



Identification and variations of the components of a regional groundwater flow system with intensive exploitation based on historical hydrogeochemical records in a coastal flow system.

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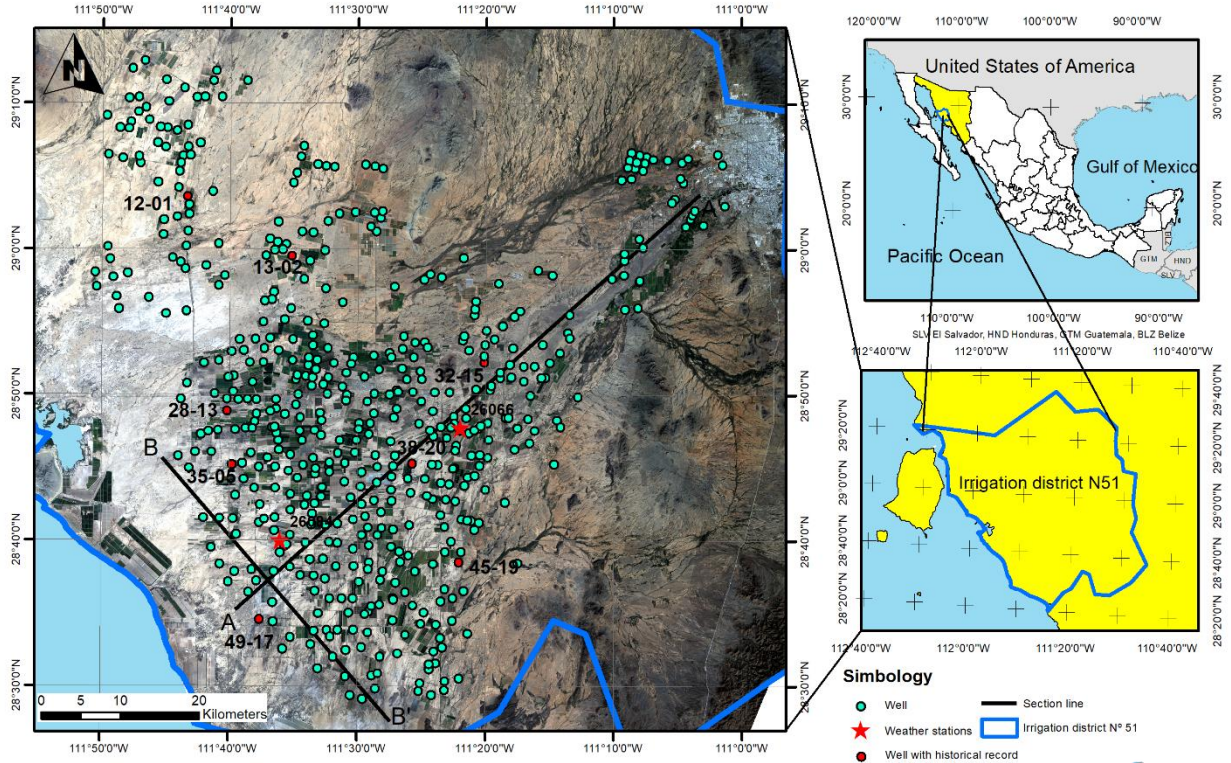


I. Study area

Sonora, México
 Irrigation district N°51

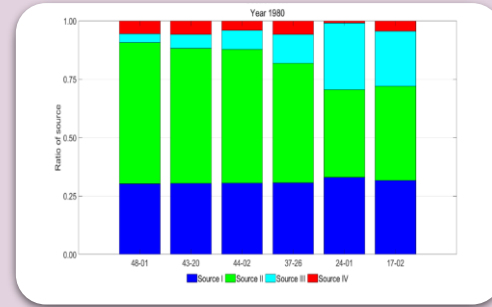
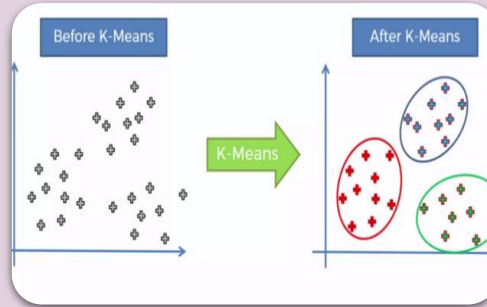
Since 1954, there has been intensive extraction of groundwater resources in the area, resulting in significant declines in groundwater levels.

- More than 500 wells on the Coast of Hermosillo.





2. Methodology



Collecting data
Sources(papers, Thesis, unpublished reports)

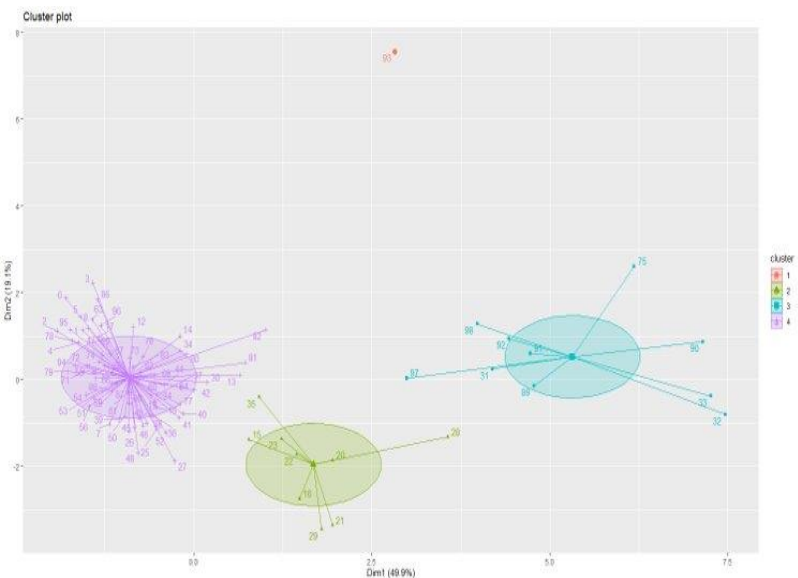
Analysis data
1.Percent error of the ion balance of major ions
2.Identification of end members
3.Identification of the mixture percentage for different years

Results
Spatial distribution of the components for the year 1980 and 1993.

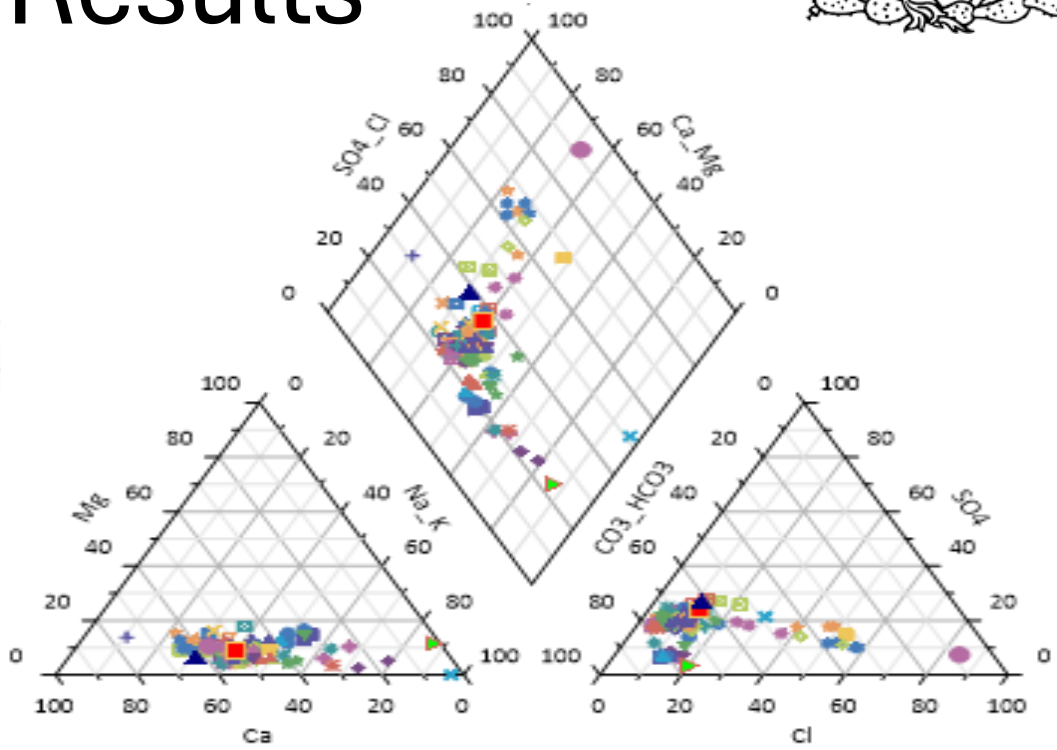




3. Preliminary Results

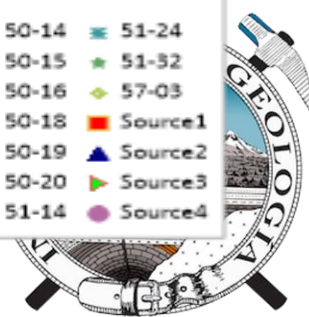


Cluster analysis



Piper Diagrams 1980
Four sources
65 wells

Legend															
◆ 02-01	▲ 14-08	◇ 24-05	■ 35-16	● 44-05	▲ 48-01	● 50-14	■ 51-24	◆ 02-08	● 15-02	□ 28-02	▼ 36-10	▲ 44-10	◇ 49-02	▲ 50-15	★ 51-32
■ 03-08	× 17-02	○ 29-23	□ 37-21	× 44-20	▲ 49-06	● 50-16	◆ 57-03	■ 03-11	★ 19-03	▲ 29-24	◇ 37-26	▼ 44-23	● 50-02	▼ 50-18	■ Source1
▲ 04-06	★ 21-06	■ 29-25	■ 43-11	★ 45-01	◆ 50-06	▲ 50-19	■ Source2	◆ 12-04	◆ 22-04	× 31-12	■ 43-20	■ 45-10	◆ 50-09	● 50-20	▲ Source3
▼ 12-15	● 24-01	★ 35-11	■ 44-02	◆ 45-23	■ 50-10	× 51-14	● Source4								





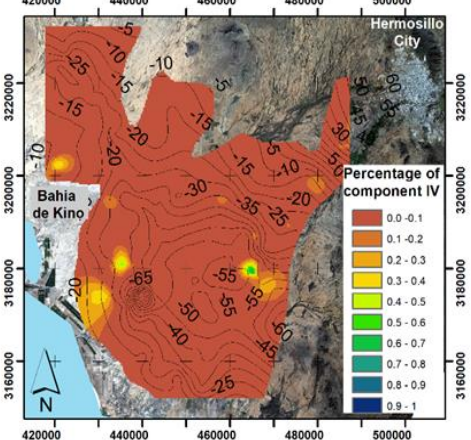
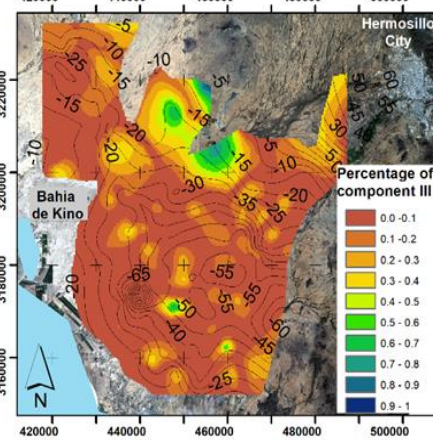
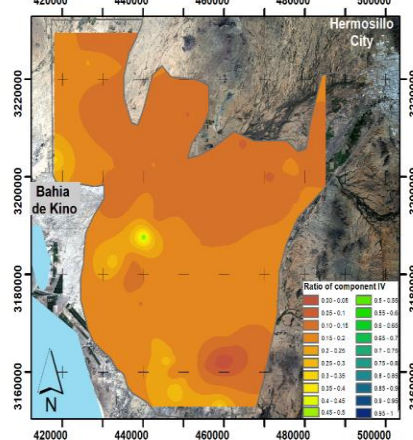
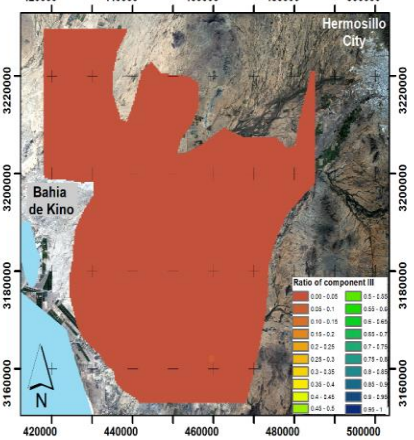
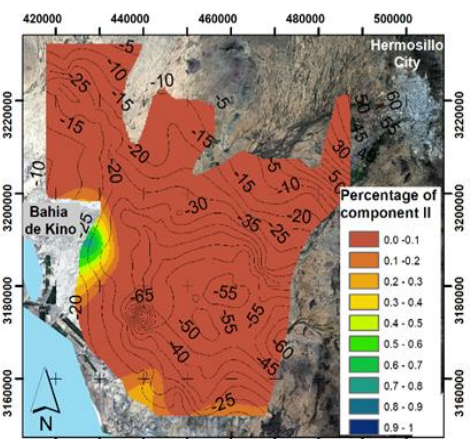
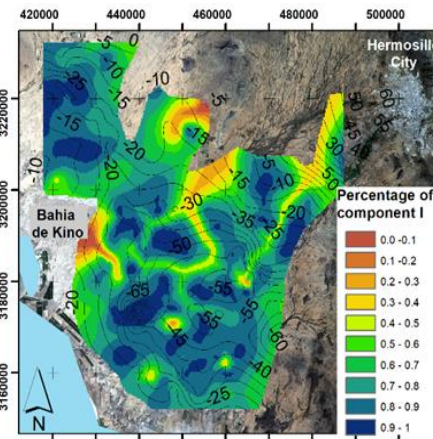
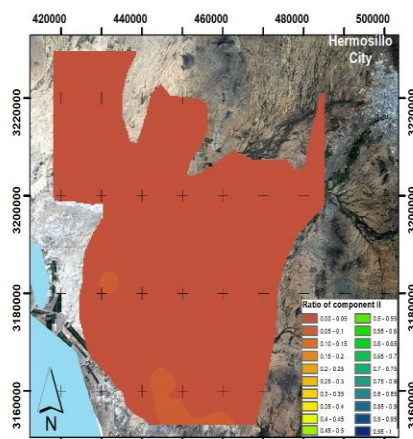
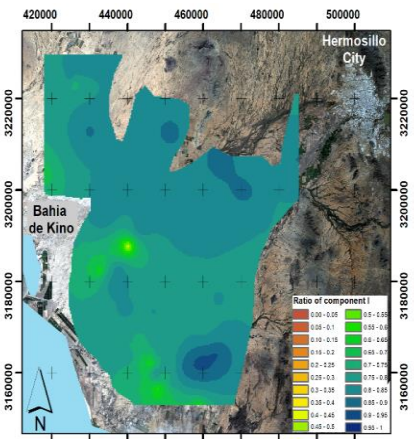
3. Preliminary Results

CI. Low ions, SDT, etc.

CII. High Cl

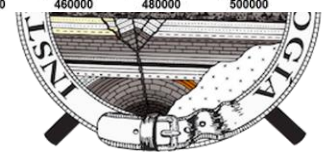
CIII. Low Ca, Mg, HCO₃, SO₄ <200mg/l)

CIV. High sulfates.



Year 1980

Year 1993





4. Conclusions

- Identifying these components will deepen our understanding of the groundwater flow system in the coastal region of Hermosillo and optimize the management of water resources.
- This understanding will facilitate the design and implementation of new, more effective mechanisms that will be designed for the current conditions of the study area.
- The identification and evaluation of the spatial distribution of the components is essential to understand how these components vary in response to groundwater exploitation in the study area.





5. Acknowledgment

In memoriam PhD. Oscar A. Escolero Fuentes



I want to express my deepest gratitude to the wonderful Dr. Escolero for his generosity in sharing his valuable knowledge and for the time he dedicated to this project.

Thank you, Dr. Escolero, for your dedication and inspiring leadership.

