

\*

|| : || :

/ /  
Ca-Na-HCO<sub>3</sub>-Cl

/ /

/ /

/ /

( )

)

(

( )

( )

(2001) Canales.

( )

)

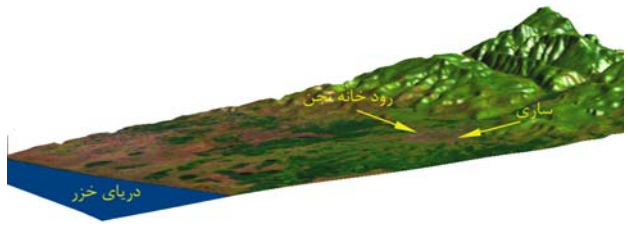
(EC)

(CI)

(2005) Hoxhaj .

( ۵ )

<sup>1</sup> SUTRA



(2006) Gibbison and Randall

:( )

( : )

( )

( )

)

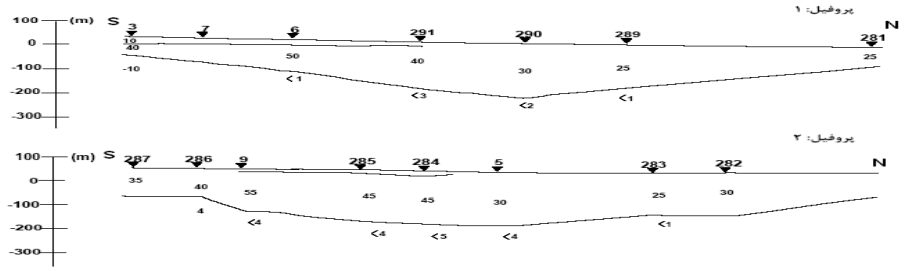
:(

( )

( )

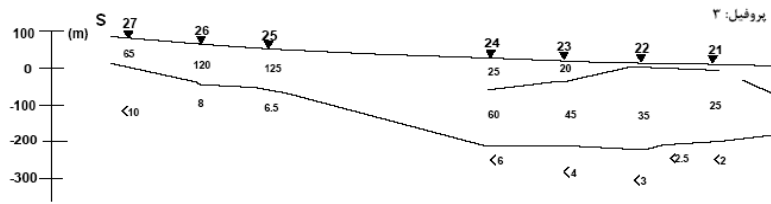
:( )

( ۵ )

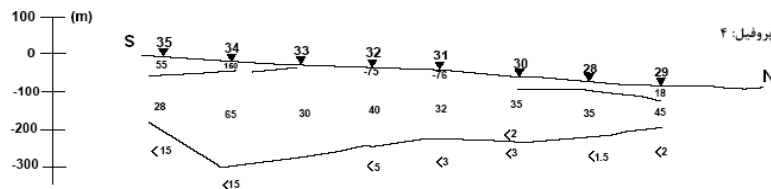


( : )

:( )

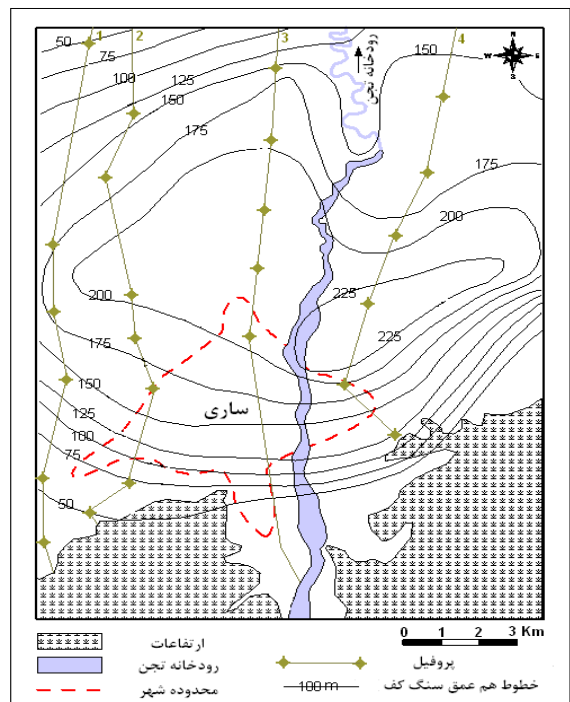


( : )



( : )

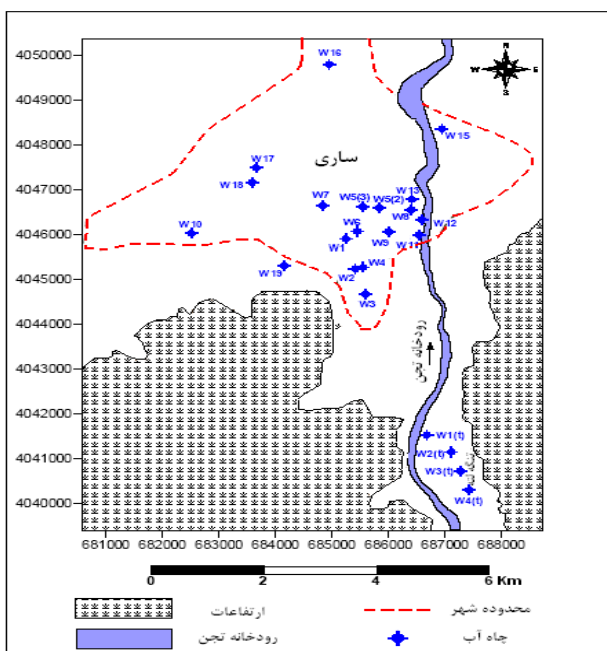
( ۶ )



( : )

( )

( ۶ )



( : )

( )

) ( )

(TDS)

( )

( )

δ

)

(

...

**TDS**

)

:( )

( $\mu\text{mohs} / \text{cm}$ )

**EC**

| Na | Mg | Ca | Cl | SO4 | HCO3 | EC | TDS |                                       |
|----|----|----|----|-----|------|----|-----|---------------------------------------|
|    |    |    |    |     |      |    |     | ( )<br>( )<br><br>(t)<br>(t)<br><br>/ |

:t

(EC)

(TDS)

( )

( )

( )

)

(

( )

$\bar{y}$   $\bar{x}$   $y$   $x$

$s_2$   $s_1$   $n$

/ / / /

$$r = \frac{\sum (x - \bar{x})(y - \bar{y})}{(n-1)s_1s_2} \quad ( )$$

**TDS** ) : ( )

( $\mu\text{mohs/cm}$  **EC**

| Na | Mg | Ca | Cl | SO4 | HCO3 | EC | TDS |            |
|----|----|----|----|-----|------|----|-----|------------|
|    |    |    |    |     |      |    |     | ( )<br>( ) |
|    |    |    |    |     |      |    |     | (t)<br>(t) |

)

( 6

Minitab r-mode cluster analysis

( )

(Guler,2002)

/

/

/

/

( ) ( )

|                  | EC | HCO <sub>3</sub> | SO <sub>4</sub> | Cl | Ca | Mg |
|------------------|----|------------------|-----------------|----|----|----|
| HCO <sub>3</sub> | /  |                  |                 |    |    |    |
| SO <sub>4</sub>  | /  | /                |                 |    |    |    |
| Cl               | /  | /                | /               |    |    |    |
| Ca               | /  | /                | /               | /  |    |    |
| Mg               | /  | /                | /               | /  | /  |    |
| Na               | /  | /                | /               | /  | /  | /  |

( ) ( )

|                  | EC | HCO <sub>3</sub> | SO <sub>4</sub> | Cl | Ca | Mg |
|------------------|----|------------------|-----------------|----|----|----|
| HCO <sub>3</sub> | /  |                  |                 |    |    |    |
| SO <sub>4</sub>  | /  | /                |                 |    |    |    |
| Cl               | /  | /                | /               |    |    |    |
| Ca               | /  | /                | /               | /  |    |    |
| Mg               | /  | /                | /               | /  | /  |    |
| Na               | /  | /                | /               | /  | /  | /  |

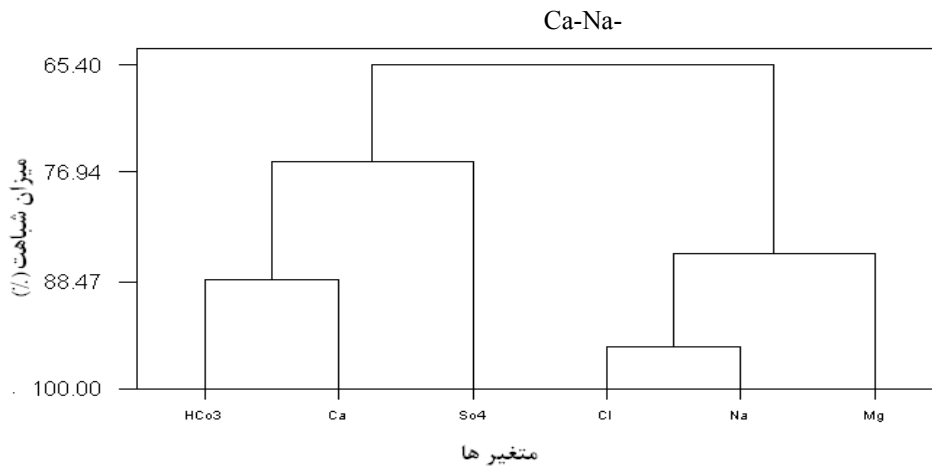
HCO<sub>3</sub>-Cl

)

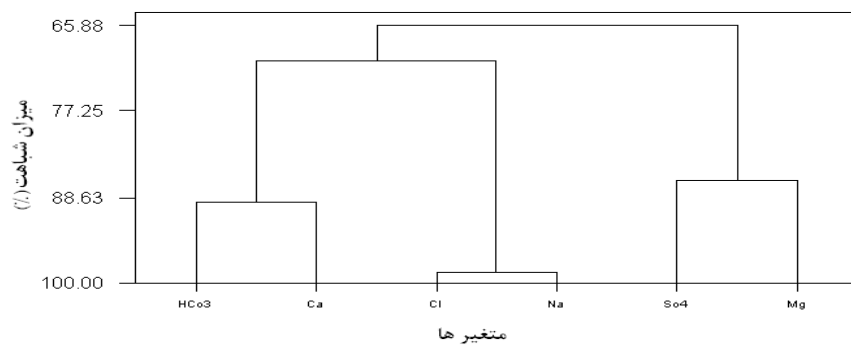
(

% %

( 6 )

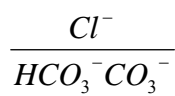


( ) ( )



( )

:( )



( )

.( )

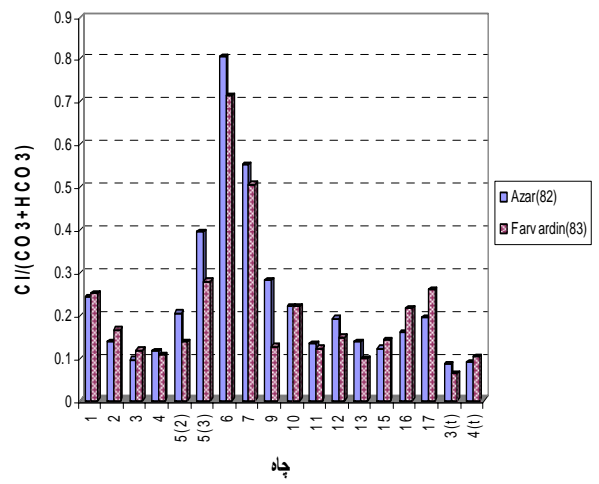
.( 5 )

.( )

:( )

| ( ) | ( ) |     |
|-----|-----|-----|
| /   | /   |     |
| /   | /   |     |
| /   | /   |     |
| /   | /   |     |
| /   | /   | ( ) |
| /   | /   | ( ) |
| /   | /   |     |
| /   | /   |     |
| /   | /   |     |
| /   | /   |     |
| /   | /   |     |
| /   | /   | (t) |
| /   | /   | (t) |
| /   | /   |     |
| /   | /   |     |
| /   | /   |     |
| /   | /   |     |

/ / / /  
 ( ) / ( )



( )

:( )

TDI-

:( ) TDI-Cl Na

)

.( Mazon,1991)

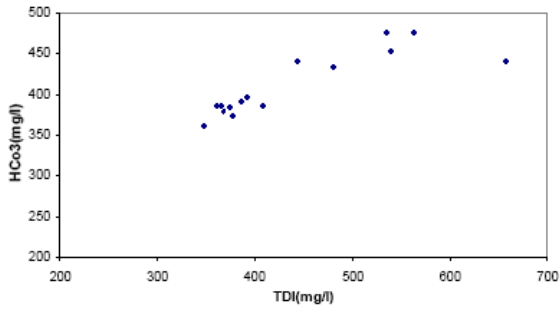
(

.(Mazon,1991)

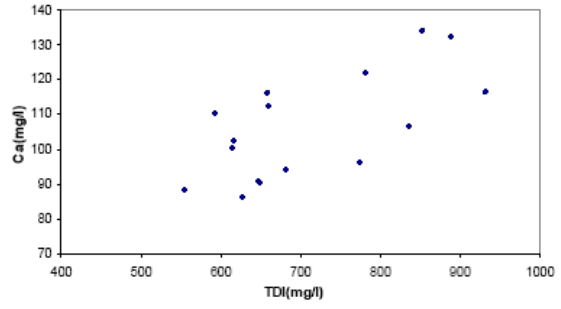
( )

:( )

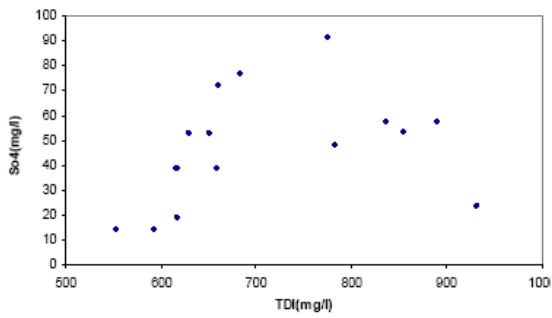




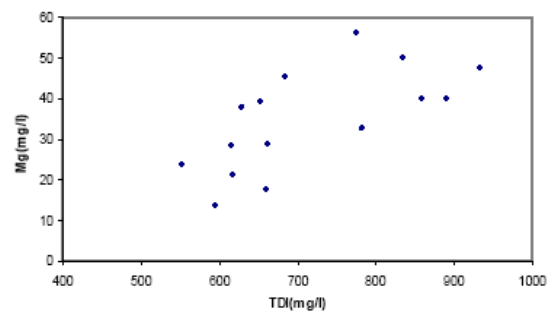
**TDI HCO<sub>3</sub>** : ( )



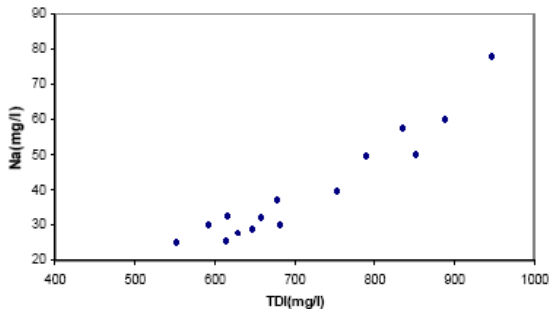
**TDI Ca** : ( )



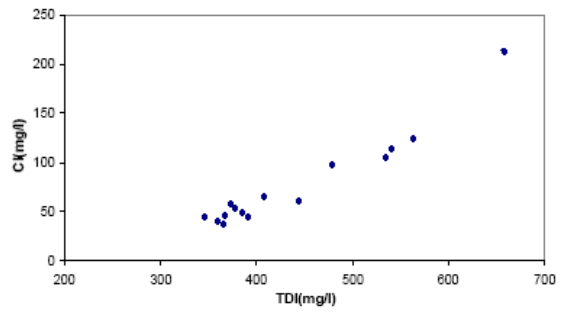
**TDI SO<sub>4</sub>** : ( ) δ



**TDI Mg** : ( ) δ



**TDI Cl** : ( ) δ



**TDI Na** : ( ) δ

Ca-Na-HCO<sub>3</sub>-Cl

( )

( )

( )

/ / / /

) ( )

/ ( )

( )

---

1- Saturated-Unsaturated Transport

2-Revelle

3-Composite plots

4-Average linkage

5-Scatter Plots

Canales, A. R., Gonzalez and Islas, L. 2001. Salt water Intrusion risk assessment in the Boca Abierta Vally, Sonora, Mexico. First international conference on salt water intrusion and coastal aquifer monitoring, modeling and management Essaouria, Morocco, April 13-25

Gibbison, A. and Randall, J. 2006. The salt water intrusion problem and water conservation practices in southeast Georgia, USA. Water and Environment Journal. Vol.2 (3).

Güler, C. et al .2002. Evaluation of graphical and multivariate statistical methods for classification of water chemistry data, Hydrogeology Journal, 10: 455–474.

Hoxhaj, F. 2005. Numerical simulation of sea water intrusion on the northern coast of Albania, Geophysical Research Abstracts, Vol.7.

Khalil.H. M. 2006. Geoelectric resistively sounding for delineating salt water intrusion in the Abu Zenima area, west Sinai, Egypt. Journal of Geophysics Engineering. 3: 243-251

Mazor, E. 1991. Applied Chemical and Isotopic Groundwater Hydrology, John Wiley & Sons, New York, 274P.

Minitab, Inc. 1996. Minitab for windows, www. Minitab.com