**Multiple choice quiz answers and commentary**

1. Agricultural drought is best defined as:
2. Low crop yields
3. Low soil moisture in the upper soil layers
4. Low soil moisture in the root zone

The answer is (a). Agricultural drought can lead to low crop yields, but is more precisely defined as low soil moisture in the root zone.

1. Which of the following variables are inputs into the JULES land surface model (select all that apply):
2. Soil moisture
3. Soil texture
4. Precipitation
5. Temperature

The answer is (b), (c), and (d). Soil moisture is an output of the JULES land surface model.

1. The Water Resource Satisfaction Index (WRSI) is defined as:  
   a. The severity of agricultural drought

b. The mean soil moisture deficit in the root zone cumulated over the growing season

c. The soil moisture anomaly cumulated over the growing season

The answer is (b). The severity of agricultural drought can be surmised from WRSI, but the definition of WRSI is soil moisture deficit in the root zone. The answer is not (c) because WRSI requires an estimate of soil moisture in the root zone. The depth of the root zone will change during the growing season.

1. Which of the following factors does our model account for when calculating WRSI (select all that apply):  
   a. The effect of temperature on the length of the growing season

b. Crop variety   
c. Soil texture

d. Fertilizer input

e. Pests and diseases

The answer is (a), (b) and (c). The model uses growing degree days to determine crop development stages and the length of the growing season. GDD are based on daily temperature. Review slide 5 if you are not sure about the definition of a growing degree day. The model also accounts for crop variety through the GDD thresholds, maximum rooting depth, LAI and canopy height. Soil texture is included in the soil moisture model (see Slide 4). The model does not account for fertilizer input or pests and diseases, as these factors are not included in the definition of WRSI.

1. A seasonal WRSI of 90% means (select all that apply):  
   a. There is no evidence of severe agricultural drought  
   b. Crop yields will be high   
   c. There was no need to irrigate  
   d. WRSI is higher than usual

The answer is (a). Although high seasonal WRSI is associated with good crop yields, other factors, such as pests and diseases and socio-economic issues can also affect yield. Just because WRSI is high does not mean that there was no need to irrigate. WRSI is calculated as a growing season mean. Therefore there may have been soil moisture deficits at key stages of the growing season, even if the mean was high. Finally, a WRSI of 90% is not necessarily higher than usual. In wet regions, a climatological seasonal WRSI of 90% or higher is possible.