

4th SADC GROUNDWATER CONFERENCE

10th -12th of November 2021
VIRTUAL CONFERENCE



RAINFALL RECHARGE OF SHALLOW AQUIFERS FROM ONDJIVA AND SURROUNDINGS (CUNENE, ANGOLA)

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Institution: Natural Science Faculty from Agostinho Neto University



International Association
of Hydrogeologists
the World-wide Groundwater Organisation



GRIPP
GROUNDWATER SOLUTIONS
INITIATIVE FOR
POLICY AND PRACTICE



British
Geological
Survey

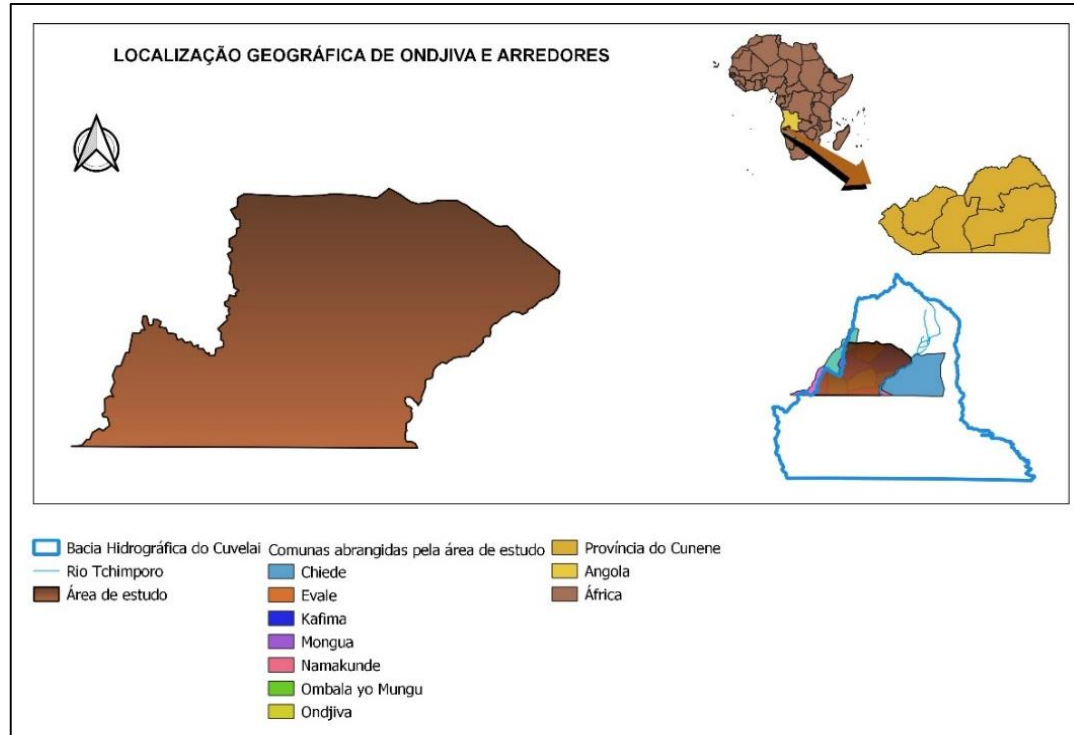


AGENDA

1. Framework of the study area;
2. Set of methodologies used in the study;
3. Preliminary Results;
4. Technical and Scientific contribution.



INTRODUCTION



Population:
300,000 inhabitants

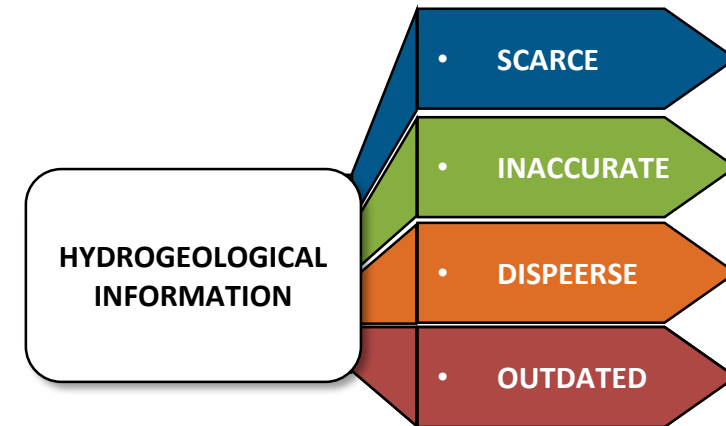


Major problems:

- Droughts
- Floods

Need for deeper characterization of climatic, environmental and technical variables

MAIN PROBLEM



Major obstacle in the elaboration of a strategic plan to artificially recharge shallow aquifers, using the waters available during periods of flooding and inundation

MAIN OBJECTIVE



To characterize the rainfall recharge process in order to provide indispensable data for decision making regarding the methodologies that can be implemented for artificial recharge

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WHY THE SHALLOW AQUIFERS?

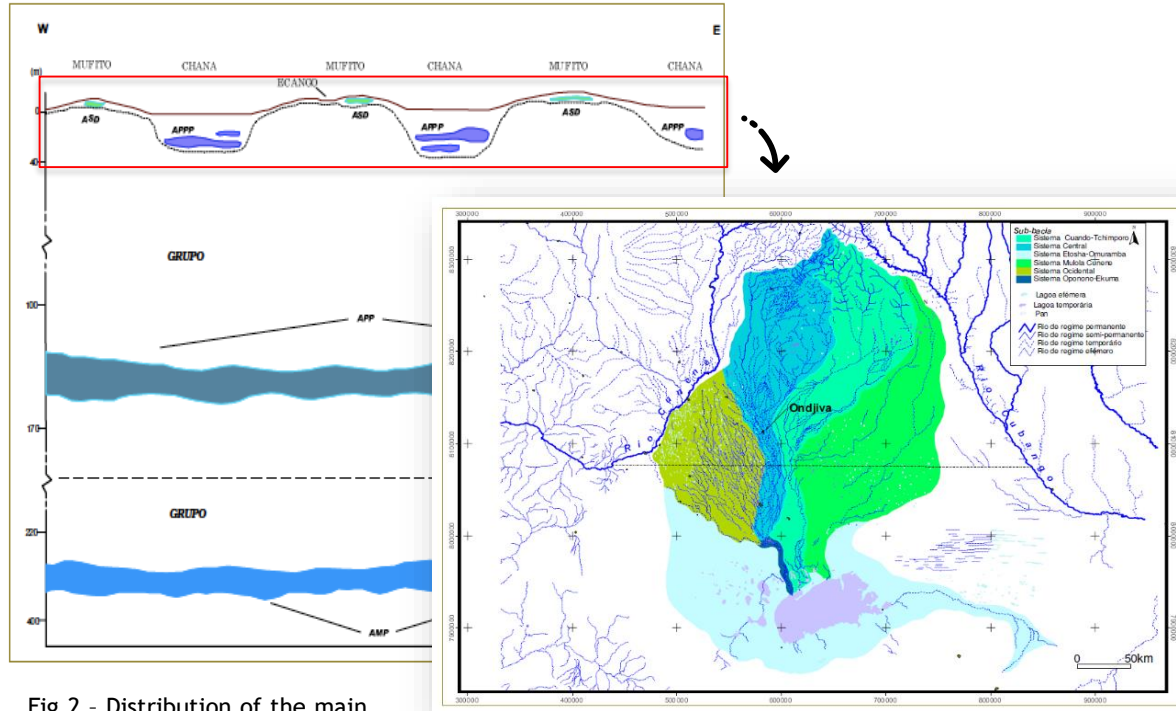


Fig.2 - Distribution of the main aquifers of the Kalahari. Source: SINIFIC, 2005, modified by Carlos, 2021.

Fig.3 - Geographic location of the Cuvelai-Mui-Peireira D'Eça-Namacunde Hydrogeological Province by Mota Marques (1966). Source: SINIFIC, 2005.

MOTA MARQUES (1966)

Only precipitation above 35mm had a real impact on the effective recharge of the shallow aquifers in this region

ANGOLA'S NATIONAL WATER PLAN (2017)

Presented an estimate of 18.5mm for groundwater recharge in the Ondjiva region, without making mention of the methodology used for this purpose

The configuration of the methodology used to respond to the main problem derives from a doctoral thesis on Hydrogeological and Environmental Characterization of Luanda and Surroundings, authored by Gabriel Luís Miguel, which guides the steps to be followed for this purpose.

WHAT IS THE NEW?



- Daily climatic information



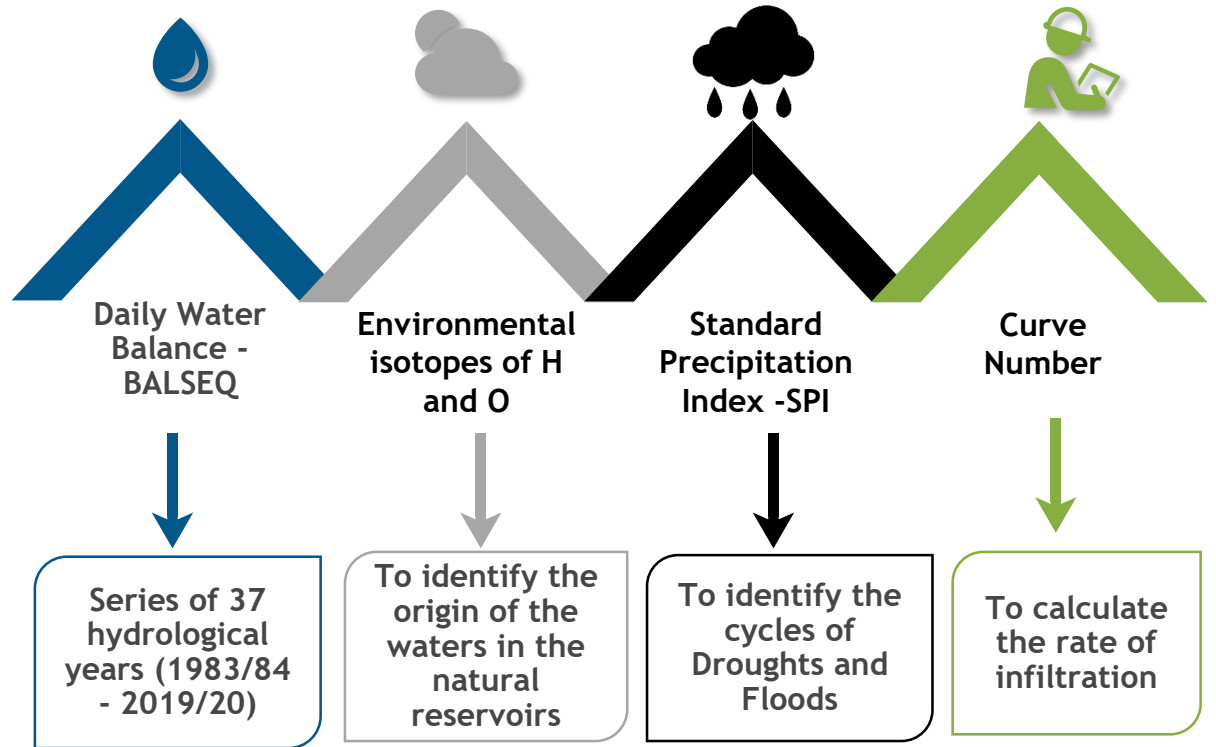
- The Tropical Rainfall Measuring Mission - TRMM (NASA)
- Precipitation Estimation from Remote Sensing Information using Artificial Neural Networks - PERSIANN (Hydrometeorological centre of the University of California)



- Daily water balance

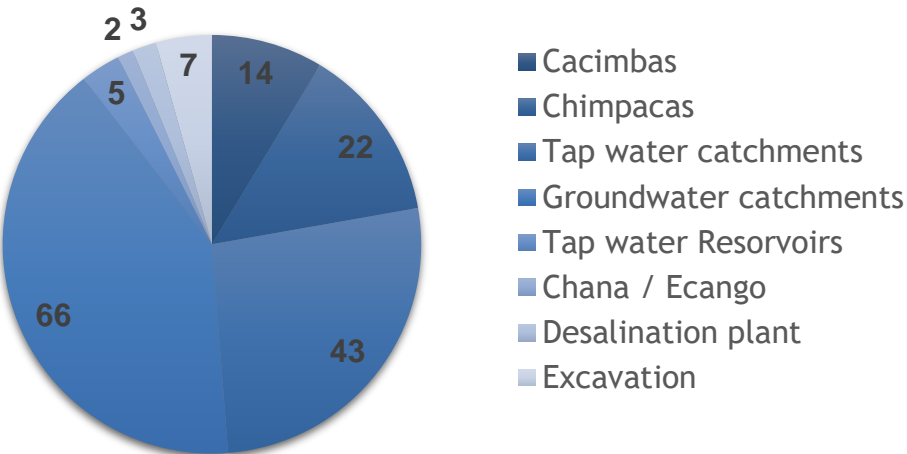


Monthly water balances in semi-arid and arid regions promotes the underestimation of climatic phenomena, due to their intra-annual variations in precipitation and sharp typical deviations



INVENTORY POINTS AND SAMPLE ANALYSIS

Total of water points inventoried = 162



Graph. 1 - Distribution of the water points inventoried. Source: Carlos, 2021



Fig. 4 - Geographic location of the fieldwork. Source: Carlos, 2021

Total of water samples = 25



Fig. 5 - Water samples from Ondjiva and Surroundings. Source: Carlos, 2021

- Submitted to majority ion and stable isotopes analysis

Total of soil samples = 15

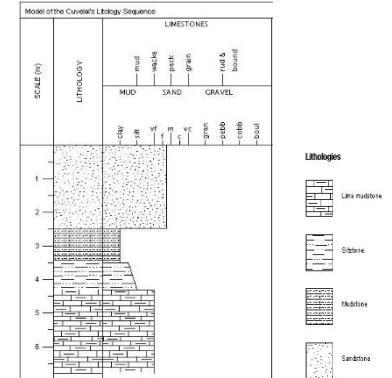
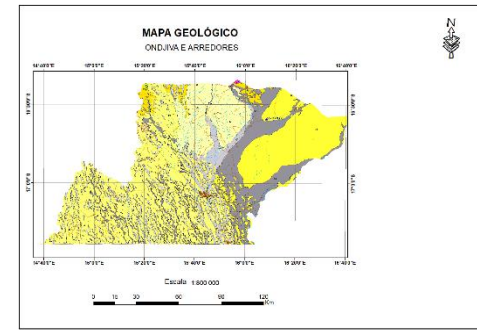
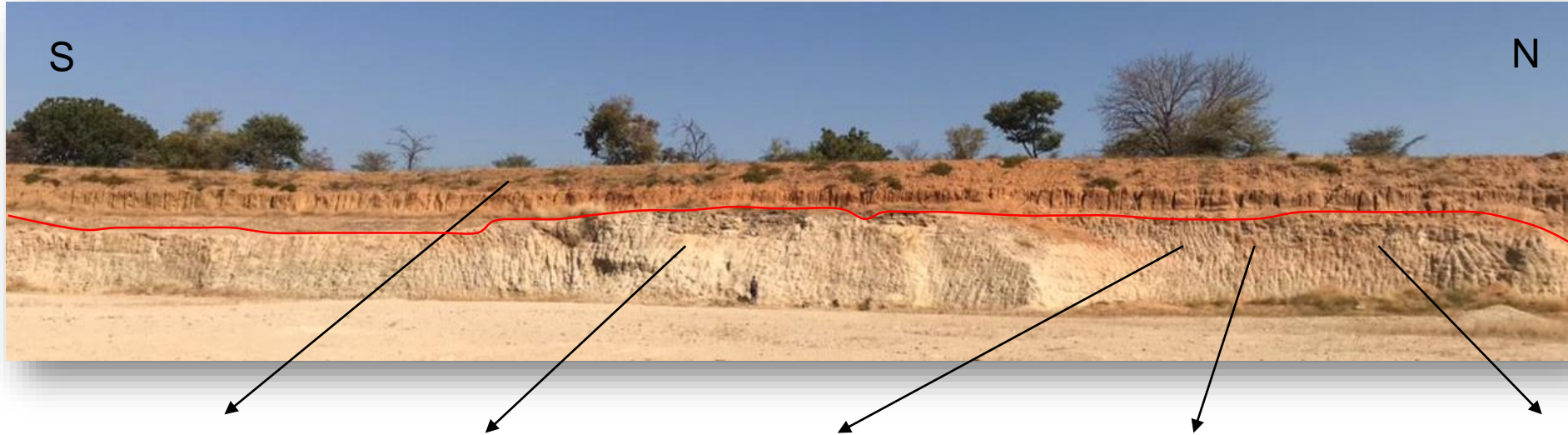


Fig. 6 - Soil samples from Ondjiva and Surroundings. Source: Carlos, 2021

- Submitted to geotechnical tests to determine the permo-porosity

PRELIMINARY RESULTS

PRELIMINARY GEOLOGICAL AND HYDROGEOLOGICAL CHARACTERIZATION



Top: Red silty sandstone



Base: White marls



Channel with carbonate material filling -
Sedimentary structure



Conglomerates identified within the marls
Stratigraphic discontinuity



Diaclasses approx. 3mm thick in SE direction

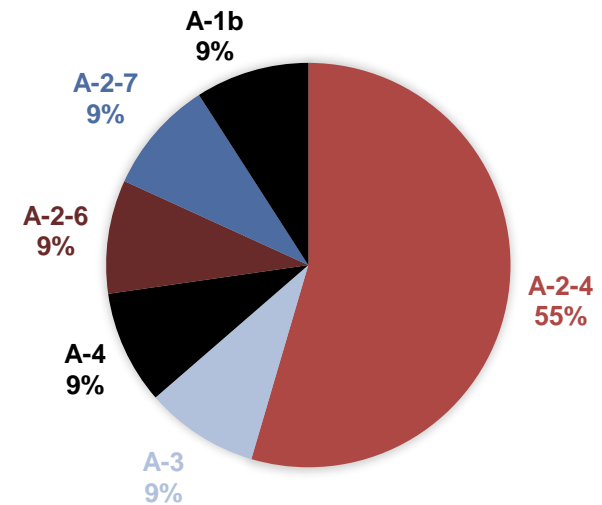
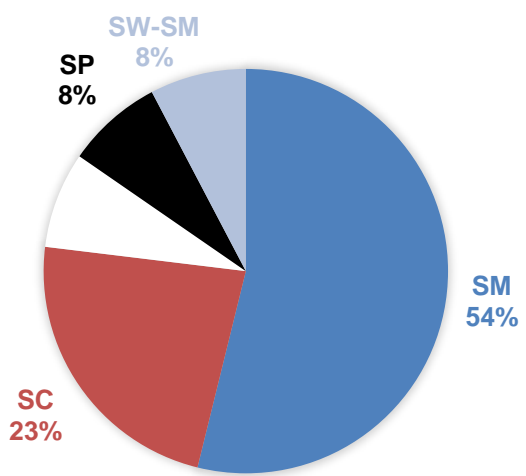
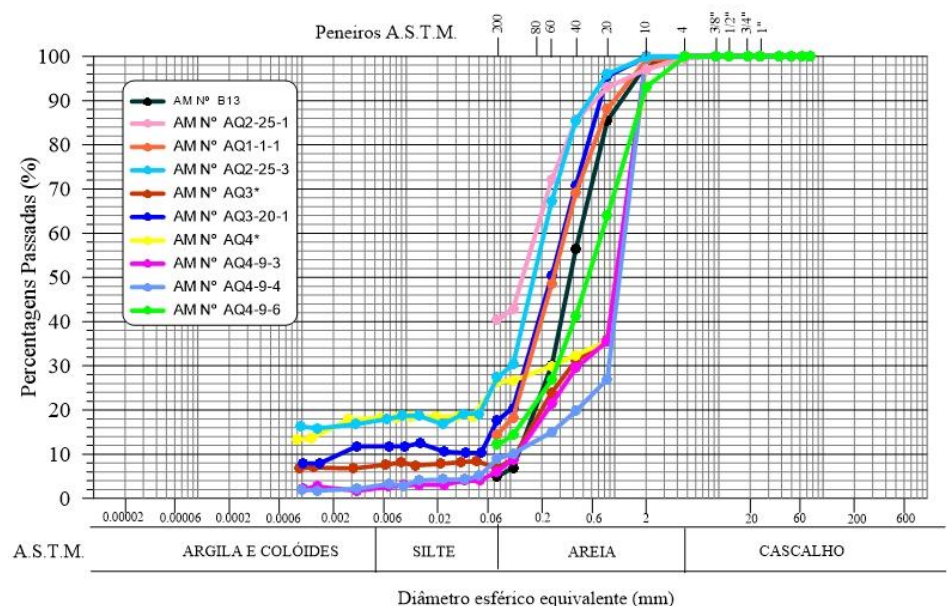


Fig. 8. Particula size analysis by sieving .Source: Carlos, 2021



Fig. 9. constant load permeameter. Source: Carlos, 2021

DETERMINING THE ORIGIN OF WATER SAMPLES THROUGH STABLE ISOTOPE ANALYSIS

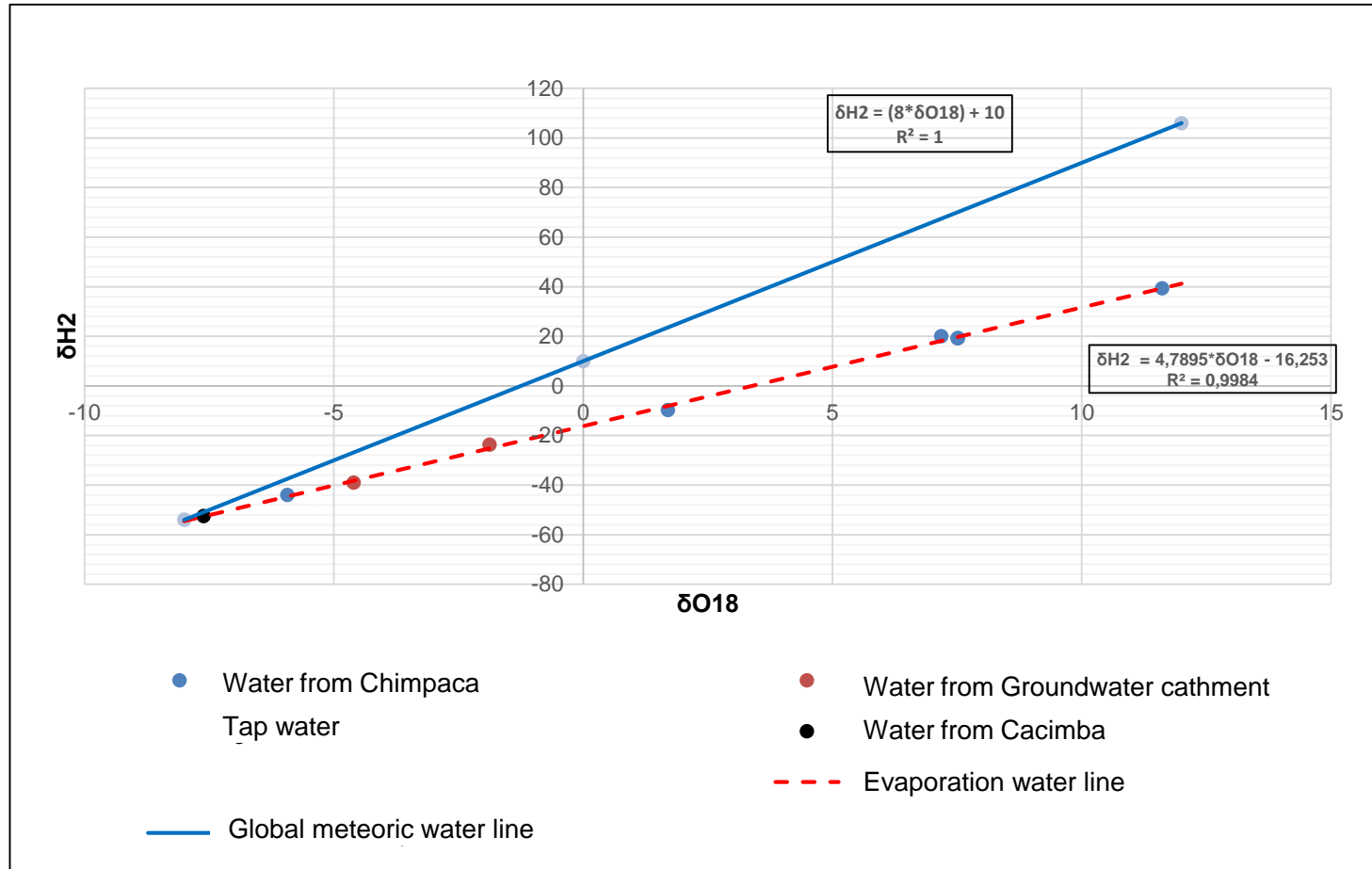
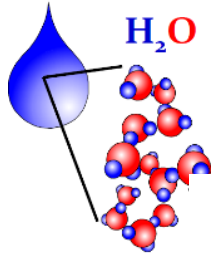


Fig. 10. water samples for isotopic analysis. Source: Carlos, 2021



Fig. 11- Liquid Water Isotopic analyser. Source: Carlos, 2021

TECHNICAL AND SCIENTIFIC CONTRIBUTION



Fig. 12- Presentation of the EFUNDJA project at the International Fair of ideas, innovations and new products - Nuremberg, Germany



Fig. 13- Silver medal won by EFUNDJA project



Fig. 14 - Authors of the EFUNDJA project



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THANK YOU FOR YOUR ATTENTION
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