

# UCLA

## Posters

### Title

TER 2: AMARSS: Automated Minirhizotron Coupled With Continuous Monitoring of Soil CO<sub>2</sub>

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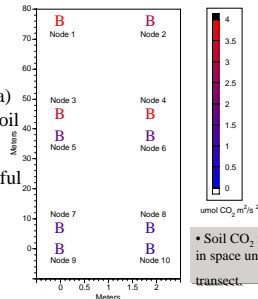
# AMARSS: Automated minirhizotron coupled with continuous monitoring of soil CO<sub>2</sub>

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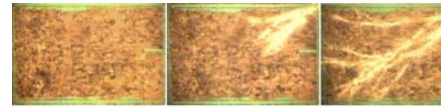
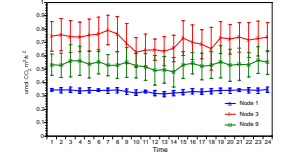
## Spatial and temporal variation in root growth and soil CO<sub>2</sub> flux:

### Research questions:

- Which are the proper spatial and temporal scales to measure: a) mycorrhizae turnover; b) soil respiration; c) soil moisture and soil temperature?
- Does increasing the number of sensors provide more meaningful information?
- How does aboveground processes relate with belowground processes (integration of NIMS with AMARSS)

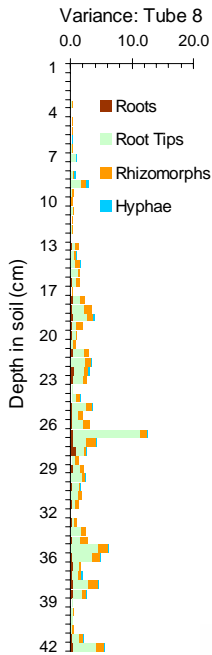


• Hyphae turnover and CO<sub>2</sub> flux variation in space and time.



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## Automated Minirhizotron and Arrayed Rhizosphere Soil Sensors (AMARSS):



### Biological variation and automated image analysis

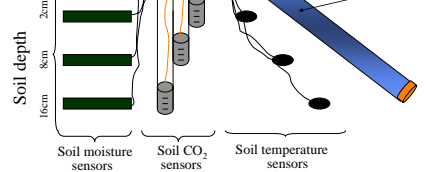
• Bar graph of variance by depth over time in counts of mycorrhizosphere components: plant roots, mycorrhizal root tips, fungal rhizomorphs and hyphae.

• Over 40,000 images have been collected using human powered minirhizotrons and ongoing development of automated image analysis is promising fast recognition of mycorrhizae fungi dynamics.



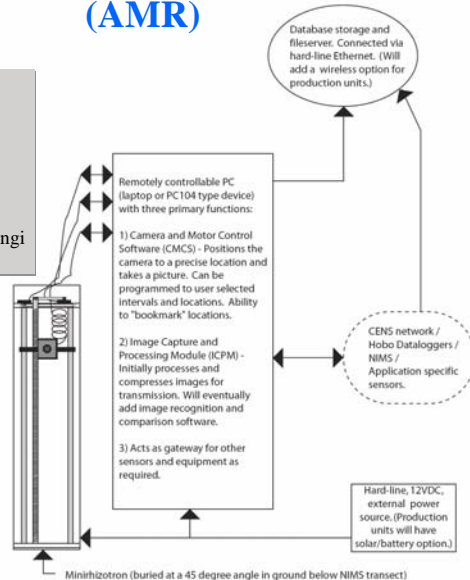
### Soil sensor array

• AMR is coupled with soil sensors to correlate changes on environmental variables with image data to better understand soil processes and mycorrhizae dynamics in space and time.

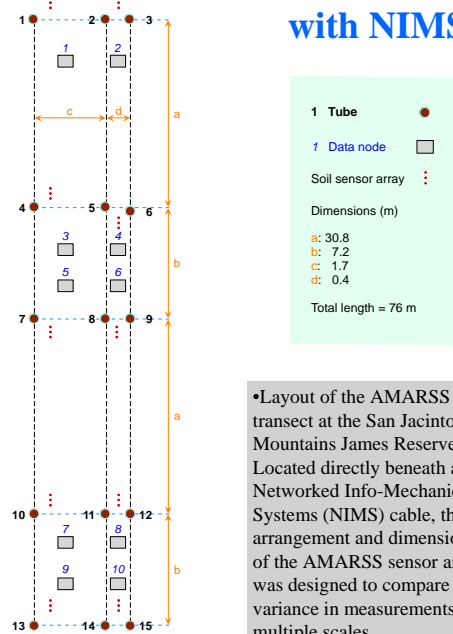


### Automated Minirhizotron (AMR)

- AMR prototype has proven superior image quality than conventional minirhizotrons.
- AMR can create a mosaic or landscape of soil images increasing the probability to detect root and mycorrhizal fungi changes in space and time.



### AMARSS coupled with NIMS



• Layout of the AMARSS transect at the San Jacinto Mountains James Reserve. Located directly beneath a Mechanical Systems (NIMS) cable, the arrangement and dimensions of the AMARSS sensor array was designed to compare variance in measurements at multiple scales.