

# Climograph

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Project home: <https://github.com/StevenBlack/climographs>

## Introduction

The motivation for this repository is, given a location, create its climograph.

See: <https://en.wikipedia.org/wiki/Climograph>.

### Static Examples (these are images)

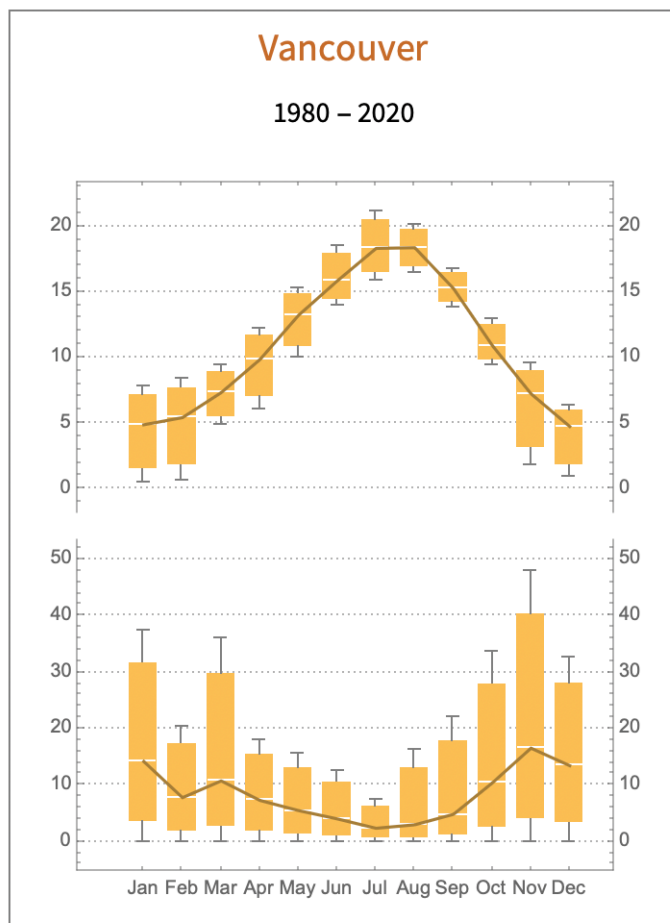
**Example:** You can pass a single location Entity and get its climograph.

In[25]:=

```
In[20]:= climograph[ Vancouver CITY ]
```

In[26]:=

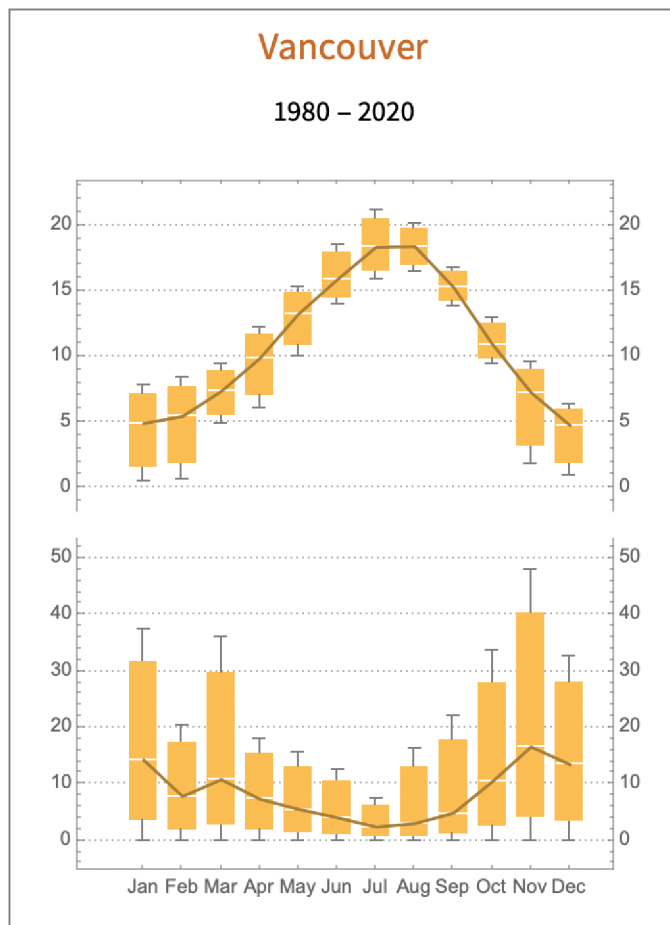
Out[20]=



Out[26]=

In[20]:= climograph[ Vancouver CITY ]

Out[20]=



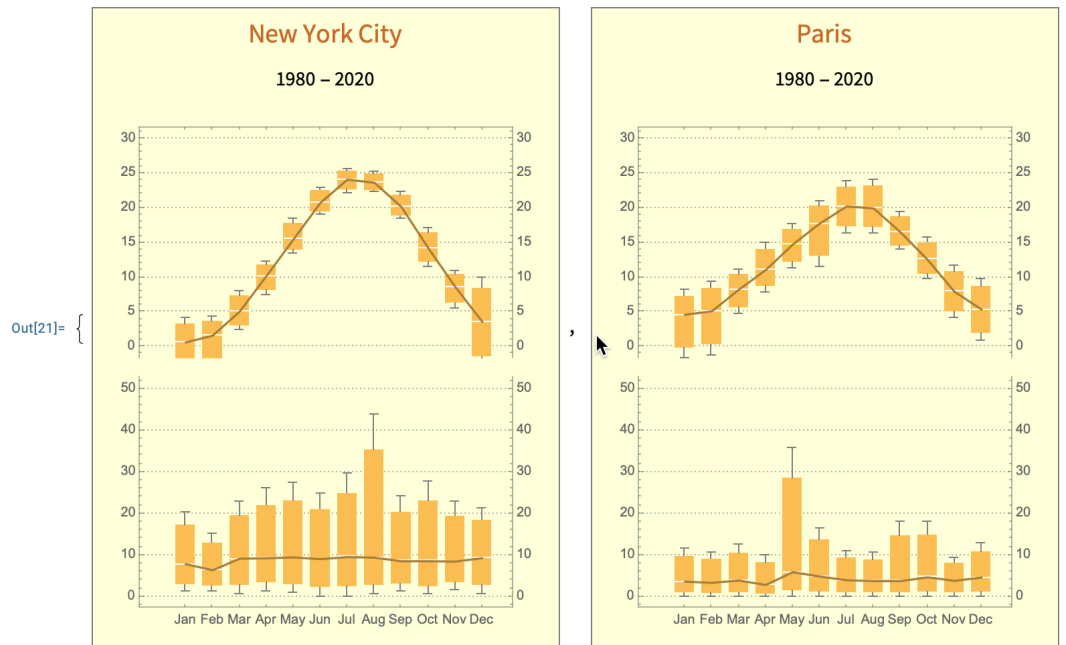
In[27]:=

**Example:** You can pass a list of location Entities and get a list of their climographs.

```

In[21]:= climograph[{New York City CITY, Paris CITY}
, TemperaturePlotRange → {0, 30}
, PrecipitationPlotRange → {0, 50}
, Background → LightYellow
]

```



## The Code

```

In[28]:= ClearAll[climograph];
(* These are the options, and the defaults, provided
by the function *)
Options[climograph] = {
  "StartDate" → {1980, 1, 1}
, "EndDate" → {2020, 12, 31}

, "InnerFrame" → None
, "Background" → White

, "InnerFrameStyle" → LightGray
, "TemperaturePlotRange" → Automatic
, "TemperatureJoined" → True

, "PrecipitationPlotRange" → Automatic
, "PrecipitationJoined" → True

, "Frame" → True
, "FrameStyle" → Gray
};

(* The interface for passing a single Entity and options. *)

```

```

climograph[location_Entity, opts : OptionsPattern[climographx]] := (
  Return[climographx[location, opts]];
);

(* The interface for passing a list of Entities with options. *)
climograph[locations_List, opts : OptionsPattern[climographx]] := (
  Return[climographx[#, opts] & /@ locations];
);

(* This function does the work *)
climographx[location_, OptionsPattern[]] := (
  startDate = OptionValue["StartDate"];
  endDate = OptionValue["EndDate"];

  (* Temperature plot - the upper plot *)
  tempByMonth =
    WeatherData[location, "MeanTemperature", {startDate, endDate, "Month"}];
  tempGroupByMonth =
    GroupBy[tempByMonth["DatePath"], DateValue[First[#], "MonthNameShort"] &];
  tempMinMaxMean = {Min[Map[Last, #]], Max[Map[Last, #]], Mean[Map[Last, #]]} & /@
    tempGroupByMonth;
  tempRange = OptionValue["TemperaturePlotRange"];
  If[ tempRange == Automatic,
    (
      maxTemp = Max[tempByMonth[[2]][[1]][[1]]];
      minTemp = Min[tempByMonth[[2]][[1]][[1]]];
      tempRange = {minTemp, maxTemp} // QuantityMagnitude;
    ), Nothing];

  ptemp = BoxWhiskerChart[
    tempMinMaxMean
    , Joined → OptionValue["TemperatureJoined"]
    , Frame → {{True, True}, {None, True}}
    , FrameTicks → {{All, All}, {None, All}}
    , PlotTheme → "Detailed"
    , PlotRange → OptionValue["TemperaturePlotRange"]
    , Ticks → All
  ];

  (* Precipitation plot - the lower plot *)
  precipByMonth = DeleteMissing[WeatherData[location,
    "TotalPrecipitation", {startDate, endDate, "Month"}]];
  precipGroupByMonth = GroupBy[
    precipByMonth["DatePath"], DateValue[First[#], "MonthNameShort"] &];
  precipMeanByMonth = Mean[Map[Last, #]] & /@ precipGroupByMonth;
  precipMinMaxMean =

```

```

{Min[Map[Last, #]], Max[Map[Last, #]], Mean[Map[Last, #]]} & /@
  precipGroupByMonth;
maxPrecip = Max[precipByMonth[[2]][[1]][[1]]];
minPrecip = 0; (* By definition *)
If[precipRange == Automatic,
  (
    maxPrecip = Max[precipByMonth[[2]][[1]][[1]]];
    precipRange = {minPrecip, maxPrecip} // QuantityMagnitude;
  ), Nothing];

pprecip = BoxWhiskerChart[
  precipMinMaxMean
  , ChartLabels → Automatic
  , Joined → OptionValue["PrecipitationJoined"]
  , Frame → {{True, True}, {True, None}}
  , FrameTicks → {{All, All}, Automatic}
  , PlotTheme → "Detailed"
  , PlotRange → OptionValue["PrecipitationPlotRange"]
  , Ticks → All
];

(* Joining the precipitation
and temperature plots together, and returning *)
Return[
  GraphicsColumn[
    {TextCell[location["Name"], "Subsection"],
     TextCell[
       ToString[startDate[[1]] <> " - " <> ToString[endDate[[1]]], "Text"],
     GraphicsColumn[
       {ptemp, pprecip}
       , Frame → OptionValue["InnerFrame"]
       , FrameStyle → OptionValue["InnerFrameStyle"]
       , Background → OptionValue["Background"]
     ]
    },
    Frame → OptionValue["Frame"]
    , FrameStyle → OptionValue["FrameStyle"]
    , Background → OptionValue["Background"]
  ]
];

```

---

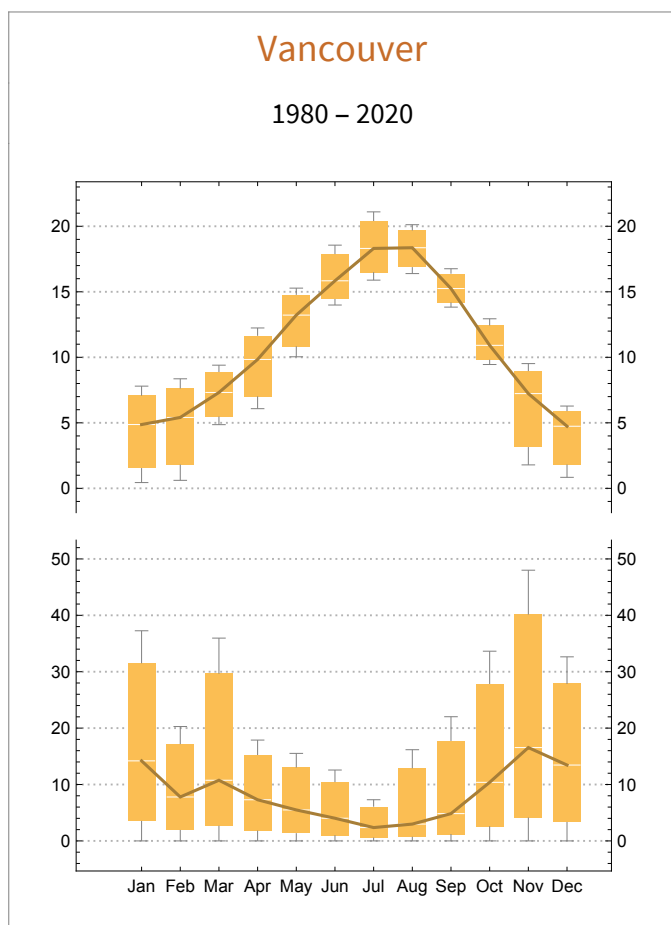
## Live Examples

### Example 1 — default climograph

This call with no options produces a default climograph.

```
In[33]:= climograph[ Vancouver CITY ]
```

Out[33]=

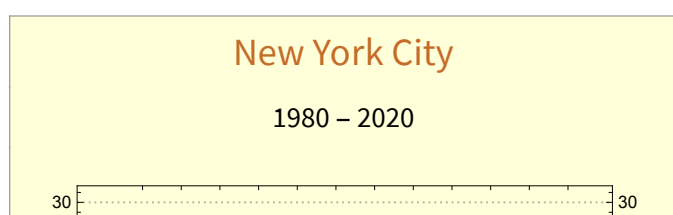


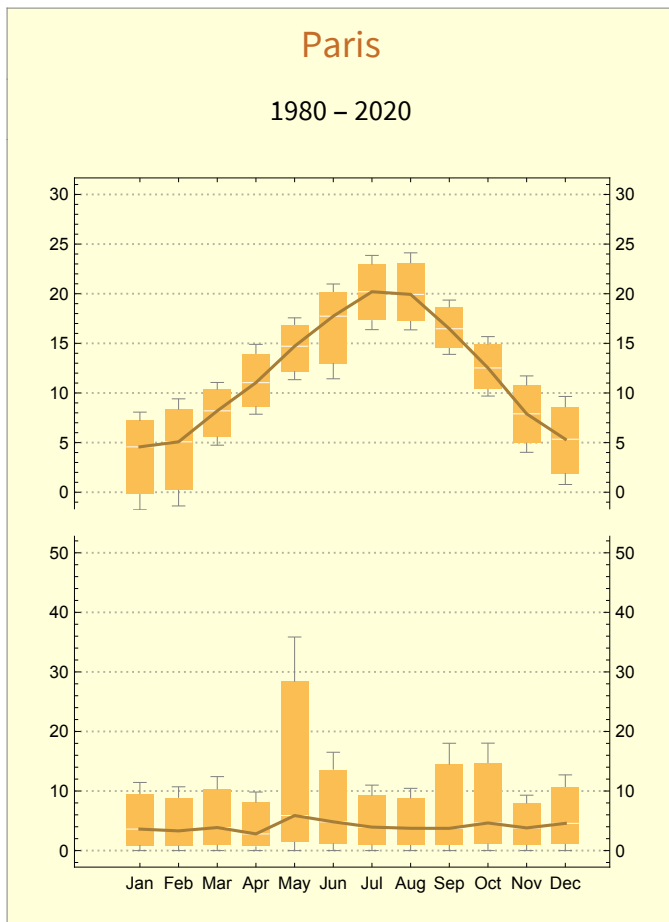
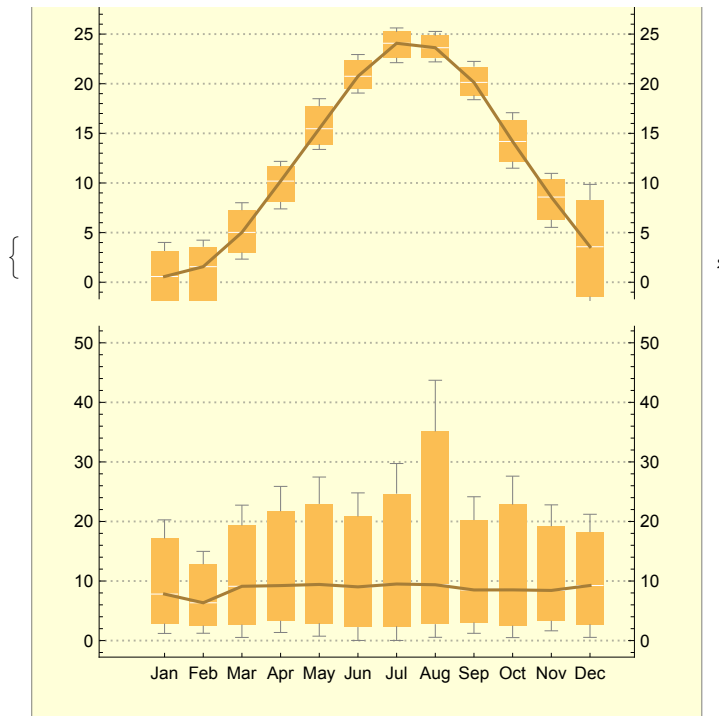
## Example 2 — normalizing scales across climographs

This call uses options to set the background color, and normalizes the vertical ranges for both the temperature and precipitation plots .

```
In[34]:= climograph[ { New York City CITY , Paris CITY }  
  , TemperaturePlotRange → {0, 30}  
  , PrecipitationPlotRange → {0, 50}  
  , Background → LightYellow  
]
```

Out[34]=



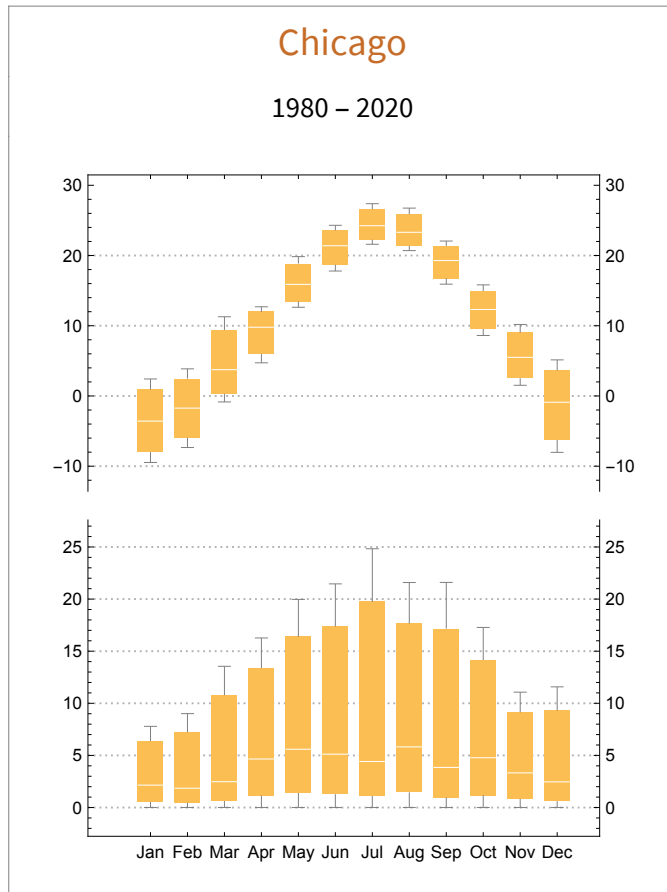


Example 3 — omit joining bars

This call uses options to omit the lines joining temperature and precipitation mean values .

```
In[35]:= climograph[ Chicago CITY ,
  TemperatureJoined → False, PrecipitationJoined → False]
```

Out[35]=



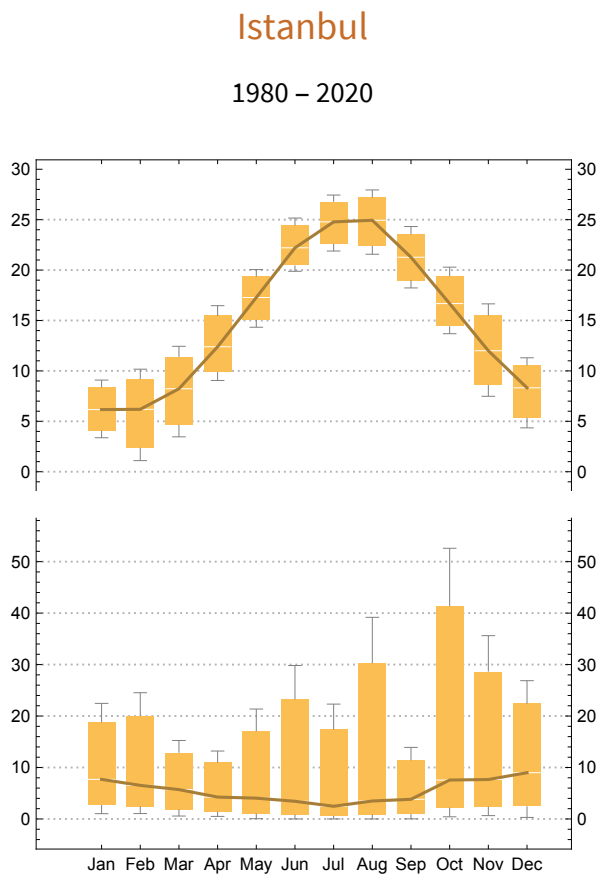
### Example 4 — omit the outer frame

This call uses options to not show an outer frame.



```
In[36]:= climograph[ Istanbul CITY, Frame → False]
```

```
Out[36]=
```



### Example 5 — styling the inner frame

This call uses options to show the inner frame with a particular style.

```
In[37]:= climograph[
  Tokyo CITY
  , InnerFrame → True
  , InnerFrameStyle → Directive[Red, Dotted, Thick]
]
```

Out[37]=

