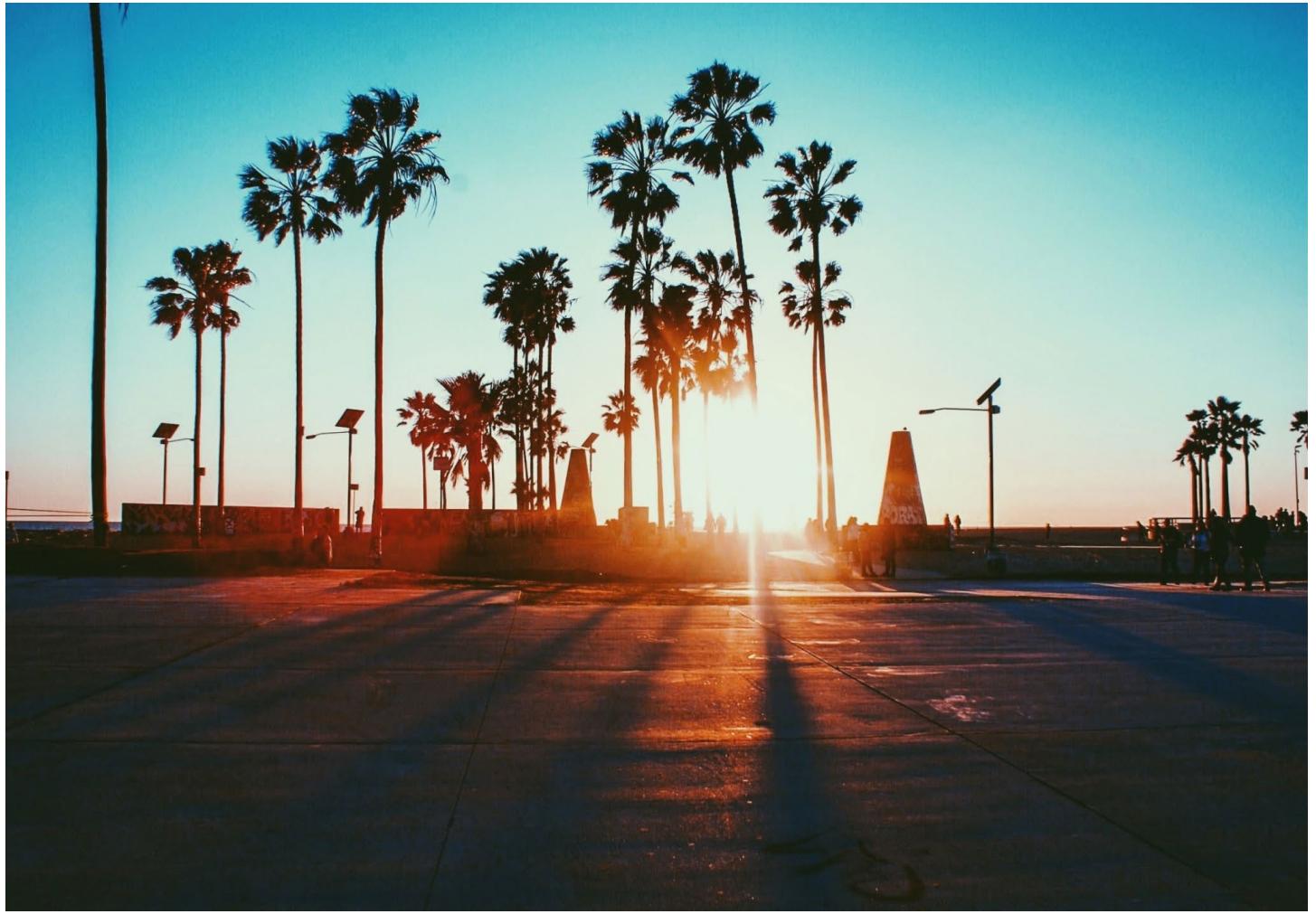


REPORT

CALIFORNIA ESTIMATED AVERAGE HIGH TEMPERATURES FOR JANUARY AND AUGUST



 Clement Geospatial

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UCLA GEOG 181B
Week 1 – Interpolation
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Introduction

California's climate varies from desert to subarctic depending on the latitude, elevation, and proximity to the Pacific Ocean. The coastal regions, Sierra Nevada foothills, and Central Valley have a Mediterranean climate while the Southeastern area of the state is desert. The subarctic climate is in the east-central area of California. This report provides the average high temperatures during January and August for the large to medium cities including Los Angeles, San Francisco, Sacramento, San Diego, San Jose, Fremont, Fresno, Lancaster, Palmdale, Riverside, Apple Valley, Lucerne Valley, California City, and Palm Springs.

Method

The data used for this report was collected from the National Oceanic and Atmospheric Administration (NOAA) and the UCLA GIS Portal websites. The NOAA data is the Long-term averages of monthly maximum temperature for California for the January and August. The data collected from the UCLA GIS Portal website is the US Census Bureau 2014 TIGER/Line shapefile containing the polygons for cities and Census-designated places.

The method used to interpolate the average high temperature data for January and August was Kriging with either an exponential or K-Bessel model type. These methods were chosen for the mean standard errors of .01 and .007.

Method Report

Input datasets	
Dataset	C:\Users\shane\OneDrive\Documents\UCLA\Adv GIS\Week 1\Assignment\aug_hightemps_kriging
Type	Feature Class
Data field 1	MEAN
Records	965
Method	
Type	Kriging
Output type	Ordinary
Dataset #	1
Trend type	None
Searching neighborhood	Standard
Neighbors to include	5
Include at least	2
Sector type	Four and 45 degree
Major semiaxis	1.395297166574
Minor semiaxis	1.395297166574
Angle	0
Variogram	Semivariogram
Number of lags	12
Lag size	0.174412145822
Nugget	8.703034175995
Measurement error %	100
Model type	K-Bessel
Parameter	0.988819876073
Range	1.395297166574
Anisotropy	No
Partial sill	179.250329117582

Method Report

Input datasets	
Dataset	C:\Users\shane\OneDrive\Documents\UCLA\Adv GIS\Week 1\Assignment\jan_avgtemps
Type	Feature Class
Data field 1	MEAN
Records	965
Method	
Type	Kriging
Output type	Ordinary
Dataset #	1
Trend type	None
Searching neighborhood	Standard
Neighbors to include	5
Include at least	2
Sector type	Four and 45 degree
Major semiaxis	0.787198468261
Minor semiaxis	0.787198468261
Angle	0
Variogram	Semivariogram
Number of lags	12
Lag size	0.098399808533
Nugget	0
Measurement error %	100
Model type	Exponential
Range	0.787198468261
Anisotropy	No
Partial sill	121.568768874914

To compare the accuracy of the Kriging results, the Inverse Distance Weighted interpolation was applied to the January average high temperature data.

Method Report

Input datasets	
Dataset	C:\Users\shane\OneDrive\Documents\UCLA\Adv GIS\Week 1\Assignment\idw_janhightemps
Type	Feature Class
Data field 1	MEAN
Records	965
Method Inverse Distance Weighted Interpolation	
Power	2
Searching neighborhood Standard	
Neighbors to include	15
Include at least	10
Sector type	Four and 45 degree
Major semiaxis	3.394173630244
Minor semiaxis	3.394173630244
Angle	0

In addition to applying Kriging and IDW, Zonal Statistics were applied to the raster values to determine the estimated values for the cities and Census-designated places.

Results

Much of the results were as expected for California. The desert climates provided the greater variance of highs and lows from January to August while the coastal areas had more stable annual temperatures.

The following are the cities with the highest average temperatures for January and August using Kriging interpolation.

January – Warmest Cities

City Name	Mean High Temperature
Mecca	70
North Tustin	68
Coto de Caza	67
Tustin	67
North Shore	67
Rancho Santa Margarita	67
Irvine	67
Lake Forest	67
Mission Viejo	67
Fountain Valley	67

January – Coldest Cities *

City Name	Mean High Temperature
Fiddletown	17
Buckhorn	16
Manton	16
Shingletown	15
Acton	15
Vincent	13
Agua Dulce	11
Azusa	8
Glendora	8
Millville	7

August – Warmest Cities

City Name	Mean High Temperature
Big River	105
Needles	103
Desert Center	99
Furnace Creek	98
Twentynine Palms	98
Searless Valley	97
Valley Wells	96
Trona	96
Baker	96
Homewood Canyon	96

August – Coldest Cities *

City Name	Mean High Temperature
La Canada Flintridge	40
Arcadia	40
El Monte	39
Altadena	39
Irwindale	37
Monrovia	35
Vincent	35
Glendora	33
Duarte	33
Azusa	30

Using the IDW interpolation method to the January data provided the following results.

January – Warmest Cities

City Name	Mean High Temperature
Mecca	71
Thermal	70
Imperial	69
Seeley	69
Coachella	68
El Centro	68
Oasis	67
Valle Vista	67
Blythe	67
Mesa Verde	67

January – Coldest Cities *

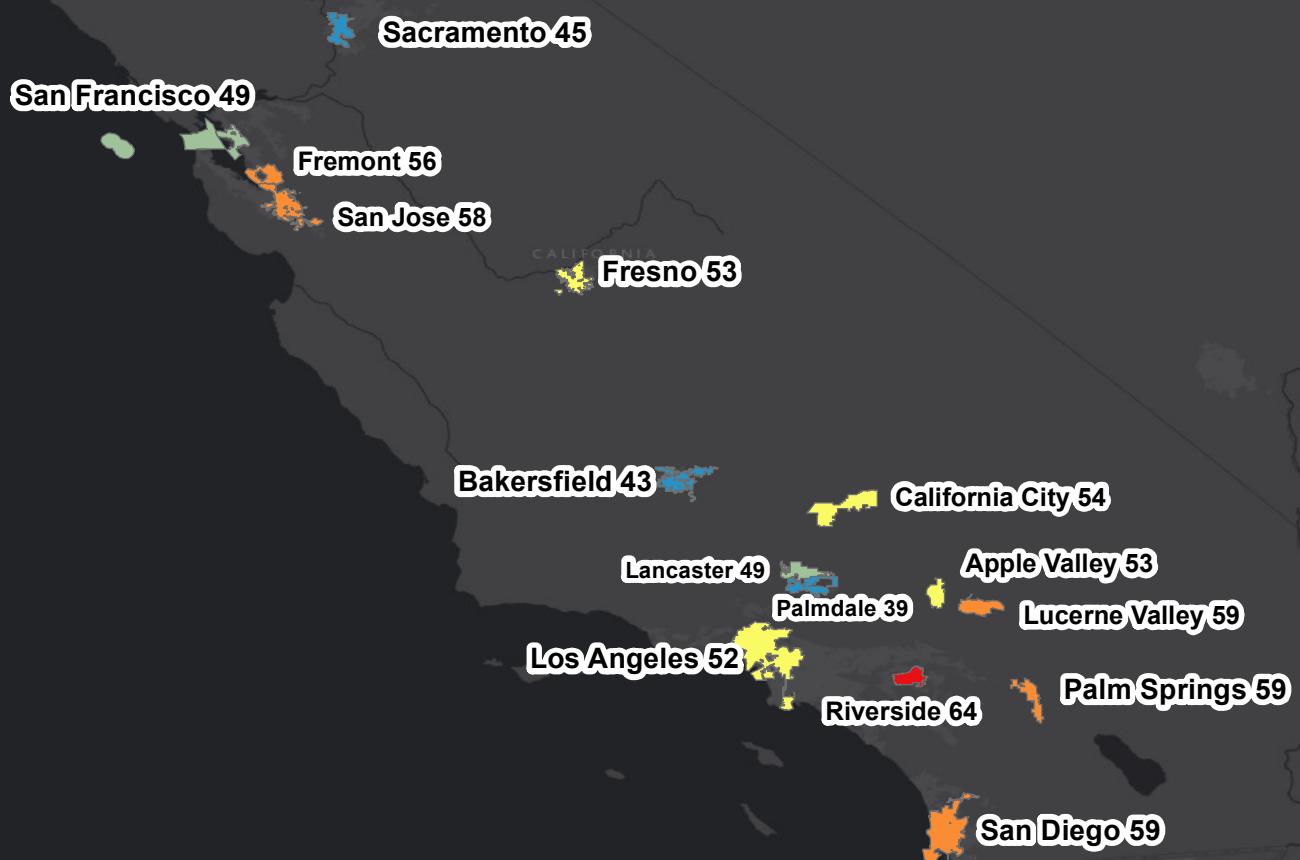
City Name	Mean High Temperature
Shingletown	6
McArthur	4
Glendora	4
West Point	3
East Nicolaus	2
Tobin	1
Azusa	1
Altadena	1
Gasquet	.8

There is a noticeable issue with the coldest cities for January and August. The temperature data is in Fahrenheit while these results appear to be in Celsius. The noted * cities were null values in the original datasets from NOAA and seemingly delivered inaccurate results. Multiple strategies were attempted to correct these data points with minimal success.

The maps demonstrate the average high temperatures for January and August for the large to midsize cities in California. The selected cities are desirable locations for potential residents. The below table compares the results for these cities with actual temperature data collected from the National Weather Service on NOWData. The selected NOWdata is the monthly summarized average maximum temperatures from 2010-2021.

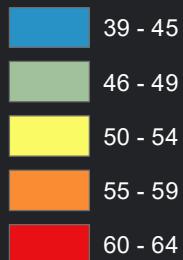
California Average High Temperatures in January

1:6,000,000



Temperatures in January

MEAN



California Average High Temperatures in August

1:5,000,000



Sacramento 71

San Francisco 67

Fremont 78

San Jose 81

Fresno 87

Bakersfield 76

California City 90

Lancaster 72

Palmdale 62

Apple Valley 88

Lucerne Valley 91

Los Angeles 62

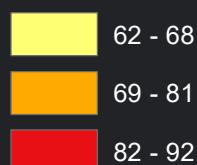
Riverside 91

Palm Springs 92

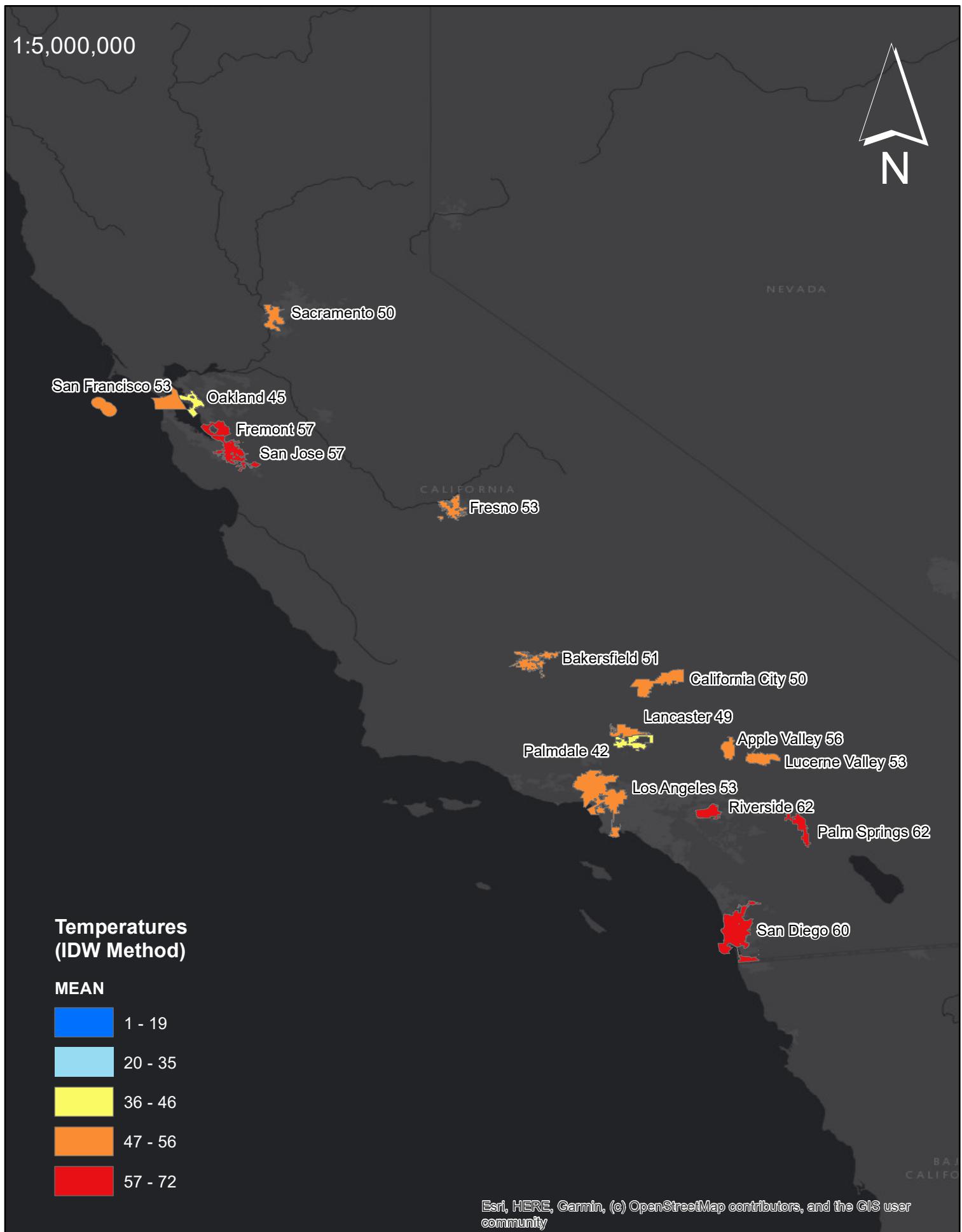
San Diego 73

Temperatures

MEAN



California Average High Temperature in January



Kriging Interpolation Compared to National Weather Service Actuals

City Name	January – Kriging	August – Kriging	January – NOAA	August - NOAA
Los Angeles	52	62	67	74
Sacramento	45	71	57	92
San Francisco	49	67	58	72
San Diego	59	73	67	77
Bakersfield	43	76	60	98
Fremont	56	78	N/A	N/A
Fresno	53	87	58	99
Lancaster	49	72	58	97
Palmdale	39	92	58	97
Riverside	64	91	69	93
Apple Valley	53	88	N/A	N/A
California City	54	90	N/A	N/A
Lucerne Valley	59	91	N/A	N/A
Palm Springs	59	92	71	108
San Jose	58	81	61	81

Conclusion

The Kriging interpolation method provided better results than the IDW method but, lower average high temperatures compared to the actual temperature data presented by the National Weather Service. The overall results demonstrate the climate differences between coastal and desert regions. Additional methods should be considered to ensure the accuracy of the Kriging interpolation results.