

## Optimization in Relation to Problem Solving

Sonnblick (1990)

Parameter	Value
Iterations	400
Learning Rate (Alpha)	0.1
Starting Theta0	-2
Starting Theta1	-10

Madrid (2022)

Parameter	Value
Iterations	100
Learning Rate (Alpha)	0.03
Starting Theta0	2
Starting Theta1	1

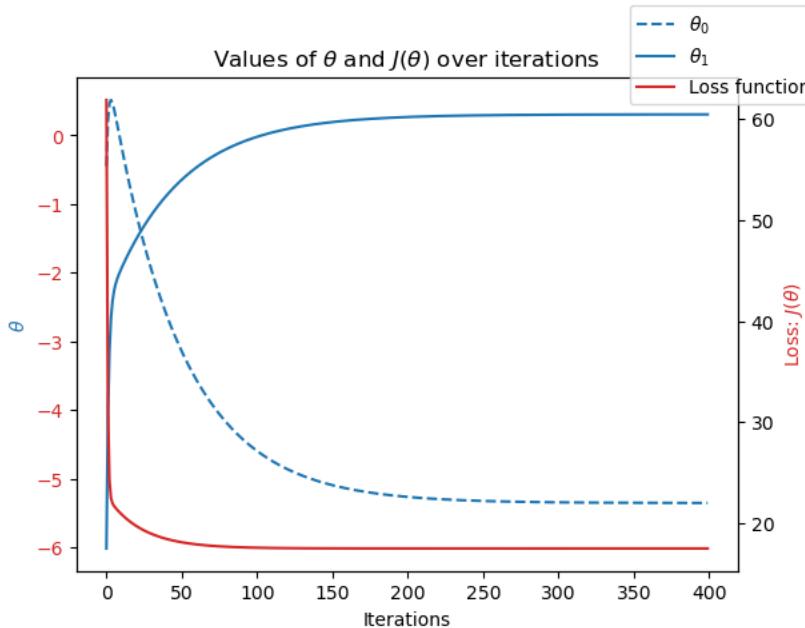
Budapest 2000

Parameter	Value
Iterations	400
Learning Rate (Alpha)	0.1
Starting Theta0	-2
Starting Theta1	2

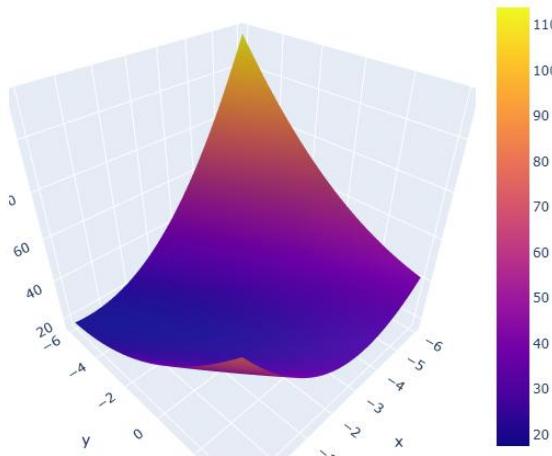
## Results by Station and Year

Sonnblick (1990)

Metric	Value
Final Theta0	-5.36
Final Theta1	0.31
Minimum Temperature	-21.7 C
Maximum Temperature	7.8 C
Convergence	Successful

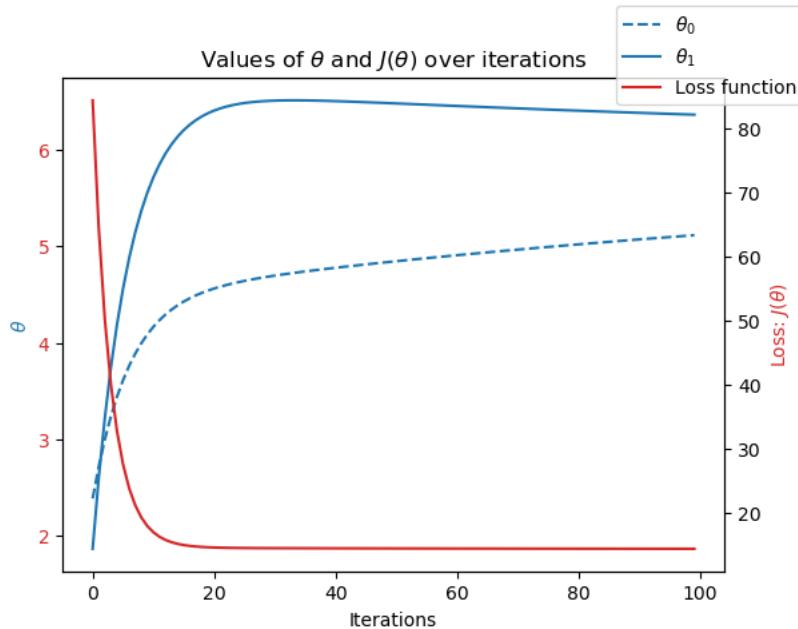


Loss function for different thetas

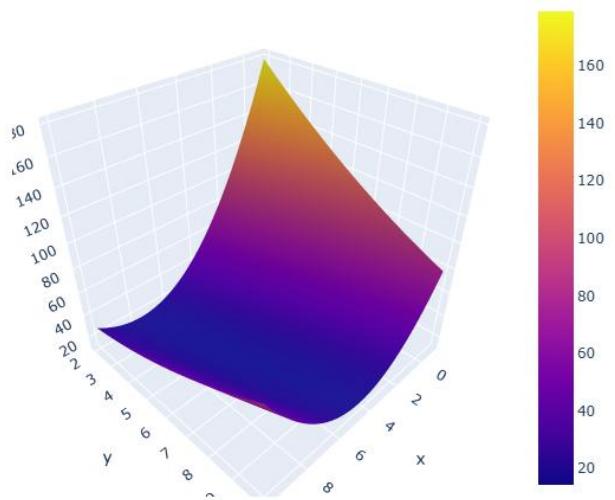


Madrid (2022)

Metric	Value
Final Theta0	5.11
Final Theta1	6.36
Minimum Temperature	3.0 C
Maximum Temperature	33.4 C
Convergence	Successful

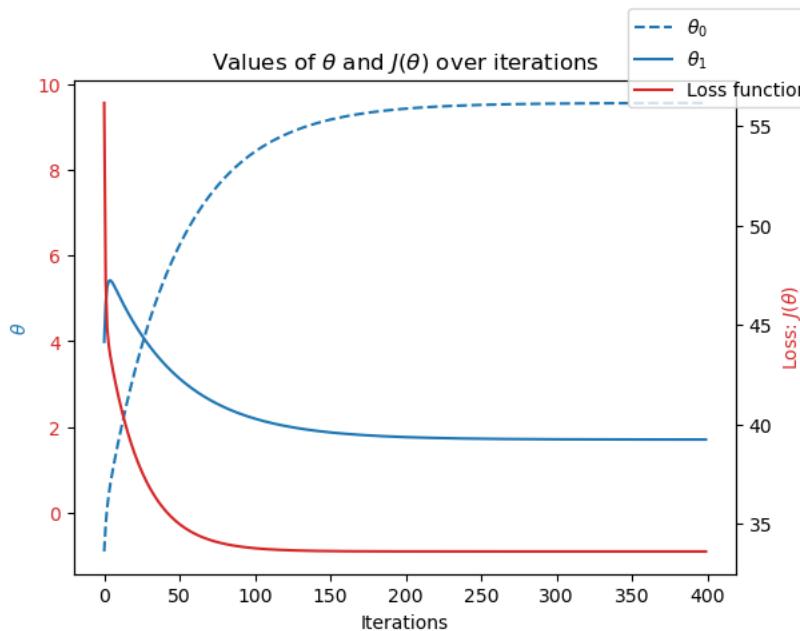


Loss function for different thetas

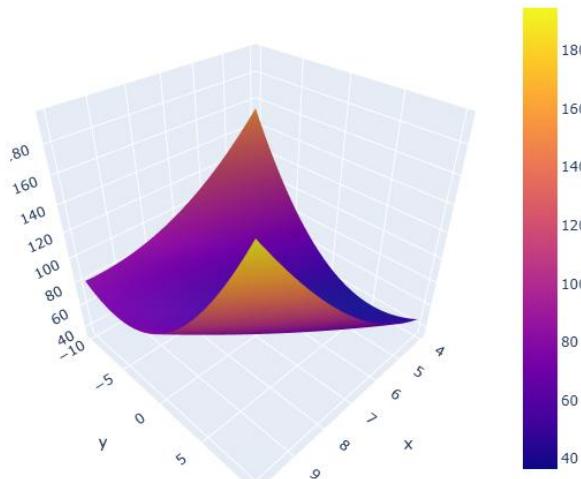


Budapest 2000

Metric	Value
Final Theta0	9.55
Final Theta1	1.71
Minimum Temperature	-6.6 C
Maximum Temperature	29.5 C
Convergence	Successful



Loss function for different thetas



## Observation

1. All three stations show long term warming, but at different rates. The positive final Theta1 in each location indicates an overall increase in temperature. However, the rate of warming varies substantially.
2. The baseline temperatures reflect geographic and climate conditions. Sonnblick's negative Theta0 confirms cold baseline temperatures. Budapest Theta0 indicates a moderate baseline climate. Finally, Madrid's Theta0 reflects warm baseline conditions, though its steep warming trend leads to much higher temperature over time.
3. Temperature ranges increase with warming intensity. Sonnblick has the coldest range, Budapest shows wider range that might indicate seasonal variation, and Madrid has the warmest and widest range. This suggests that stations with stronger warming trends also experience higher maximum temperatures and broader variability.