# Estimation of soil water balance using satellite data from 2010-2021. Doñana National Park study case (Huelva, Spain)

**Alejandro Ruiz[1], Zulimar Hernández[1,2] & Tomás de Figueiredo[2,3]**

[1]Laboratorio UAM-Copernicus, Dpto. Geografía. Universidad Autónoma de Madrid (UAM), Madrid, España
[2] SusTec-Laboratório Associado para a Sustentabilidade e Tecnologia em Regiões de Montanha, Instituto Politécnico de Bragança (IPB),Bragança, Portugal
[3]CIMO-Centro de Investigação de Montanha, Instituto Politécnico de Bragança (IPB),Bragança, Portugal

ESA Symposium on Earth Observation for Soil Protection and Restoration

# INTRODUCTION

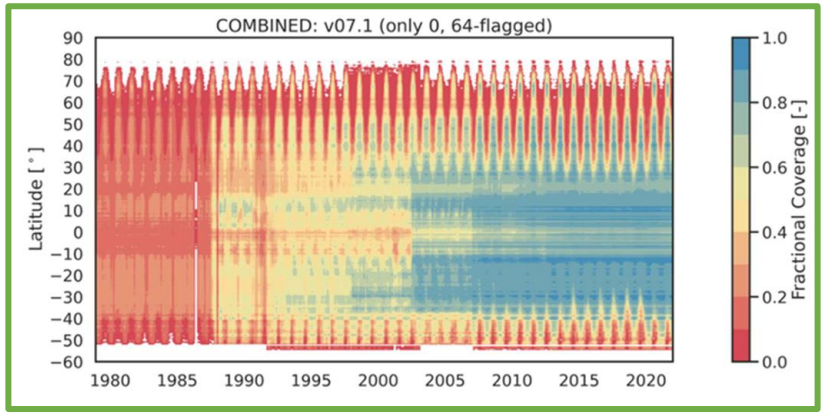




**Figure 1**. Global coverage of valid ESA CCI-sm observations. (ESA,2022)

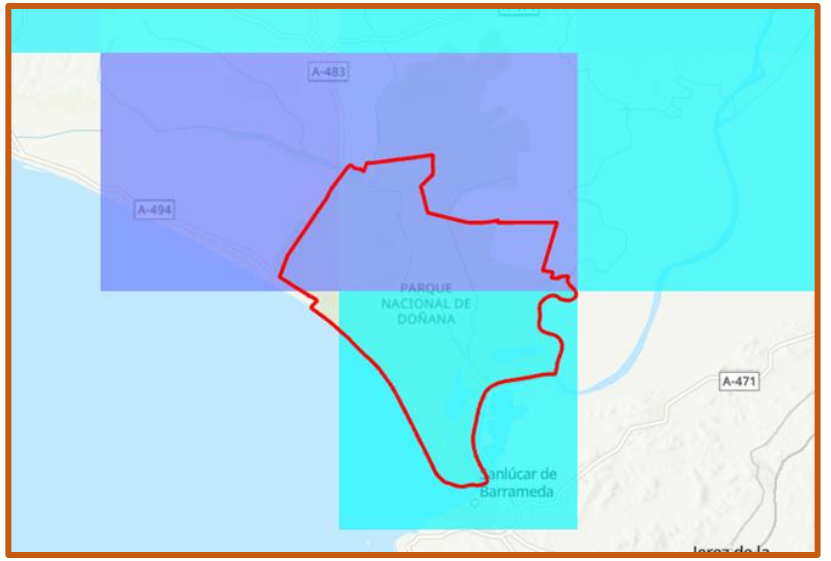



**Figure 2**. ESA CCI-sm spatial resolution in the study area

# OBJECTIVES & DATA

- The objective is to compare 2 different methodologies for calculating the availability of water in the soil in the Doñana National Park (Huelva, Spain), in the period between 2010-2021.

- The ESA CCI-Soil Moisture product (ESA CCI-SM) obtained with radar data from several passives and active satellites SWB is compared with the meteorological data obtained after applying the Thornthwaite method for the same period of time and same study area.

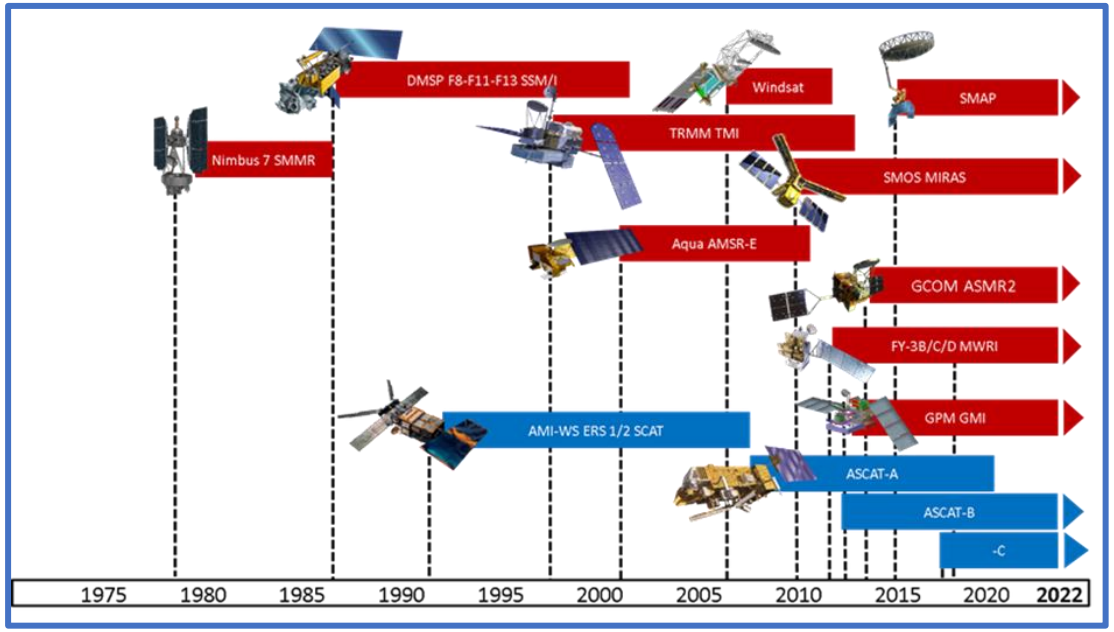



**Figure 3**. ESA CCI-sm satellites involved. (ESA,2022)

# RESULTS

- Importance of temporal resolution
- ESA CCI-SM soil moisture product VS Thornthwaite method
- Variation of soil water concentration in the study area
- Predictive analysis of the tendency for the soil water concentration in the last 10 years

# RESULTS

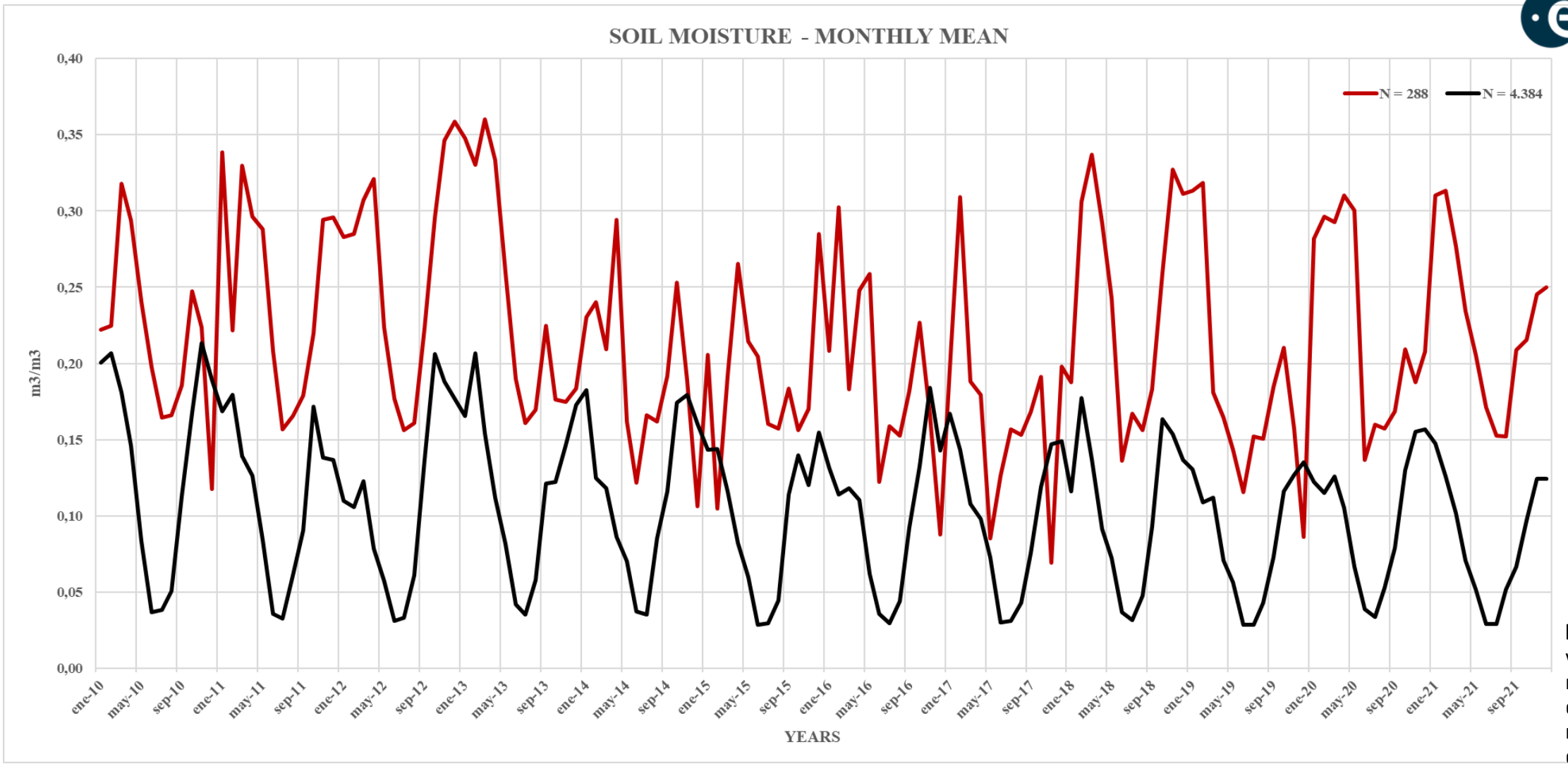
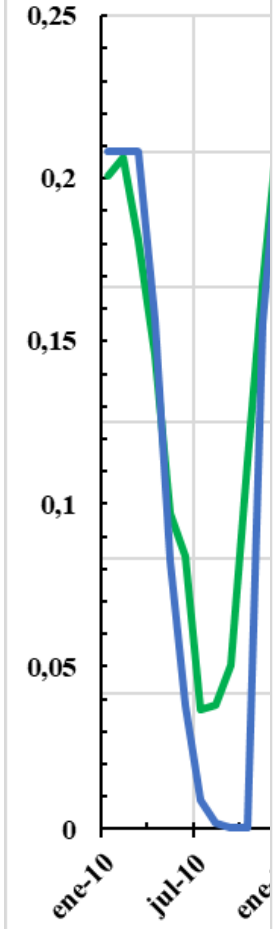
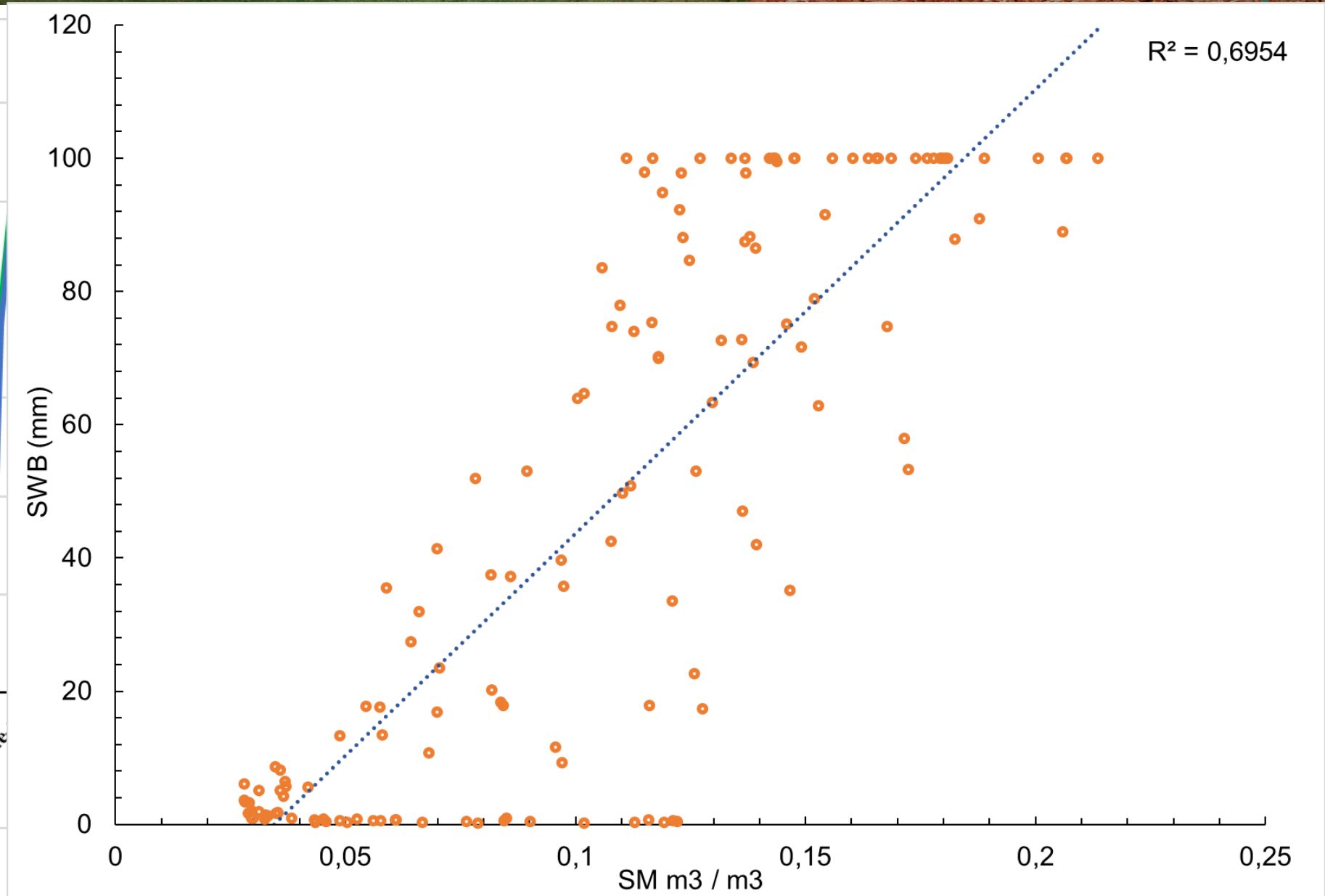
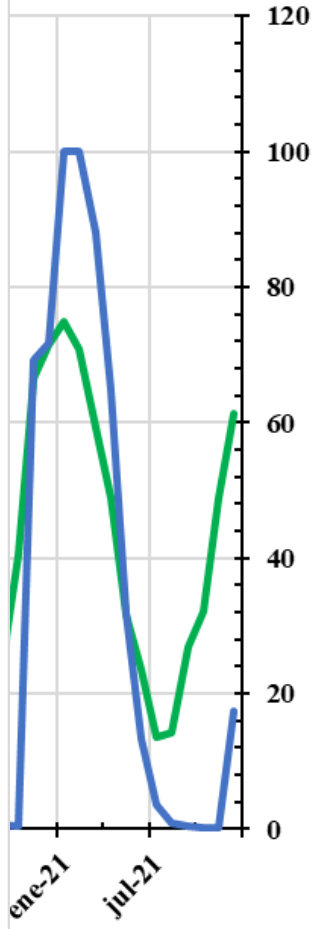



**Figure 4**.Data variation with n = 288 obsevations vs n = 4.384 observations

# RESULTS

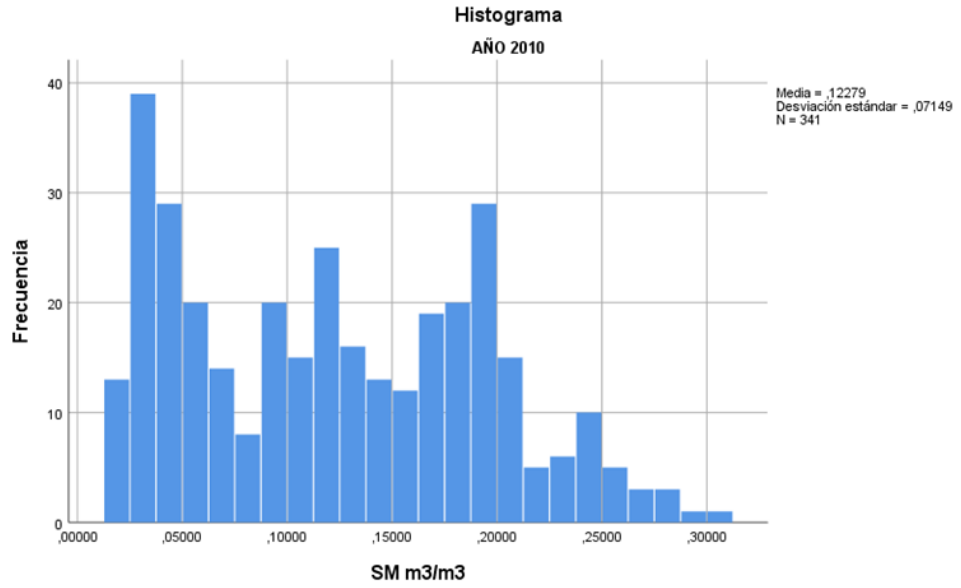


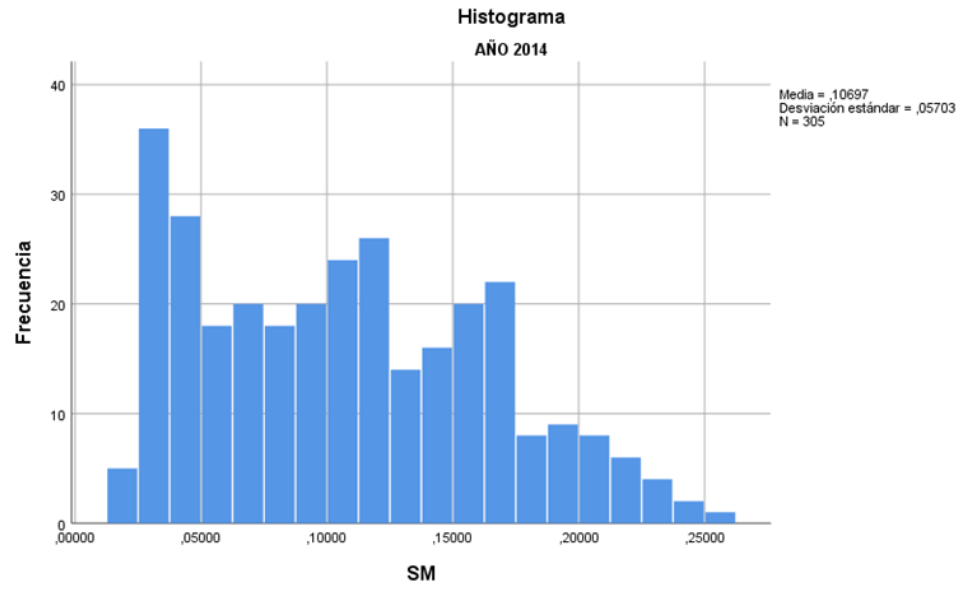



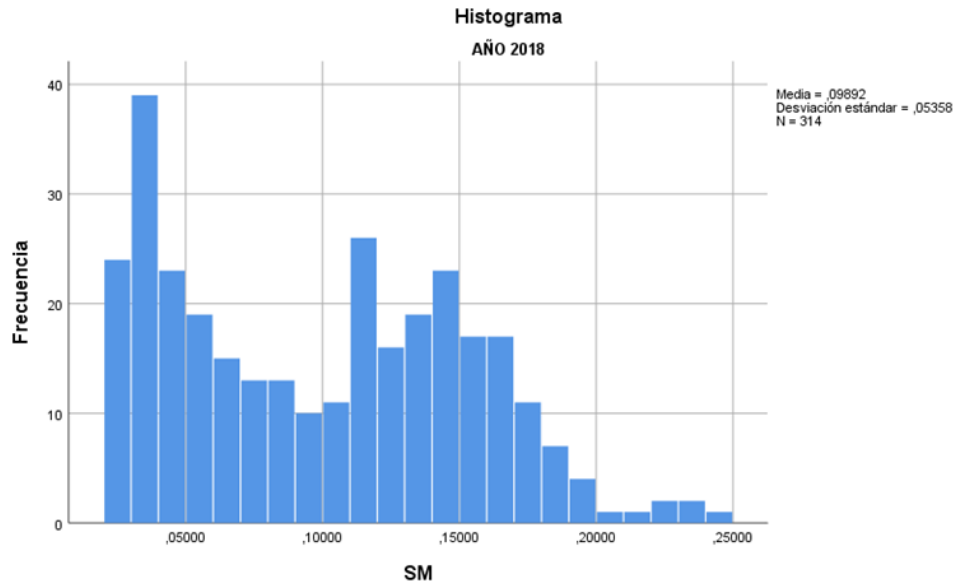




CCI-sm data ($m^3/m^3$) vs
method data (mm)

# RESULTS



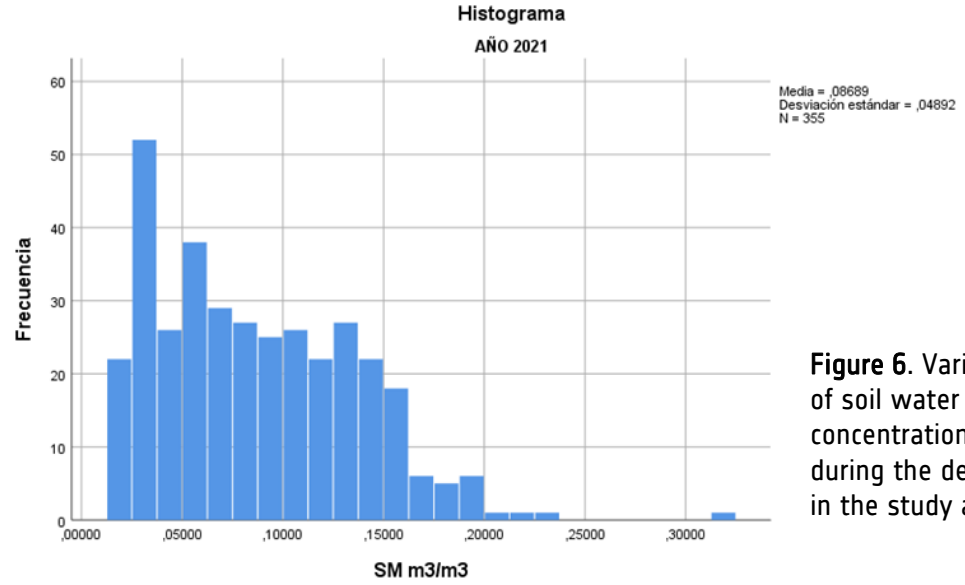




**Figure 6**. Variation of soil water concentration during the decade in the study area

# RESULTS

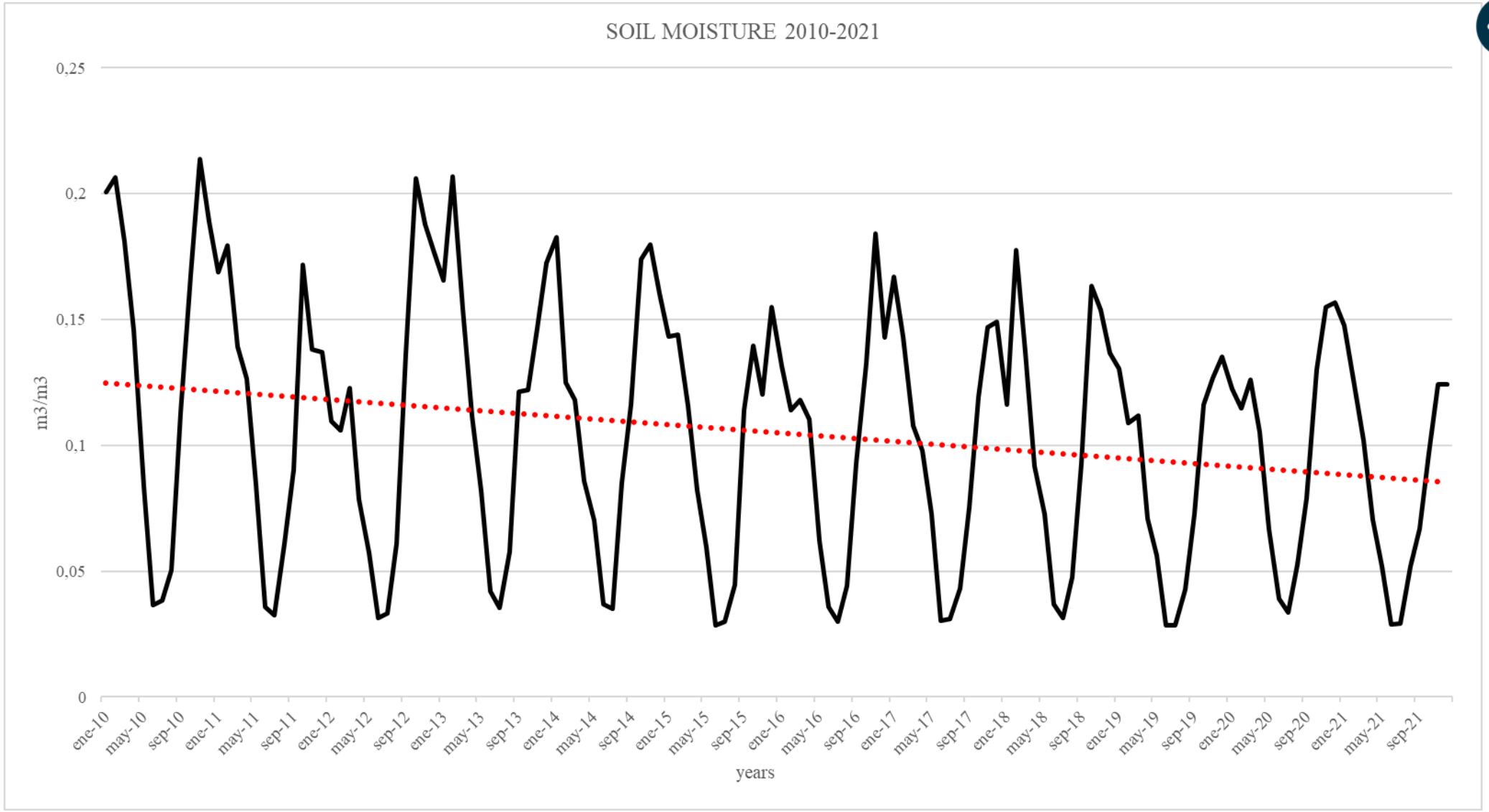



**Figure 7**. Soil water concentration tendency for the decade in the study area

# CONCLUSIONS

i. Feasible alternative for the study of water resources and soil water availability.

ii. Data acquired by satellites seem to indicate a more accurate water recharge in the soil than meteorological data.

iii. Generalized trend towards lower soil water availability and, therefore, lower water concentration in it.

iv. Importance of future studies considering other soil variables (SOC - NDVI - LST- Land Use) and a deeper analysis of the study area by downscaling ESA – CCI soil moisture product.


UAM Universidad Autónoma de Madrid
ipb INSTITUTO POLITÉCNICO DE BRAGANÇA
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CONTACT INFO
ALEJANDRO.RUIZD@ESTUDIANTE.UAM.ES
ZULIMAR.HERNANDEZ@UAM.ES
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