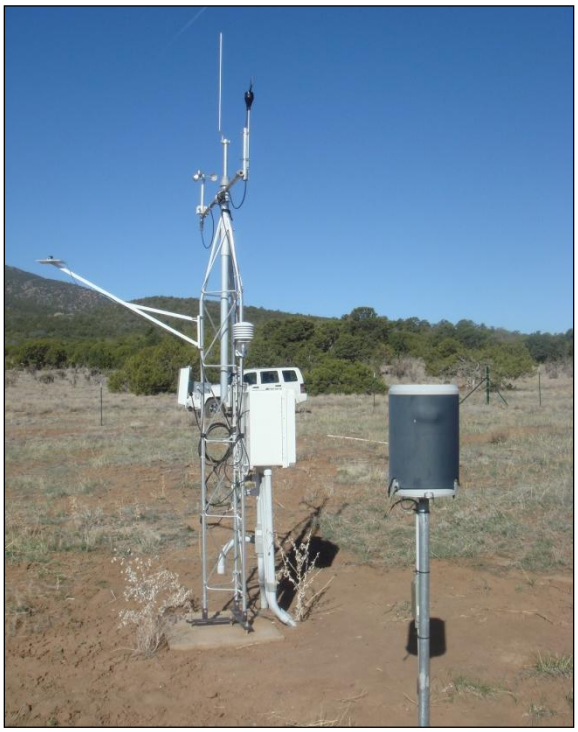
SOUTH MOUNTAIN WEATHER STATION: REPORT FOR QUARTER 4 (OCTOBER–DECEMBER) 2011



Prepared for
ESTANCIA BASIN WATERSHED HEALTH,
RESTORATION AND MONITORING STEERING COMMITTEE

c/o CLAUNCH-PINTO SOIL AND WATER CONSERVATION DISTRICT
P.O. Box 129
Mountainair, New Mexico 87036
Telephone (505) 847-2941

Prepared by
SWCA® ENVIRONMENTAL CONSULTANTS
5647 Jefferson Street NE
Albuquerque, New Mexico 87109
Telephone: (505) 254-1115; Fax: (505) 254-1116

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SOUTH MOUNTAIN WEATHER STATION DATA FOR QUARTER 4, 2011 (OCTOBER–DECEMBER)

This quarterly report provides graphs of summarized rainfall and soil moisture data for the period of October through December 2011. Please see the South Mountain Weather Station (SMWS) 2008 Annual Report on the New Mexico Forest and Watershed Restoration Institute (Restoration Institute) website (http://www.nmfwri.org/images/stories/pdfs/Estancia_Basin_Monitoring/South_Mountain_Weather_Station/SMWS_Manual.pdf) for detailed information about the location, configuration, history, and operation of the SMWS. Complete raw data files for hourly measurements of all SMWS variables were submitted to the Restoration Institute at the time this report was submitted. Those data files also may be accessed through the Restoration Institute website (ftp://ftp.nmfwri.org/South_Mountain_Excel_Files/). The weather station data logger records readings from all instruments every 10 minutes. Data presented here are summarized to hourly, daily, or monthly averages.

SUMMARY OF 2011 QUARTER 4 DATA

This section presents graphical summaries of data obtained from the SMWS, via wireless offload, for the interval of October 1 to December 31, 2011. Summary graphs and tables have been created for several basic climate parameters: 1) daily rainfall, 2) daily minimum and maximum ambient temperatures, 3) average daily ambient temperature with average daily relative humidity, and 4) daily average soil moisture at different depths for each both the Meadow and the Tree sites.

Below is a list of the variables that the SMWS takes every 10 minutes (Table 1). Not all the variables being measured are presented here, this report summarizes the more "important" data.

Table 1. SMWS Data Variables

Variable	Units
Wind speed	Inches
Wind direction	Miles per hour
Ambient air temperature	Degrees
Ambient relative humidity	Degrees Fahrenheit
Solar, lunar, and sky radiation intensity	Kilowatts per meter
Soil temperature at different depths	Degrees Fahrenheit
Soil moisture content at different depths	Kilopascals

Precipitation

Daily precipitation values from October 1 through December 31, 2011, are presented graphically in Figure 1 below. The total precipitation received during Quarter 4 was 3.54 inches with October receiving 1.51 inches, November receiving 0.14 inch, and December receiving 1.89 inches.

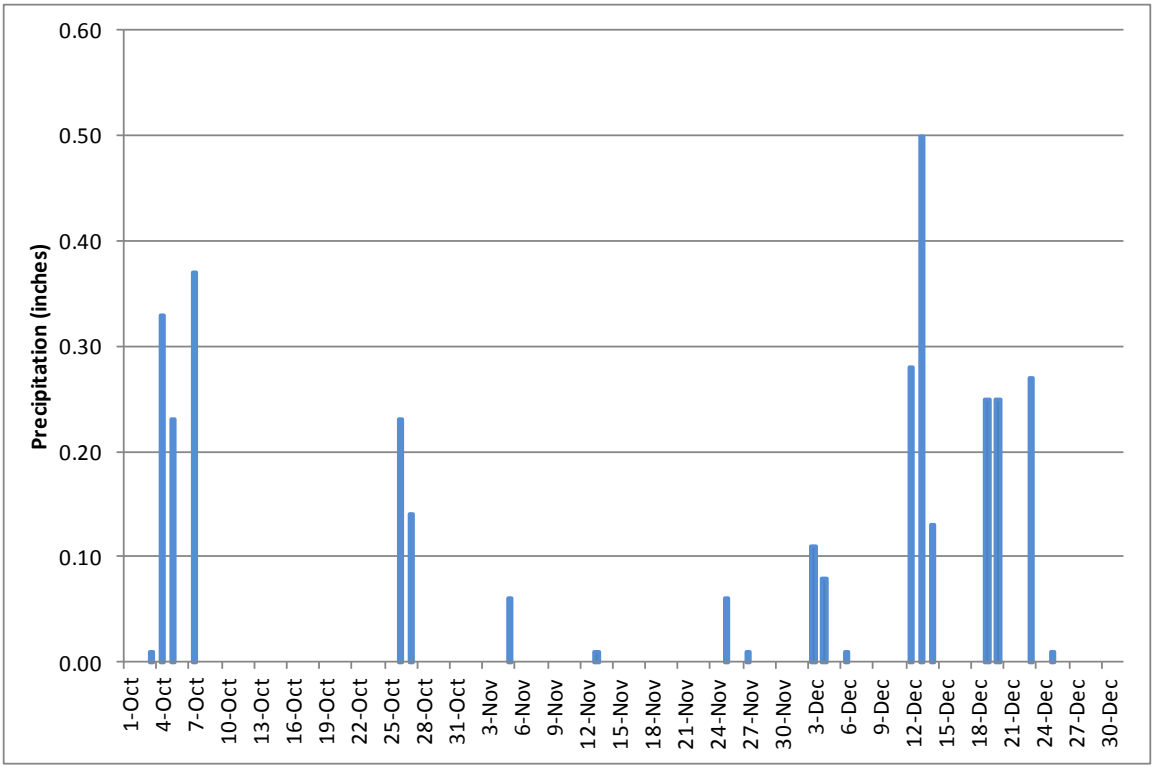

Figure 1. Daily total precipitation (inches), October–December 2011, from the SMWS.

Soil Moisture

Soil moisture measurements taken from both the Tree and Meadow sites are displayed below in Figure 2 through Figure 4.

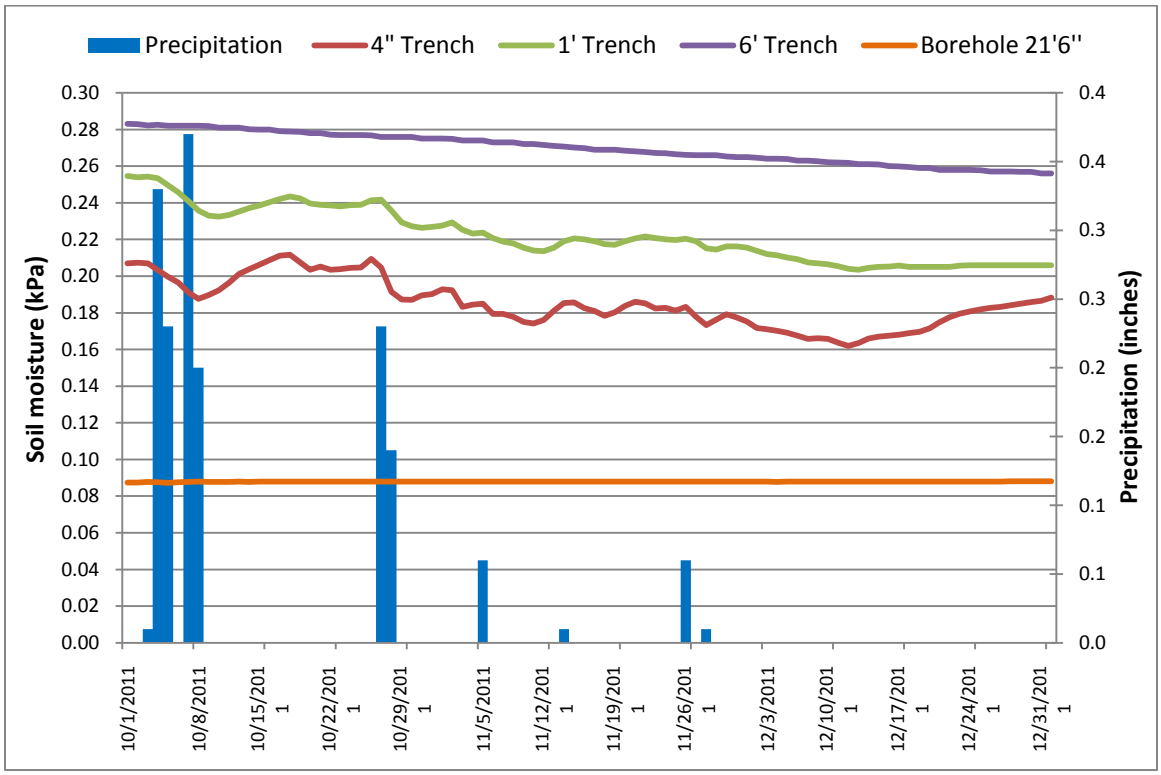

Figure 2. Tree site soil moisture levels (kPa) at four depths and daily precipitation amount (inches), October–December 31, 2011.

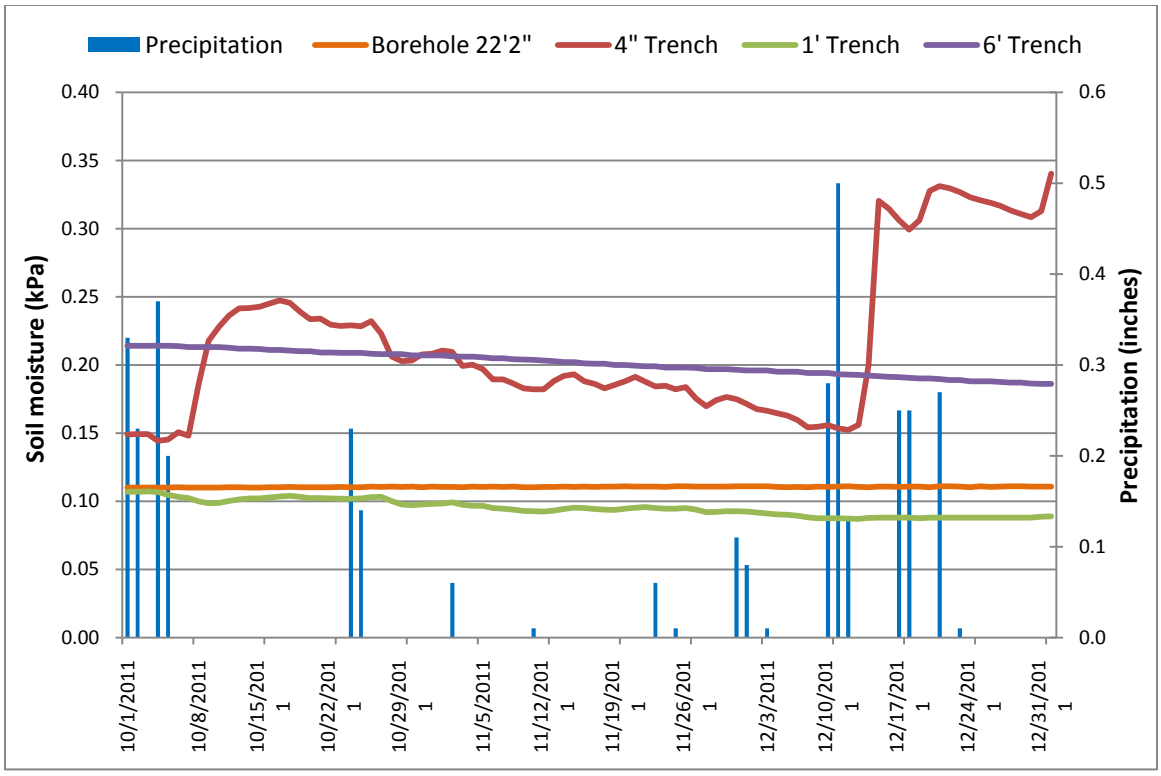

Figure 3. Meadow site soil moisture levels (kPa) at four depths and daily precipitation amount (inches), October–December 2011.

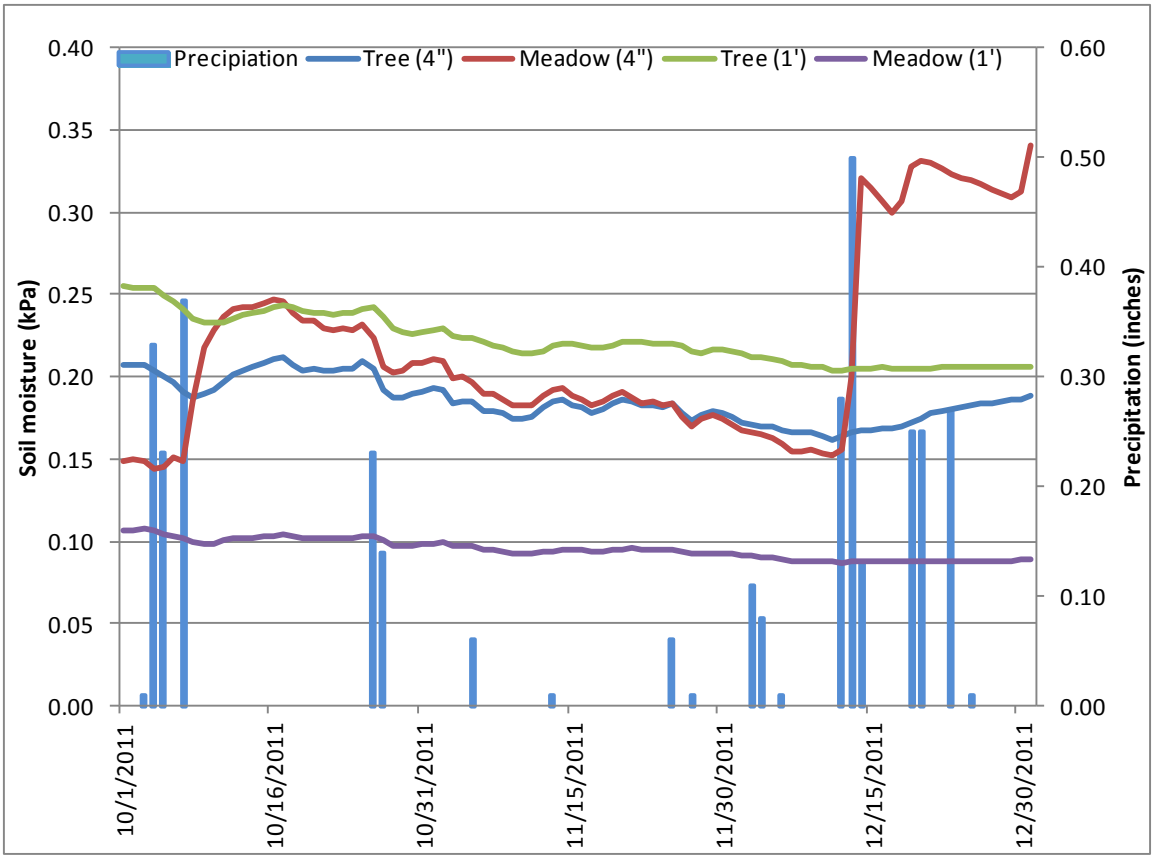

Figure 4. Comparison of Tree and Meadow soil moisture levels at the 4-inch and 1-foot depths, along with precipitation, October–December 2011.

Temperature and Relative Humidity

Figure 5 and Figure 6 summarize the daily minimum and maximum ambient temperatures occurring during Quarter 4. Figure 7 displays the average temperature plotted against the average relative humidity.

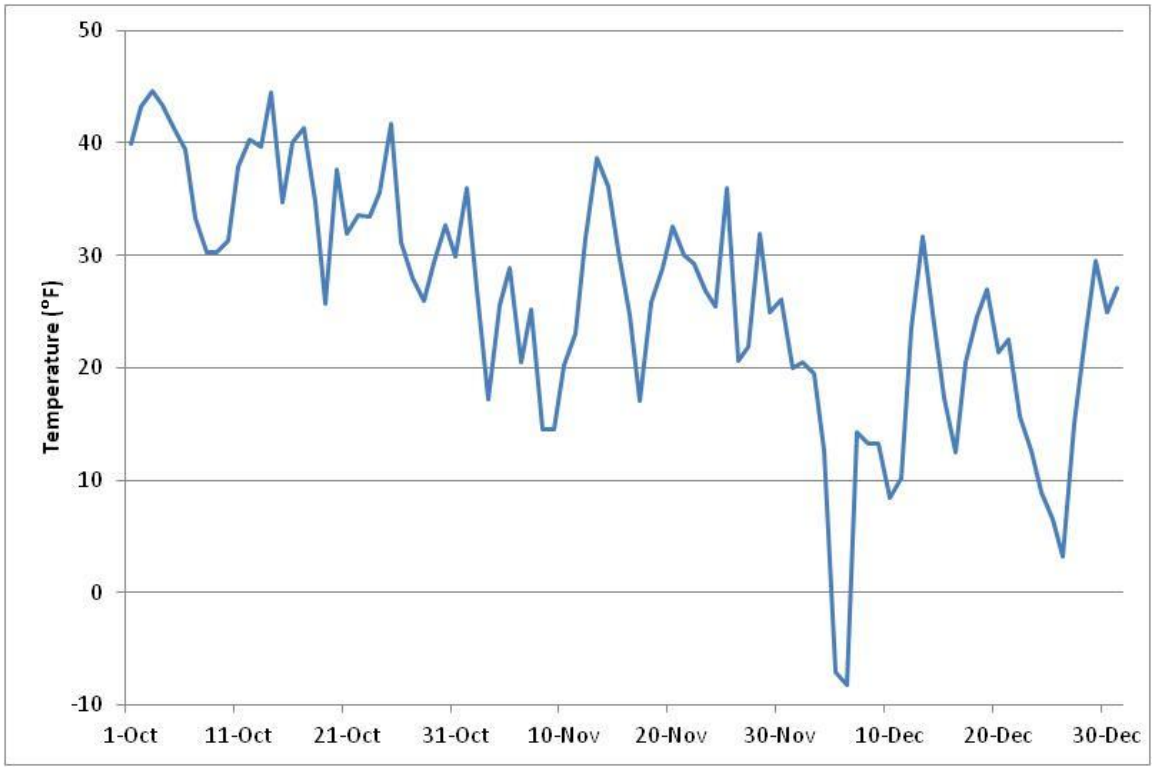

Figure 5. Daily minimum ambient air temperature (degrees Fahrenheit), October–December 2011.

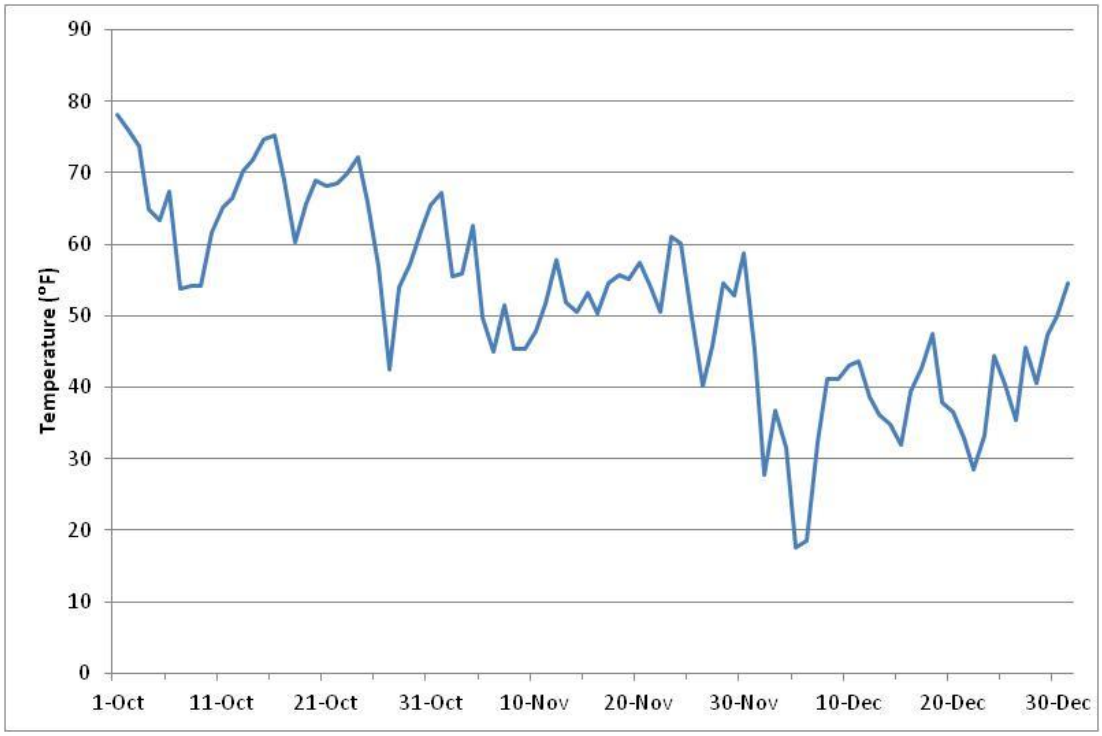

Figure 6. Daily maximum ambient air temperature (degrees Fahrenheit), October–December 2011.

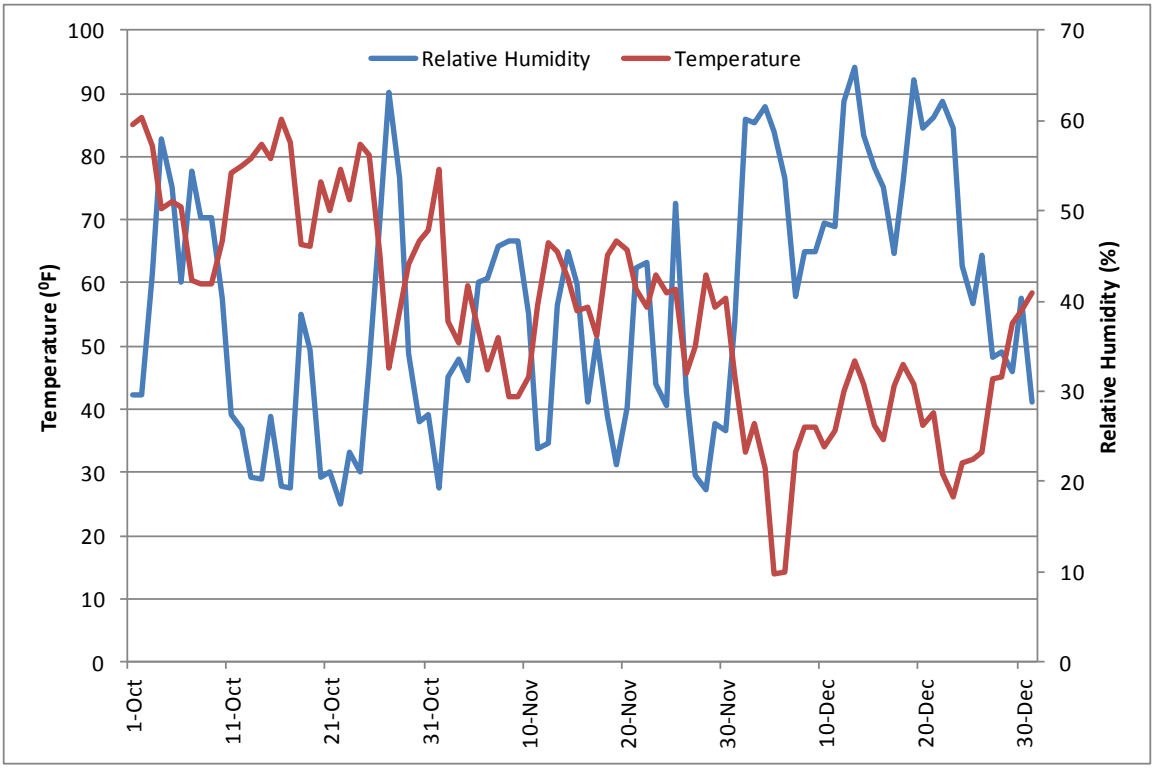

Figure 7. Daily average ambient air temperature and relative humidity, October–December 2011.

Interpretation of Quarter 4 2011 Data

The overlay of precipitation and soil moisture showed correlation between precipitation and soil moisture levels during the time period of October to December 2011. A response to the precipitation events can clearly be seen in the soil moistures at both the Tree and Meadow sites. Visually examining the graphs of soil moisture and precipitation at the Tree and Meadow sites show that the soil moisture response was more pronounced at the 4-inch and 1-foot trench levels at the Meadow location. This can possibly be attributed to the difference of the spatial variances between the sites. Not surprisingly, the closer to the surface and the more exposed to the elements, the faster the soil moisture values for the Meadow site respond to precipitation in comparison with the Tree site.

The atmospheric data collected at the SMWS can be used as a reference for particular storm events. It also can provide the ability to compare meteorological data from 2008, 2009, 2010, 2011, and future data. For example, this year it would be possible to compare 2007–2011 precipitation data and daily maximum temperatures to see how the inter-year variability looks. The SMWS will also provide an interesting comparison to the WatchDog Mini Weather Stations installed in and around the Estancia Basin and within the Trigo fire burn area perimeter.