WORLD METEOROLOGICAL ORGANIZATION

MOXXI Measurements & Observations in the 21st Century

Working Group - International Association of Hydrological Sciences

USING INFRARED THERMOGRAPHY TO ASSESS SOIL WATER REPELLENCY: LABORATORY AND FIELD APPLICATIONS

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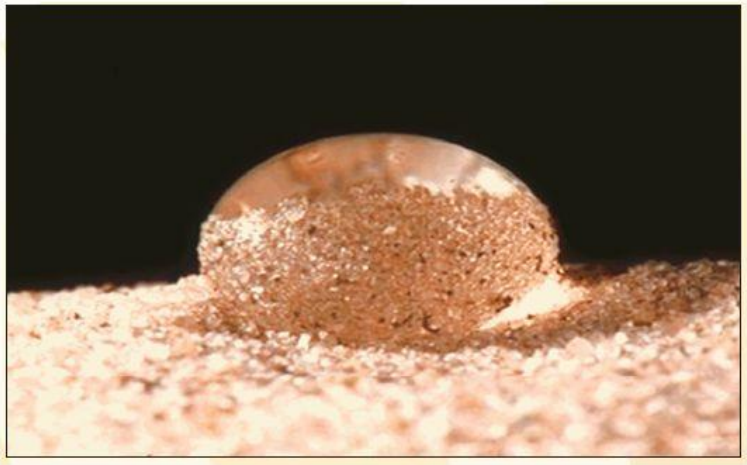
SOIL WATER REPELLENCY (SWR)

Reduction in the ability of water for wetting or infiltrating the soil.



Main cause is the coating of soil particles with hydrophobic organic substances due to:

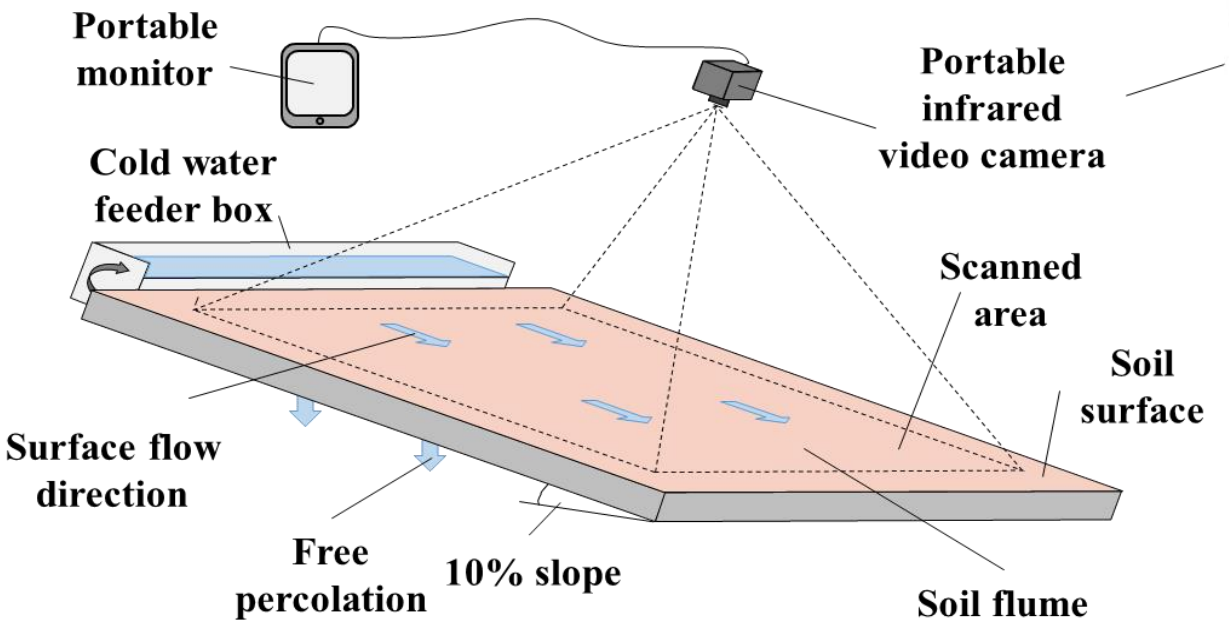
- Plant release and decomposition;
- Soil fungi and microorganisms;
- Industrial pollution;
- Forest fires.

Effects of SWR

- Alter infiltration and water storage capacity;
- Enhance surface runoff generation and associated erosion;
- Indirectly affect seed germination, seed establishment and plant growth.

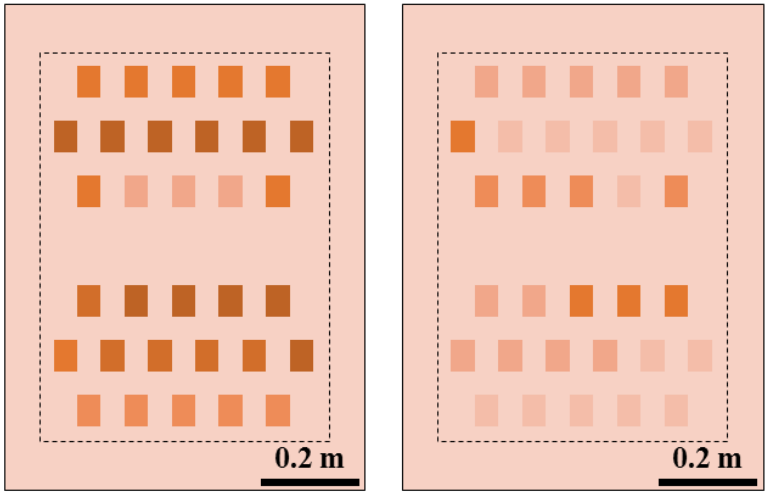
LABORATORY SETUP

Optris PI160



Waterproofing substance

SWR scenarios



MED test

Slope direction

Scanned area

0% Ethanol

3% Ethanol

13% Ethanol

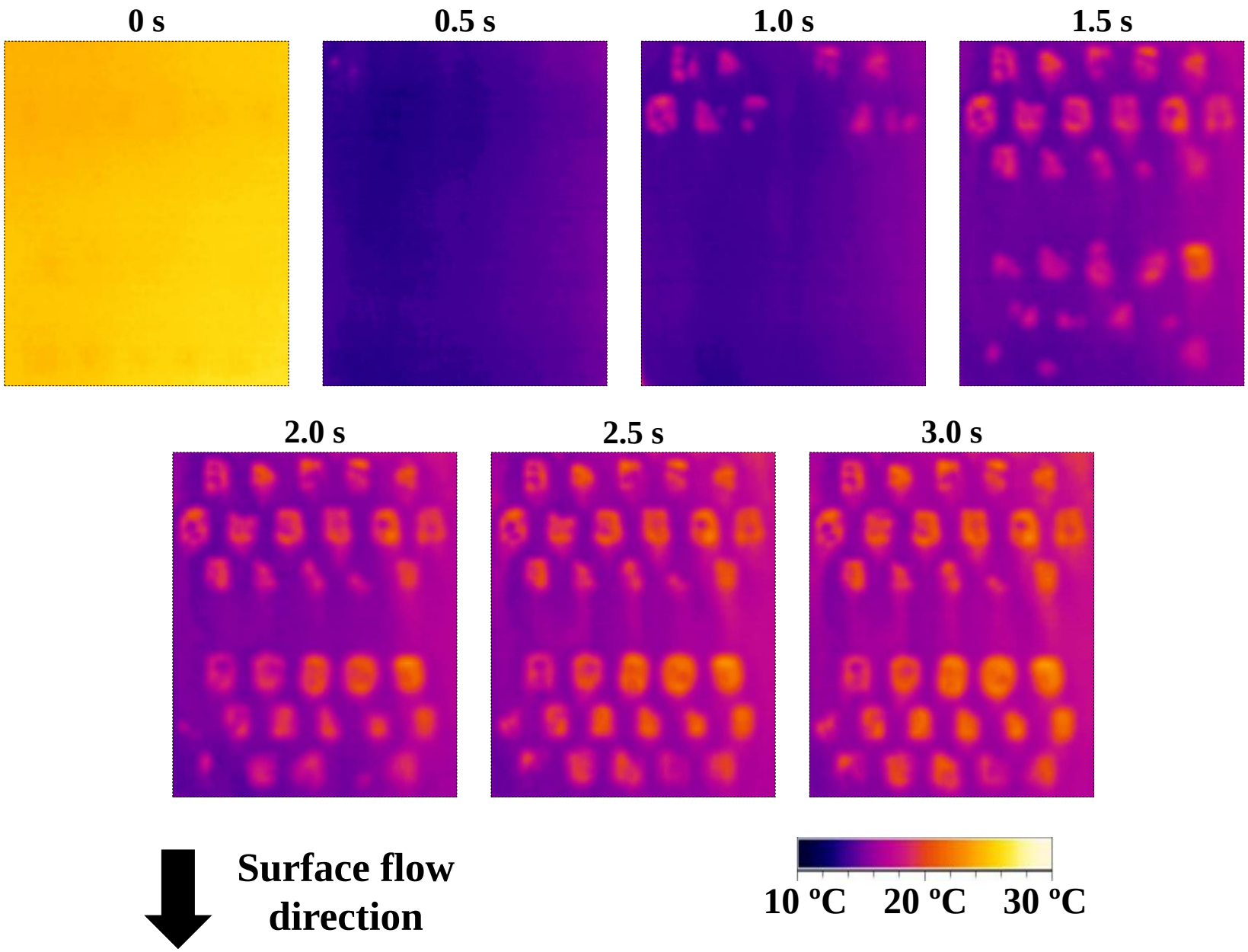
18% Ethanol

24% Ethanol

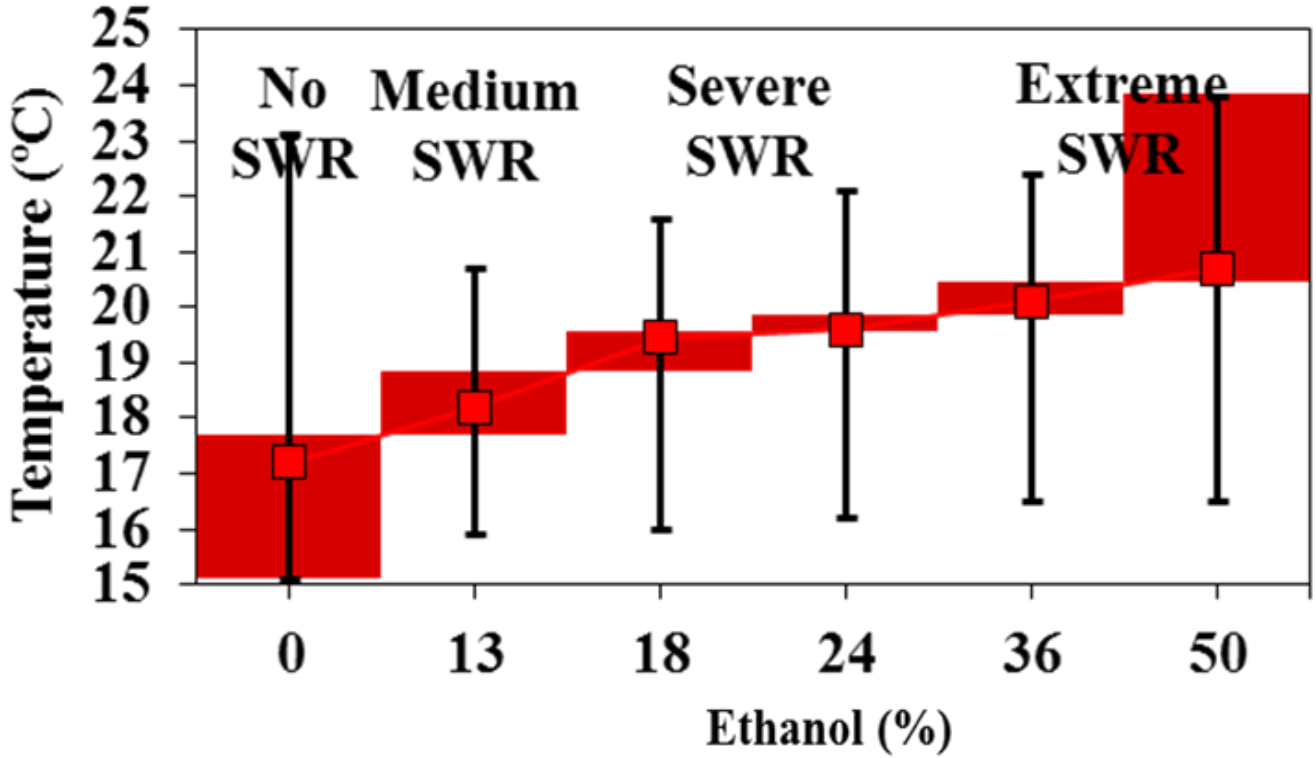
36% Ethanol

50% Ethanol

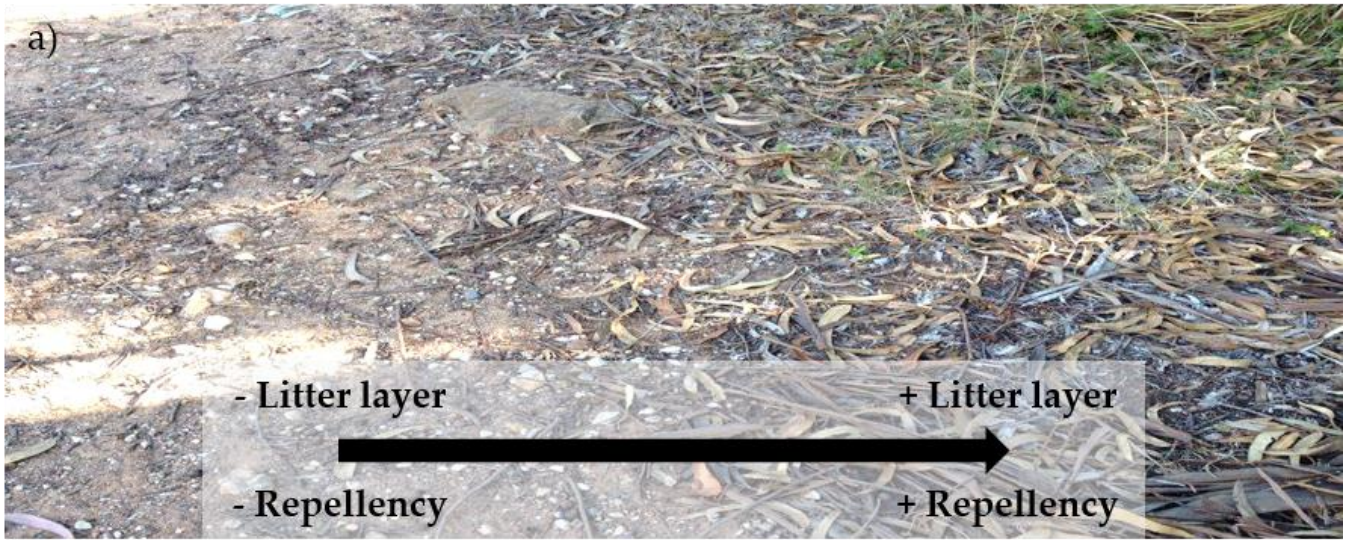
LABORATORY RESULTS

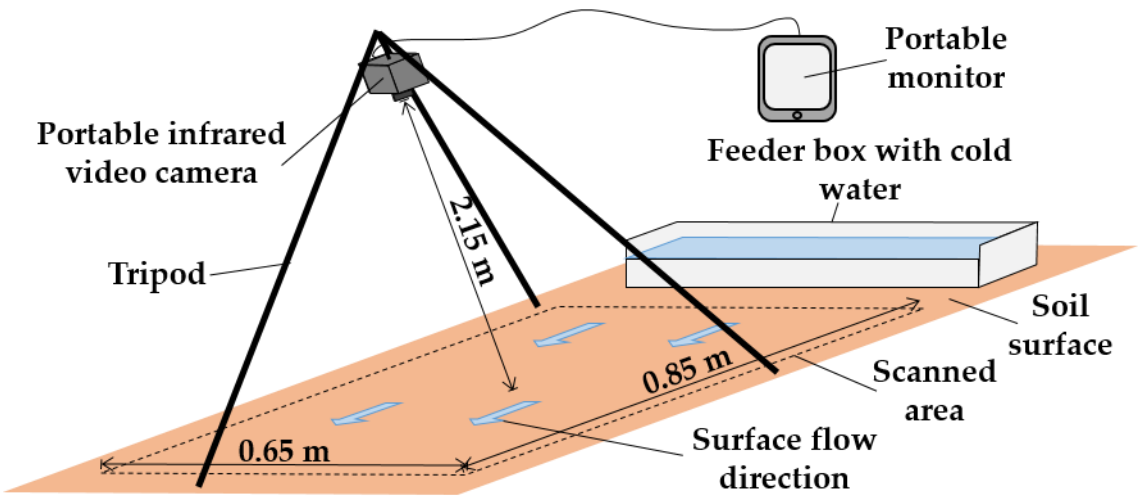


LABORATORY RESULTS



FIELD TESTS


a)
- Litter layer
+ Litter layer
- Repellency
+ Repellency

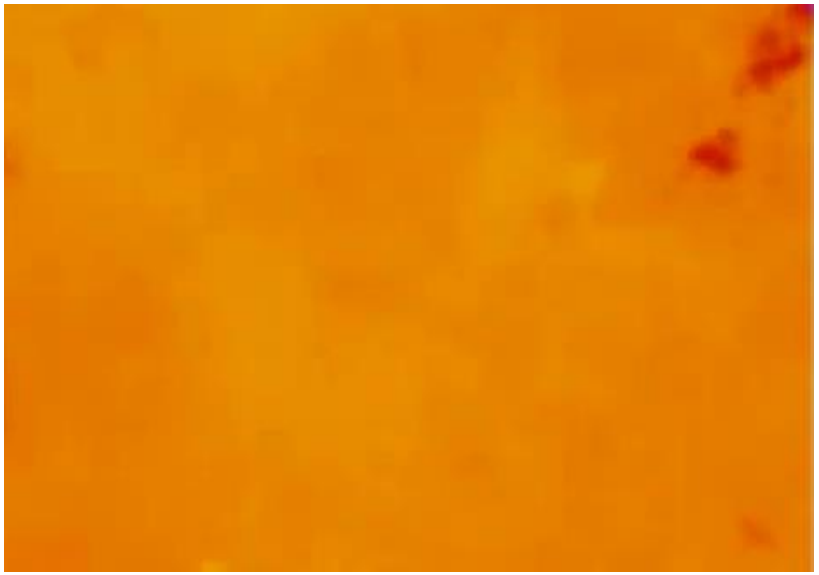

Portable monitor
Portable infrared video camera
Feeder box with cold water
Tripod
2.15 m
Soil surface
0.85 m
Scanned area
0.65 m
Surface flow direction


d)
SWR measuring points

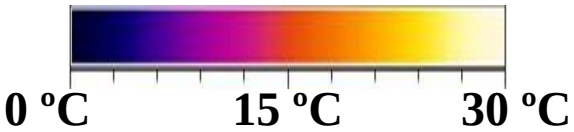
FIELD RESULTS

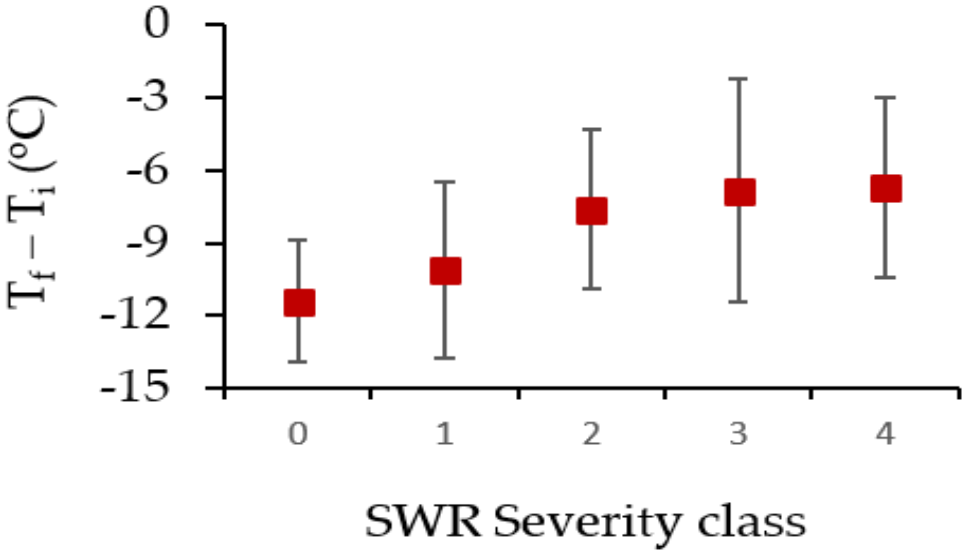
NO SWR

SEVERE SWR



Surface flow direction





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Thank you!

Publications

Abrantes, J.R.C.B., de Lima, J.L.M.P., Prats, S.A., Keizer, J.J. 2016. Assessing soil water repellency spatial variability using a thermographic technique: small-scale laboratory study. Geoderma 287, p. 98-104.

Abrantes, J.R.C.B., de Lima, J.L.M.P., Prats, S.A., Keizer, J.J. 2016. Field assessment of soil water repellency using infrared thermography. Forum Geographic 15 (2), p. 12-18.