المدرسة الوطنية للمهندسين بتونس
école nationale d'ingénieurs de Tunis

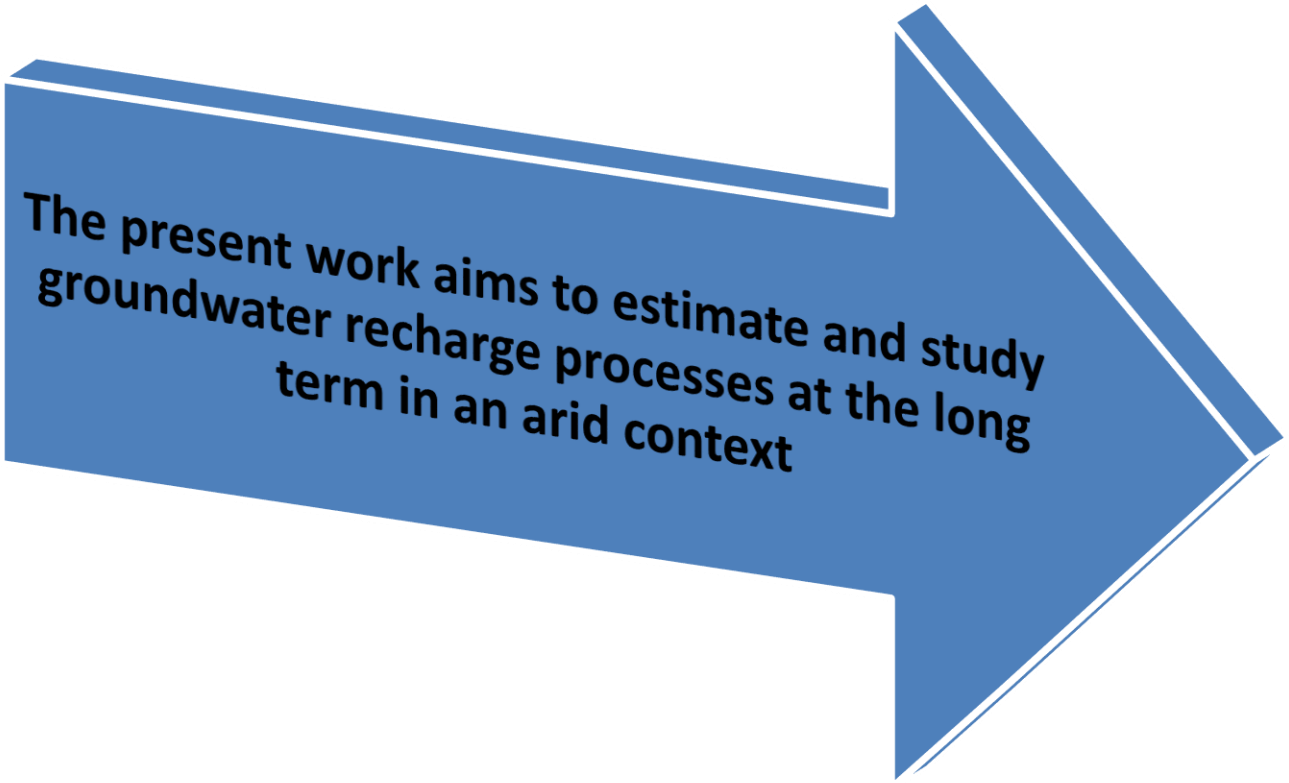
Estimating groundwater recharge in an arid region in Central Tunisia using Chloride Mass Balance and Unsaturated modeling

Imen Hassen, Fairouz Slama, Rachida Bouhlila

N°abstract **2325**

25-29th September 2016
Montpellier, France
CORUM CONFERENCE CENTER
43rd IAH congress

Objective



Materials and Methods

Experimental Data




Numerical Modeling- Hydrus 1D

Upper Boundary conditions
Atmospheric boundary conditions with surface run off (From 1997 to 2015)
Daily potential values of evaporation, transpiration and precipitation were added as variable boundary conditions

Lower Boundary conditions
Constant Water content from the field study measured in Mai 2015

Chloride Mass Balance (CMB)

Several scientists studied, in arid and semi arid regions, the recharge rate using Chloride Mass Balance (CMB) Method (Allison and Hughes, 1978)

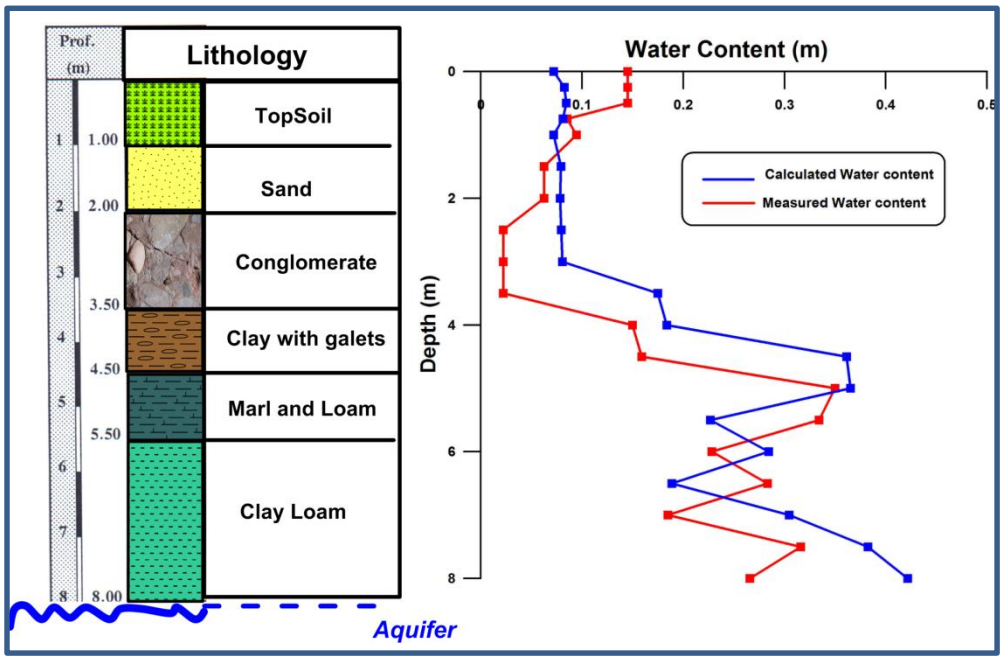
$$R_d = \frac{P(C_p + C_d)}{C_s}$$

Where:

- P is the long-term average annual precipitation of the region
- C_p is the mean concentration of chloride in rainfall
- C_d is the mean chloride from dry deposition (Cp and Cd can be considered together as total deposition (TD)
- C_s is the mean concentration of chloride in the pore waters in the unsaturated zone

Chloride Mass Balance (CMB) and variably saturated numerical modeling are the retained methods to estimate the water recharge.

Results



Hydrus-1D was calibrated using field and climate data at a daily scale and for along time period to reach an early steady state regime

Recharge Results with different methods

	Hydrus 1D Modeling	CMB	Chloride Profil
Infiltration (mm)	11.28	3.81	7.13
Recharge Rate (%)	3.7	1.26	2.34

Conclusion

- This research investigates direct recharge using flow modeling in the unsaturated zone and chloride mass balance method.
- Calculations are to be continued for other sites in Kasserine Aquifer System in order to attribute recharge rates for each recharge area.

Thanks for your attention