TRANSPOSABILITY AND EVALUATION OF PEDOTRANSFER FUNCTIONS FOR PREDICTING PROPERTIES OF WATER RETENTION ON SOILS OF LOW CHELIFF. ALGERIA.

[1]Sami Touil, [1]Djamel Saidi, [2]Aurore Degré

[1]Institute of agronomy, University of Hassiba BenBouali of Chlef, BP151, Chlef, Algeria;

[2]Soil – Water Systems, Univ. Liège, Gembloux Agro-Bio Tech, Belgium.

Introduction

❑ research has focused on the discussion of the ability of PTF to estimate more or less accurately the water content measured for the sample that have relatively the same kind of soil constituents.

❑ An important question remains about PTF's transposability to others agropedoclimatic contexts. Models developed and validated in a particular bioclimatic context, were relatively little tested in other contexts.

Objectives

❑ The evaluation of PTF to estimate water retention at field capacity pF 2.5 (-330 hPa) and at wilting point pF 4.2 (-15000 hPa) of some soils of Lower Cheliff . Algeria.

❑ Discuss the relevance of application of PTF in agropedoclimatic contexts different from those of their developments.

Selection Tools

✓ 134 samples collected from soils of Lower Cheliff

✓ Eight (08) PTF selected.

✓ Evaluation Criteria: The root mean square error (*RMSE*), the Akaike information criterion (*AIC*) the geometric mean error (*GMER*).

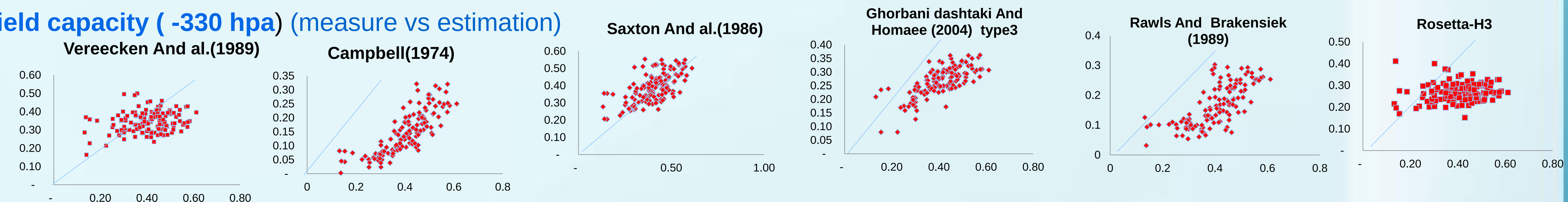
Authors	mathematical formalism	Number of samples	Origin of soils	Inputs					
				Pressure	Sa	Li	Ar	OM	BD
Rawls et al. (1982)	MRNL	2541	USA	pF 2.5	+		+	+	
				pF 4.2			+	+	
Rawls et Brakensiek (1985)	MRNL	5320	USA	pF 2.5	+		+		+
				pF 4.2	+		+		+
Vereecken et al(1989)	MRNL	182	Belgium	pF 2.5	+	+	+	+	+
				pF 4.2	+	+	+	+	+
Saxton et al. (1986)	MRNL	np	USA	pF 2.5	+		+		
				pF 4.2	+		+		
Rosetta-H3 (Schaap et al. 2002)	ANN	24691	North America and Europe	pF 2.5	+	+	+		+
				pF 4.2	+	+	+		+
Campbell (1974)	MRNL	1400	USA	pF 2.5	+		+		+
				pF 4.2	+		+		+
Ghorbani Dashtak Homaee (2004) Type1	MRNL	234	Iran	pF 2.5	+	+	+		+
				pF 4.2			+		
Ghorbani Dashtak Homaee (2004) Type3	MRL/ANN	234	Iran	pF 2.5	+		+		+
				pF 4.2	+		+		+

OM: *organic matter,* ***BD****: bulk density,* ***Ar, Li, Sa:*** *clay, silt and sable.np: unspecified,* ***MRL; MRNL****: Multiple regression linear and nonlinear* ***ANN:*** *artificial neural network*

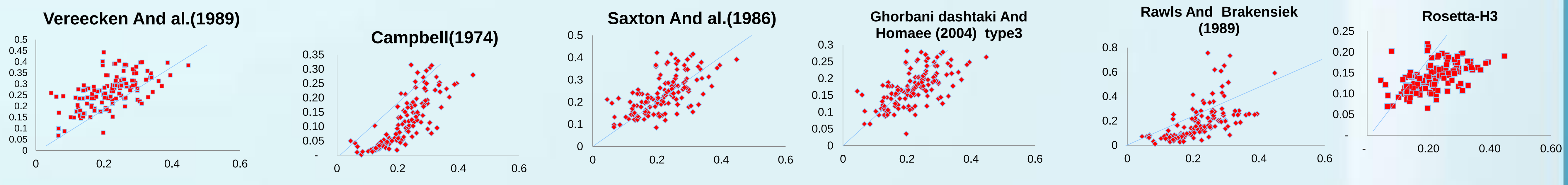
Results

▪ The results showed that the best models in the estimation are Rawls et al, (1982) and GH-1 (2004), at **field capacity and wilting point** respectively.

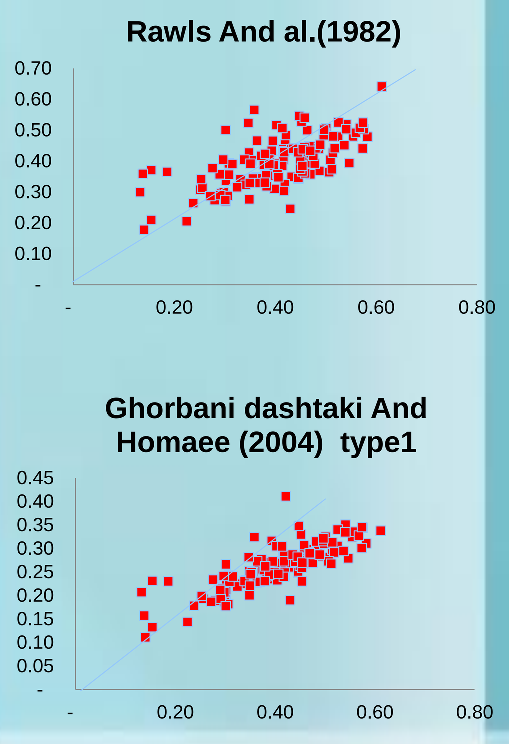
➢ θ **At field capacity (-330 hpa)** (measure vs estimation)



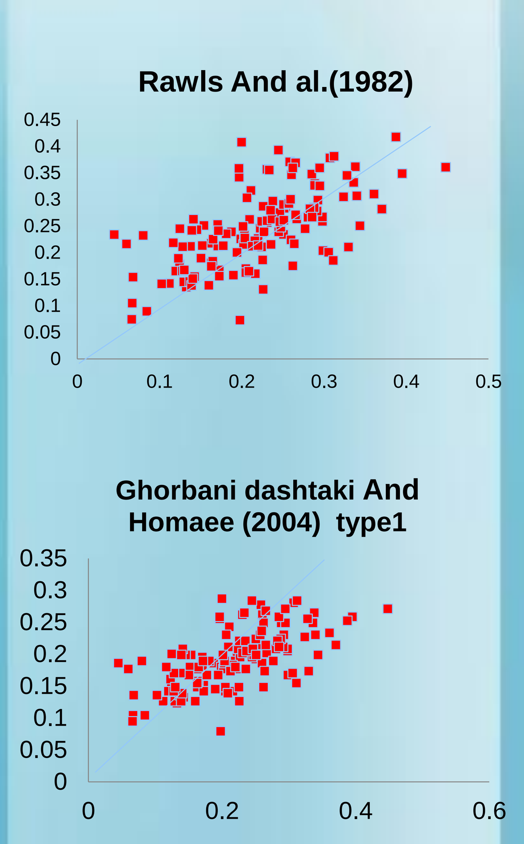
➢ **θ At wilting point (-15000 hpa) (measure vs estimation)**



➢ **At field capacity (-330 hpa)**

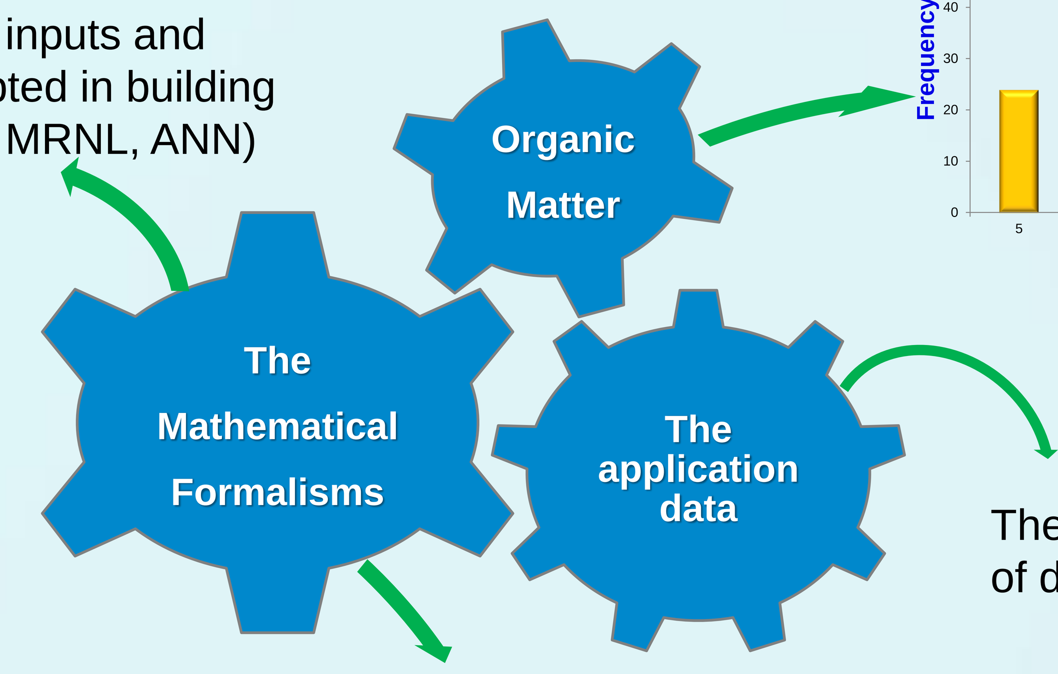


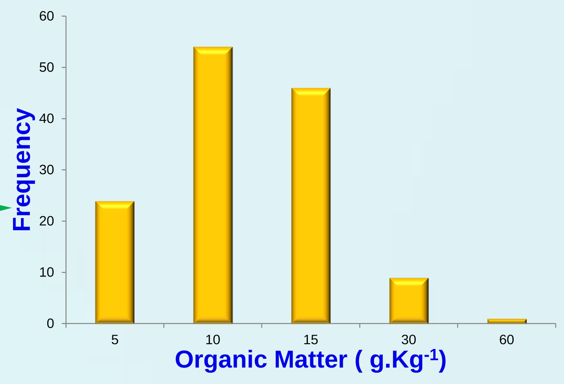
➢ **At wilting point (-15000 hpa)**



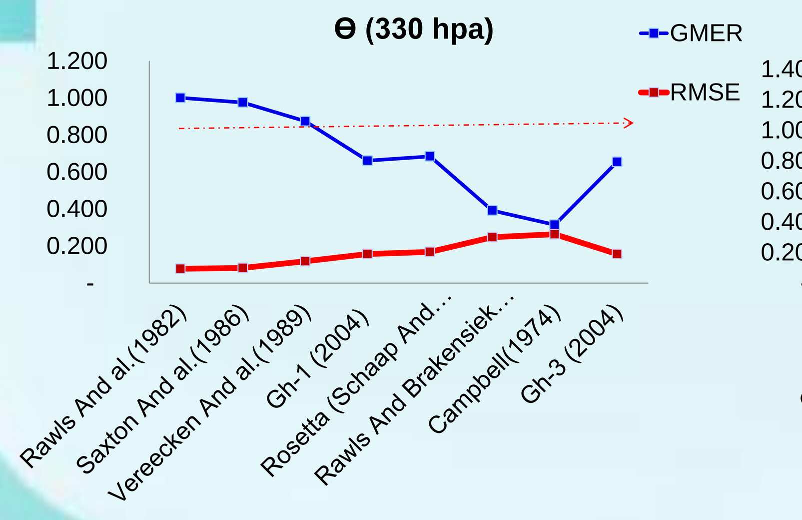
Discussions

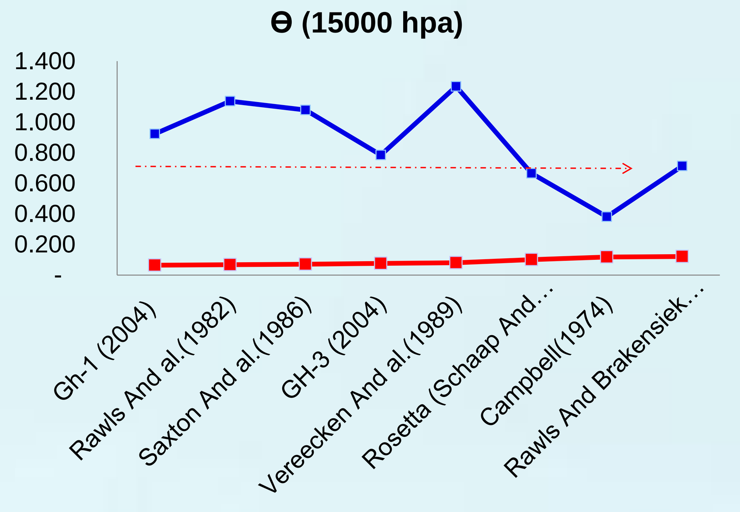
The choice of inputs and methods adopted in building of PTF (MRL, MRNL, ANN)





The geographical origin of data sets.





Conclusion

➢ The transferability of PTF derived from a wide range of soil variation (heterogeneity) behave much better than other models derived from data sets from specific agropedoclimatic contexts.

➢ The mathematical formulation of the PTF is a important element in improving the estimation of the soil water retention.

References

▪ **Pachepsky, Y.A, Rawls, W.J. 2004**, development of Pedotransfer functions in soil hydrology.

▪ **Donatelli M., Wösten J.H.M., Belocchi G., Acutis M., Nemes A., Fila G., 2004,** Methods to evaluate pedotransfer functions. Elsevier B.V. 30, 357–411.

▪ **S. Ghorbani Dashtaki., M. Homaee & H. Khodaverdiloo. 2010**, Derivation and validation of pedotransfer functions for estimating soil water retention curve using a variety of soil data