Innovative startup - Spin-off

Finapp®

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La sonda a neutroni per la rilevazione dell'umidità del suolo: principi di funzionamento e possibili applicazioni

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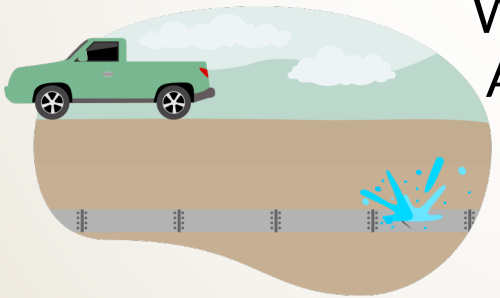
Azienda Sasse-Rami - Ceregnano (RO)

What we do

Finapp was born with the intention of revolutionizing the way in which the water is measured. We do it on a large scale and in depth, we do it without touching anything and with a single sensor.

Soil moisture
Biomass

Climate change
Extreme event



Water leaks
Aqueducts

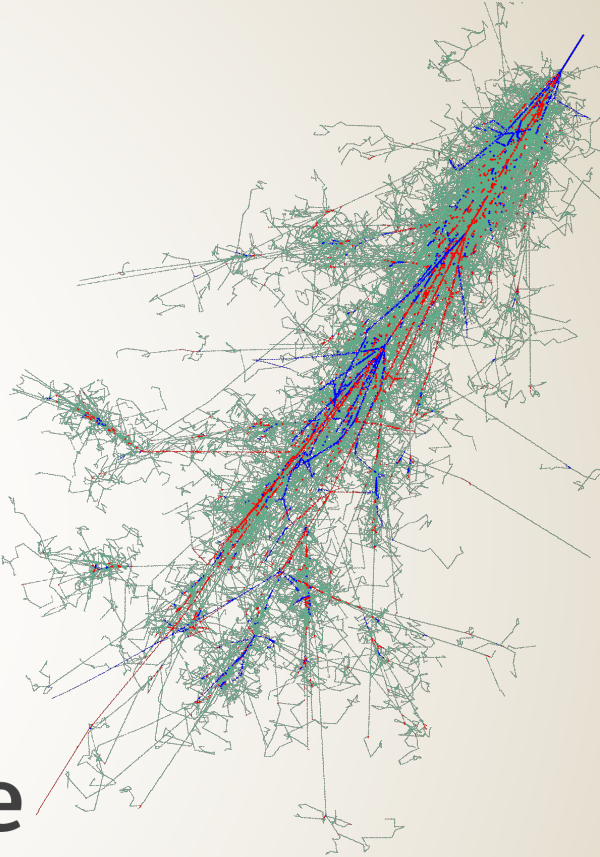
Snow Water equivalent
Water management

We employ

cosmic rays

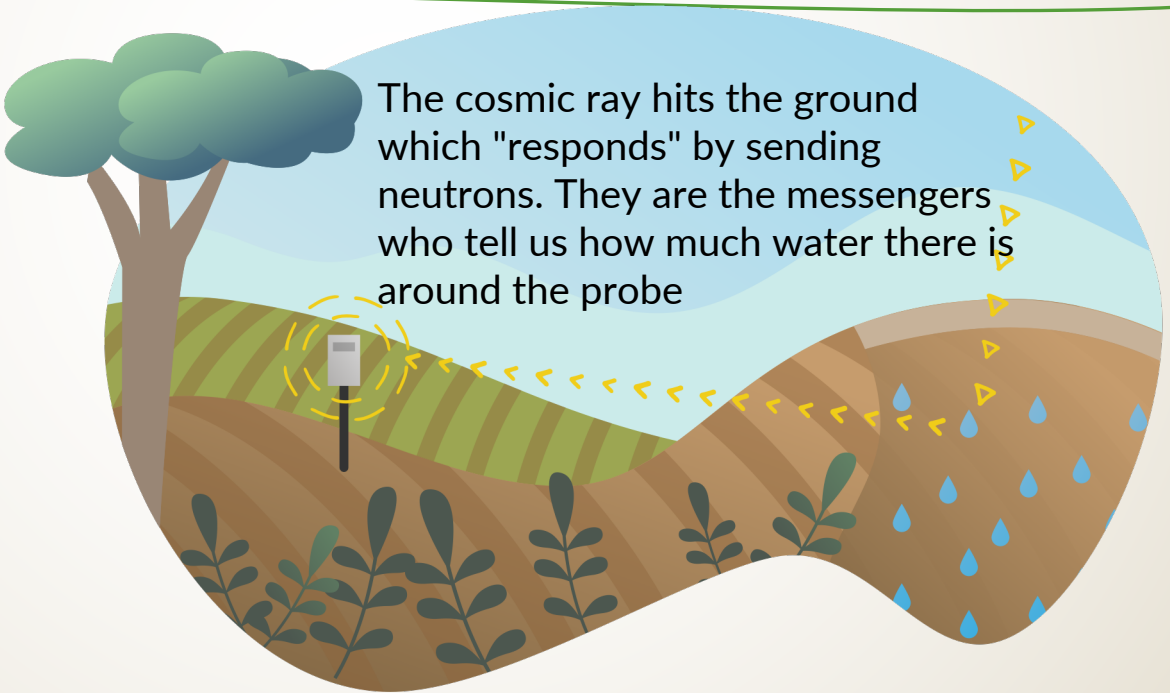
to measure

soil moisture

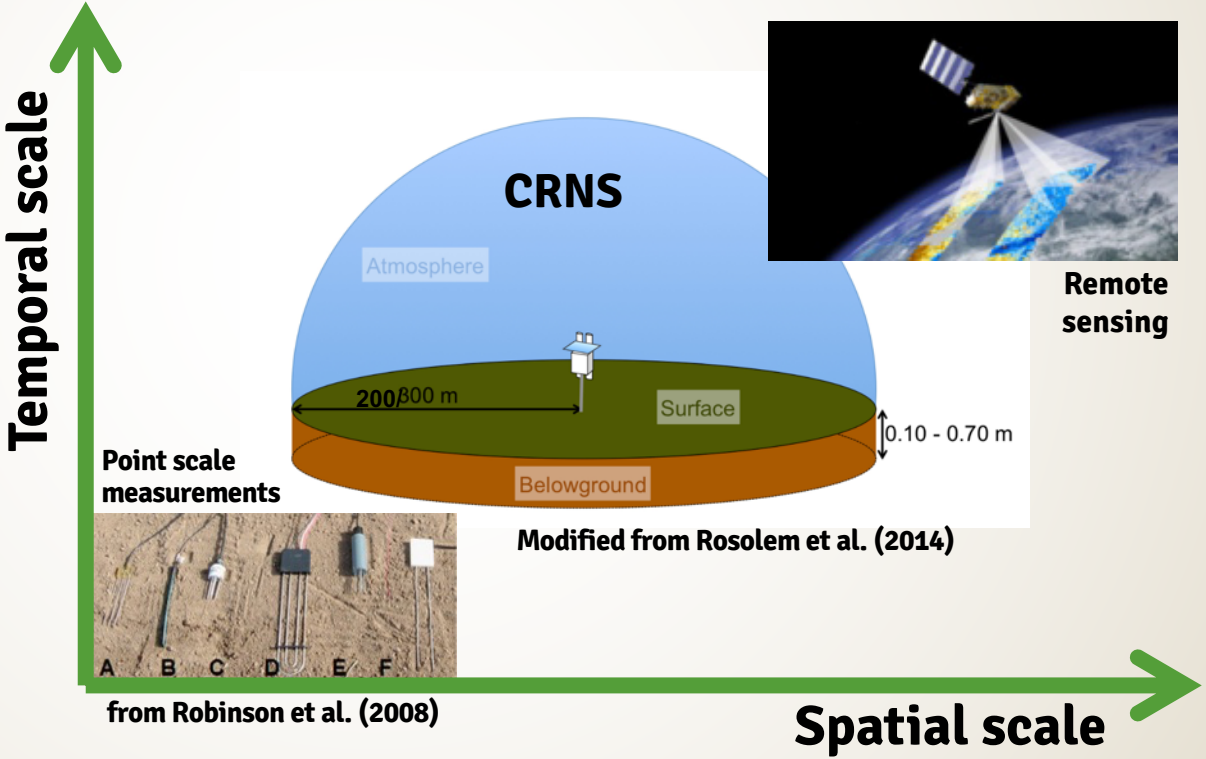


How does it work?

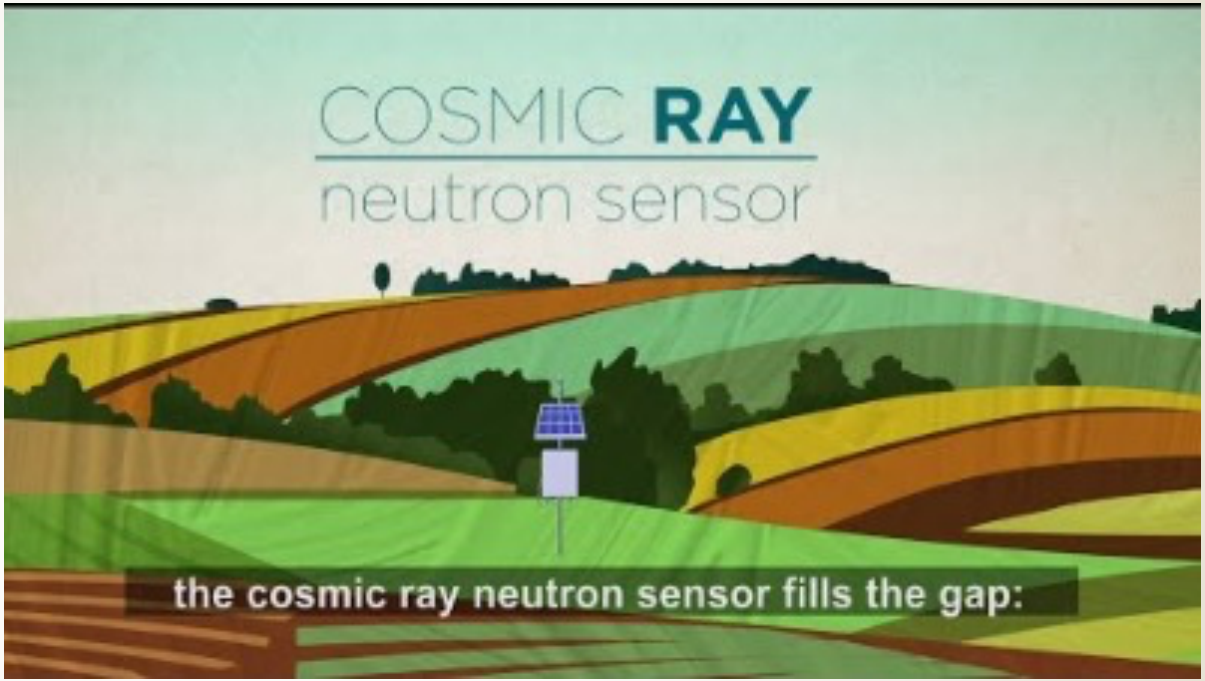
We have created a sensor that uses cosmic radiation to measure the amount of water stored in the soil, in the biomass, in the snow over a large surface



Why Cosmic Rays Neutron Sensing ?



FAO-IAEA support Cosmic rays technology

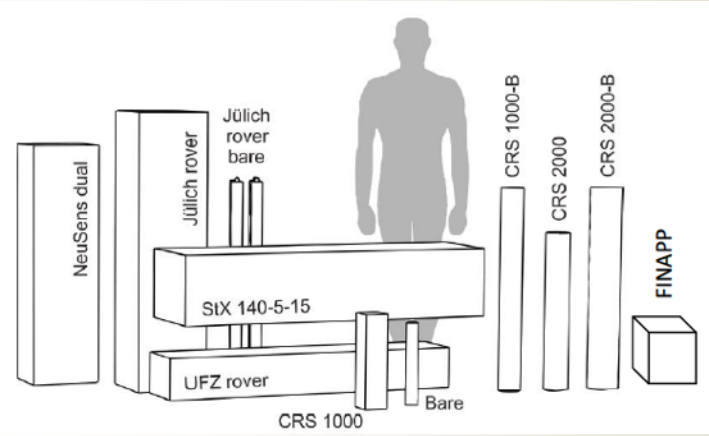


Youtube video produced by a United Nations agency with which we collaborate (Joint FAO IAEA, Soil and water division) that uses e promote the methodology

https://www.youtube.com/watch?v=eZTeQRSmcGY

Finapp innovation

Thanks to neutrons and cosmic rays it is possible to measure with a single sensor, installed 2 meters above the ground, soil moisture over 5 hectares around the probe and up to 50 cm deep



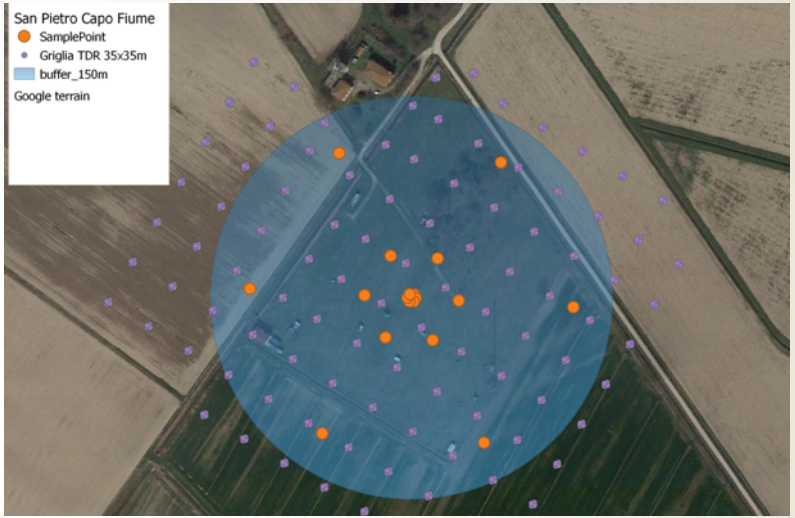
https://doi.org/10.5194/essd-12-2289-2020.

1. Overcome the networks of punctual sensors
2. We do not hinder the work on the field
3. Insensitive to the texture of the soil
4. Lightweight and easy to install probe
5. Powered by a small solar panel
6. Long life: it is not buried in the ground
7. Real-time data without interference

Support for precision agriculture

Range of action of the probe

It would take more than dozen of punctual probes to obtain the same information



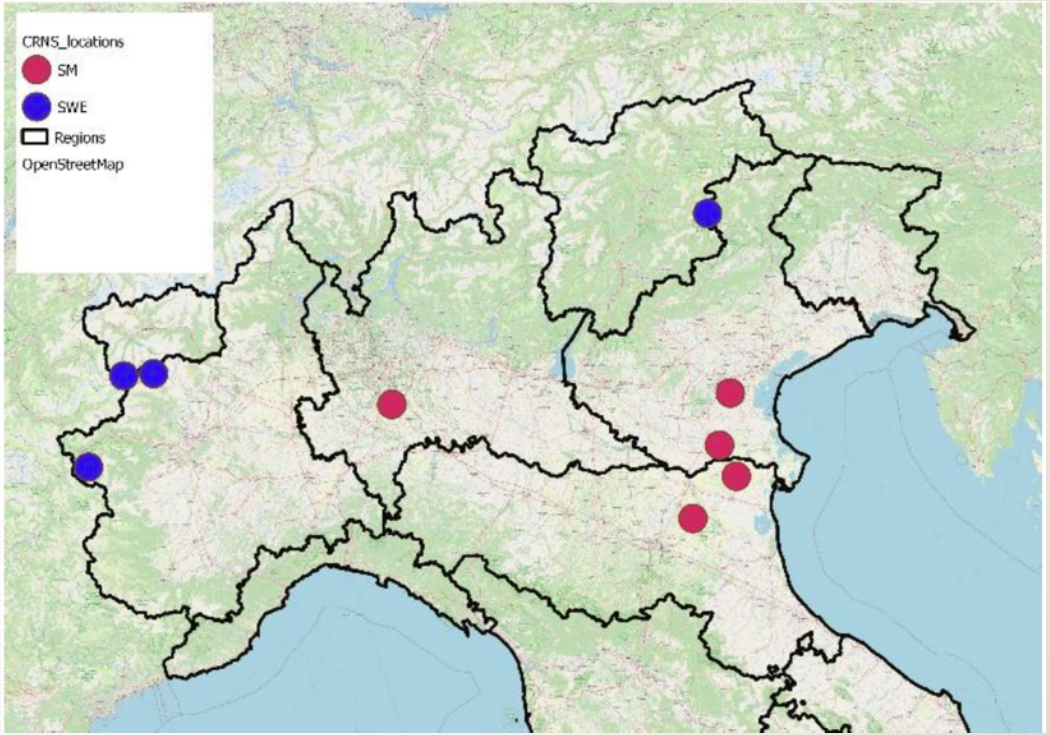
Food and Agriculture Organization of the United Nations

FAO argues that this technology is the future of precision agriculture

Proof of Concept program

We installed 16 probes during the Proof of Concept program The project wants to test and spread extensively this new technology in order to make CRNS better know.

University of Bologna collaborates to measure manually soil moisture in order to have a benchmark of the CRNS data

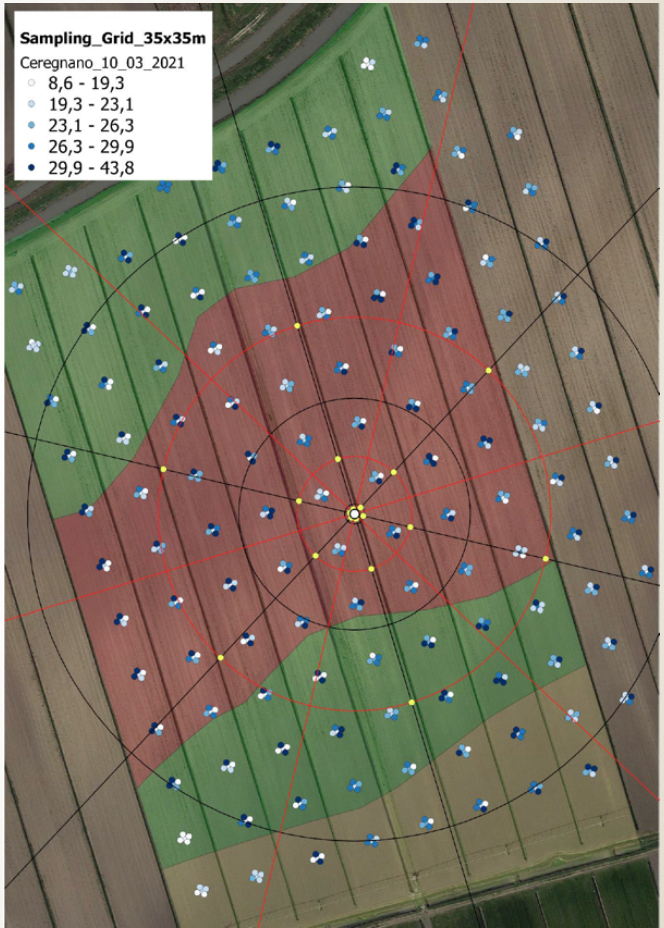


Ceregnano - Veneto Agricoltura

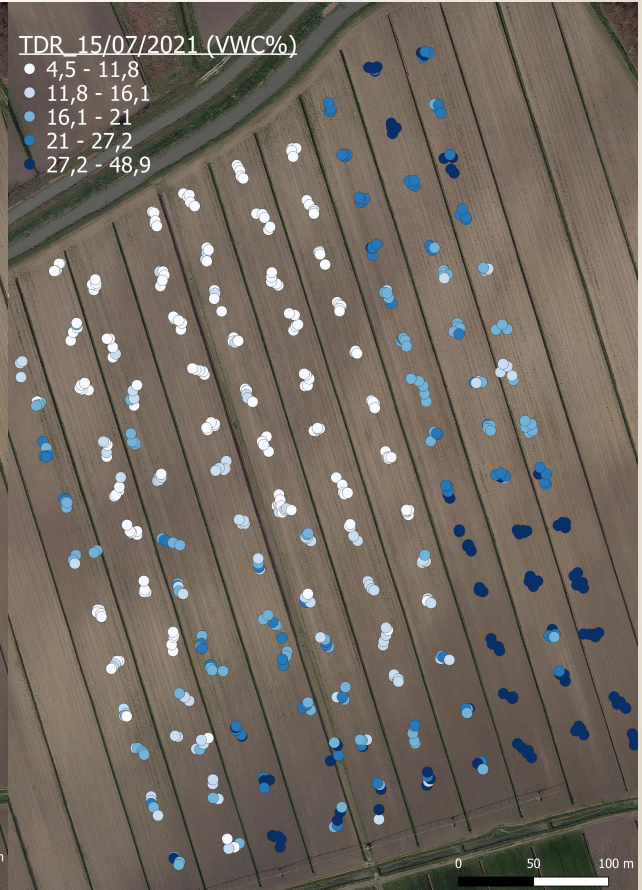
Altitude: 1 m slm
Latitude: 45.347394
Longitude: 45.058481
Installation: 6th March 2021

Ceregnano – Schema di misura

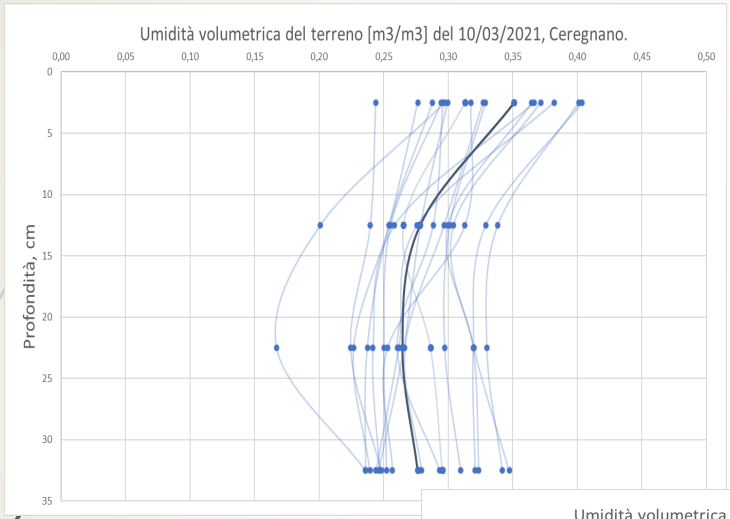
$$\theta[m^3/m^3] = \left(\frac{0.0808}{\frac{N}{N_0} - 0.372} - 0.115 - \theta_{LW} - \theta_{SOC} \right) \cdot \rho_b$$

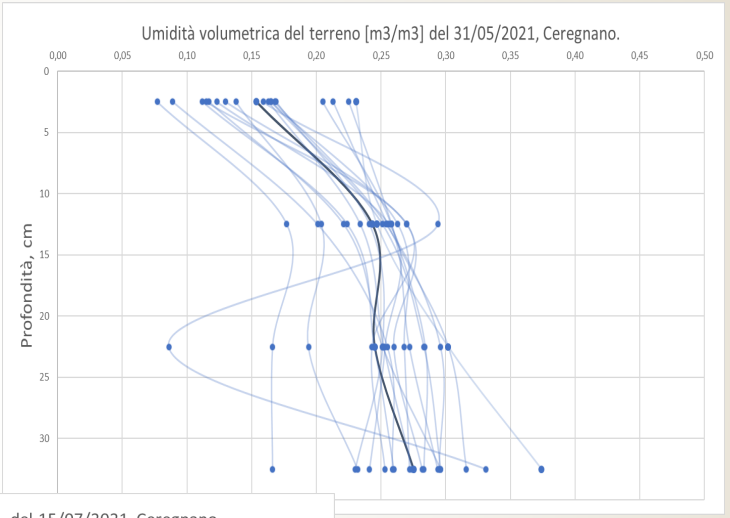


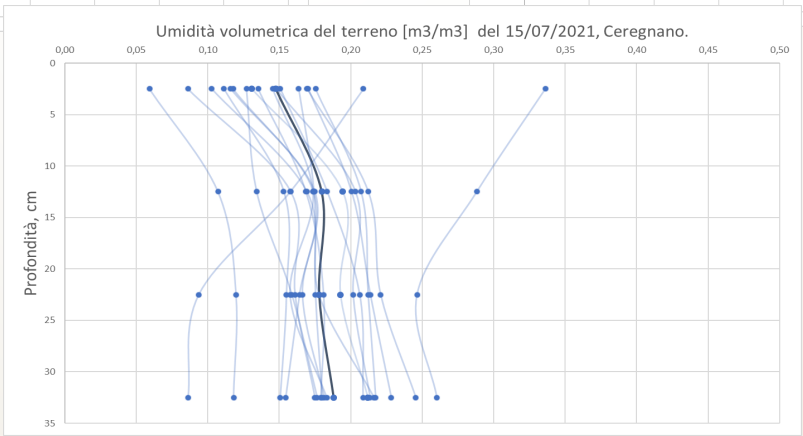
Campagne di misura manuali



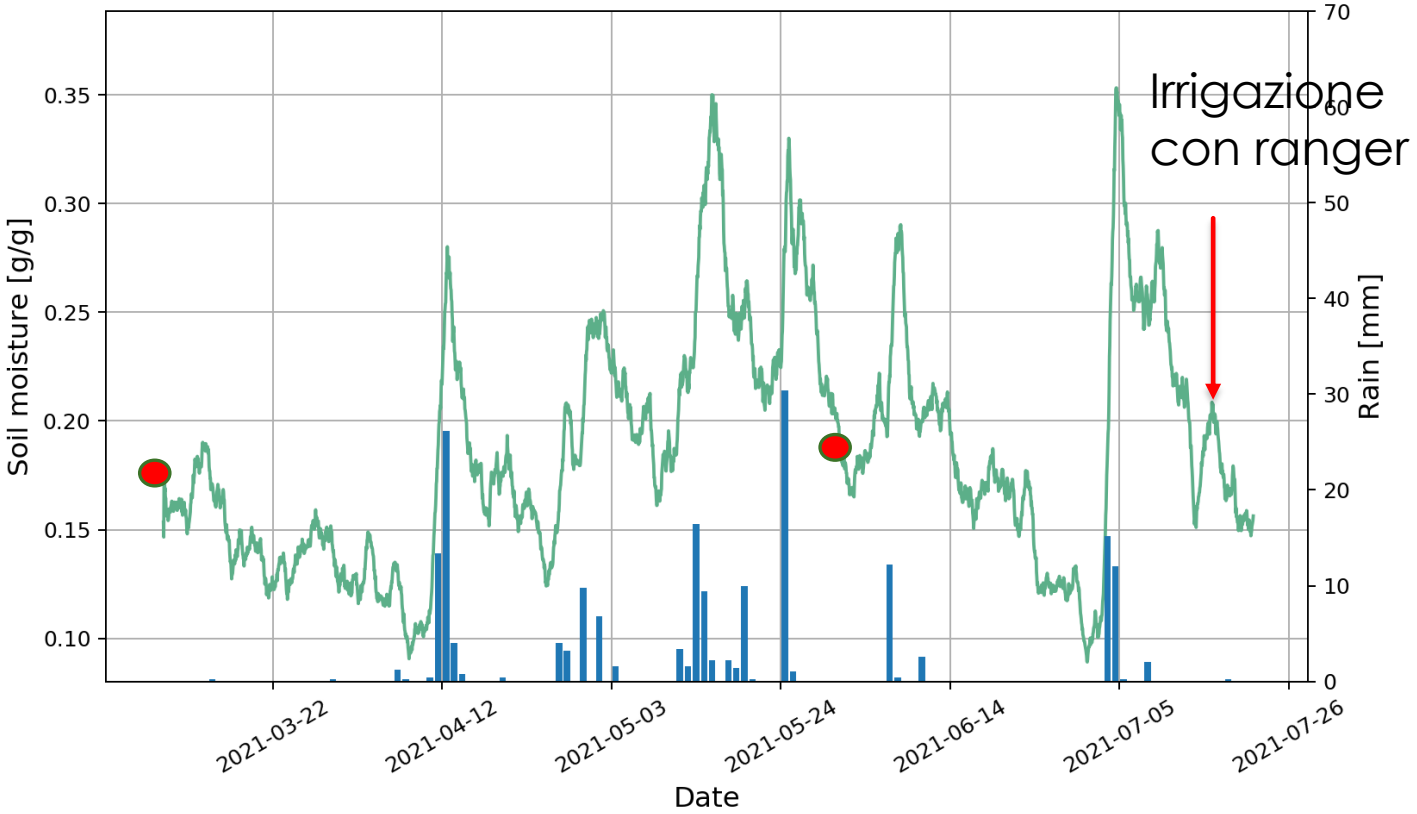
Campagne di misura manuali – Profili di umidità



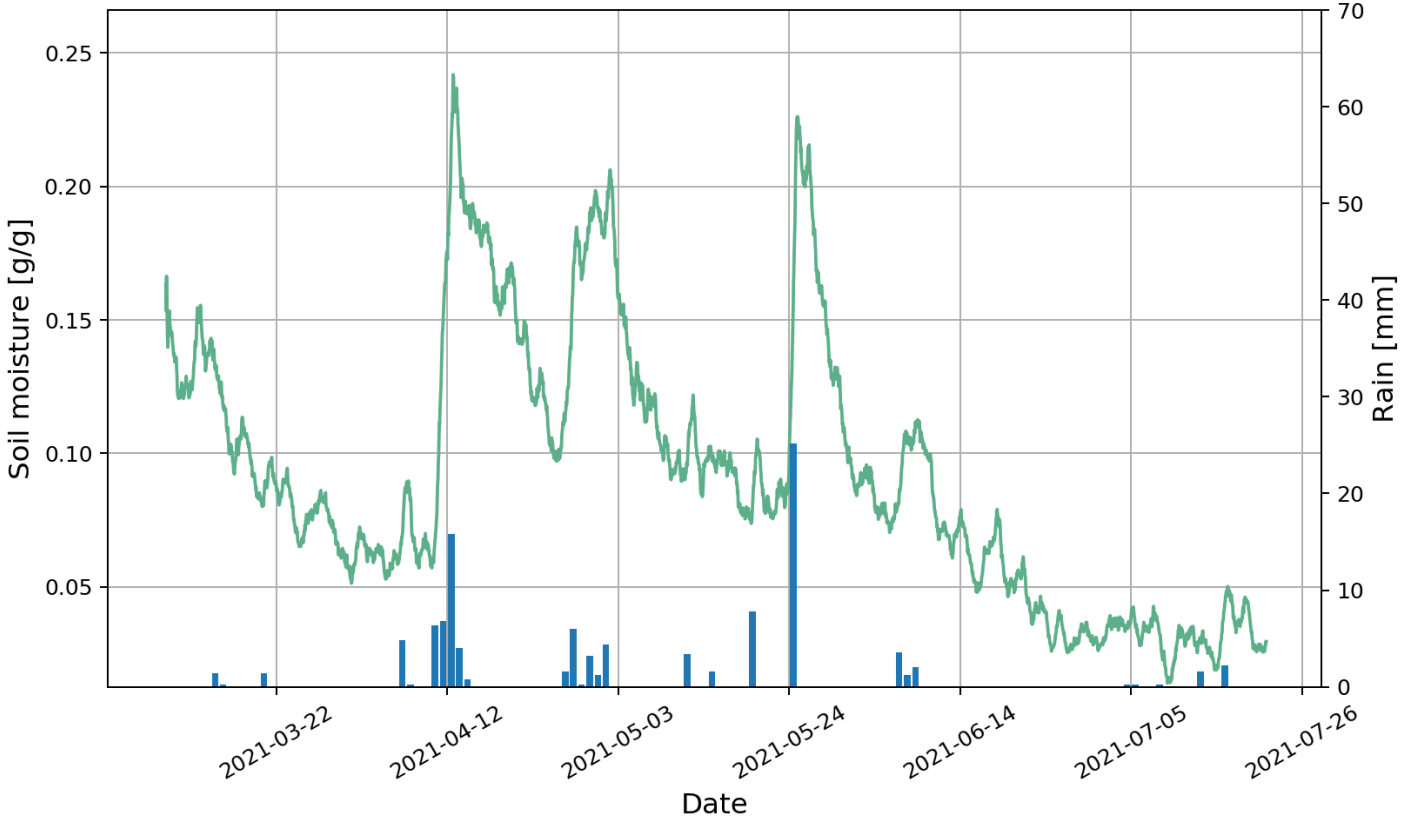




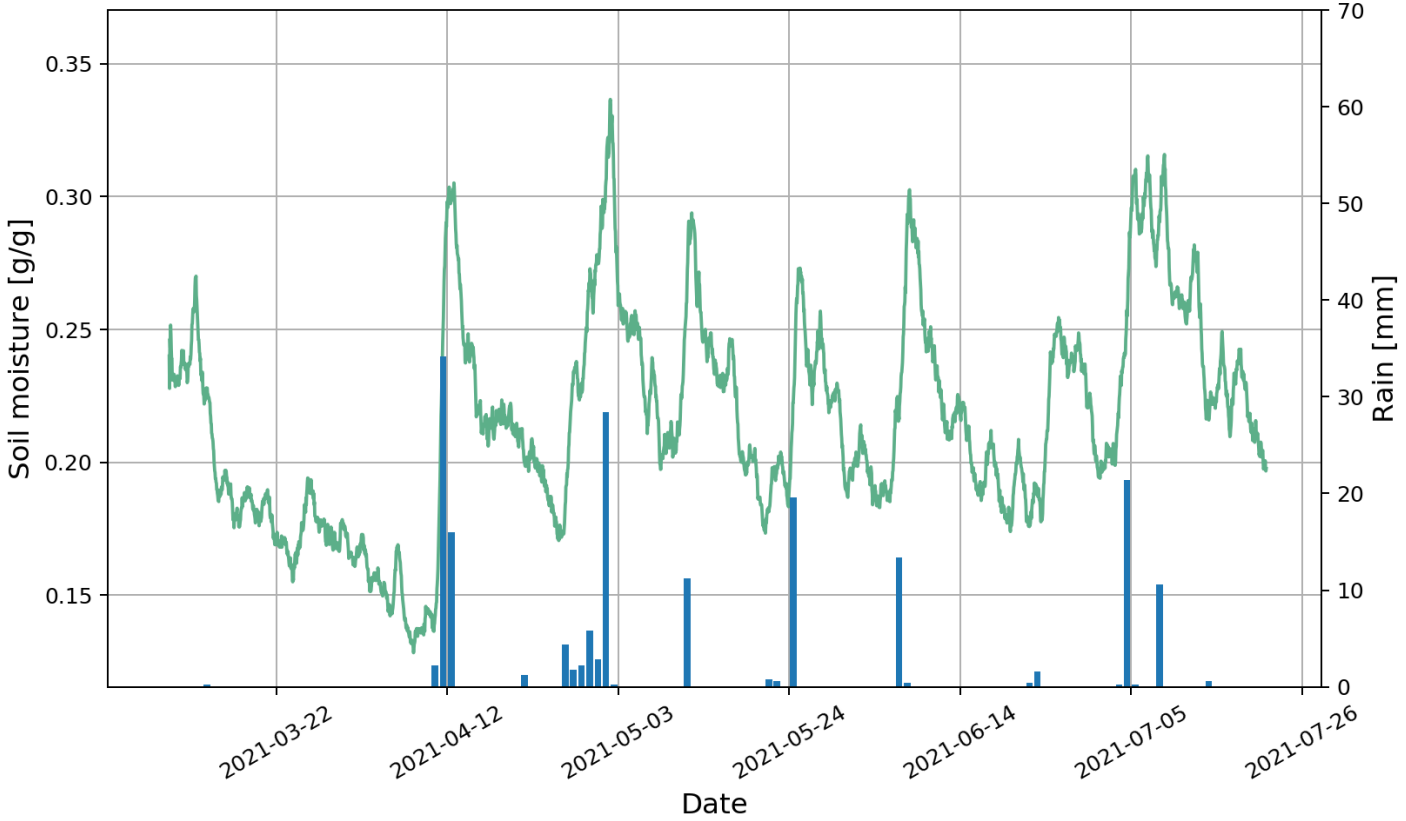
Ceregnano (RO) - Veneto Agricoltura



San Pietro Capofiume (BO) - ARPAE



Landriano (PV) - ARPAL



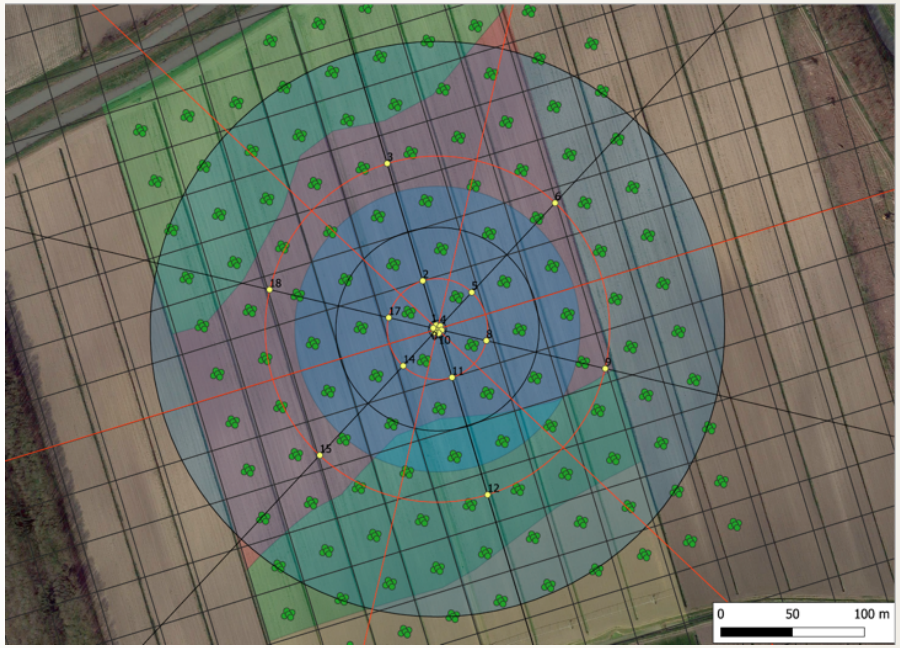
Biomass measurement

Once out of the ground, the neutrons can also interact with the water present in plants, providing us with the Biomass Water Equivalent data.

Finapp probe installed at Borello Castle - Val di Susa

Thanks to the measurement of biomass we can help the farmer to monitor the growth, health and maturity of the crop

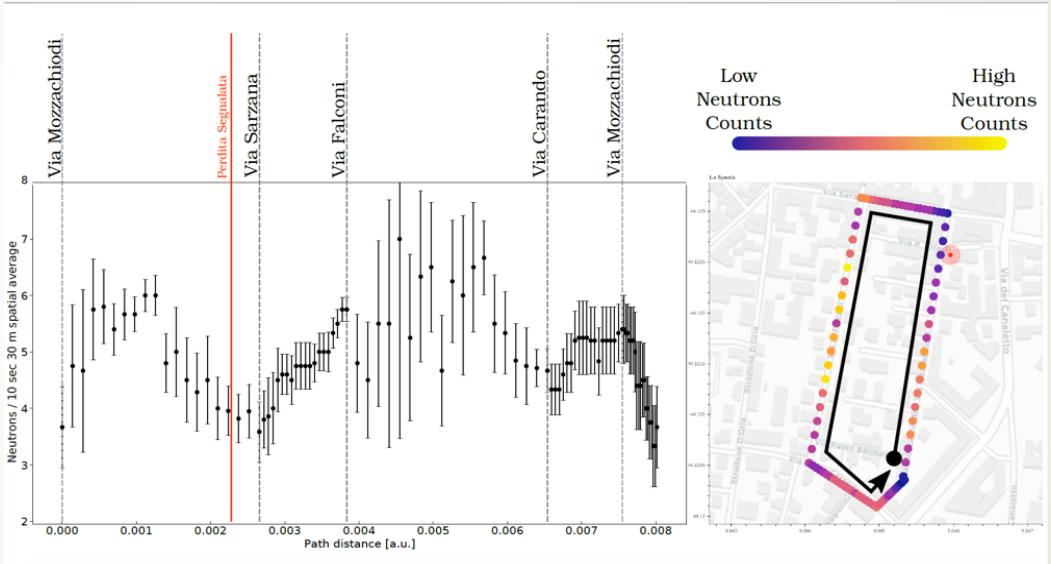
Finapp4D - Spatial measurements

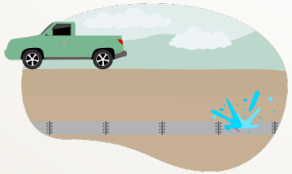


By mounting the probe on an agricultural vehicle, it is possible to provide heat maps on very large areas to support variable rate irrigation

Water leaks search

By installing the probe on a vehicle that circulates on the road, it is possible to identify the areas with the highest humidity that could correspond to leaks in the water pipe.



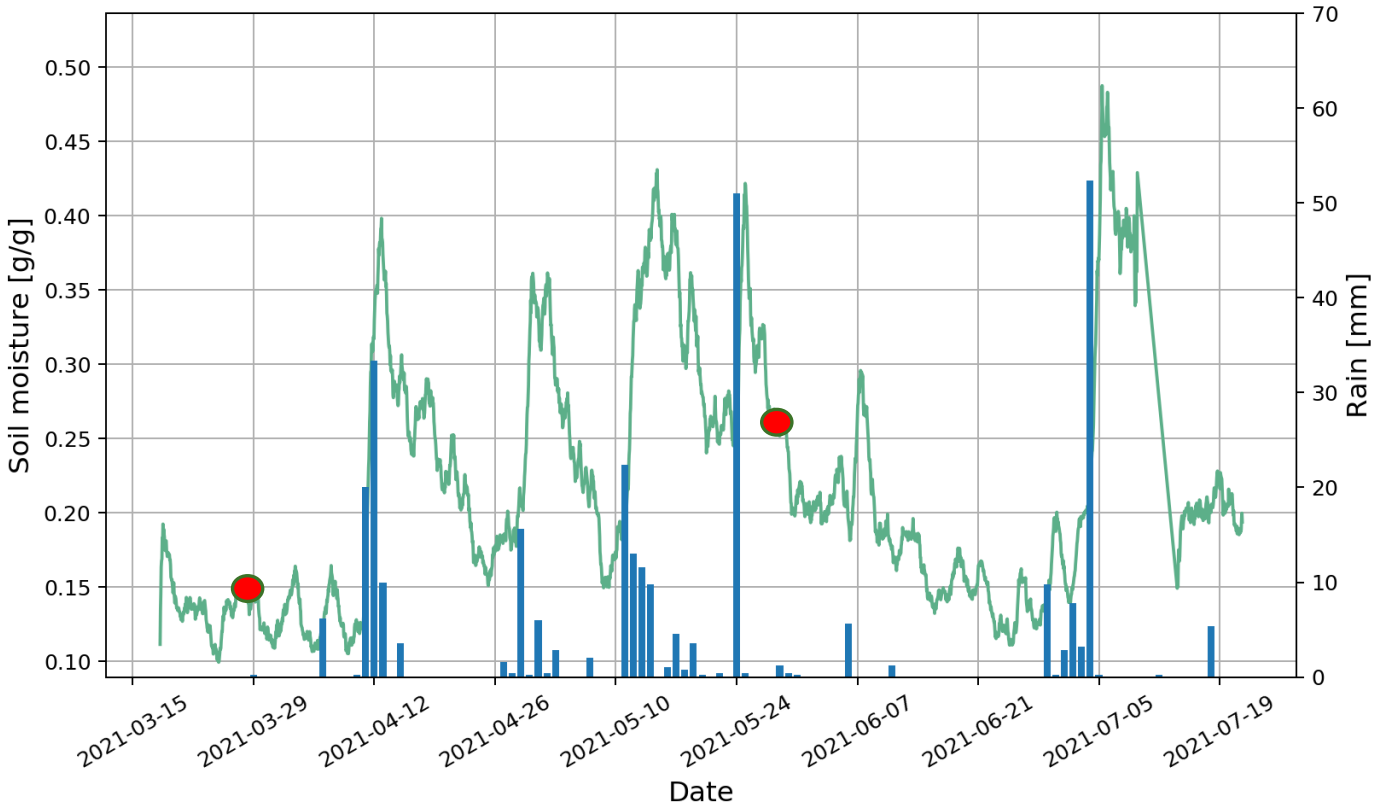


Compared to a traditional water leak detection, we increase the detection speed by a factor of 10

Legnaro ARPAV Test Site

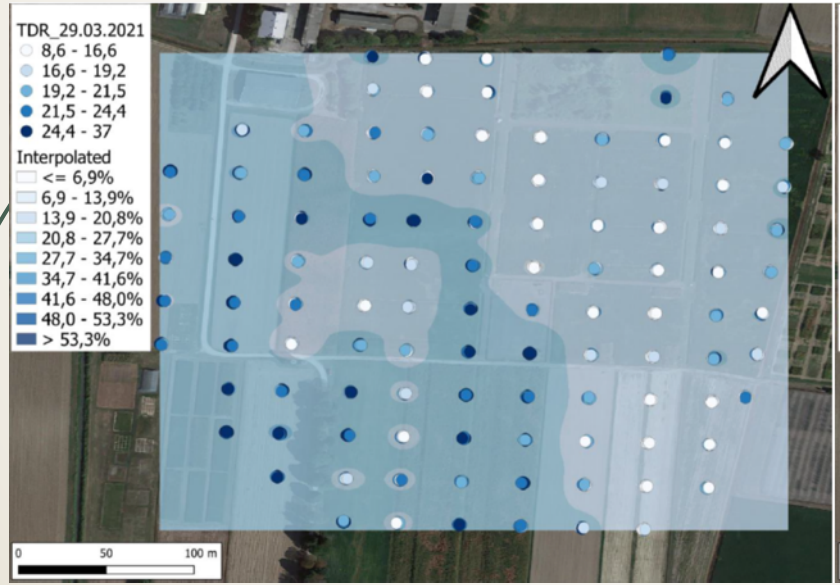
Altitude: 7 m slm
Latitude: 45.347394
Longitude: 11.952142
Installation: 15th March 2021

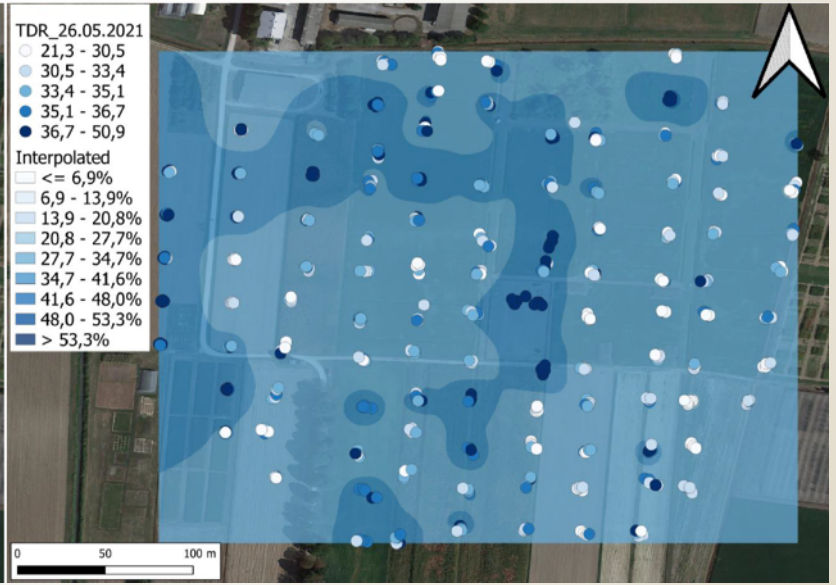
Soil moisture measurement in Legnaro



Legnaro test site

Survey date @ Legnaro	29/03/2021	26/05/2021
Gravimetric SM [m3/m3] (72 campioni)	0,16	0,23
Dev. st. SM σ =	2,07	5,23
Bulk Density [g/cm^3] =	1,453	1,463
Volumetric SM [%] (535 oss.) =	20,62	33,89
Dev st. volumetric σ SM =	4,75	4,18
Gravimetric OM [g/g] =	0,0441	
Gravimetric LW [g/g] =	0,1524	



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