Inmaculada Lebron Robinson

Education

1982 University of Zaragoza — Spain
BS/ Chemistry

1984 University of Zaragoza — Spain
MS/ Water Quality

1989 University of Zaragoza — Spain
PhD/ Soil Chemistry

Professional experience

1989 - 1991	U.S. Salinity Laboratory	USA
Visiting Scientist		
1992 - 1998	University of California, Riverside	USA
Research Scientist		
1998 - 2004	University of California, Riverside	USA
Assistant Research Scientist III		
2004- 2005	Utah State University	USA
Assistant Research Professor		
2005- present	Stanford University	USA
Visiting Scientist		

Chapters in Edited Books

Suarez, D.L. and I. Lebron. 1993. Water quality criteria for irrigation with highly saline water. In H. Lieth and A. Al Masoom (eds.) Towards the rational use of high salinity tolerant plants. Vol. 2:389-397. Kluwer Academic Publishers. Netherlands.

Goldberg, S.R., I. Lebron, and D.L. Suarez. 1999. Soil colloidal behavior. *In Handbook of Soil Science*. Summer M.E. (Ed.) Section II.p. B-195-240. CRS Press Inc. Boca Raton.

Reports

Suarez, D.L. and I.Lebron. 1995. Maximizing water and nutrient use efficiency in the agromanagement of arid zone sandy soils. *National Agriculture Research Project* (58-319R-3-007). Final Report, 45pp.

McGiffen, M. and I. Lebron. 2001. Organic and other alternative cultural systems for carrots. *California Fresh Carrot Advisory Board,* Department of Food and Agriculture, State of California. p85-

Publications

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Alberto, F. and I. Lebron. 1984. Hydrosalinity balance for the Ebro river between Tudela and Zaragoza. I. Water use and saline and ionic balances (in Spanish). Anales Aula Dei, 17 (½), 88-101.

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Lebron I. 1989. Suelos salino-sodico-alcalinos de la Depresion Media del Ebro. Condiciones de formacion, caracteristicas y propiedades. Universidad de Zaragoza. 483pp.

Lebron, I. and D. L. Suarez. 1992. Electrophoretic mobility of illite and micaceous soil clays. Soil Sci. Soc. Am. J. 56, 4, 1106-1115.

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Lebron, I. and D.L. Suarez. 1994. Coloideoquimica de arcillas micaceas. Curso Internacional de Riego por Goteo. Ciclo de Seminarios. 7:1-31.

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Lebron, I. and D.L. Suarez. 1998. Modeling Calcite precipitation as Affected by P_{CO2} and organic ligands at 25^0C. *Mineralogical Magazine*, vol 62, 864-866.

Lebron, I. and D.L. Suarez. 1998. Kinetics and mechanisms of precipitation of calcite as affected by PCO2 and organic ligands at 25 0C. Geochimica et Cosmochimica Acta 63(3):405-416.

Lebron, I. and D.L. Suarez. 1999. Mechanisms and precipitation rate of rhodochrosite at 25oC as affected by PCO2 and organic ligands. Soil Sci. Soc. Am. J. 63:561-568.

Lebron, I., M.G. Schaap, and D.L. Suarez 1999. Saturated hydraulic conductivity prediction from microscopic pore geometry measurements and neural network analysis. Water Resources Research 35, 3149-3157.

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Robinson, D.A., Kelleners, T.J., Cooper, J.D. Gardner C.M.K., Wilson P., Lebron I. and Logsdon S. D. 2005. Evaluation of a Capacitance Probe Frequency Response Model Accounting for Bulk Electrical Conductivity: Comparison with TDR and Network Analyzer Measurements. VZJ 4:992-1003.

Statement of Research Interests

My research interest emphasizes the study of the soil aggregate size and geometry, the arrangement of the aggregates in the soil matrix and how the chemical and microbiological activities affect the water retention and hydraulic properties. Below is an outline of my research activities in the recent past as well as the direction proposed for the future.

Traditional methods to quantify aggregates size and aggregate stability in soils require the dislodging of the aggregates from the soil matrix. The tests, generally performed in dilute systems, have been questioned lately. Dilute systems may not properly represent the soil conditions in the field, as geometrical confinement has a dramatic effect in the pair wise double-layer interaction between two clay particles. As an alternative to the traditional methods to measure aggregate stability, I developed a new method based on the quantification of the aggregates using scanning electron microscopy (SEM), which together with image analysis provides the tools required to measure pore and aggregate size and shape.

Soil pore space and its intrinsic characteristics such as surface area, roughness, tortuosity, and connectivity are probably the most important factors controlling water retention, water movement and microbial activity in soils. The relevance of the micro scale is that many of the important hydrological processes occur at this scale in earth materials. The dynamics of soil fabric is often controlled by the shrinking and swelling of clays, the majority of chemical reactions occur on the surfaces of small pores which is fundamental in both contaminant and nutrient transport.

Electrical methods of determining water content have proved highly successful for a range of scales. The reason for this success is because of the strong underlying relationship between the effective permittivity of a mixture of solid, water and air (eg soil) and its water content. Techniques ranging from active microwave remote sensing, to ground penetrating radar and time domain reflectometry all exploit this. However, after more than twenty years of research the relative contributions of soil structure and rotationally hindered water to the over all effective permittivity is still unresolved. Lower effective permittivity in aggregated clay soils is caused by both geometrical isolation of the aggregates and by dielectric saturation of water. The dielectric saturation is caused by water adsorbed onto surfaces (water of condensation) and by water bound to cations in their hydration sheath. My research interest for the near future is to identify the contribution of the geometrical arrangement of particles and aggregates to the effective permittivity, including particle shape and aggregate structure.