

## CLASSROOM ACTIVITY [Soil Moisture]

Soil moisture is one of the variables observed by the Oklahoma Mesonet. There are many different ways to measure soil moisture, but for most purposes, Mesonet soil moisture values are presented as Fractional Water Index (FWI). FWI ranges from 0.0 (driest) to 1.0 (wettest). In other words, as soil moisture goes up (the soil gets wetter), so does the FWI. When the soil is completely saturated (in other words, when it can't hold any more water), the FWI will be very close to 1.0. A powder-dry soil will have an FWI near zero.

You can use the FWI to find out about whether plants will have enough moisture to thrive in the environment.

### Fractional Water Index Categories

| FWI Value | Soil Moisture Category  | Explanation   |
|-----------|-------------------------|---|
| 0.8-1.0   | Excellent Soil Moisture | Plenty of available water for plants.                       |
| 0.5-0.8   | Limited Plant Growth    | Watering or irrigation is needed for full plant growth.     |
| 0.0-0.5   | Dry                     | Soils are too dry for plant growth. Plants may wilt or die. |

FWI is measured at multiple levels in the soil. This way, people can check whether a recent rain has penetrated to deeper layers of the soil. Sometimes, light rain events only moisten the top layers of soil, and don't help deeper layers, where mature plant roots will reach for water.

### Questions

Please refer to the graph on the following page (page 20) to answer the following questions.

1. On January 1st, 2006 (the left hand side of the traces), which depth was the driest? Which was the wettest?
2. On January 28th, 2006, the Oilton Mesonet site received about one-half inch of rainfall. How did the 5cm FWI (blue trace) respond to this rainfall?
3. On January 28th, how did the FWI at deeper levels respond (25 cm: orange; 60 cm: brown)?
4. In general, which of the soil moisture traces changed the most often over the six months?
5. Look at traces during May and June (near the right-hand side of the graph). Which trace dried out the slowest?
6. Based on your above answers, what can you say about the time it takes to dry out deeper soil layers versus shallower soil layers?

Figure 1 - Fractional Water Graph

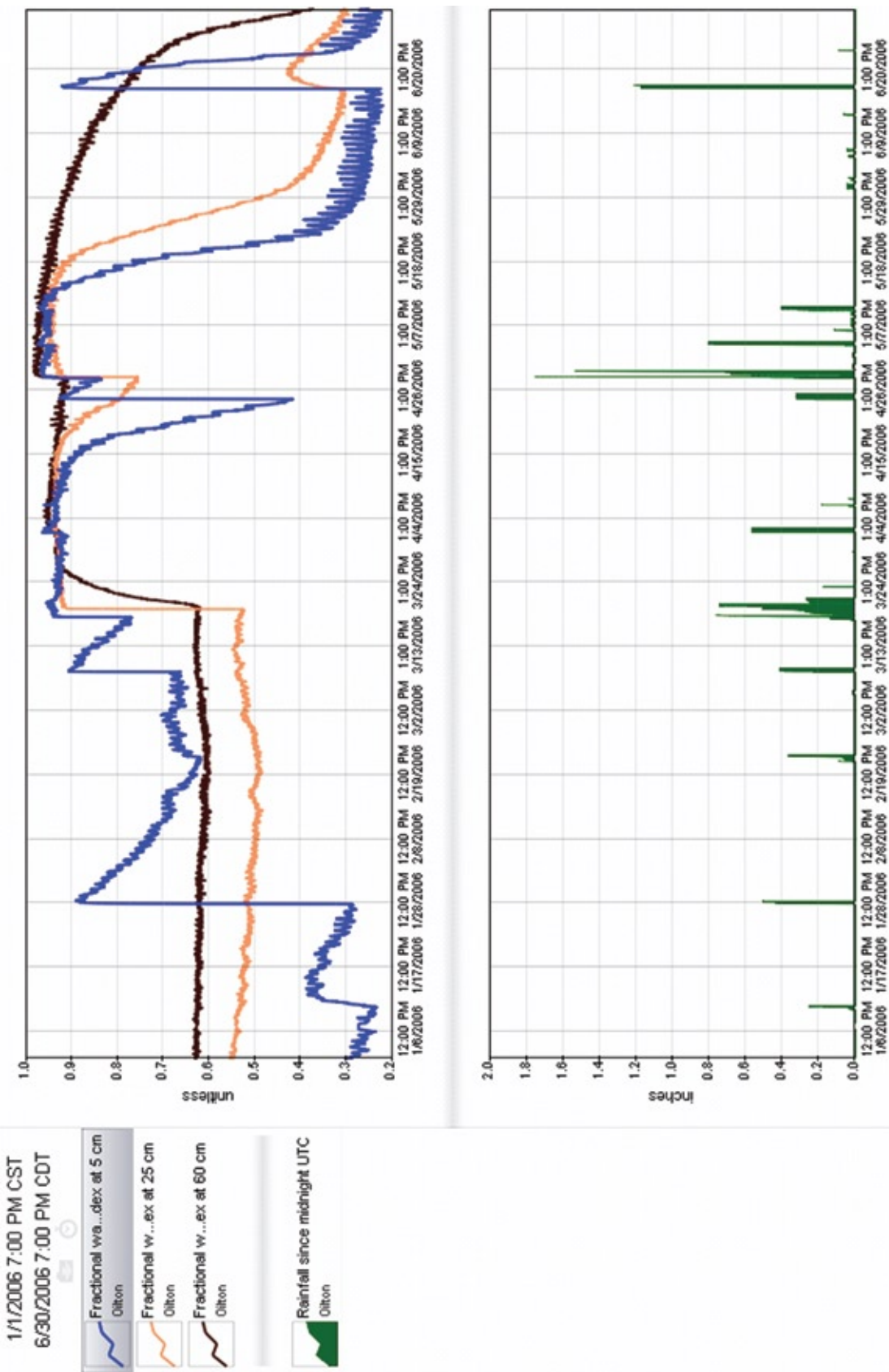


Figure: The top traces show soil moisture (FWI) at three levels for January-June 2006 at Oliton. The blue trace shows the shallowest level, 5 cm. The orange trace shows FWI at 25 cm deep, while the brown shows FWI at 60 cm. The bottom panel shows rainfall events during the period.