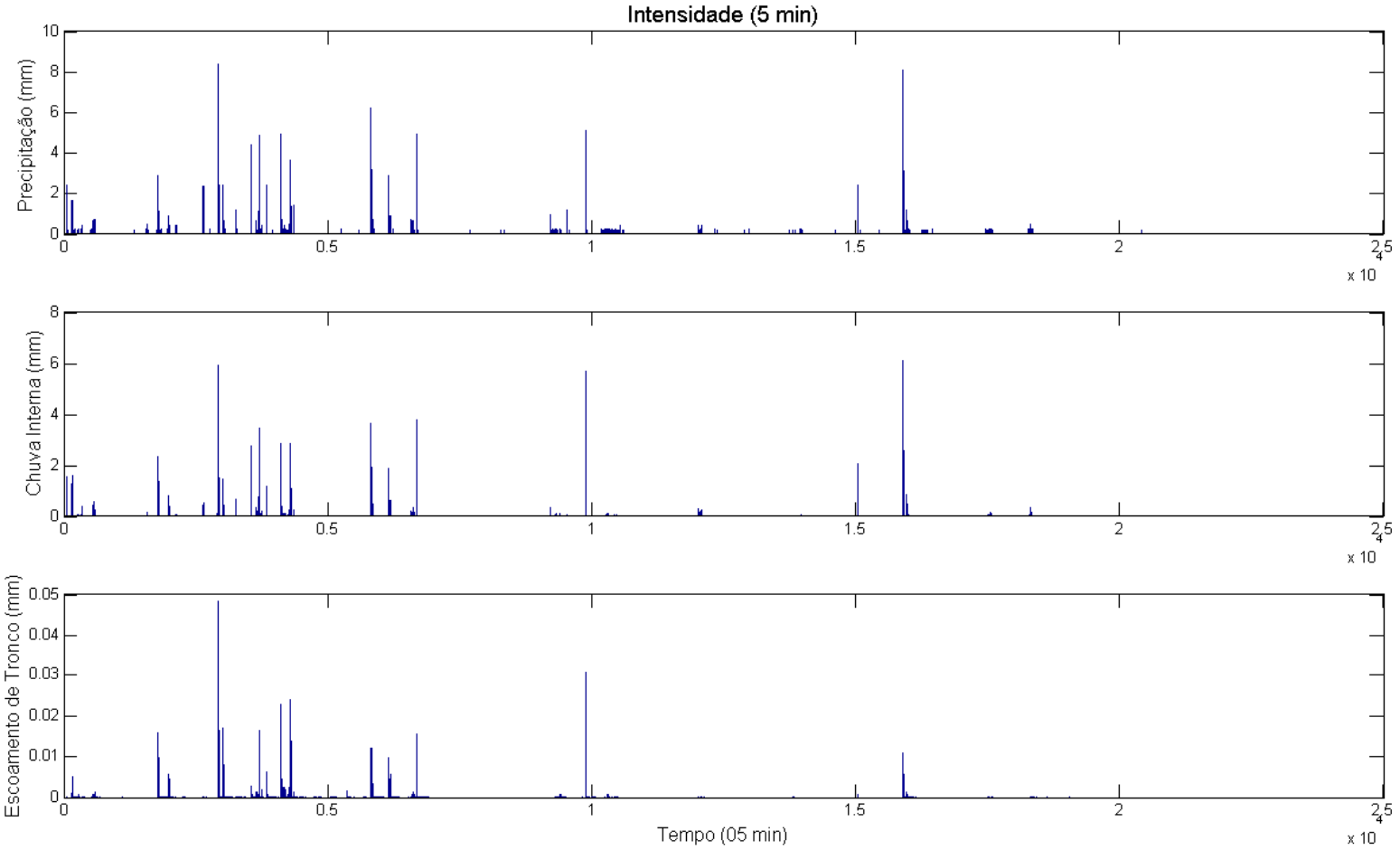
SWAT MODEL

```
use parm

integer :: j, ii
real :: xx, canmxl, canstori

j = 0
j = ihru

if (blai(idplt(j)) < 0.001) return

select case (ievent)
  case (2,3)

    canstori = 0.
    canmxl = 0.
    canstori = canstor(j)
    canmxl = canmx(j) * laiday(j) / blai(idplt(j))
    do ii = 2, nstep+1
      xx = 0.
      xx = precipdt(ii)
      precipdt(ii) = precipdt(ii) - (canmxl - canstor(j))

      if (precipdt(ii) < 0.) then
        canstor(j) = canstor(j) + xx
        precipdt(ii) = 0.
      else
        canstor(j) = canmxl
      endif
    end do
    if (canstor(j) > canstori) then
      do ii = 1, nstep
        xx = 0.
        xx = precipdt(ii)
        precipdt(ii) = precipdt(ii) - (canstor(j) - canstori)

        if precipdt(ii) < 0.) then
          canstori = canstori + xx
          precipdt(ii) = 0.
        else
          canstori = canstor(j)
        endif
      end do
    end if
```

- O modelo esvazia diariamente o volume da capacidade de armazenamento máximo (canmx) ;
- O modelo não utiliza o escoamento de tronco para o calculo da interceptação;
- Não subtrai a evapotranspiração da capacidade de armazenamento da copa durante o evento.

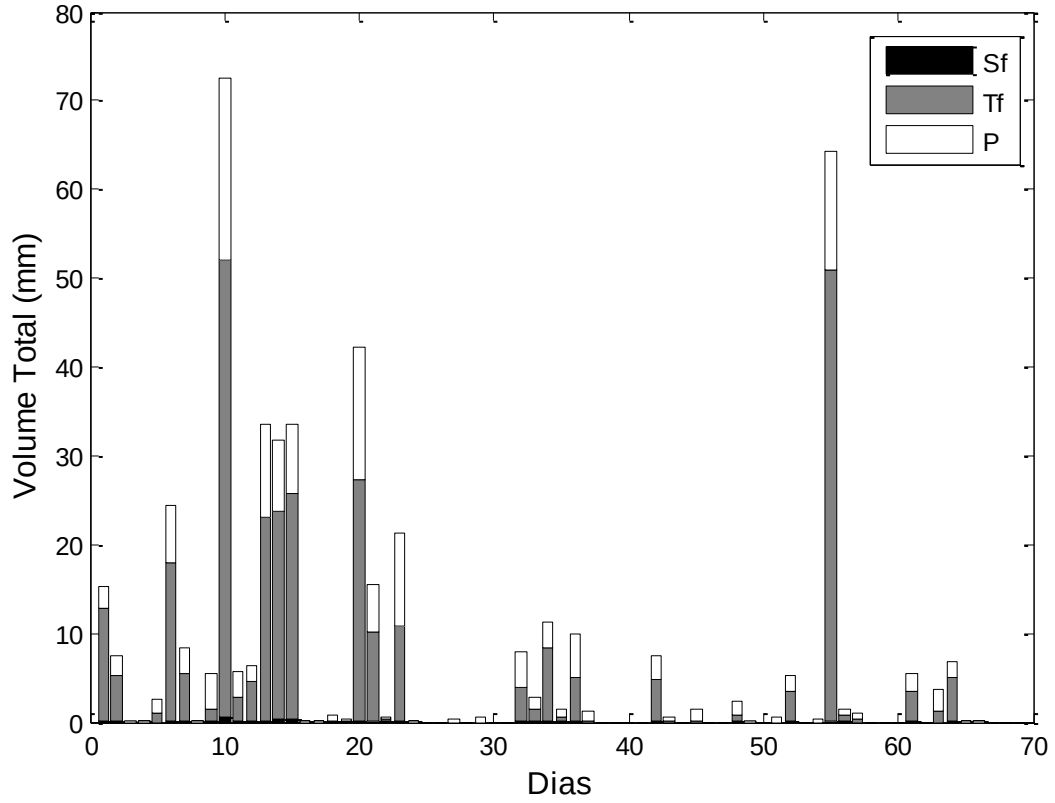
RESULTS

- Gross monitored data



RESULTS

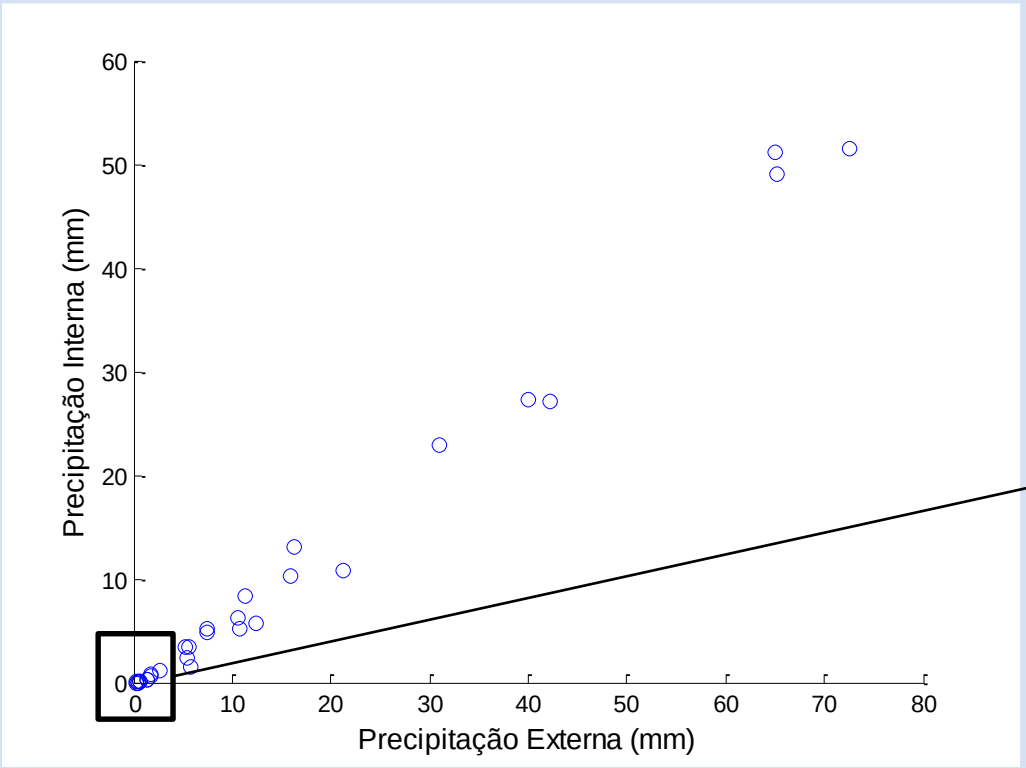
- Interception process



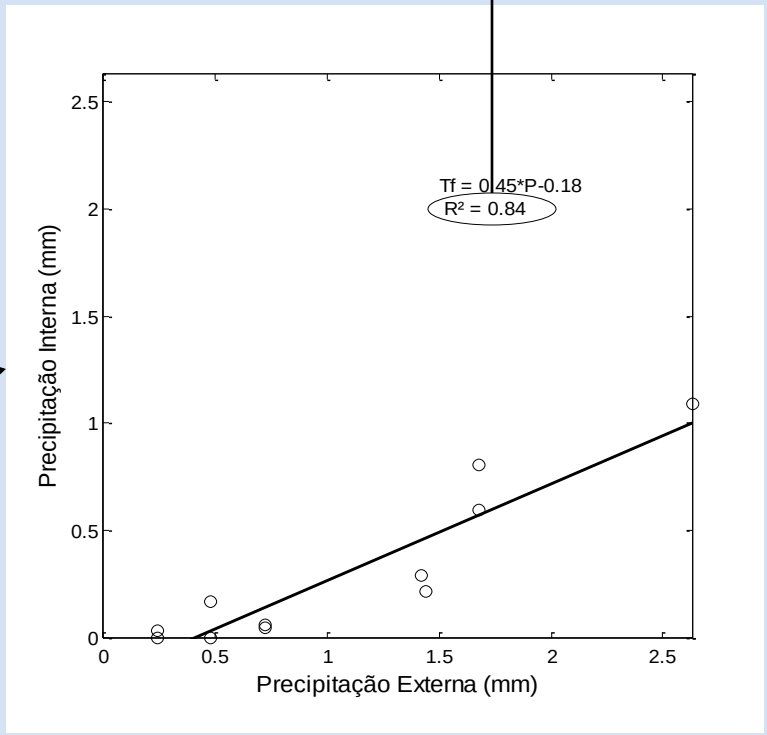
	Volume Total	
	mm	%
P	463.0	100
Tf	312.5	67.5
Sf	2.5	0.5
Loss I	148.1	31.9

RESULTS

- 30 events

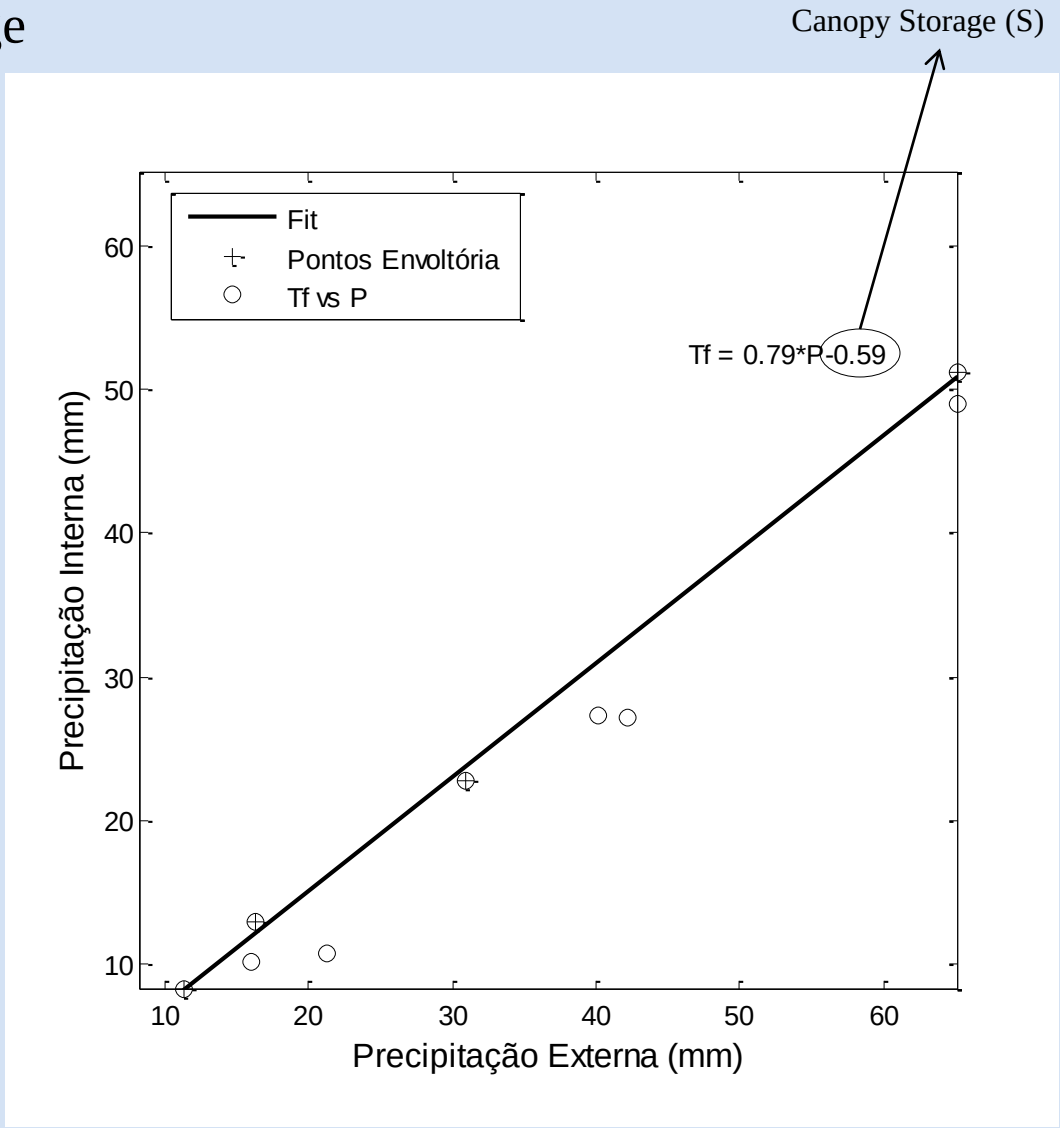


Forest cover (*c*)



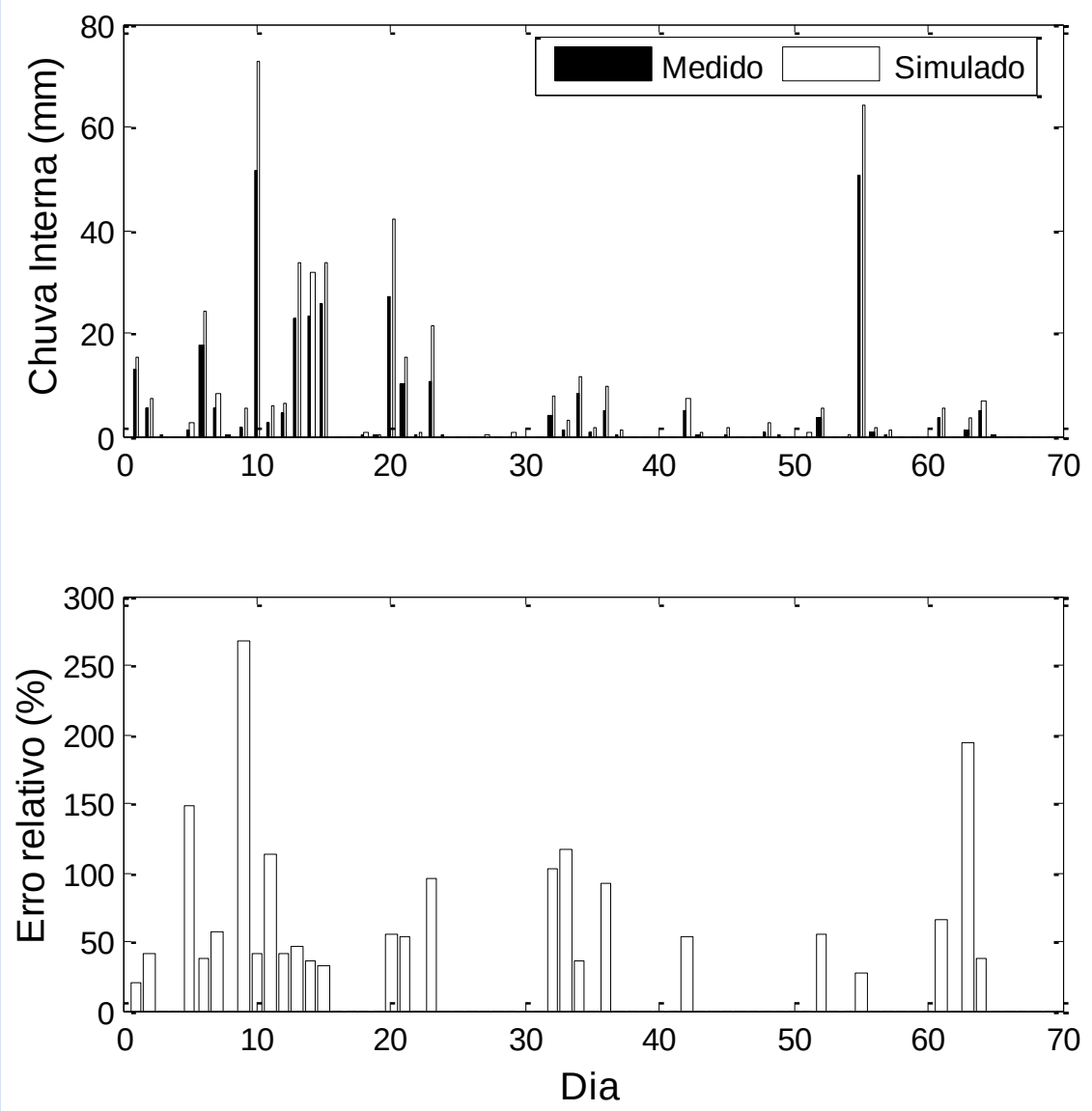
RESULTS

- Canopy Storage



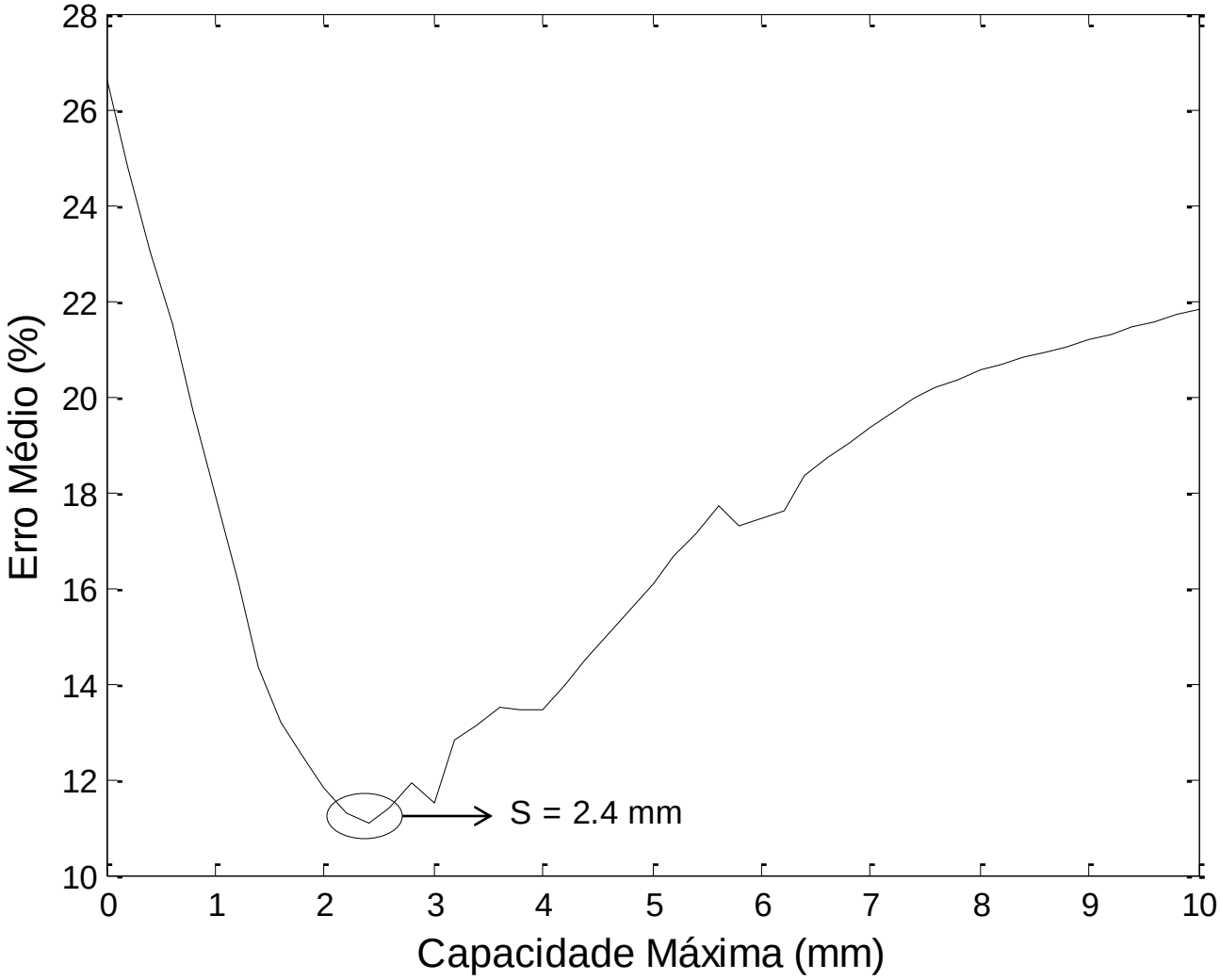
RESULTS

- Canopy Storage 0.59 mm;
- Mean relative erro of 27 %;
- Maximum relative erro of 250 %.



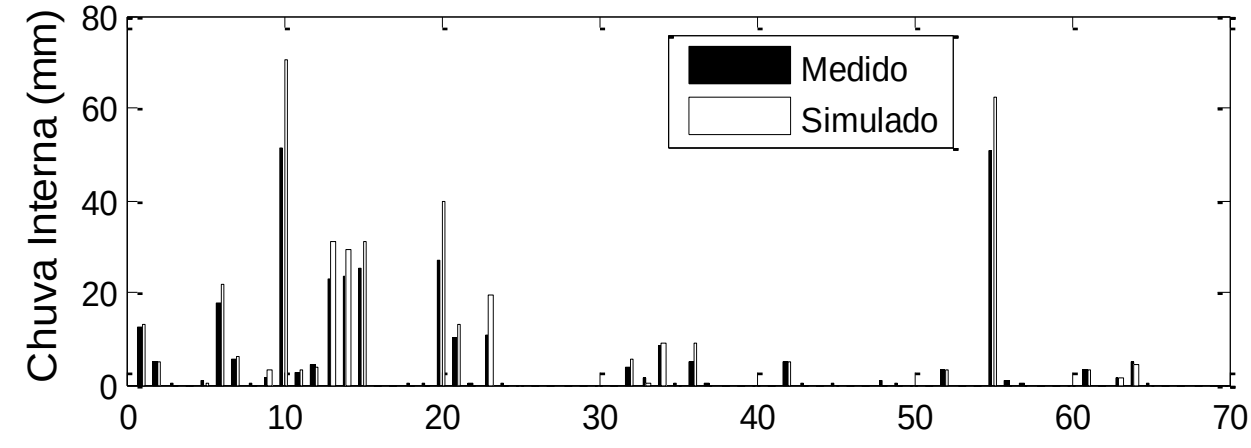
RESULTS

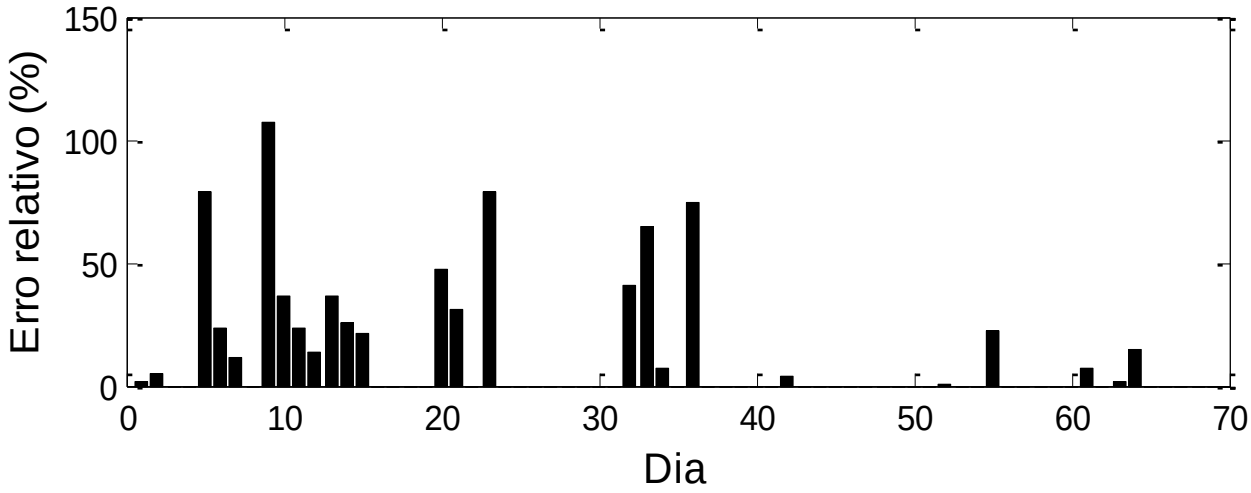
- Calibration of SWAT model



RESULTS

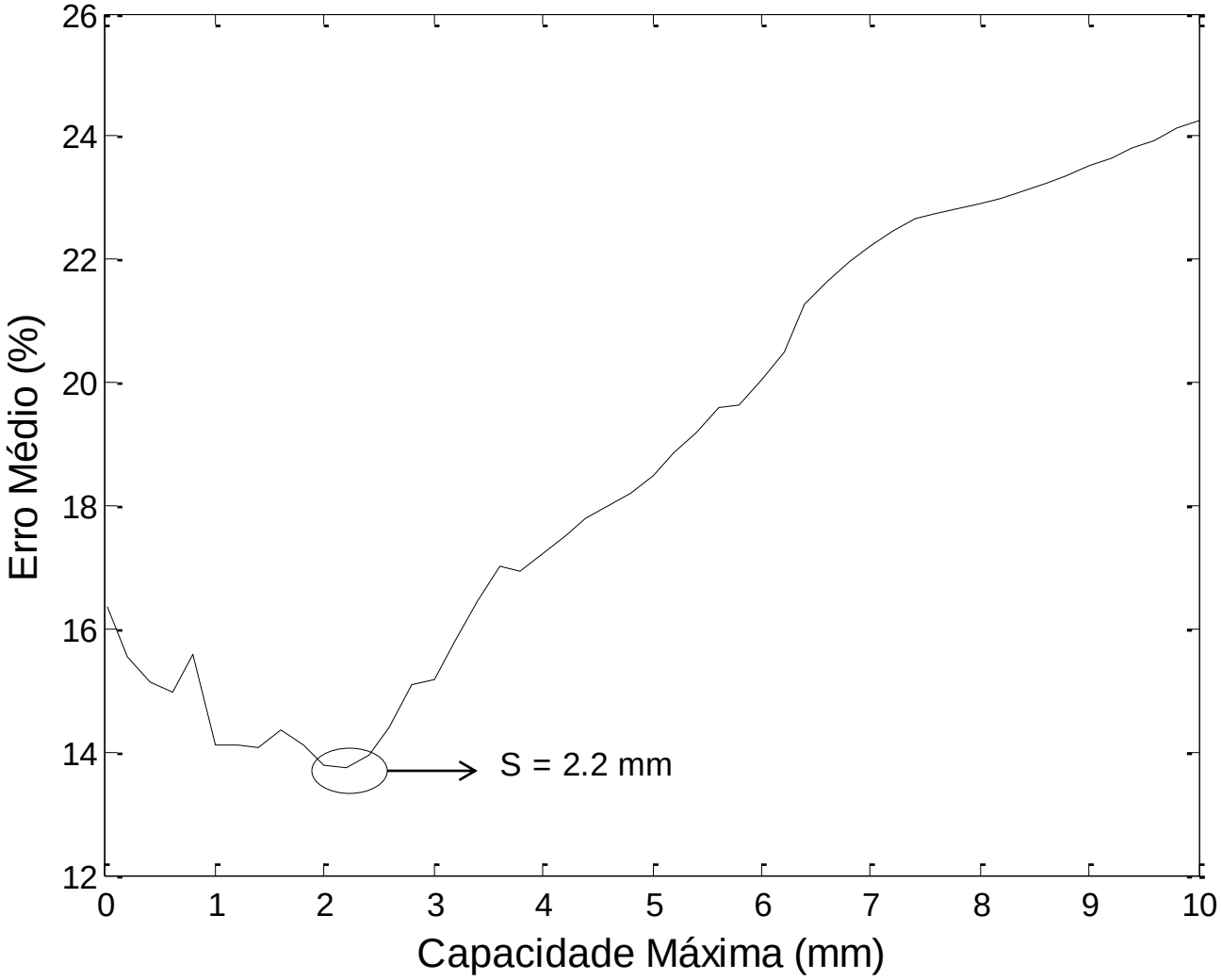
- Canopy Storage 2.4 mm;
- Mean relative erro of 11 %;
- Maximum relative erro of 106 %.





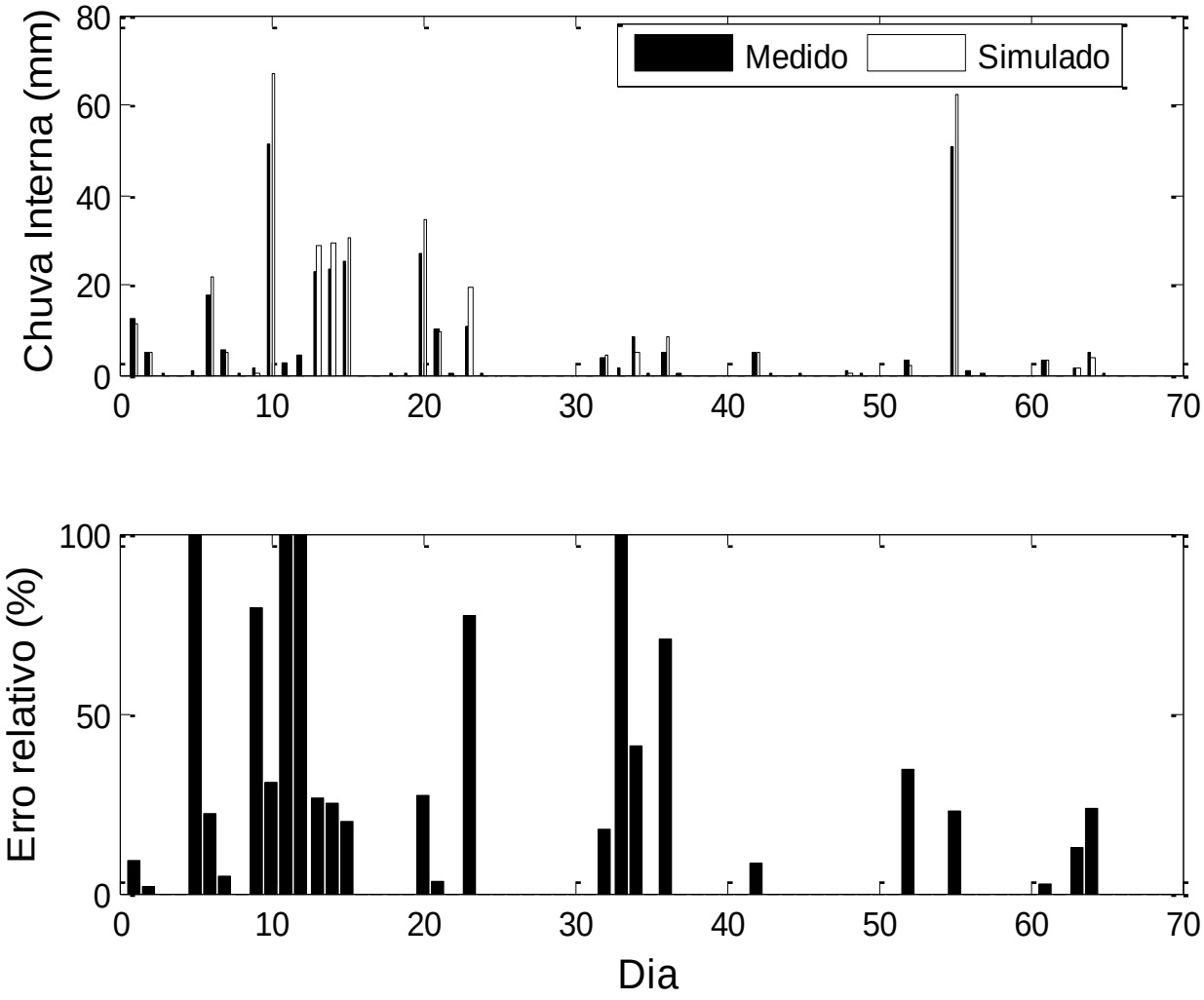
RESULTS

- Calibration of SWAT model + Evapotranspiration



RESULTS

- Canopy Storage 2.2 mm;
- Mean relative erro of 13 %;
- Maximum relative erro of 100 %.



CONCLUSIONS

- The interception process is not well detailed in SWAT;
- The appendage of variable evapotranspiration decreases the relative error of the model;
- Improvement of routine canopyint process.

ACKNOWLEDGMENT

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THANK YOU FOR YOUR ATTENTION

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