Hydrogeological, hydrochemical and isotopic study of the Chibunga river basin (Ecuador)

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OBJETIVES

- Improve the information about water quality.
- Create a geochemical database to support water management project.
- Improve the information about groundwater recharge processes.

MATERIALS AND METHODS

Baseline survey.

- Literature review
- Collaboration and support for ungraduated thesis
- Data collection from IAEA database

Framing the study area

- Descriptive maps of the study area and the sampling carried out were made.

Field sampling

- Springs, rivers, lakes, precipitation have been collected in the catchment from 2500 m to 4800 m

Analysis of the considered samples

- Hydrogeochemical Analysis.
- Isotope Analysis

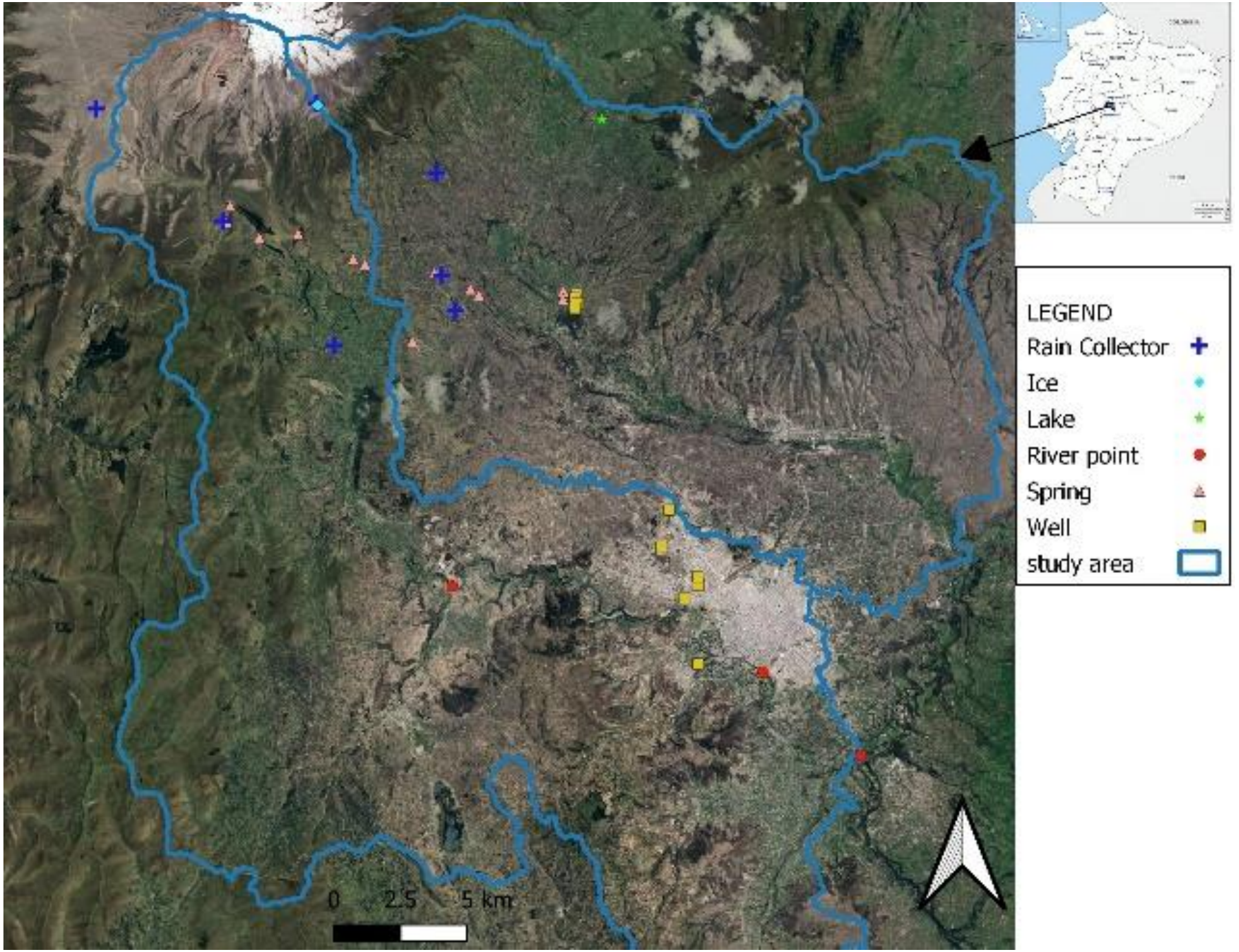
Hydrogeochemical Analysis

- Hydrochemical facies
- Statistical analyses.

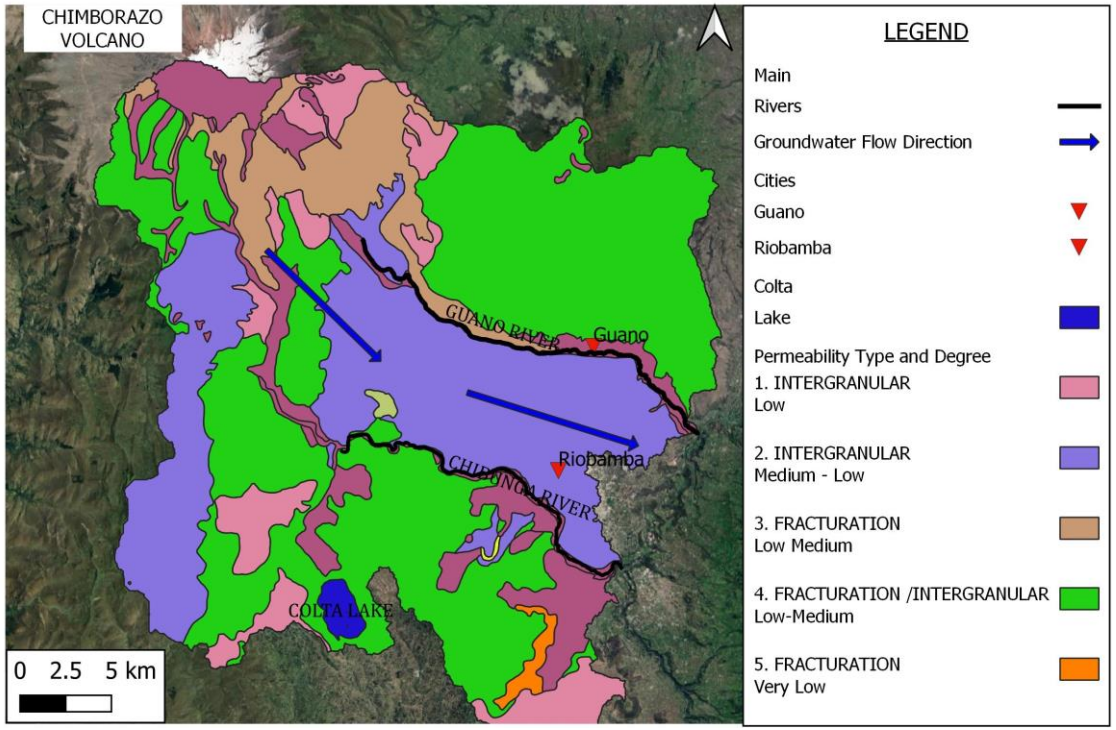
Isotope Analysis

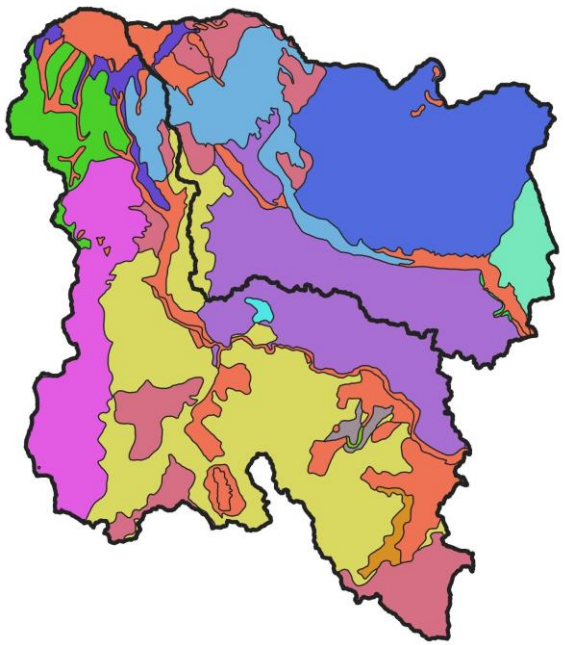
- Local Meteoric Line
- Isotopic hydro-archieve

STUDY AREA


LEGEND
Rain Collector
Ice
Lake
River point
Spring
Well
study area
0
2.5
5 km

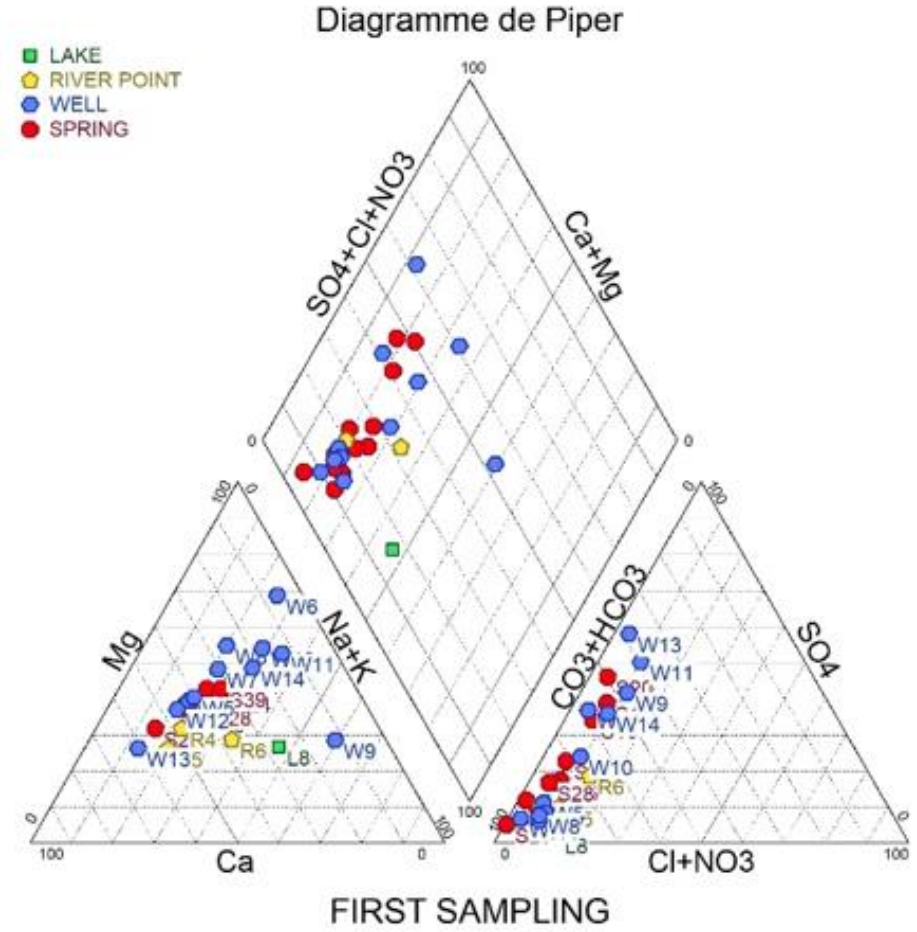
HYDROGEOLOGICAL MAP

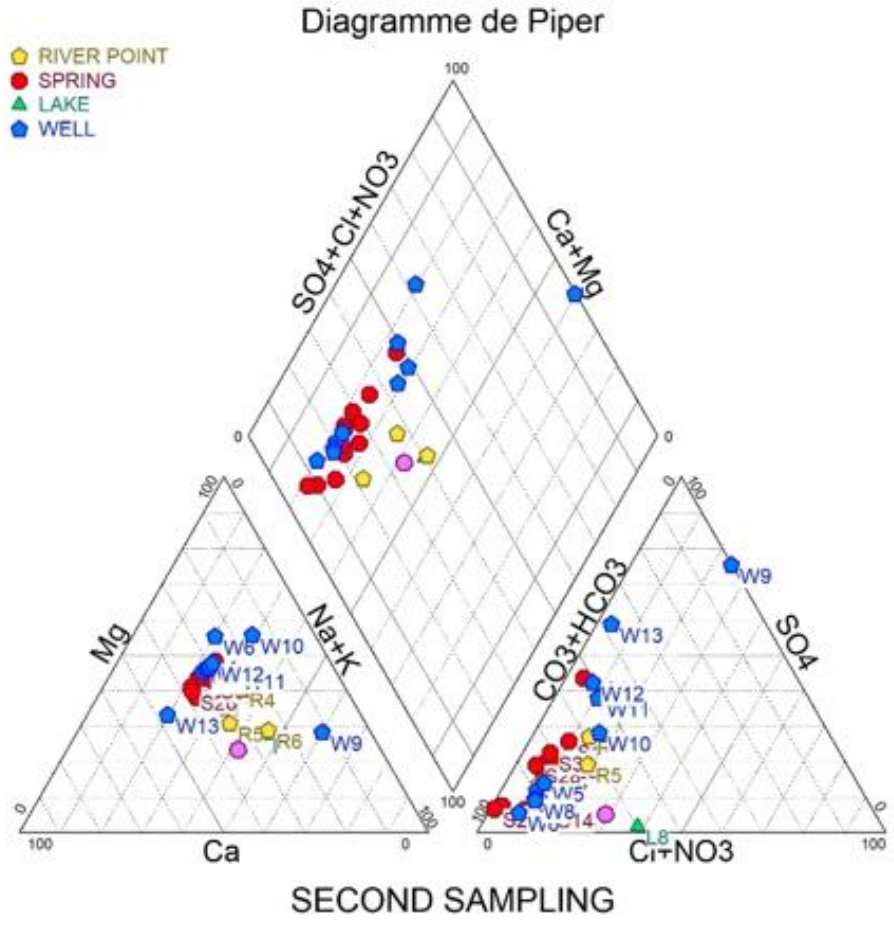




UNITS
- CANGAGUA
- F.RIOBAMBA
- F.YARUQUIES
- F.YUNGILLA
- LAVAS DEL CARIHUAIRAZO Y ANTIGUAS DEL CHIMBORAZO
- LAVAS JOVENES DEL CHIMBORAZO
- ROCAS BASALTICAS DEL TUNGURAHUA PUNALICA Y CALPI
- SEDIEMENTOS RIO CHAMBO
- U.MACUCHI
- U.PAUTE
- VOLCANICOS ALTAR
- VOLCANICOS DEL CHIMBORAZO
- VOLCANICOS DEL IGUALATA,MULMUL HUISLA,CHIQUICHAMSAGOATOA
- VOLCANICOS SICALPA

HIDROGEOCHEMICAL ANALYSIS

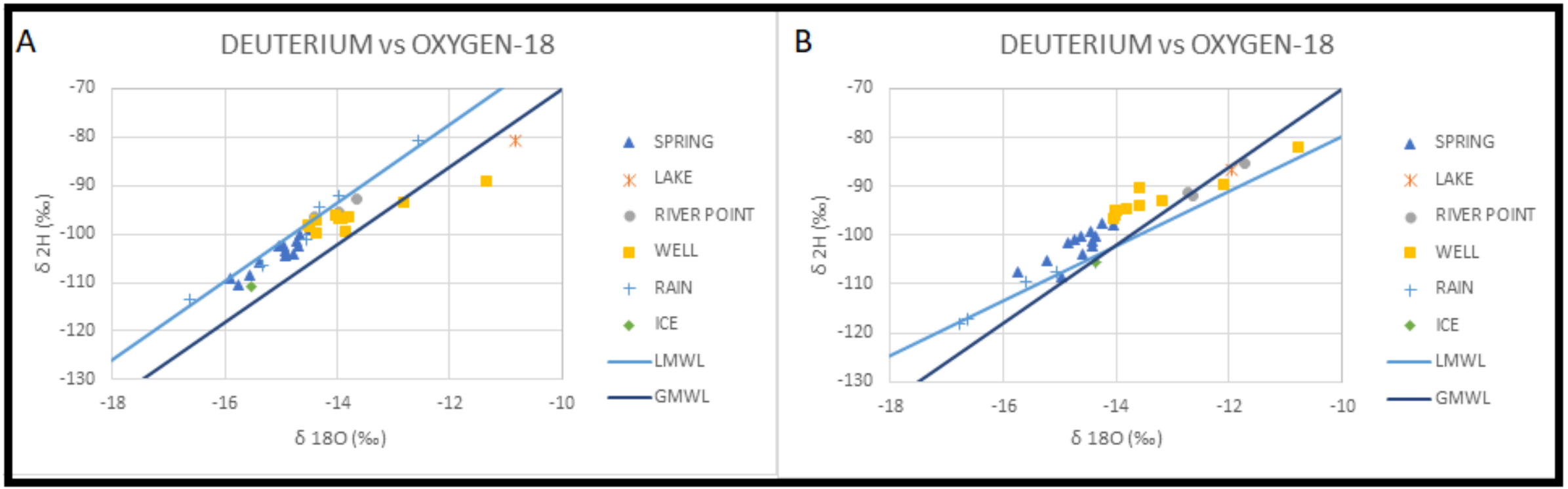




First Sampling: DECEMBER 2020- JANUARY 2021; Second sampling: AUGUST 2021

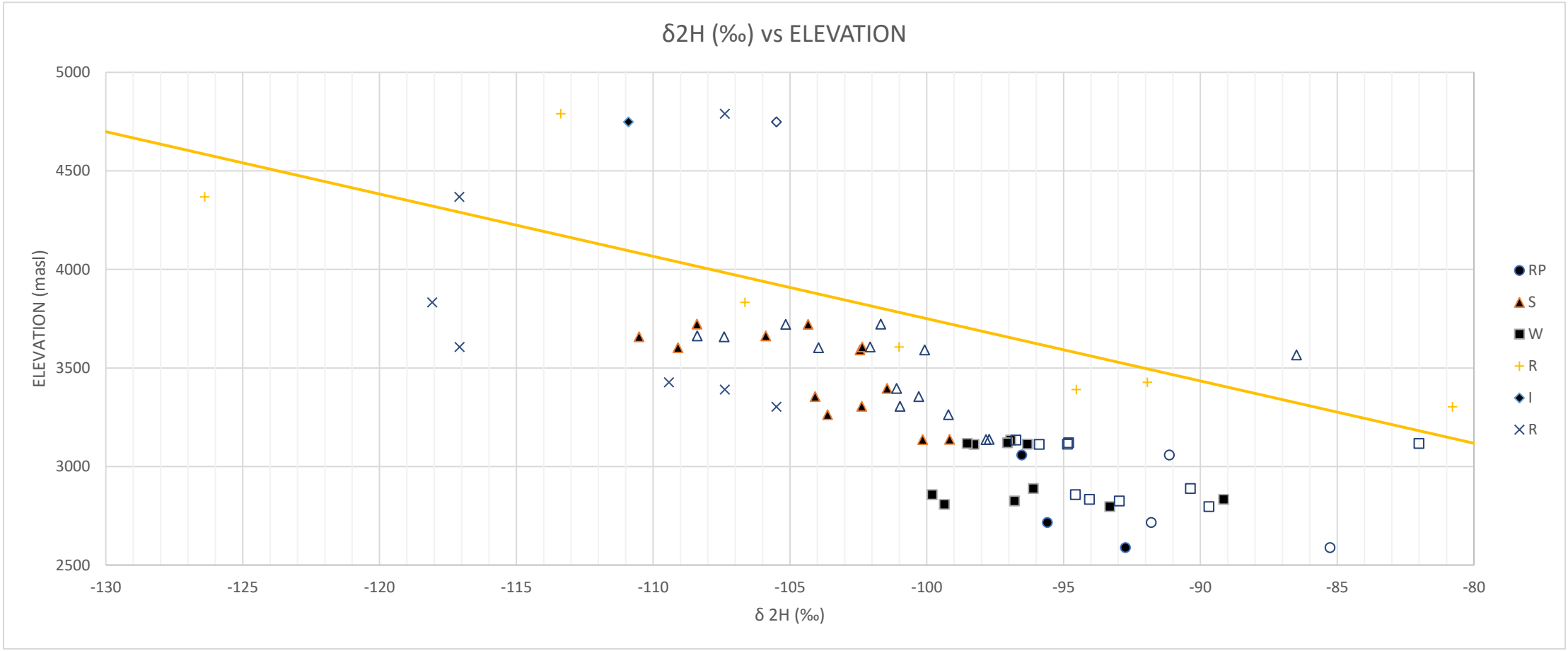
RELATIONSHIP (DEUTERIUM with OXYGEN)

- GMWL es (δ2H = 8*δ18O + 10‰)
- LMWL es (δ2H = 7.93 δ18O + 15.42 ‰) FOR ECUADOR.



A= first sampling DECEMBER 2020- JANUARY 2021 B= Second sampling AUGUST 2021.

DEUTERIUM-ELEVATION RELATIONSHIP ***(RP=River Point; S=Spring; W=Well; R=Rain; I=Ice)***



CONCLUSION

- We improved the available data of the micro-basin level.
- The geochemical analyzes show a good quality of the water for drinking, irrigation, and agricultural use, the exception being the state of the wells located within the city that are found with high concentrations of chlorides from anthropic activities.