

```
In [1]: # Dependencies and Setup
import matplotlib.pyplot as plt
import pandas as pd
import numpy as np
import requests
import time

# Import API key
from config import (api_key, gkey)

# Incorporated citipy to determine city based on latitude and longitude
from citipy import citipy

# Dependencies
import openweathermapy.core as owm
import gmaps

# Output File (CSV)
output_data_file = "output_data/cities.csv"

# Range of latitudes and longitudes
lat_range = (-90, 90)
lng_range = (-180, 180)
```

Generate Cities List

```
In [2]: # List for holding lat_lngs and cities
lat_lngs = []
cities = []

# Create a set of random lat and lng combinations
lats = np.random.uniform(low=-90.000, high=90.000, size=1500)
lngs = np.random.uniform(low=-180.000, high=180.000, size=1500)
lat_lngs = zip(lats, lngs)

# Identify nearest city for each lat, lng combination
for lat_lng in lat_lngs:
    city = citipy.nearest_city(lat_lng[0], lat_lng[1]).city_name

    # If the city is unique, then add it to a our cities list
    if city not in cities:
        cities.append(city)

# Print the city count to confirm sufficient count
len(cities)
```

Out[2]: 639

Perform API Calls

```
In [3]: # Dictionary for holding city and weather info
weatherCity = {}

# Create settings dictionary with information we're interested in OpenWeatherMap API Key
settings = {"units": "imperial", "appid": api_key}

# Print header
print("""Beginning Data Retrieval
-----""")

# Get current weather per city
counter = 1
setCounter = 1
for city in cities:
    try:
        print(f"Processing Record {counter} of Set {setCounter} | {city}")

        current_weather_city = owm.get_current(city, **settings)
        # Add city and weather object into
        weatherCity[city] = current_weather_city
        counter += 1
        if(counter == 50):
            counter = 0
            setCounter += 1
    except:
        # ignore city and continue on
        continue
```

Beginning Data Retrieval

```

-----
Processing Record 1 of Set 1 | salekhard
Processing Record 2 of Set 1 | zhigansk
Processing Record 3 of Set 1 | okato
Processing Record 4 of Set 1 | zhuhai
Processing Record 5 of Set 1 | chokurdakh
Processing Record 6 of Set 1 | punta arenas
Processing Record 7 of Set 1 | black river
Processing Record 8 of Set 1 | sibolga
Processing Record 9 of Set 1 | arroyo
Processing Record 10 of Set 1 | hobart
Processing Record 11 of Set 1 | pacific grove
Processing Record 12 of Set 1 | halifax
Processing Record 13 of Set 1 | barentsburg
Processing Record 13 of Set 1 | fortuna
Processing Record 14 of Set 1 | megion
Processing Record 15 of Set 1 | port hedland
Processing Record 16 of Set 1 | busselton
Processing Record 17 of Set 1 | kapaa
Processing Record 18 of Set 1 | saint-philippe
Processing Record 19 of Set 1 | ushuaia
Processing Record 20 of Set 1 | uray
Processing Record 21 of Set 1 | butaritari
Processing Record 22 of Set 1 | guapore
Processing Record 22 of Set 1 | banda aceh
Processing Record 23 of Set 1 | cape town
Processing Record 24 of Set 1 | grand river south east
Processing Record 24 of Set 1 | orlik
Processing Record 25 of Set 1 | fuerte olimpo
Processing Record 26 of Set 1 | souillac
Processing Record 27 of Set 1 | kaitangata
Processing Record 28 of Set 1 | alofi
Processing Record 29 of Set 1 | albany
Processing Record 30 of Set 1 | novobirilyussy
Processing Record 31 of Set 1 | geraldton
Processing Record 32 of Set 1 | carnarvon
Processing Record 33 of Set 1 | hilo
Processing Record 34 of Set 1 | port keats
Processing Record 35 of Set 1 | illoqqortoormiut
Processing Record 35 of Set 1 | barcelos
Processing Record 36 of Set 1 | rikitea
Processing Record 37 of Set 1 | veraval
Processing Record 38 of Set 1 | kapoeta
Processing Record 38 of Set 1 | mitrofanovka
Processing Record 39 of Set 1 | puerto ayora
Processing Record 40 of Set 1 | bonavista
Processing Record 41 of Set 1 | pemberton
Processing Record 42 of Set 1 | tasiilaq
Processing Record 43 of Set 1 | kuah
Processing Record 43 of Set 1 | vaini
Processing Record 44 of Set 1 | faxinal
Processing Record 45 of Set 1 | kuche
Processing Record 45 of Set 1 | mataura
Processing Record 46 of Set 1 | alice
Processing Record 47 of Set 1 | tiksi
Processing Record 48 of Set 1 | puerto escondido

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Processing Record 49 of Set 1		murgab
Processing Record 0 of Set 2		atuona
Processing Record 1 of Set 2		kathu
Processing Record 2 of Set 2		arkhangelsk
Processing Record 3 of Set 2		luau
Processing Record 4 of Set 2		hithadhoo
Processing Record 5 of Set 2		campbell river
Processing Record 6 of Set 2		lasa
Processing Record 7 of Set 2		upernavik
Processing Record 8 of Set 2		bluff
Processing Record 9 of Set 2		barrow
Processing Record 10 of Set 2		victoria
Processing Record 11 of Set 2		olafsvik
Processing Record 11 of Set 2		yantal
Processing Record 12 of Set 2		jamestown
Processing Record 13 of Set 2		ribeira grande
Processing Record 14 of Set 2		yellowknife
Processing Record 15 of Set 2		maceio
Processing Record 16 of Set 2		arlit
Processing Record 17 of Set 2		baruun-urt
Processing Record 18 of Set 2		zanjan
Processing Record 19 of Set 2		bambous virieux
Processing Record 20 of Set 2		krivosheino
Processing Record 21 of Set 2		avarua
Processing Record 22 of Set 2		poum
Processing Record 23 of Set 2		vao
Processing Record 24 of Set 2		hermanus
Processing Record 25 of Set 2		safaga
Processing Record 25 of Set 2		pilao arcado
Processing Record 25 of Set 2		port lincoln
Processing Record 26 of Set 2		margate
Processing Record 27 of Set 2		bejar
Processing Record 28 of Set 2		waingapu
Processing Record 29 of Set 2		komsomolskiy
Processing Record 30 of Set 2		tuktoyaktuk
Processing Record 31 of Set 2		solnechnyy
Processing Record 32 of Set 2		muromtsevo
Processing Record 33 of Set 2		fountain hills
Processing Record 34 of Set 2		mallaig
Processing Record 35 of Set 2		nanortalik
Processing Record 36 of Set 2		provideniya
Processing Record 37 of Set 2		aubenas
Processing Record 38 of Set 2		dingli
Processing Record 39 of Set 2		vaxjo
Processing Record 39 of Set 2		kodiak
Processing Record 40 of Set 2		meulaboh
Processing Record 41 of Set 2		dongli
Processing Record 42 of Set 2		bredasdorp
Processing Record 43 of Set 2		yeppoon
Processing Record 44 of Set 2		ust-tsilma
Processing Record 45 of Set 2		dikson
Processing Record 46 of Set 2		nueva loja
Processing Record 47 of Set 2		trusesti
Processing Record 48 of Set 2		taoudenni
Processing Record 49 of Set 2		chuy
Processing Record 0 of Set 3		parana
Processing Record 1 of Set 3		alta floresta

Processing Record 2 of Set 3	kavaratti
Processing Record 3 of Set 3	xinzhi
Processing Record 4 of Set 3	klaksvik
Processing Record 5 of Set 3	caravelas
Processing Record 6 of Set 3	iqaluit
Processing Record 7 of Set 3	pyaozerskiy
Processing Record 8 of Set 3	taolanaro
Processing Record 8 of Set 3	constitucion
Processing Record 9 of Set 3	kegayli
Processing Record 9 of Set 3	demba
Processing Record 10 of Set 3	caledon east
Processing Record 11 of Set 3	codrington
Processing Record 12 of Set 3	cidreira
Processing Record 13 of Set 3	arman
Processing Record 14 of Set 3	mahebourg
Processing Record 15 of Set 3	port alfred
Processing Record 16 of Set 3	samusu
Processing Record 16 of Set 3	santiago
Processing Record 17 of Set 3	stonewall
Processing Record 18 of Set 3	hovd
Processing Record 19 of Set 3	karasjok
Processing Record 20 of Set 3	longyearbyen
Processing Record 21 of Set 3	cap-aux-meules
Processing Record 22 of Set 3	nchelenge
Processing Record 23 of Set 3	port elizabeth
Processing Record 24 of Set 3	rocha
Processing Record 25 of Set 3	vardo
Processing Record 26 of Set 3	severo-kurilsk
Processing Record 27 of Set 3	belushya guba
Processing Record 27 of Set 3	aklavik
Processing Record 28 of Set 3	libcice nad vltavou
Processing Record 29 of Set 3	vaitupu
Processing Record 29 of Set 3	tsihombe
Processing Record 29 of Set 3	namibe
Processing Record 30 of Set 3	outjo
Processing Record 31 of Set 3	saurimo
Processing Record 32 of Set 3	oranjestad
Processing Record 33 of Set 3	fort dodge
Processing Record 34 of Set 3	mujiayingzi
Processing Record 35 of Set 3	attawapiskat
Processing Record 35 of Set 3	bilaspur
Processing Record 36 of Set 3	pasni
Processing Record 37 of Set 3	herat
Processing Record 38 of Set 3	khatanga
Processing Record 39 of Set 3	gisborne
Processing Record 40 of Set 3	mangai
Processing Record 41 of Set 3	dubai
Processing Record 42 of Set 3	richards bay
Processing Record 43 of Set 3	thompson
Processing Record 44 of Set 3	east london
Processing Record 45 of Set 3	qaanaaq
Processing Record 46 of Set 3	mumford
Processing Record 47 of Set 3	pevek
Processing Record 48 of Set 3	laguna
Processing Record 49 of Set 3	clarksburg
Processing Record 0 of Set 4	paredon
Processing Record 1 of Set 4	dingle

Processing Record 2 of Set 4	hluti
Processing Record 3 of Set 4	general roca
Processing Record 4 of Set 4	mattru
Processing Record 5 of Set 4	vestmanna
Processing Record 6 of Set 4	kropotkin
Processing Record 7 of Set 4	fez
Processing Record 8 of Set 4	broken hill
Processing Record 9 of Set 4	leon
Processing Record 10 of Set 4	coquimbo
Processing Record 11 of Set 4	plouzane
Processing Record 12 of Set 4	saint george
Processing Record 13 of Set 4	ponta do sol
Processing Record 14 of Set 4	dalbandin
Processing Record 15 of Set 4	airai
Processing Record 16 of Set 4	cherskiy
Processing Record 17 of Set 4	akdepe
Processing Record 18 of Set 4	esperance
Processing Record 19 of Set 4	vila
Processing Record 20 of Set 4	mergui
Processing Record 20 of Set 4	tumannyy
Processing Record 20 of Set 4	kristiansund
Processing Record 21 of Set 4	lompoc
Processing Record 22 of Set 4	isoka
Processing Record 23 of Set 4	torbay
Processing Record 24 of Set 4	ler
Processing Record 25 of Set 4	yanji
Processing Record 26 of Set 4	tinskoy
Processing Record 27 of Set 4	isangel
Processing Record 28 of Set 4	urucui
Processing Record 29 of Set 4	jaisalmer
Processing Record 30 of Set 4	saleaula
Processing Record 30 of Set 4	broome
Processing Record 31 of Set 4	los llanos de aridane
Processing Record 32 of Set 4	nouadhibou
Processing Record 33 of Set 4	bethel
Processing Record 34 of Set 4	castro
Processing Record 35 of Set 4	manuel doblado
Processing Record 35 of Set 4	cockburn town
Processing Record 36 of Set 4	polis
Processing Record 37 of Set 4	arraial do cabo
Processing Record 38 of Set 4	west lafayette
Processing Record 39 of Set 4	grindavik
Processing Record 40 of Set 4	tual
Processing Record 41 of Set 4	verkhnyaya inta
Processing Record 42 of Set 4	ulladulla
Processing Record 43 of Set 4	sentyabrskiy
Processing Record 43 of Set 4	yarmouth
Processing Record 44 of Set 4	eirunepe
Processing Record 45 of Set 4	lorengau
Processing Record 46 of Set 4	bela
Processing Record 47 of Set 4	norman wells
Processing Record 48 of Set 4	dubrovnik
Processing Record 49 of Set 4	corinto
Processing Record 0 of Set 5	komyshany
Processing Record 1 of Set 5	bengkulu
Processing Record 1 of Set 5	usinsk
Processing Record 2 of Set 5	kankon

Processing Record 3 of Set 5	mikuni
Processing Record 4 of Set 5	maragogi
Processing Record 5 of Set 5	kazalinsk
Processing Record 5 of Set 5	mayo
Processing Record 6 of Set 5	amderma
Processing Record 6 of Set 5	colchester
Processing Record 7 of Set 5	tuatapere
Processing Record 8 of Set 5	vung tau
Processing Record 9 of Set 5	new norfolk
Processing Record 10 of Set 5	pischia
Processing Record 11 of Set 5	kapit
Processing Record 12 of Set 5	ust-kulom
Processing Record 13 of Set 5	riyadh
Processing Record 14 of Set 5	nhulunbuy
Processing Record 15 of Set 5	clyde river
Processing Record 16 of Set 5	niquelandia
Processing Record 17 of Set 5	lebu
Processing Record 18 of Set 5	businga
Processing Record 19 of Set 5	jablah
Processing Record 20 of Set 5	hazorasp
Processing Record 21 of Set 5	guerrero negro
Processing Record 22 of Set 5	lebedyn
Processing Record 23 of Set 5	georgetown
Processing Record 24 of Set 5	cayenne
Processing Record 25 of Set 5	hamilton
Processing Record 26 of Set 5	okakarara
Processing Record 27 of Set 5	huinan
Processing Record 28 of Set 5	tabuk
Processing Record 29 of Set 5	mukhen
Processing Record 30 of Set 5	san patricio
Processing Record 31 of Set 5	taywarah
Processing Record 32 of Set 5	fairbanks
Processing Record 33 of Set 5	pitimbu
Processing Record 34 of Set 5	nata
Processing Record 35 of Set 5	gouyave
Processing Record 36 of Set 5	christchurch
Processing Record 37 of Set 5	innisfail
Processing Record 38 of Set 5	anchorage
Processing Record 39 of Set 5	kutum
Processing Record 40 of Set 5	vila velha
Processing Record 41 of Set 5	mar del plata
Processing Record 42 of Set 5	el badari
Processing Record 42 of Set 5	saldanha
Processing Record 43 of Set 5	yamada
Processing Record 44 of Set 5	tocopilla
Processing Record 45 of Set 5	bac giang
Processing Record 46 of Set 5	santa maria da vitoria
Processing Record 47 of Set 5	batagay-alyta
Processing Record 48 of Set 5	litoral del san juan
Processing Record 48 of Set 5	ancud
Processing Record 49 of Set 5	takoradi
Processing Record 0 of Set 6	aykhal
Processing Record 1 of Set 6	camiri
Processing Record 2 of Set 6	nome
Processing Record 3 of Set 6	havre-saint-pierre
Processing Record 4 of Set 6	saskylakh
Processing Record 5 of Set 6	saint anthony

Processing Record 6 of Set 6	bria
Processing Record 7 of Set 6	tarko-sale
Processing Record 8 of Set 6	frankfort
Processing Record 9 of Set 6	marawi
Processing Record 10 of Set 6	uige
Processing Record 11 of Set 6	gat
Processing Record 12 of Set 6	sao luis do quitunde
Processing Record 13 of Set 6	hirado
Processing Record 14 of Set 6	milingimbi
Processing Record 14 of Set 6	umm lajj
Processing Record 15 of Set 6	redmond
Processing Record 16 of Set 6	rio gallegos
Processing Record 17 of Set 6	mentok
Processing Record 17 of Set 6	silver city
Processing Record 18 of Set 6	ilulissat
Processing Record 19 of Set 6	gravdal
Processing Record 20 of Set 6	alotau
Processing Record 20 of Set 6	egvekinot
Processing Record 21 of Set 6	narsaq
Processing Record 22 of Set 6	kongolo
Processing Record 23 of Set 6	aksarka
Processing Record 24 of Set 6	hasaki
Processing Record 25 of Set 6	lolua
Processing Record 25 of Set 6	bodden town
Processing Record 26 of Set 6	luoyang
Processing Record 27 of Set 6	mys shmidta
Processing Record 27 of Set 6	shubarkuduk
Processing Record 28 of Set 6	acarau
Processing Record 28 of Set 6	autun
Processing Record 29 of Set 6	vuktyl
Processing Record 30 of Set 6	mount gambier
Processing Record 31 of Set 6	te anau
Processing Record 32 of Set 6	uvira
Processing Record 33 of Set 6	evans
Processing Record 34 of Set 6	puerto carreno
Processing Record 35 of Set 6	labuhan
Processing Record 36 of Set 6	qandala
Processing Record 37 of Set 6	saint-georges
Processing Record 38 of Set 6	nikolskoye
Processing Record 39 of Set 6	kabo
Processing Record 40 of Set 6	husavik
Processing Record 41 of Set 6	kalmunai
Processing Record 42 of Set 6	praia
Processing Record 43 of Set 6	izhma
Processing Record 44 of Set 6	izumo
Processing Record 45 of Set 6	ayan
Processing Record 46 of Set 6	portoferraio
Processing Record 47 of Set 6	luderitz
Processing Record 48 of Set 6	kollumerland
Processing Record 48 of Set 6	flinders
Processing Record 49 of Set 6	yar-sale
Processing Record 0 of Set 7	langxiang
Processing Record 1 of Set 7	medina
Processing Record 2 of Set 7	roebourne
Processing Record 3 of Set 7	japura
Processing Record 4 of Set 7	ust-omchug
Processing Record 5 of Set 7	wattegama

Processing Record 6 of Set 7	paamiut
Processing Record 7 of Set 7	juneau
Processing Record 8 of Set 7	gombong
Processing Record 9 of Set 7	red wing
Processing Record 10 of Set 7	hofn
Processing Record 11 of Set 7	suda
Processing Record 12 of Set 7	port-gentil
Processing Record 13 of Set 7	palmer
Processing Record 14 of Set 7	pechenga
Processing Record 15 of Set 7	cukai
Processing Record 16 of Set 7	springbok
Processing Record 17 of Set 7	sikea
Processing Record 17 of Set 7	barcelona
Processing Record 18 of Set 7	aitape
Processing Record 19 of Set 7	thunder bay
Processing Record 20 of Set 7	salalah
Processing Record 21 of Set 7	ahipara
Processing Record 22 of Set 7	moron
Processing Record 23 of Set 7	south lake tahoe
Processing Record 24 of Set 7	saint-francois
Processing Record 25 of Set 7	kaberaido
Processing Record 26 of Set 7	danville
Processing Record 27 of Set 7	marzuq
Processing Record 28 of Set 7	allanmyo
Processing Record 28 of Set 7	san quintin
Processing Record 29 of Set 7	tooele
Processing Record 30 of Set 7	san-pedro
Processing Record 31 of Set 7	dargaville
Processing Record 32 of Set 7	kushima
Processing Record 33 of Set 7	haines junction
Processing Record 34 of Set 7	nakhon phanom
Processing Record 35 of Set 7	paragominas
Processing Record 36 of Set 7	mfou
Processing Record 37 of Set 7	warburton
Processing Record 38 of Set 7	camopi
Processing Record 39 of Set 7	faanui
Processing Record 40 of Set 7	cabo san lucas
Processing Record 41 of Set 7	panaba
Processing Record 42 of Set 7	grand gaube
Processing Record 43 of Set 7	nuuk
Processing Record 44 of Set 7	touros
Processing Record 45 of Set 7	sri aman
Processing Record 46 of Set 7	samfya
Processing Record 47 of Set 7	high level
Processing Record 48 of Set 7	dostpur
Processing Record 49 of Set 7	natal
Processing Record 0 of Set 8	palabuhanratu
Processing Record 0 of Set 8	juifang
Processing Record 0 of Set 8	berlevag
Processing Record 1 of Set 8	saint marys
Processing Record 2 of Set 8	carutapera
Processing Record 3 of Set 8	jalu
Processing Record 4 of Set 8	rawah
Processing Record 4 of Set 8	maniitsoq
Processing Record 5 of Set 8	anloga
Processing Record 6 of Set 8	batticaloa
Processing Record 7 of Set 8	doha

Processing Record 8 of Set 8	vanimo
Processing Record 9 of Set 8	ondorhaan
Processing Record 9 of Set 8	that phanom
Processing Record 10 of Set 8	sitka
Processing Record 11 of Set 8	iquique
Processing Record 12 of Set 8	bezenchuk
Processing Record 13 of Set 8	cap malheureux
Processing Record 14 of Set 8	conde
Processing Record 15 of Set 8	diego de almagro
Processing Record 16 of Set 8	vaitape
Processing Record 17 of Set 8	wuwei
Processing Record 18 of Set 8	college
Processing Record 19 of Set 8	avera
Processing Record 20 of Set 8	takob
Processing Record 20 of Set 8	ayagoz
Processing Record 21 of Set 8	sarti
Processing Record 22 of Set 8	korla
Processing Record 22 of Set 8	palu
Processing Record 23 of Set 8	lae
Processing Record 24 of Set 8	kibala
Processing Record 25 of Set 8	oriximina
Processing Record 26 of Set 8	inuvik
Processing Record 27 of Set 8	tura
Processing Record 28 of Set 8	bambanglipuro
Processing Record 29 of Set 8	usak
Processing Record 30 of Set 8	kirakira
Processing Record 31 of Set 8	umea
Processing Record 32 of Set 8	cabras
Processing Record 33 of Set 8	altay
Processing Record 34 of Set 8	lubango
Processing Record 35 of Set 8	gushikawa
Processing Record 36 of Set 8	sabang
Processing Record 37 of Set 8	santa cruz
Processing Record 38 of Set 8	buritizeiro
Processing Record 39 of Set 8	opuwo
Processing Record 40 of Set 8	praya
Processing Record 41 of Set 8	umzimvubu
Processing Record 41 of Set 8	akdagmadeni
Processing Record 42 of Set 8	stillwater
Processing Record 43 of Set 8	faya
Processing Record 44 of Set 8	staryy nadym
Processing Record 45 of Set 8	lebanon
Processing Record 46 of Set 8	conceicao do araguaia
Processing Record 47 of Set 8	iskateley
Processing Record 48 of Set 8	borinskoye
Processing Record 49 of Set 8	mahuva
Processing Record 0 of Set 9	cortez
Processing Record 1 of Set 9	awbari
Processing Record 2 of Set 9	kahului
Processing Record 3 of Set 9	riohacha
Processing Record 4 of Set 9	saint-leu
Processing Record 5 of Set 9	severomorsk
Processing Record 6 of Set 9	nioro
Processing Record 7 of Set 9	bargal
Processing Record 7 of Set 9	madras
Processing Record 8 of Set 9	fort nelson
Processing Record 9 of Set 9	kruisfontein

Processing Record 10 of Set 9	axim
Processing Record 11 of Set 9	bathsheba
Processing Record 12 of Set 9	jujuy
Processing Record 12 of Set 9	lavrentiya
Processing Record 13 of Set 9	vila franca do campo
Processing Record 14 of Set 9	along
Processing Record 15 of Set 9	kudahuvadhoo
Processing Record 16 of Set 9	yirol
Processing Record 16 of Set 9	rajauri
Processing Record 16 of Set 9	roma
Processing Record 17 of Set 9	labutta
Processing Record 17 of Set 9	jackson
Processing Record 18 of Set 9	bourne-mouth
Processing Record 19 of Set 9	goure
Processing Record 20 of Set 9	houma
Processing Record 21 of Set 9	port blair
Processing Record 22 of Set 9	bud
Processing Record 23 of Set 9	horsham
Processing Record 24 of Set 9	blagoyevo
Processing Record 25 of Set 9	merrill
Processing Record 26 of Set 9	virginia beach
Processing Record 27 of Set 9	resistencia
Processing Record 28 of Set 9	kasongo-lunda
Processing Record 29 of Set 9	pisco
Processing Record 30 of Set 9	auki
Processing Record 31 of Set 9	cabatuan
Processing Record 32 of Set 9	shache
Processing Record 33 of Set 9	partizanskoye
Processing Record 34 of Set 9	florida
Processing Record 35 of Set 9	derzhavinsk
Processing Record 36 of Set 9	ugoofaaru
Processing Record 37 of Set 9	khakhea
Processing Record 38 of Set 9	qagortoq
Processing Record 39 of Set 9	itarema
Processing Record 40 of Set 9	semey
Processing Record 41 of Set 9	comodoro rivadavia
Processing Record 42 of Set 9	saint-pierre
Processing Record 43 of Set 9	apac
Processing Record 44 of Set 9	urdzhar
Processing Record 44 of Set 9	merauke
Processing Record 45 of Set 9	amamai
Processing Record 46 of Set 9	tarpon springs
Processing Record 47 of Set 9	henties bay
Processing Record 48 of Set 9	mecca
Processing Record 49 of Set 9	anadyr
Processing Record 0 of Set 10	tamandare
Processing Record 1 of Set 10	dingtao
Processing Record 2 of Set 10	xining
Processing Record 3 of Set 10	bubaque
Processing Record 4 of Set 10	norden
Processing Record 5 of Set 10	yuzhno-yeniseyskiy
Processing Record 5 of Set 10	tubruq
Processing Record 5 of Set 10	marrakesh
Processing Record 6 of Set 10	slave lake
Processing Record 7 of Set 10	moose factory
Processing Record 8 of Set 10	polson
Processing Record 9 of Set 10	camachile

Processing Record 10 of Set 10	yurya
Processing Record 10 of Set 10	melilla
Processing Record 11 of Set 10	kamina
Processing Record 12 of Set 10	raga
Processing Record 12 of Set 10	gambela
Processing Record 13 of Set 10	petropavlovsk-kamchatskiy
Processing Record 14 of Set 10	casablanca
Processing Record 15 of Set 10	verkhnevilyuysk
Processing Record 16 of Set 10	kenitra
Processing Record 17 of Set 10	marcona
Processing Record 17 of Set 10	bundaberg
Processing Record 18 of Set 10	mweka
Processing Record 19 of Set 10	vostok
Processing Record 20 of Set 10	ostrovnoy
Processing Record 21 of Set 10	vanavara
Processing Record 22 of Set 10	khandyga
Processing Record 23 of Set 10	honiara
Processing Record 24 of Set 10	fukue
Processing Record 25 of Set 10	gumushane
Processing Record 25 of Set 10	bobo dioulasso
Processing Record 25 of Set 10	northam
Processing Record 26 of Set 10	tarauaca
Processing Record 27 of Set 10	zaysan
Processing Record 28 of Set 10	svetlyy
Processing Record 28 of Set 10	tilichiki
Processing Record 29 of Set 10	mogadishu
Processing Record 30 of Set 10	iquitos
Processing Record 31 of Set 10	sorrento
Processing Record 32 of Set 10	kaeo
Processing Record 33 of Set 10	beloha
Processing Record 34 of Set 10	klimovo
Processing Record 35 of Set 10	isabela
Processing Record 36 of Set 10	port hardy
Processing Record 37 of Set 10	calama
Processing Record 38 of Set 10	saint-augustin
Processing Record 39 of Set 10	kimbe
Processing Record 40 of Set 10	anahuac
Processing Record 41 of Set 10	belaya gora
Processing Record 42 of Set 10	haapu
Processing Record 42 of Set 10	alyangula
Processing Record 43 of Set 10	bur gabo
Processing Record 43 of Set 10	harper
Processing Record 44 of Set 10	ilongero
Processing Record 45 of Set 10	baoro
Processing Record 46 of Set 10	genc
Processing Record 47 of Set 10	bombay
Processing Record 48 of Set 10	sao filipe
Processing Record 49 of Set 10	denpasar
Processing Record 0 of Set 11	aden
Processing Record 1 of Set 11	khonuu
Processing Record 1 of Set 11	evansville
Processing Record 2 of Set 11	nantucket
Processing Record 3 of Set 11	malolos
Processing Record 4 of Set 11	martil
Processing Record 5 of Set 11	yermakovskoye
Processing Record 6 of Set 11	koumac
Processing Record 7 of Set 11	coihaique

Processing Record 8 of Set 11	lake city
Processing Record 9 of Set 11	oistins
Processing Record 10 of Set 11	yumen
Processing Record 11 of Set 11	formosa
Processing Record 12 of Set 11	tabiauea
Processing Record 12 of Set 11	partenit
Processing Record 13 of Set 11	sayyan
Processing Record 14 of Set 11	katsuura
Processing Record 15 of Set 11	louisbourg
Processing Record 15 of Set 11	wanlaweyn
Processing Record 16 of Set 11	chara
Processing Record 17 of Set 11	asosa
Processing Record 18 of Set 11	lagoa
Processing Record 19 of Set 11	rungata
Processing Record 19 of Set 11	bada
Processing Record 20 of Set 11	omsukchan
Processing Record 21 of Set 11	hit
Processing Record 22 of Set 11	andenes
Processing Record 22 of Set 11	ponta delgada
Processing Record 23 of Set 11	osypenko
Processing Record 24 of Set 11	guadalupe y calvo
Processing Record 25 of Set 11	byron bay
Processing Record 26 of Set 11	portobelo
Processing Record 27 of Set 11	sarila
Processing Record 28 of Set 11	tautira
Processing Record 29 of Set 11	porto novo
Processing Record 30 of Set 11	piacabucu
Processing Record 31 of Set 11	falealupo
Processing Record 31 of Set 11	portland
Processing Record 32 of Set 11	khowst
Processing Record 32 of Set 11	menongue
Processing Record 33 of Set 11	saint-joseph
Processing Record 34 of Set 11	bajil
Processing Record 35 of Set 11	inderborskiy
Processing Record 35 of Set 11	rozivka
Processing Record 36 of Set 11	kingaroy
Processing Record 37 of Set 11	nynashamn
Processing Record 38 of Set 11	san luis
Processing Record 39 of Set 11	santa vitoria do palmar
Processing Record 40 of Set 11	kichmengskiy gorodok
Processing Record 41 of Set 11	colares
Processing Record 42 of Set 11	tateyama
Processing Record 43 of Set 11	chicama
Processing Record 44 of Set 11	manaira
Processing Record 45 of Set 11	whitley bay
Processing Record 46 of Set 11	mafiga
Processing Record 46 of Set 11	yilan
Processing Record 47 of Set 11	taburi
Processing Record 47 of Set 11	dudinka
Processing Record 48 of Set 11	lewiston
Processing Record 49 of Set 11	viligili
Processing Record 49 of Set 11	sao jose da coroa grande
Processing Record 0 of Set 12	moosomin
Processing Record 1 of Set 12	westport
Processing Record 2 of Set 12	fare
Processing Record 3 of Set 12	sanchez
Processing Record 4 of Set 12	loding

```

Processing Record 5 of Set 12 | pandan
Processing Record 6 of Set 12 | jarjis
Processing Record 6 of Set 12 | mahibadhoo
Processing Record 7 of Set 12 | ukiah
Processing Record 8 of Set 12 | tahe
Processing Record 9 of Set 12 | saryshagan
Processing Record 9 of Set 12 | ginir
Processing Record 10 of Set 12 | hirara
Processing Record 11 of Set 12 | letpadan
Processing Record 12 of Set 12 | druskininkai
Processing Record 13 of Set 12 | krasnomayskiy
Processing Record 14 of Set 12 | santa maria
Processing Record 15 of Set 12 | baculin
Processing Record 16 of Set 12 | solone

```

```

In [4]: # Create DataFrame to store: City, Cloudiness, Country, Date, Humidity,
        Lat, Lng, Max Temp, Wind Speed
weatherCity_df = pd.DataFrame([weatherCity[city]('name'), weatherCity[c
ity]('clouds.all'), weatherCity[city]('sys.country'),
        weatherCity[city]('dt'), weatherCity[city]('main.humidity'), weather
City[city]('coord.lat'),
        weatherCity[city]('coord.lon'), weatherCity[city]('main.temp_max'),
weatherCity[city]('wind.speed')]
        for city in weatherCity])
# Rename columns
weatherCity_df = weatherCity_df.rename(columns={0: 'City',
                                                1: 'Cloudiness',
                                                2: 'Country',
                                                3: 'Date',
                                                4: 'Humidity',
                                                5: 'Lat',
                                                6: 'Lng',
                                                7: 'Max Temp',
                                                8: 'Wind Speed'})

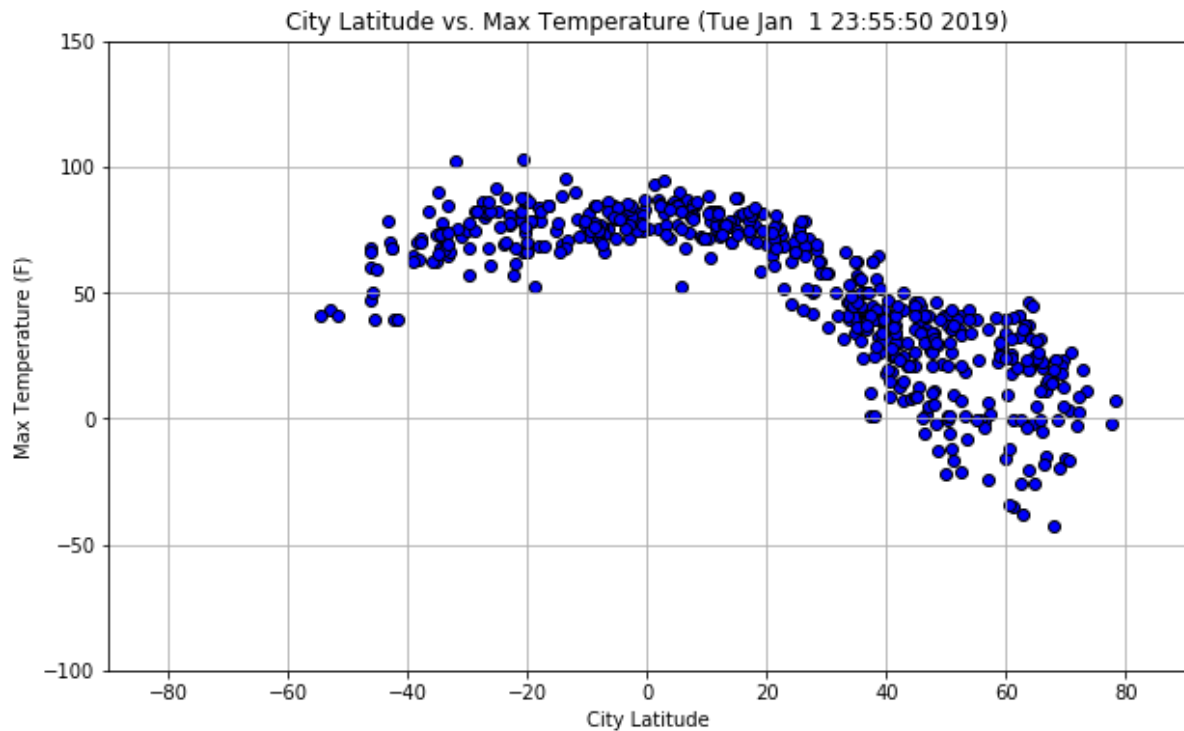
# Preview data
weatherCity_df.head()

```

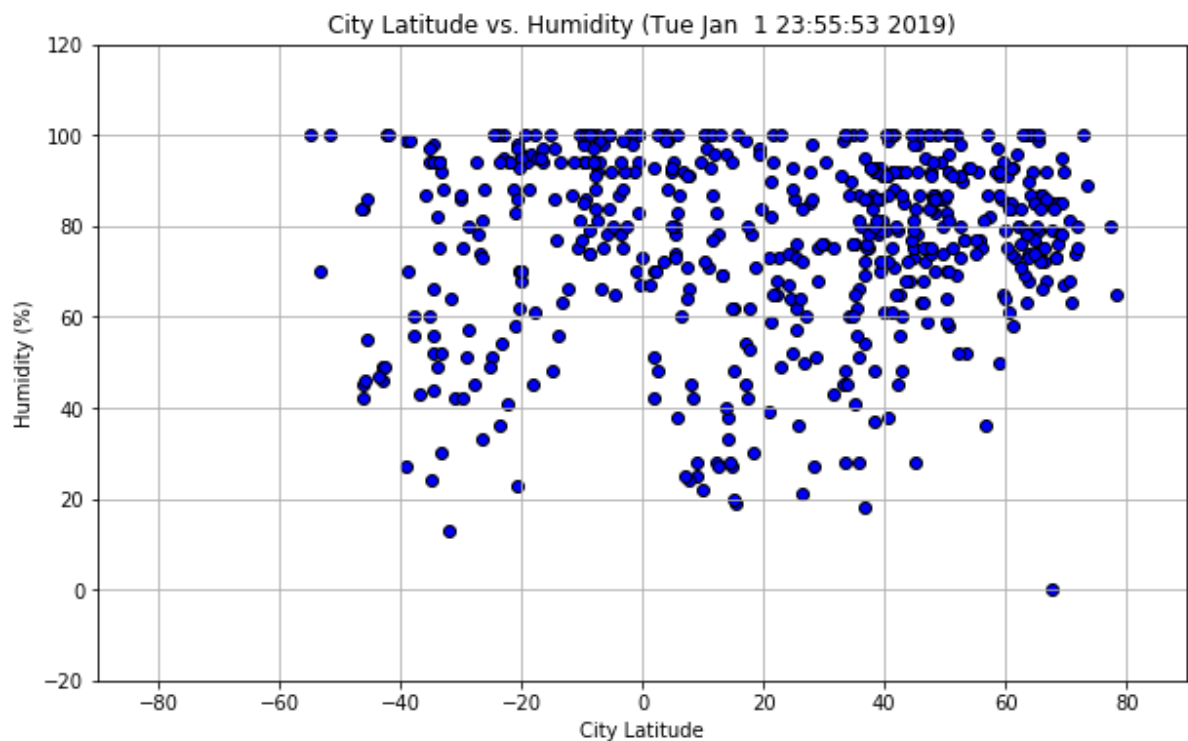
Out[4]:

	City	Cloudiness	Country	Date	Humidity	Lat	Lng	Max Temp	Wind Speed
0	Salekhard	80	RU	1546415546	72	66.54	66.62	10.64	11.77
1	Zhigansk	68	RU	1546415546	68	66.77	123.37	-15.10	7.58
2	Okato	32	NZ	1546415546	99	-39.19	173.88	64.64	12.28
3	Zhuhai	32	CN	1546412400	38	40.71	112.04	24.80	2.24
4	Chokurdakh	48	RU	1546415319	81	70.62	147.90	3.62	17.20

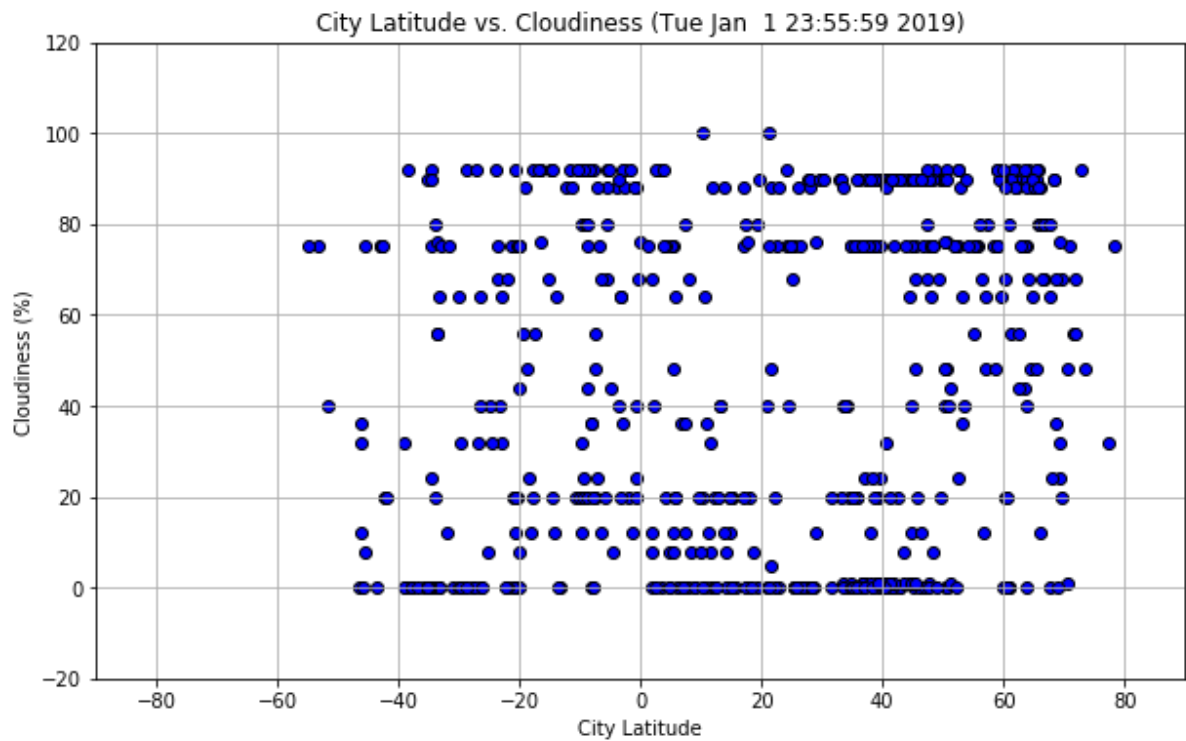
```
In [5]: # Scatter Plot Temperature (F) vs. Latitude
plt.figure(figsize=(10,6))
plt.scatter(x=weatherCity_df['Lat'], y=weatherCity_df['Max Temp'], color
='blue', edgecolors='black')
plt.ylim(-100, 150)
plt.xlim(-90, 90)
plt.title(f"City Latitude vs. Max Temperature ({time.asctime(time.localtime
ime(time.time()))})")
plt.xlabel("City Latitude")
plt.ylabel("Max Temperature (F)")
plt.grid()
```



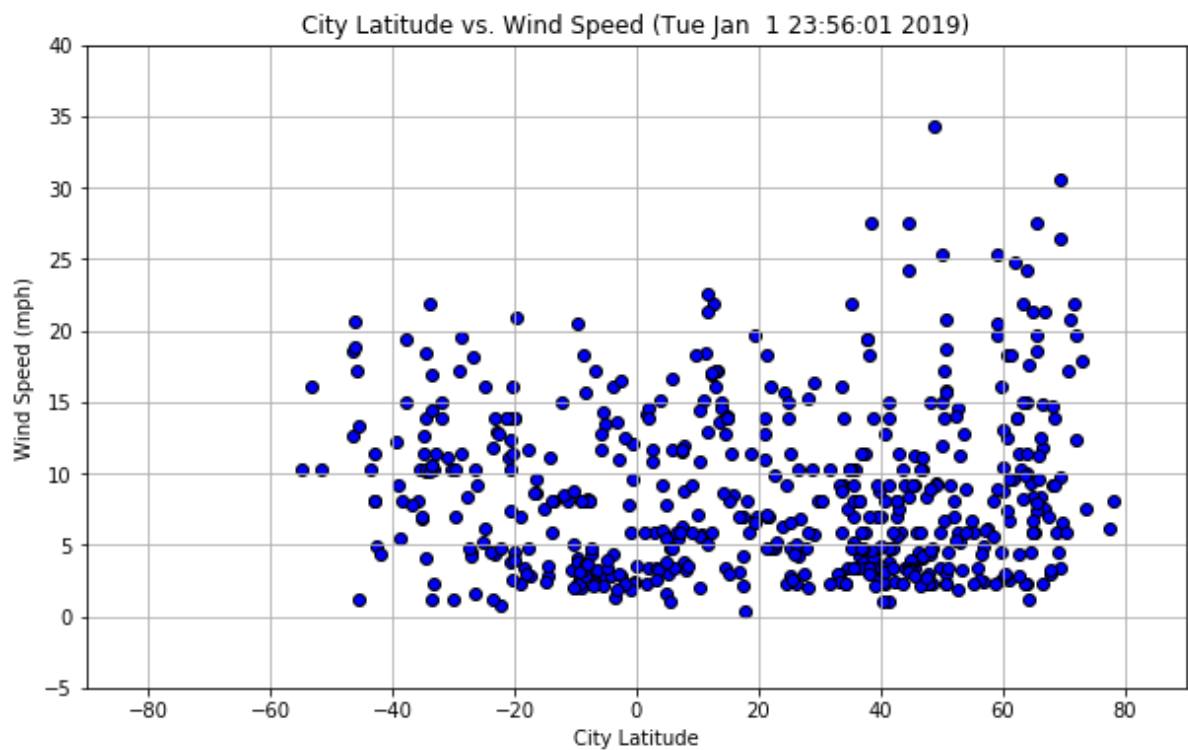
```
In [6]: # Humidity (%) vs. Latitude
plt.figure(figsize=(10,6))
plt.scatter(x=weatherCity_df['Lat'], y=weatherCity_df['Humidity'], color='blue', edgecolors='black')
plt.ylim(-20, 120)
plt.xlim(-90, 90)
plt.title(f"City Latitude vs. Humidity ({time.asctime(time.localtime(time.time()))})")
plt.xlabel("City Latitude")
plt.ylabel("Humidity (%)")
plt.grid()
```




```
In [7]: # Cloudiness (%) vs. Latitude
plt.figure(figsize=(10,6))
plt.scatter(x=weatherCity_df['Lat'], y=weatherCity_df['Cloudiness'], col
or='blue', edgecolors='black')
plt.ylim(-20, 120)
plt.xlim(-90, 90)
plt.title(f"City Latitude vs. Cloudiness ({time.asctime(time.localtime(t
ime.time()))})")
plt.xlabel("City Latitude")
plt.ylabel("Cloudiness (%)")
plt.grid()
```



```
In [8]: # Wind Speed (mph) vs. Latitude
plt.figure(figsize=(10,6))
plt.scatter(x=weatherCity_df['Lat'], y=weatherCity_df['Wind Speed'], color='blue', edgecolors='black')
plt.ylim(-5, 40)
plt.xlim(-90, 90)
plt.title(f"City Latitude vs. Wind Speed ({time.asctime(time.localtime(time.time()))})")
plt.xlabel("City Latitude")
plt.ylabel("Wind Speed (mph)")
plt.grid()
```



```
In [9]: # Heat map of Max Temp.
# Configure gmaps with API key
gmaps.configure(api_key=gkey)
```

```
In [12]: # Store 'Lat' and 'Lng' into locations
locations = weatherCity_df[['Lat', 'Lng']].astype(float)

# Convert Max Temp. to float and store
# HINT: be sure to handle NaN values
# Shift temperatures by +50 to fix within heat range
weatherCity_df['Max Temp'] = weatherCity_df['Max Temp'] + 50
max_temp = weatherCity_df['Max Temp'].astype(float)
```

```
In [20]: # Create a Max Temp. Heatmap layer
fig = gmaps.figure()

heat_layer = gmaps.heatmap_layer(locations, weights=max_temp,
                                  dissipating=False, max_intensity=170,
                                  point_radius = 2)

# Adjust heat_layer setting to help with heatmap dissipating on zoom
heat_layer.dissipating = False
heat_layer.max_intensity = 170
heat_layer.point_radius = 2

fig.add_layer(heat_layer)

fig
```

```
In [14]: # Convert Humidity rate to list
humidity_rate = weatherCity_df["Humidity"].tolist()
```

```
In [21]: # Create Humity symbol layer
humidity_layer = gmaps.symbol_layer(
    locations, fill_color='rgba(0, 150, 0, 0.4)',
    stroke_color='rgba(0, 0, 150, 0.4)', scale=1,
    info_box_content=[f"Humity: {humidity}" for humidity in humidity_rate]
)

fig = gmaps.figure()
fig.add_layer(humidity_layer)

fig
```

```
In [22]: # Create a combined map
fig = gmaps.figure()

fig.add_layer(heat_layer)
fig.add_layer(humidity_layer)

fig
```