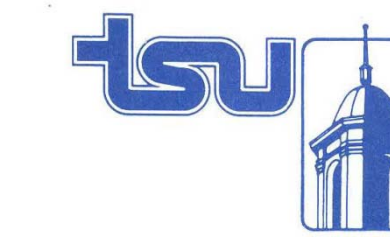


# Online Remote-Sensing Tool for Calculating Evapotranspiration

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## Introduction

An automated online remote sensing model based on the energy balance to calculate lake evaporation (E) and crop evapotranspiration (ET) can be used to monitor irrigation scheduling and calculate water loss from lakes. The model inputs are daily and hourly weather data (humidity, temperature, and wind speed) and MODIS satellite data.



## Objective

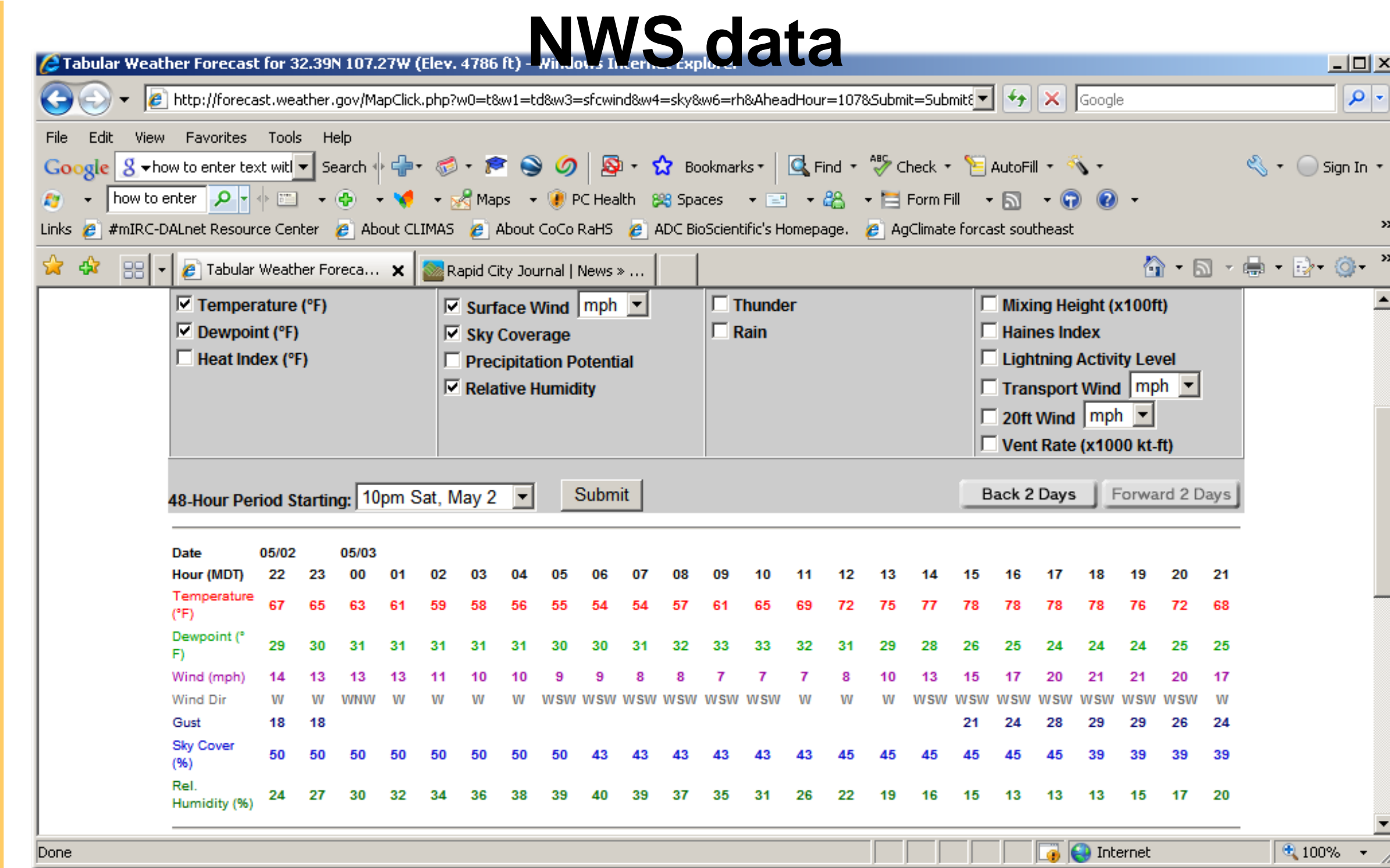
The objective of the research was to develop an automated Internet-based remote sensing tool to evaluate evapotranspiration using MODIS satellite data.

**Procedures:** The model was written in C++, coupled with HDFViewer (from NASA), and automated for downloading (from Internet satellite data sites and weather data sites), inputting, processing, and outputting data on the Internet. The model has a 1000 m spatial resolution and a daily temporal resolution. The weather data is acquired from a point weather station or from the National Weather Service one day in the future forecast model.

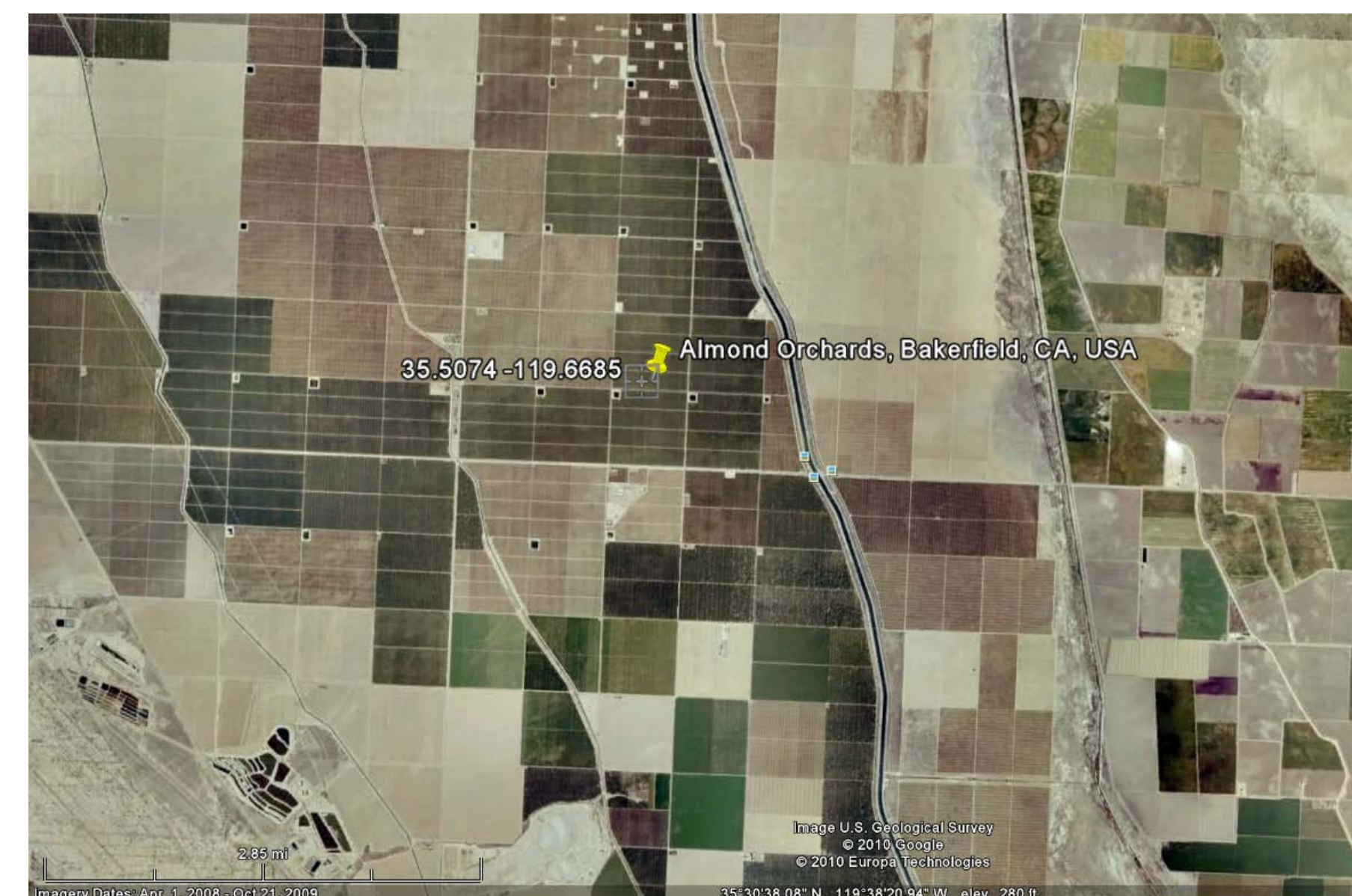
The hot and cold spots required by the model were acquired automatically using a search routine based around the point of interest specified in the input file. The cold spot had to have a NDVI > 0.5 unless a switch was turned on in the input file to allow the cold spot to be a water body with a NDVI of <0.0.

## National Weather Services' (NWS) hourly forecast model.

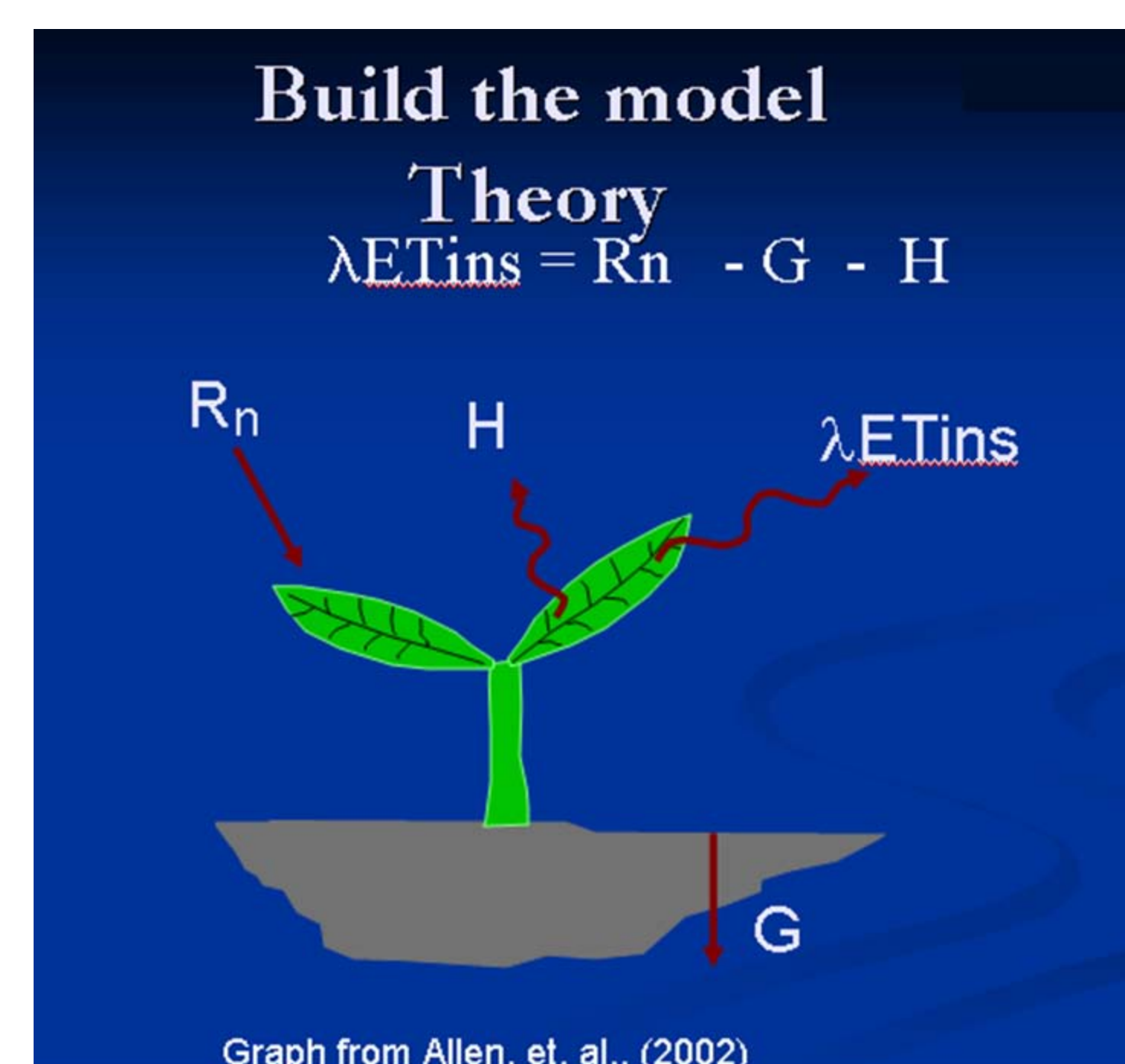
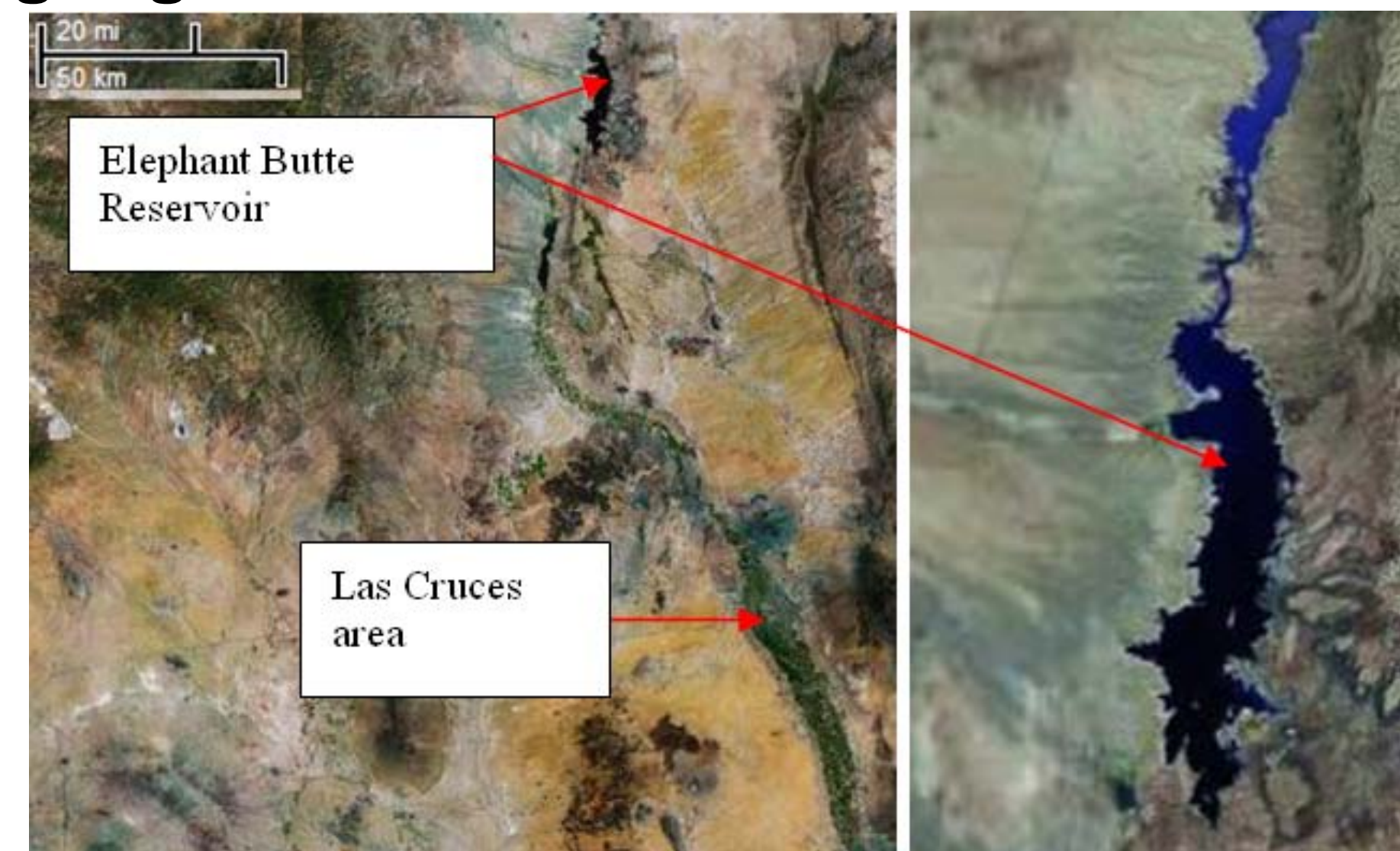
A Python script was written to read a location (lat. and long.), capture and parse the data into an ASCII file and calculate daily reference Etr based on the forecast data for the next 24 hr. (1-5 km resolution)



ET Measurement Site: Almond, Bakerfield, CA)



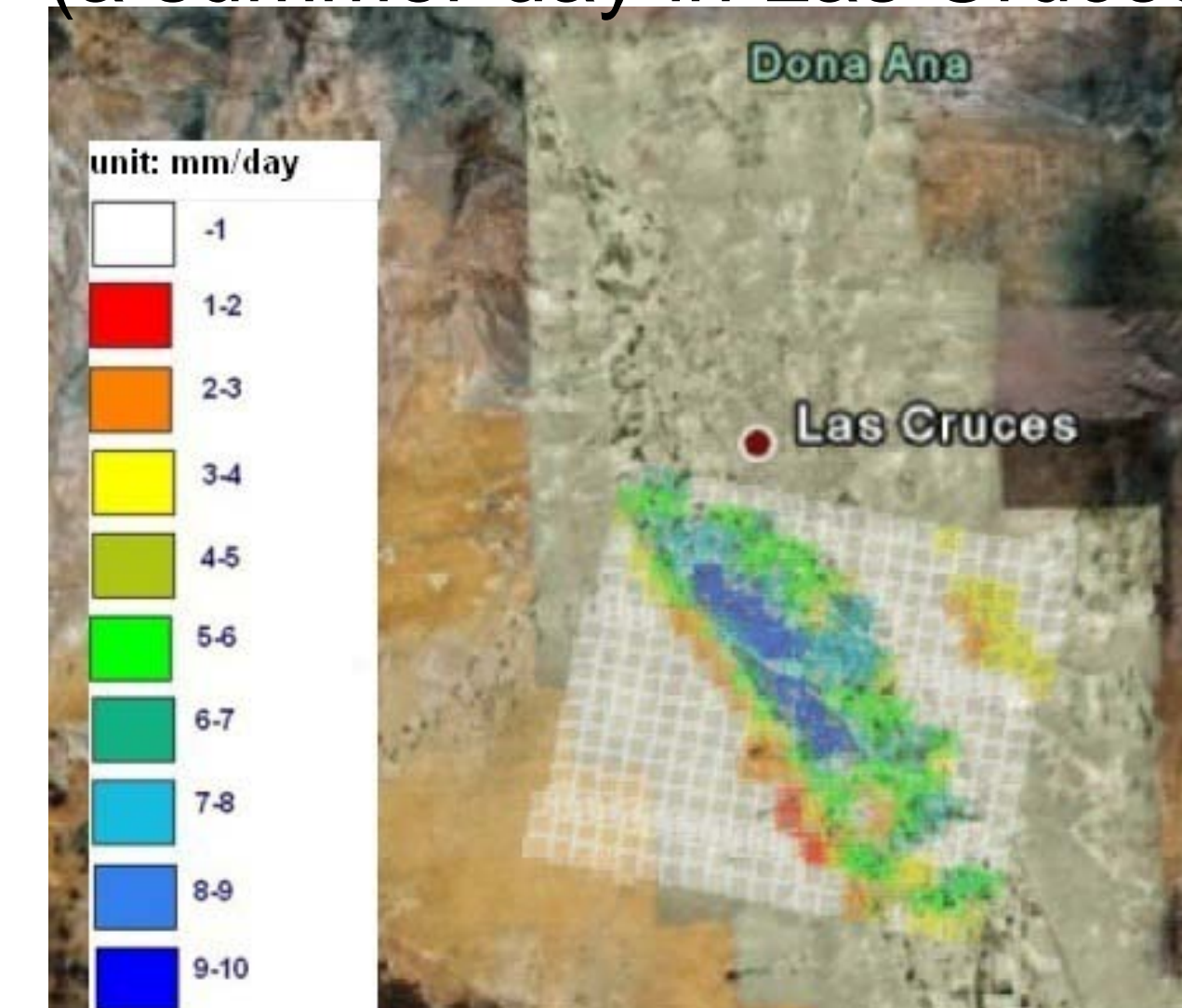
ET Measurement site: Elephant Butte Reservoir and Las Cruces area, NM, USA. From maps.google.com



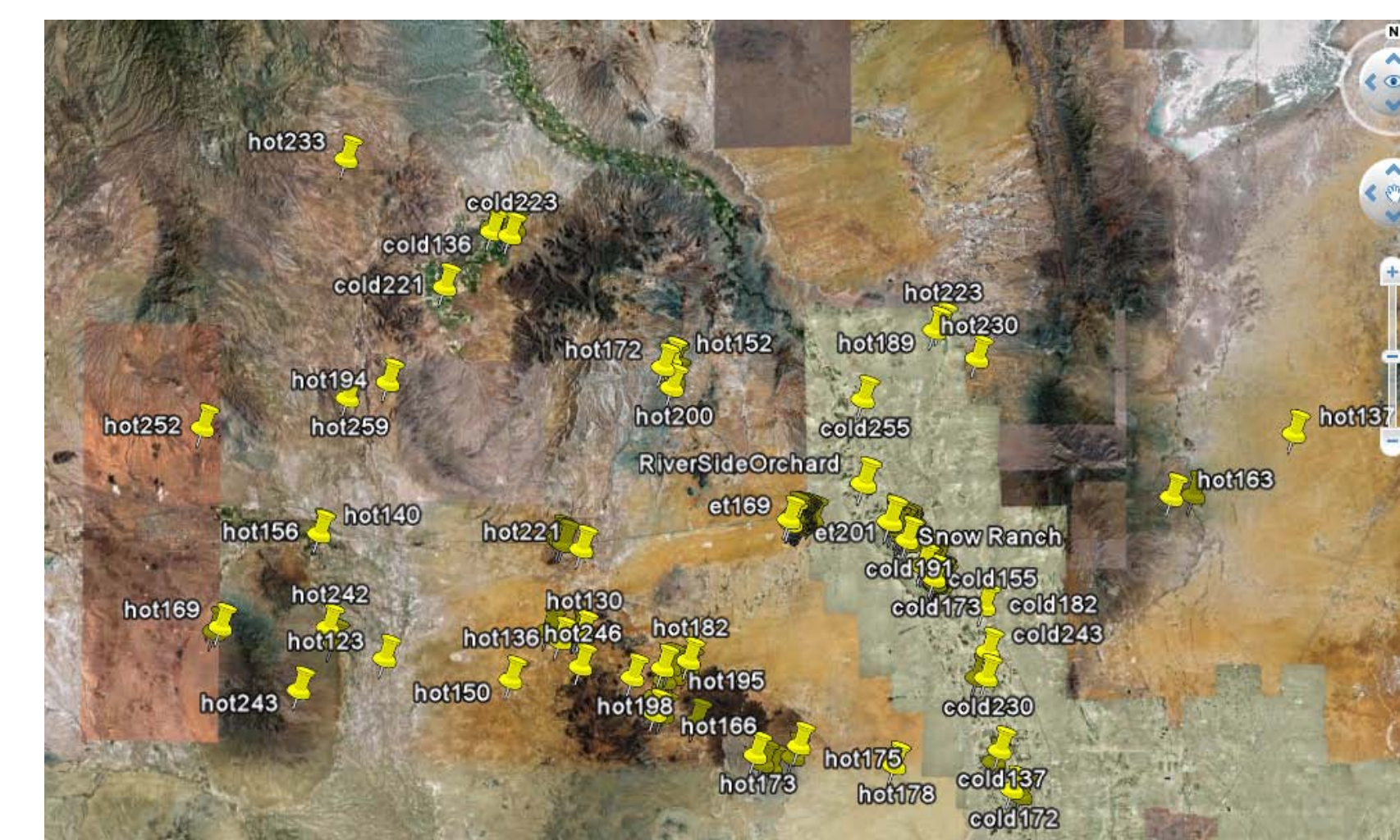
## Internet Interface ([Rset.nmsu.edu; remotesensing.tnstate.edu](http://Rset.nmsu.edu/remotesensing.tnstate.edu))



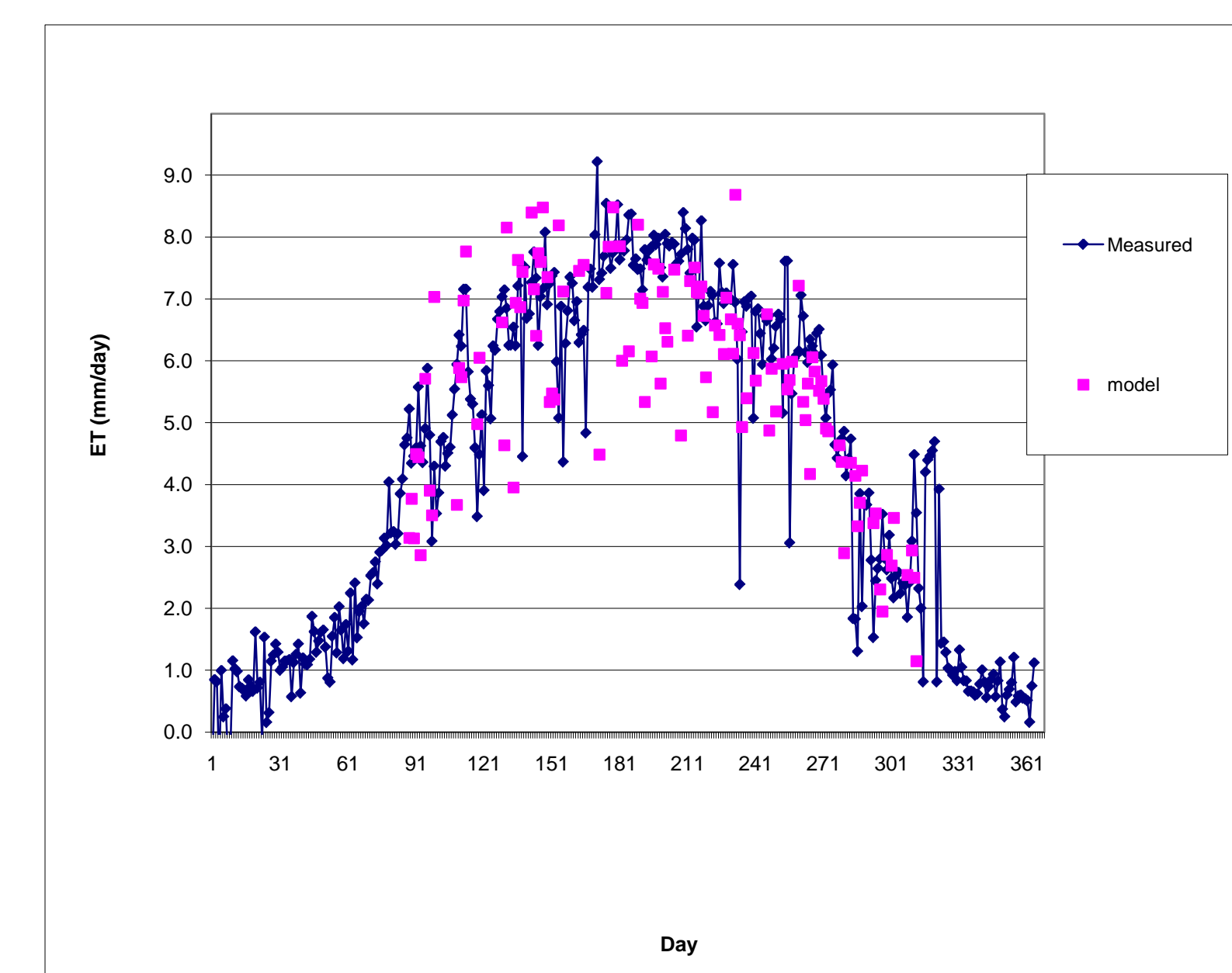
GoogleMap ET output (a summer day in Las Cruces, NM)



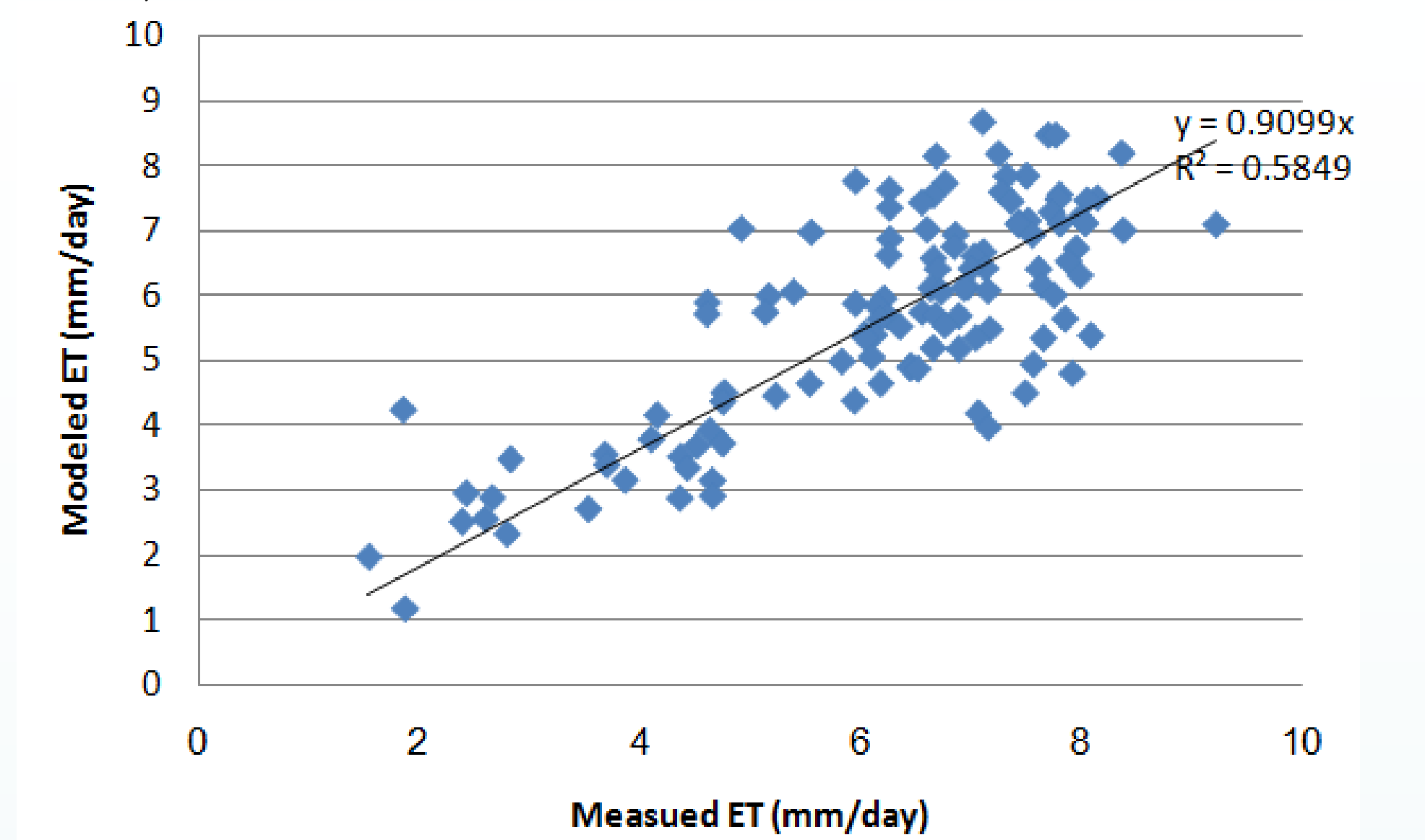
Model searched cold and hot spots used in the ET calculations.



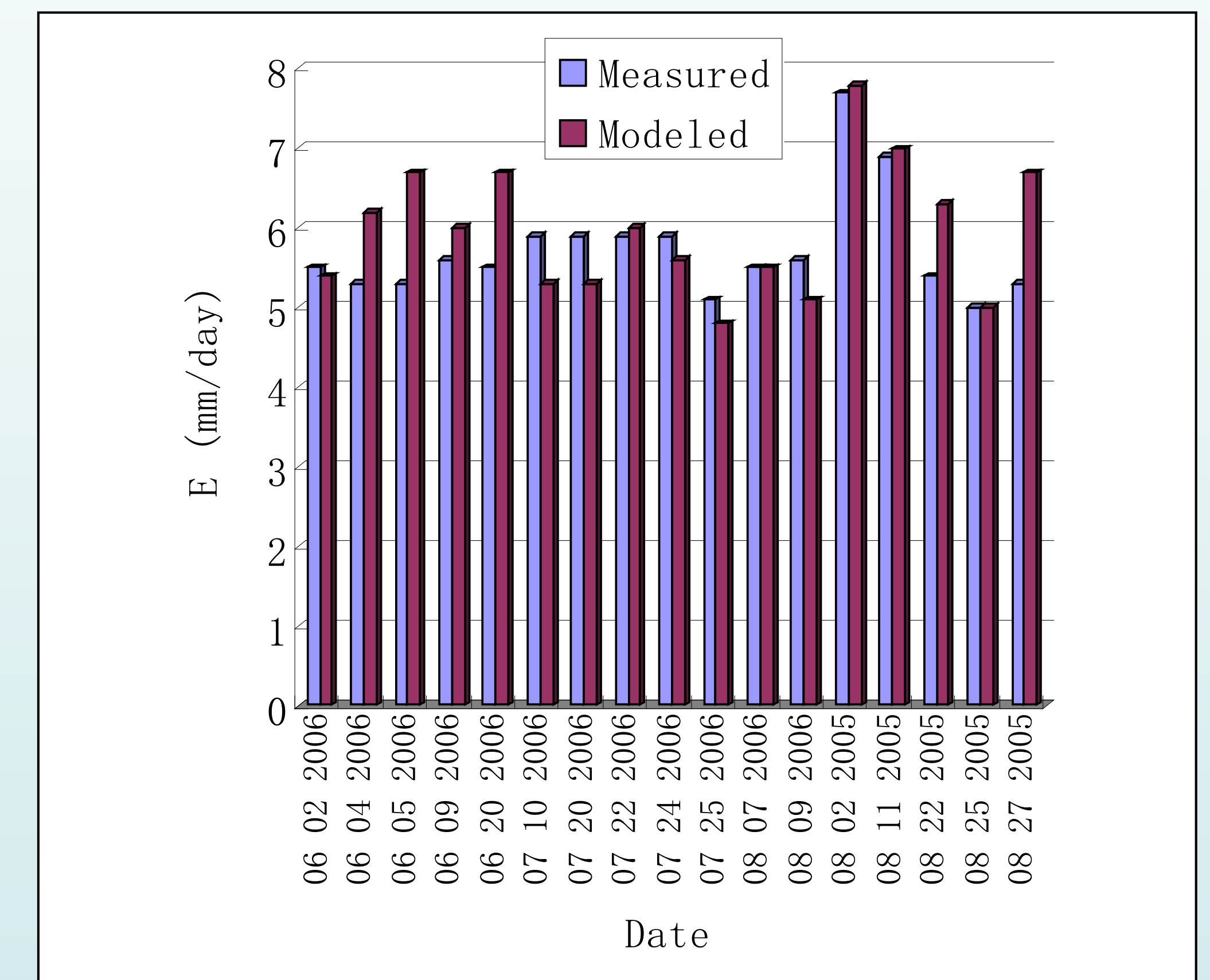
## Modeled vs. Measured ET at Bakerfield, CA, USA



## Modeled vs. Measured Et at Bakerfield, CA, USA



## Modeled vs. Measured ET at Elephant Butte Reservoir, New Mexico, USA



## Conclusions

1. Remote sensing calculation of ET using MODIS satellite data was automated that makes multiple-year daily spatial Et calculation possible and the online model is easy to use even for a layman.

2. The preliminary evaluation showed that the accuracy was acceptable.