SI-SWAT: IMPACTS OF SPATIAL VARIATION OF SOIL ON WATER BALANCE IN WATERSHED OF THE PARAIBA STATE-BRASIL

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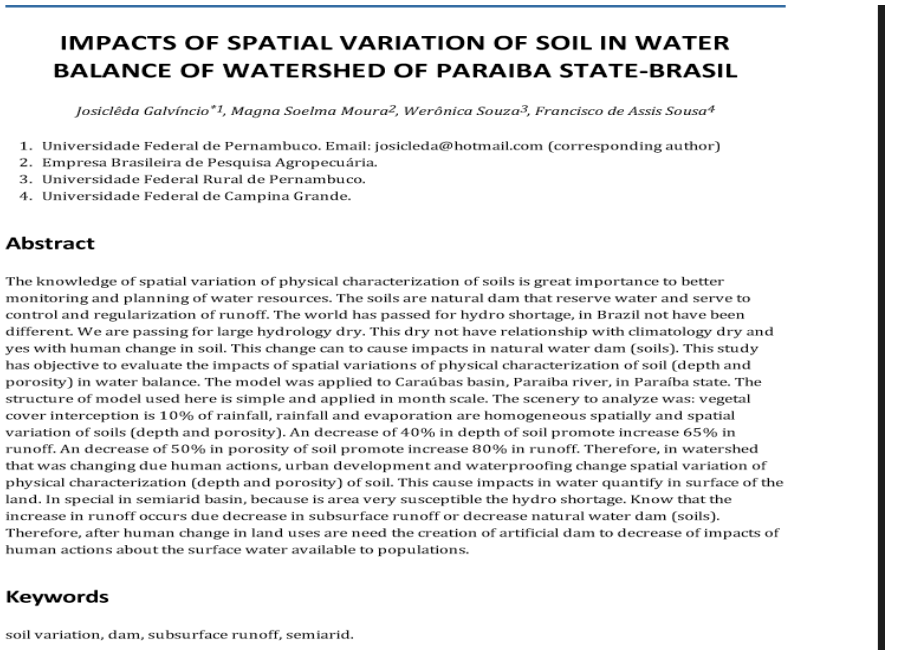

IMPACTS OF SPATIAL VARIATION OF SOIL IN WATER BALANCE OF WATERSHED OF PARAIBA STATE-BRASIL

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Abstract

The knowledge of spatial variation of physical characterization of soils is great importance to better monitoring and planning of water resources. The soils are natural dam that reserve water and serve to control and regularization of runoff. The world has passed for hydro shortage, in Brazil not have been different. We are passing for large hydrology dry. This dry not have relationship with climatology dry and yes with human change in soil. This change can to cause impacts in natural water dam (soils). This study has objective to evaluate the impacts of spatial variations of physical characterization of soil (depth and porosity) in water balance. The model was applied to Caraúbas basin, Paraiba river, in Paraíba state. The structure of model used here is simple and applied in month scale. The scenery to analyze was: vegetal cover interception is 10% of rainfall, rainfall and evaporation are homogeneous spatially and spatial variation of soils (depth and porosity). An decrease of 40% in depth of soil promote increase 65% in runoff. An decrease of 50% in porosity of soil promote increase 80% in runoff. Therefore, in watershed that was changing due human actions, urban development and waterproofing change spatial variation of physical characterization (depth and porosity) of soil. This cause impacts in water quantify in surface of the land. In special in semiarid basin, because is area very susceptible the hydro shortage. Know that the increase in runoff occurs due decrease in subsurface runoff or decrease natural water dam (soils). Therefore, after human change in land uses are need the creation of artificial dam to decrease of impacts of human actions about the surface water available to populations.

Keywords

soil variation, dam, subsurface runoff, semiarid.

Introduction

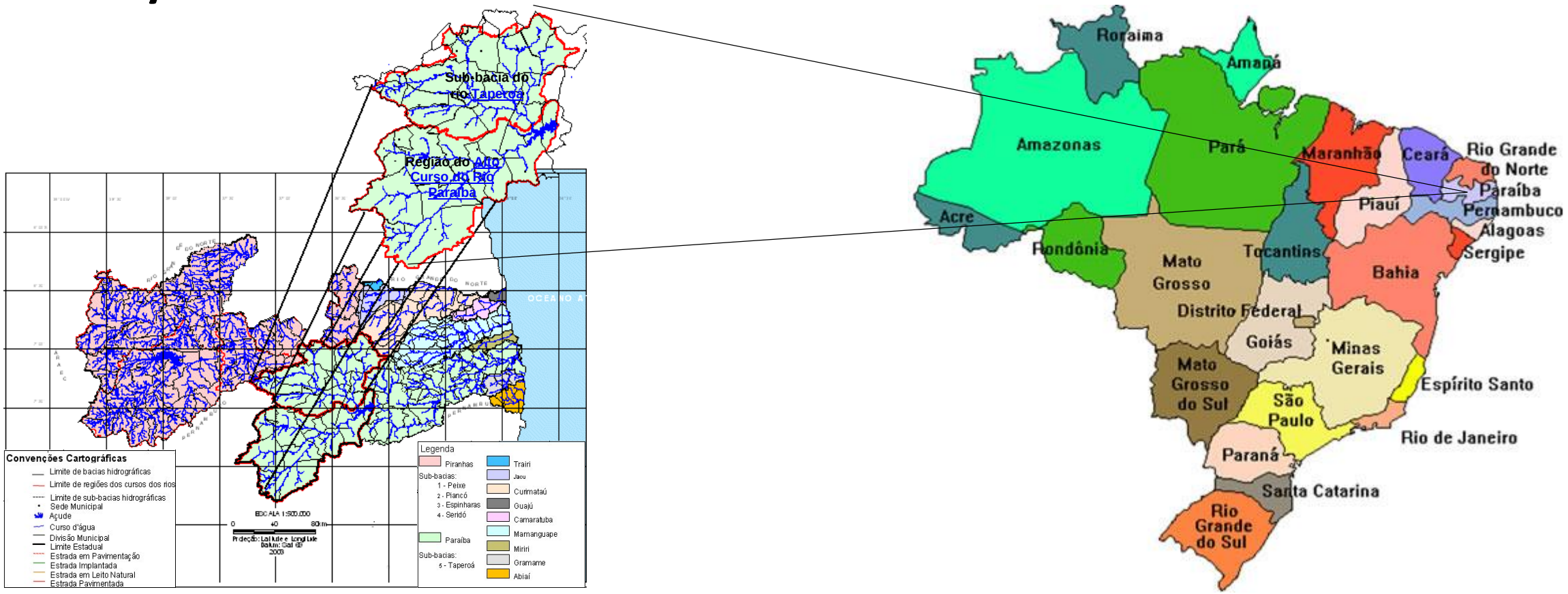
- Soil dam is natural- serve to control and regularization of runoff
- But, what is changing?
- In local, the climate change, yet is not see in area different, but the water have decrease in watershed different. Why?
- The soil dam has changed. The soil condiction is very importante to water balance. I think that the soil dam is decrease the depth as last century.
- Hydrological model is not real situations of basin because human actions.
- How to do a confiable hydrology model with this condiction?
- To know soil variation characterization actual with this condiction is very important.
- Why I do when I dont have good observed data?
- I need to improve my models to simulate the runoff with another data that represent the real situation.

Objective

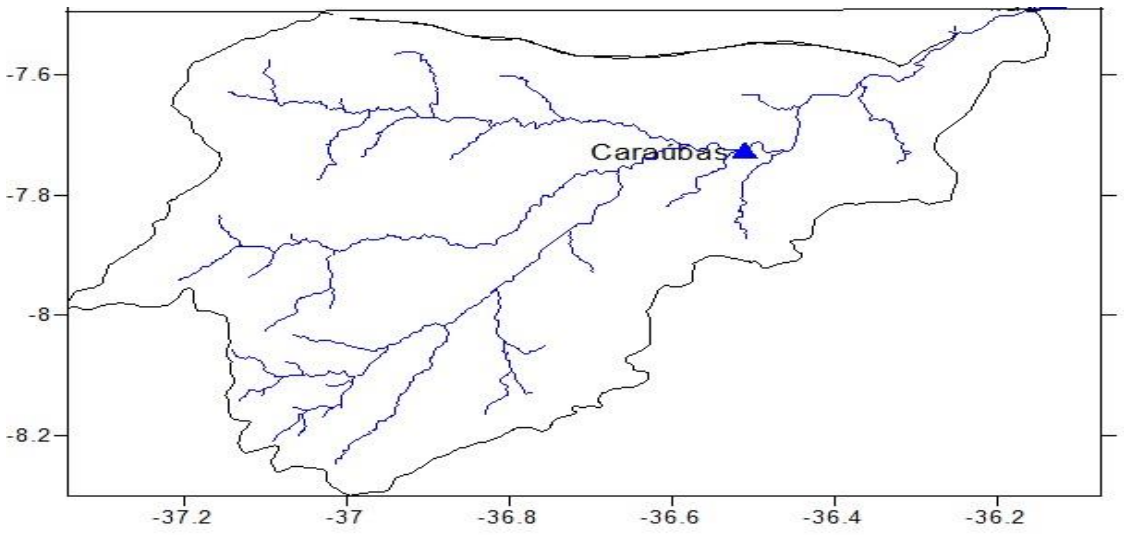
- To evaluate the impacts of spatial variation of physical characterization of soil (depth and porosity) in water balance in semiarid region.

Material and methods

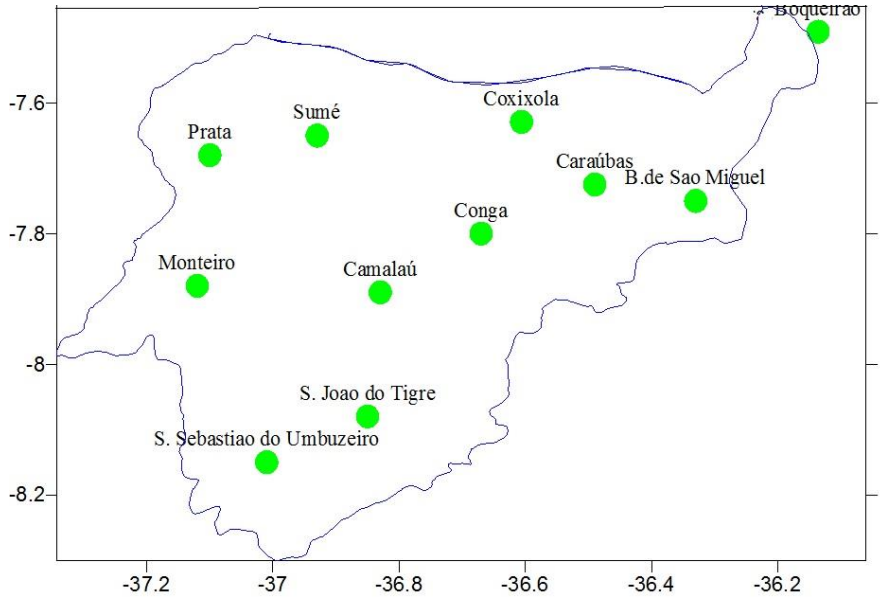
- **Study area**



Runoff station



Spatial soil variation



Basic equation of the model

$$\frac{ds(t)}{dt} = p(t) - q_{se}(t) - e(t)$$

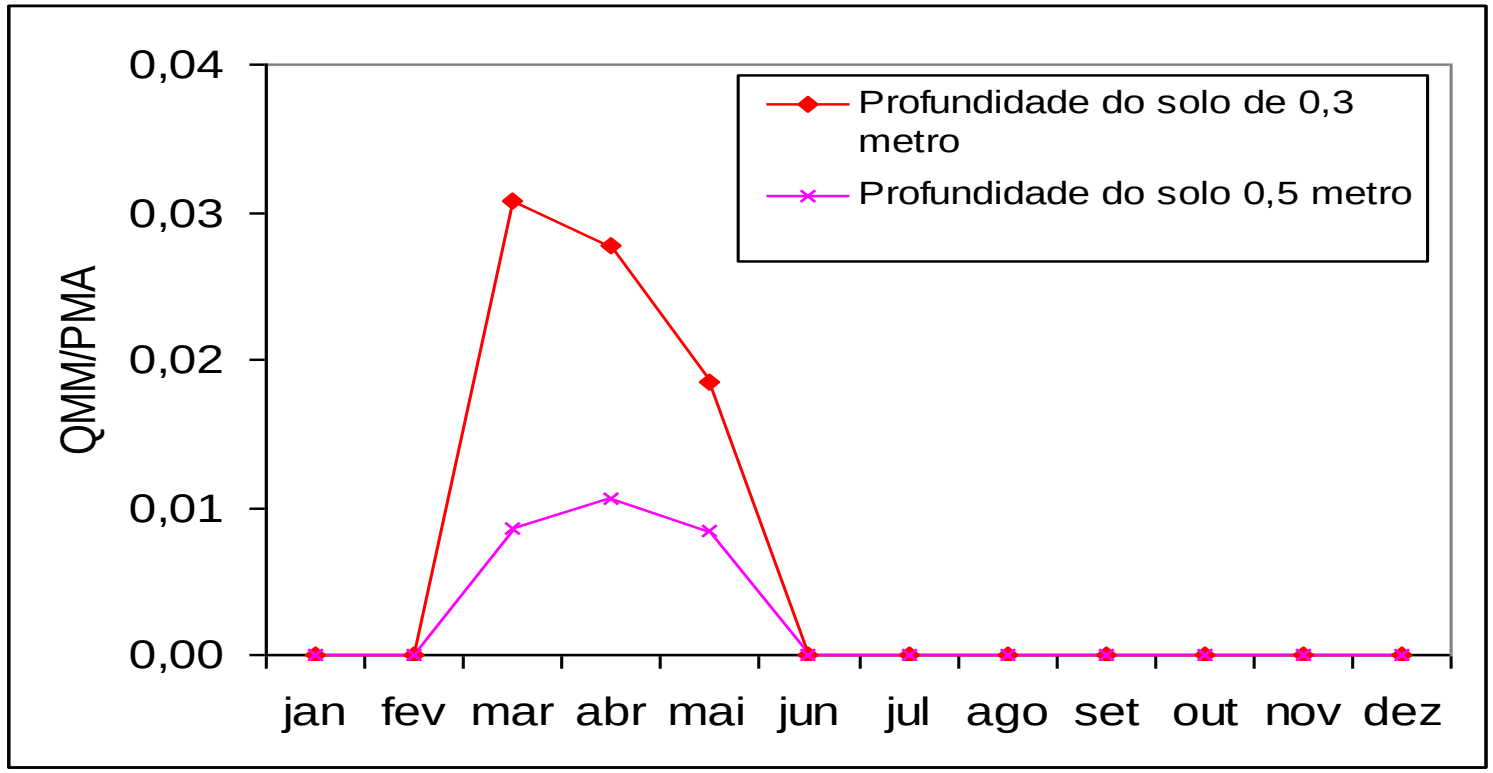
P (t) is rainfall
Q_{se}(t) is runoffe
e (t) is evapotranspiration

Nash Sutcliffe

$$NEC = \frac{\sum (Q_i - \overline{Q})^2 - \sum (Q_i - \hat{Q}_i)^2}{\sum (Q_i - \overline{Q})^2}$$

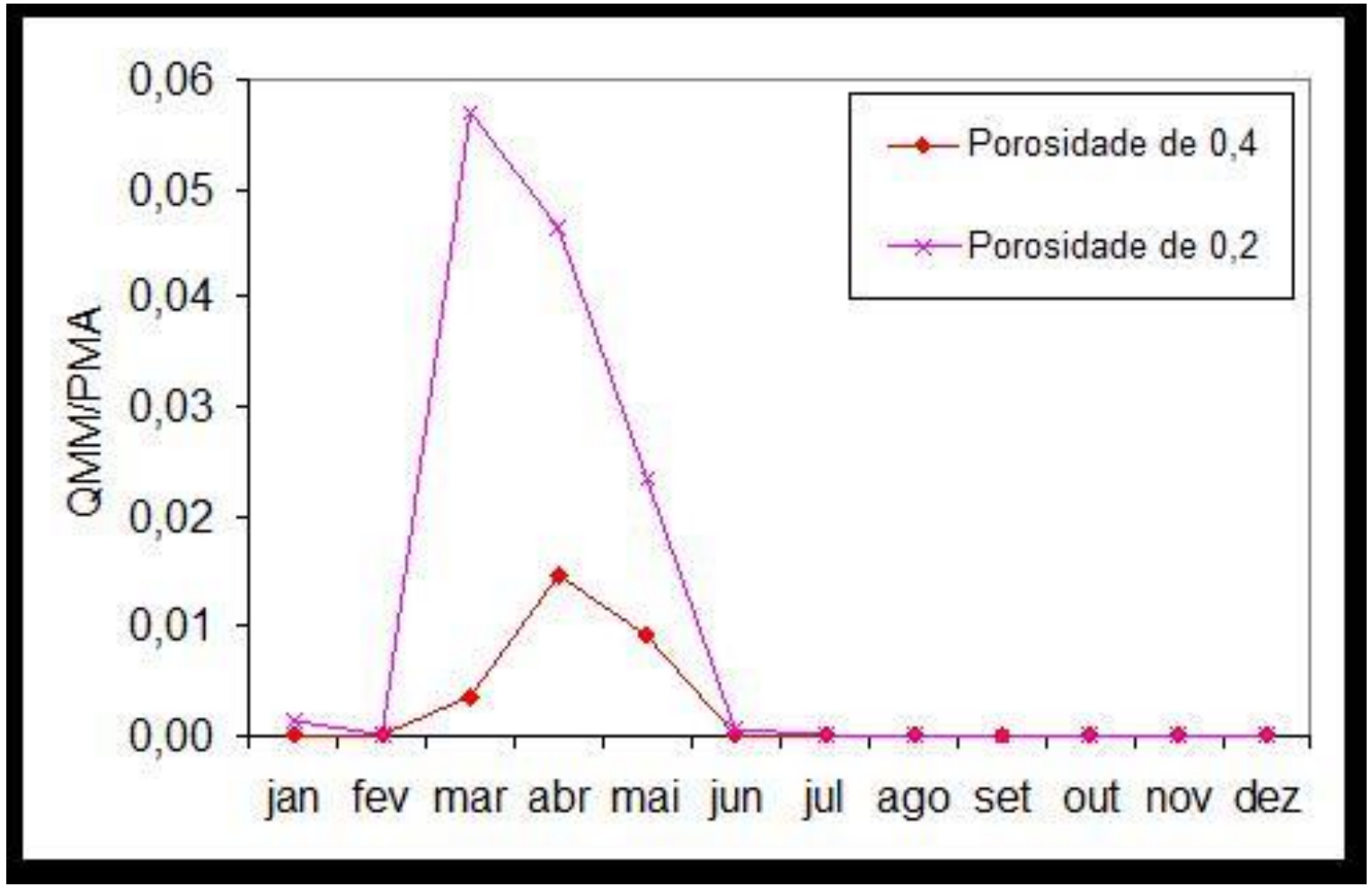
Results and discussion

What the impacts this condiction in water balance?



Increase 40% in soil depth ⟶ decrease 65 % on runoff.

Results and discussion

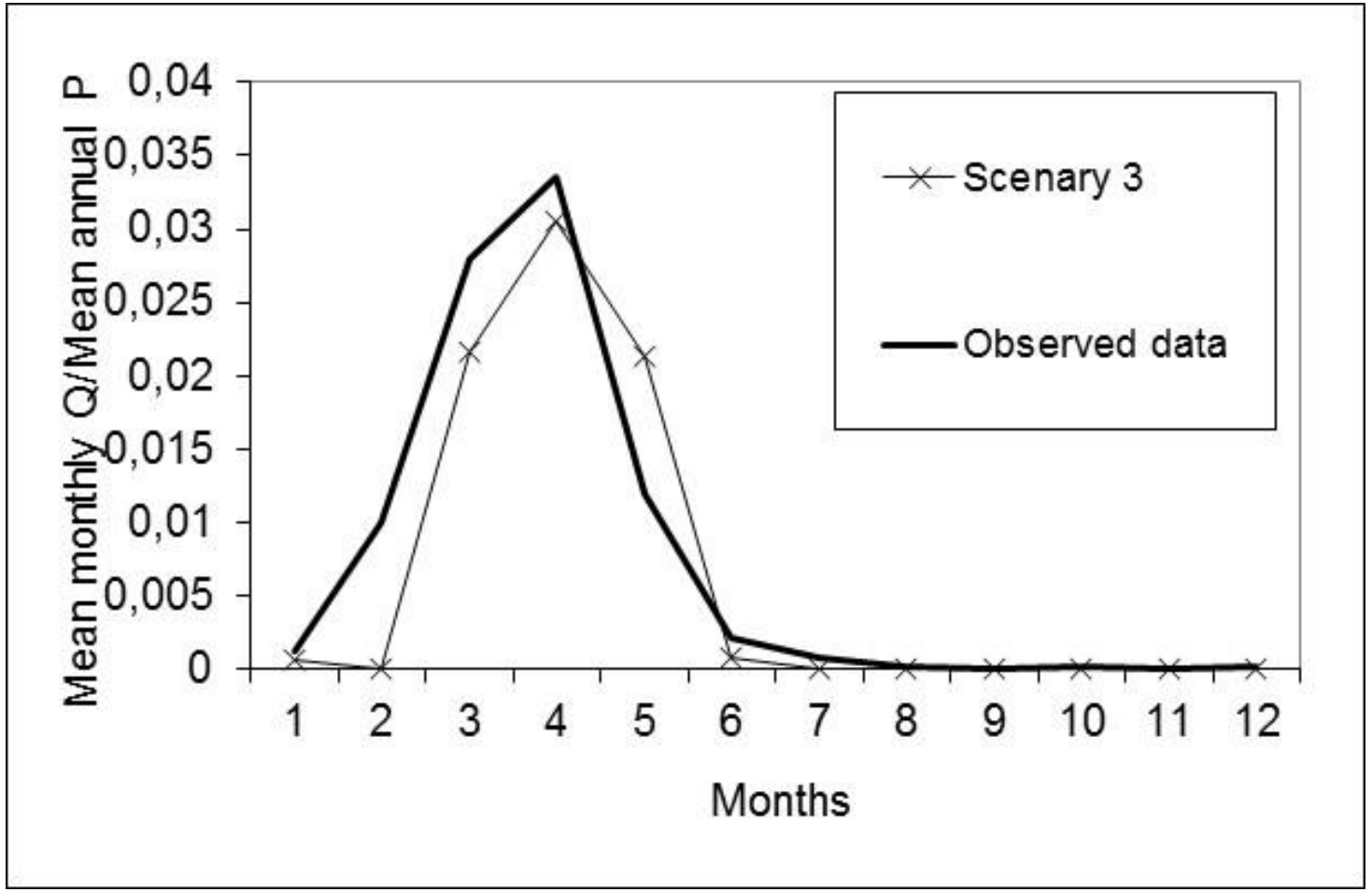


Increase 50% in soil porosity ⟶ decrease 80 % on runoff.

What occurs when change human this natural condiction?

- The water soil dam regularize runoff in dry season. In short time not have impacts but in long time this is problem.

Results and discussion



When we have soil more deep - decrease and delay runoff. Decrease high flow and increase

Scenary differents of the study.

	Soil deep	Rainfall	Vegetable cover	Condutividade hidraulica	Soil porosity
one	Uniform	Homogeneous	uniform	constant	constant
two	variation	Homogeneous	uniform	variation	variation

Acknowledgement

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Conclusion

- The soil to have important influence in water balance. The actions human have change the soil condictions. Is very important put in hydrology model the soil change. Because the soil dam have change. The soil have important functions to regularize runoff.
- In Brazil, the primitive use of soil and land use very have contribute to impacts of soil and decrease in water dam.

Conclusion

- The results of water balance show change on runoff standard. This change are decrease and delay on runoff, this is because the new dam construction and land use.
- Actualy, 12% is change to runoff.

Thank you so much!