Climograph

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

Introduction

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

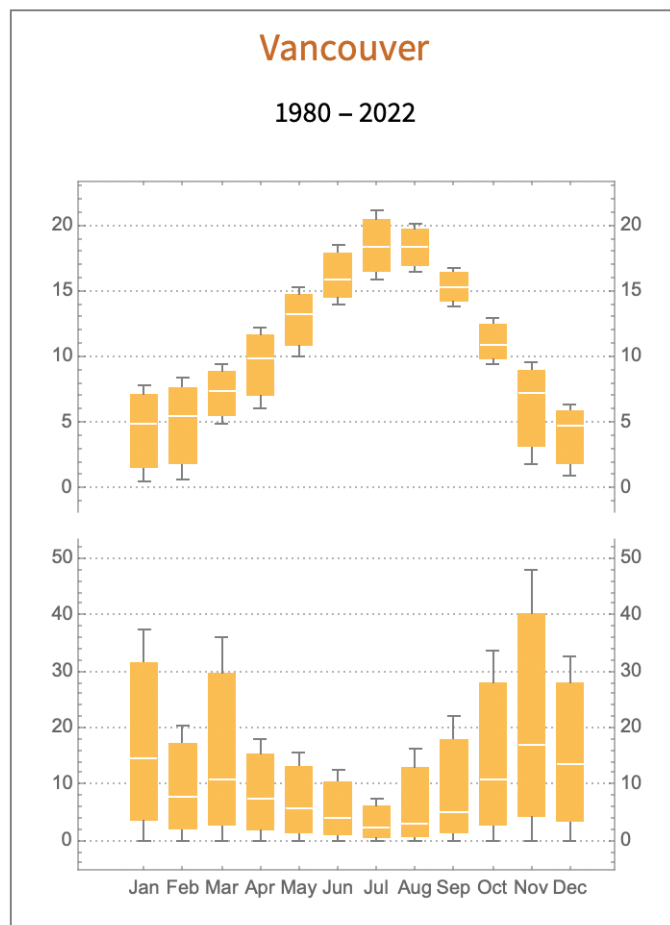See: https://en.wikipedia.org/wiki/Climograph.

Examples (images)

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

In[339]:=

In[340]:=

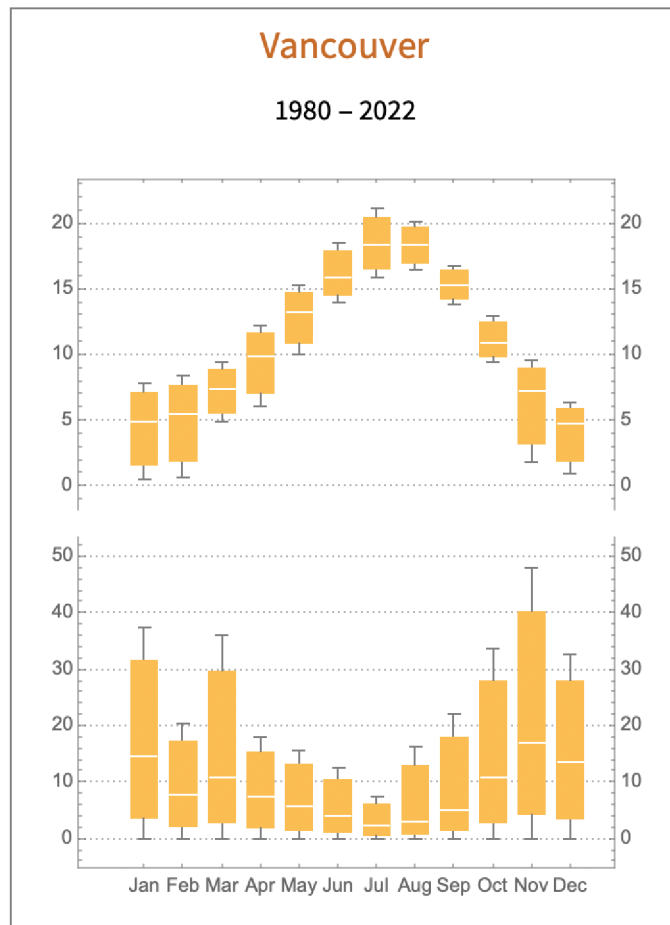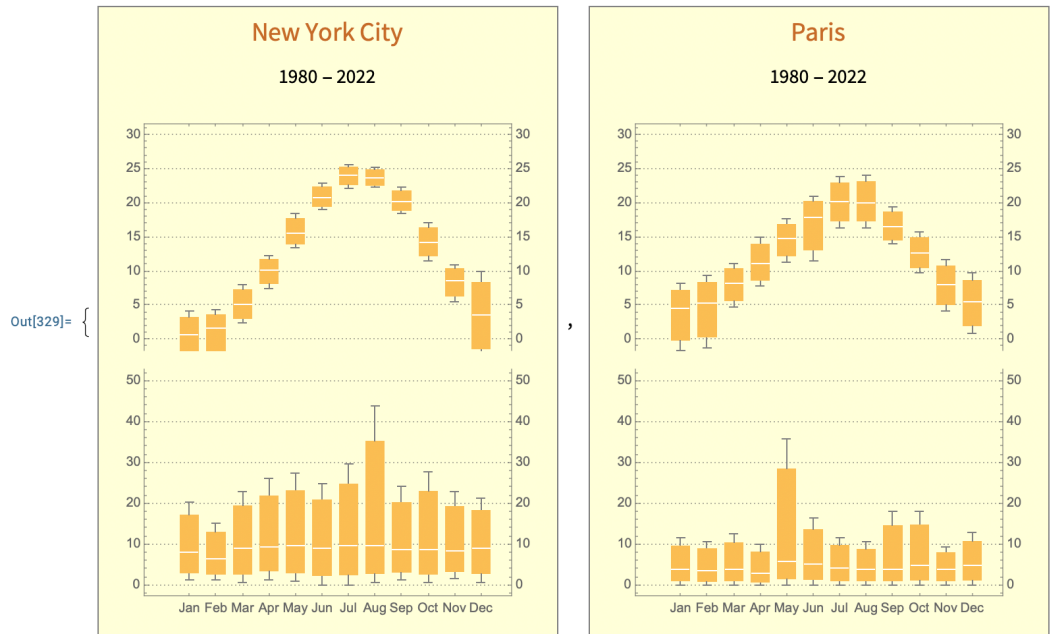In[328]:= climograph[**Vancouver** CITY]

Out[328]=

Out[340]=

In[328]:= `climograph[ Vancouver CITY ]`

Out[328]=

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

In[329]:= `climograph[{` New York City CITY `,` Paris CITY `}`
`, TemperaturePlotRange → {0, 30}`
`, PrecipitationPlotRange → {0, 50}`
`, Background → LightYellow`
`]`

Out[329]= {

,

}

The Code

In[341]:=
```
ClearAll[climograph];
(* These are the options, and the defaults, provided
 by the function *)
Options[climographx] = {
    "StartDate" → {1980, 1, 1}
    , "EndDate" → {2022, 12, 31}
    , "InnerFrame" → None
    , "InnerFrameStyle" → LightGray
    , "TemperaturePlotRange" → Automatic
    , "TemperatureJoined" → True
    , "PrecipitationPlotRange" → Automatic
    , "PrecipitationJoined" → True
    , "Background" → White
    , "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 → 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 → 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"]
  ]
 ]
);
```
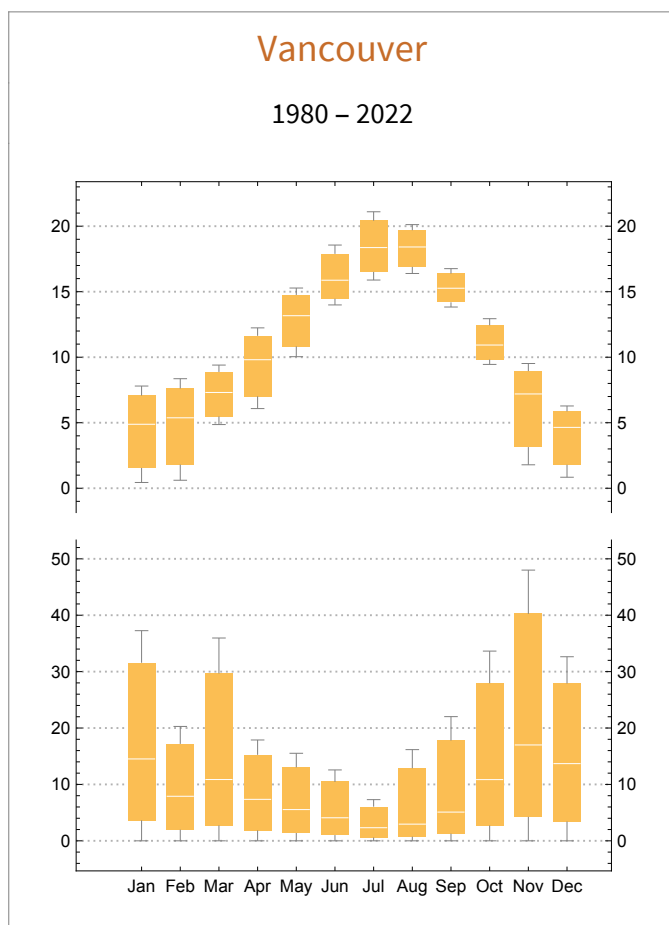
Live Examples

Example 1: This call with no options produces a default climograph.

In[346]:=

```
climograph[ Vancouver CITY ]
```
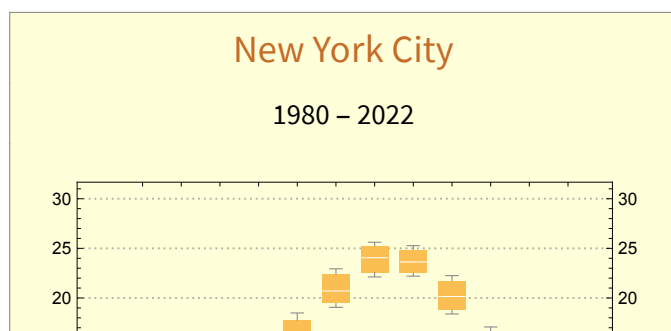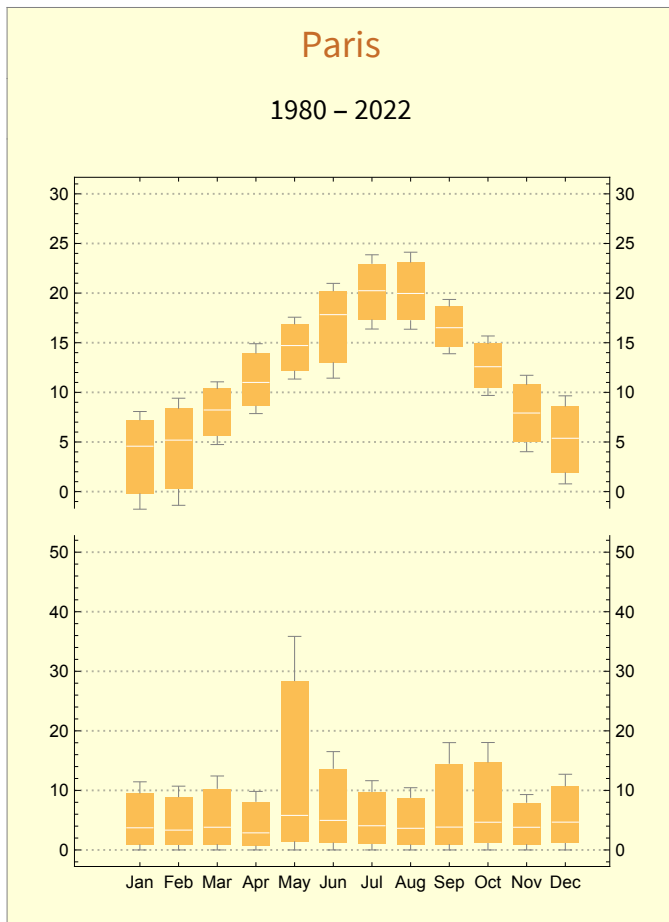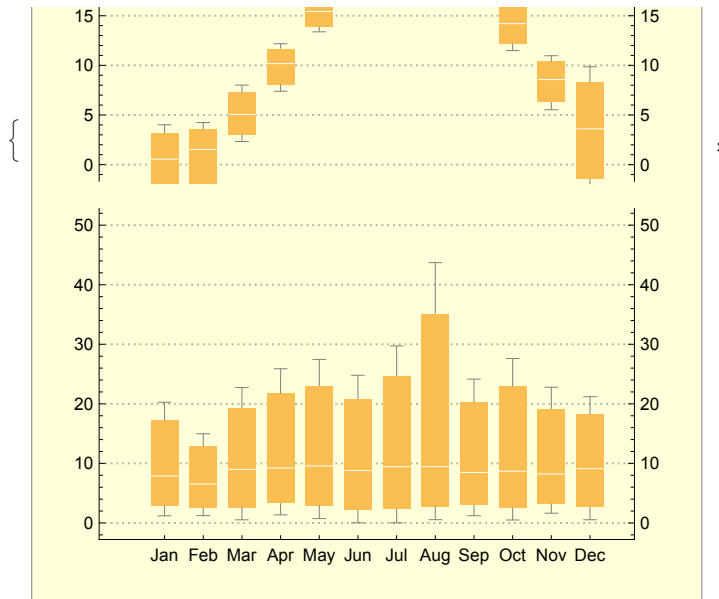
Out[346]=

Example 2: This call uses options to set the background color, and normalizes the vertical ranges for both the temperature and precipitation plots.

In[347]:=

```
climograph[{ New York City CITY , Paris CITY }
 , TemperaturePlotRange → {0, 30}
 , PrecipitationPlotRange → {0, 50}
 , Background → LightYellow
]
```
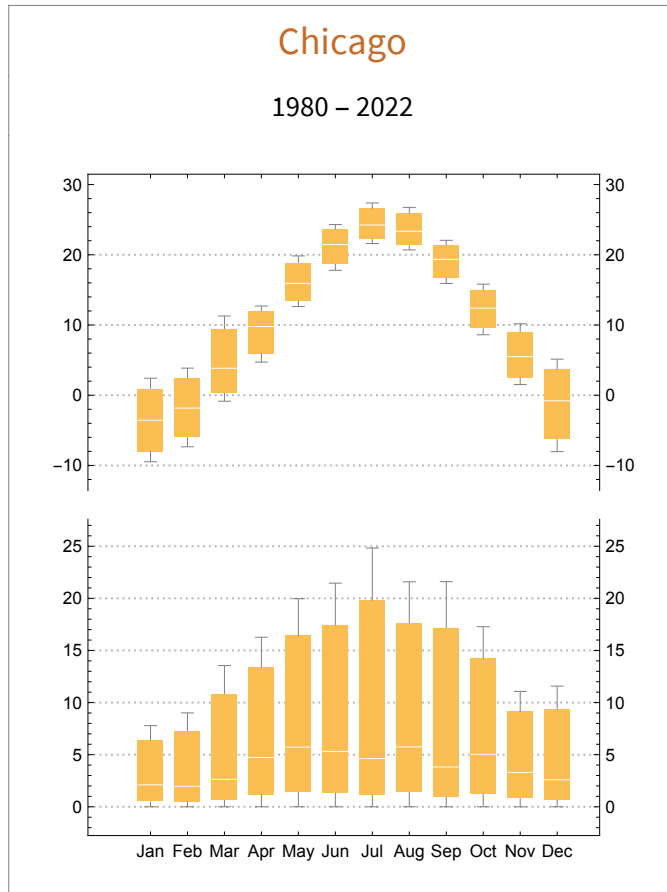
Out[347]=

Example 3: This call uses options to omit the lines joining temperature and precipitation mean values.

In[348]:=

```
climograph[ Chicago CITY ,
  TemperatureJoined → False, PrecipitationJoined → False]
```
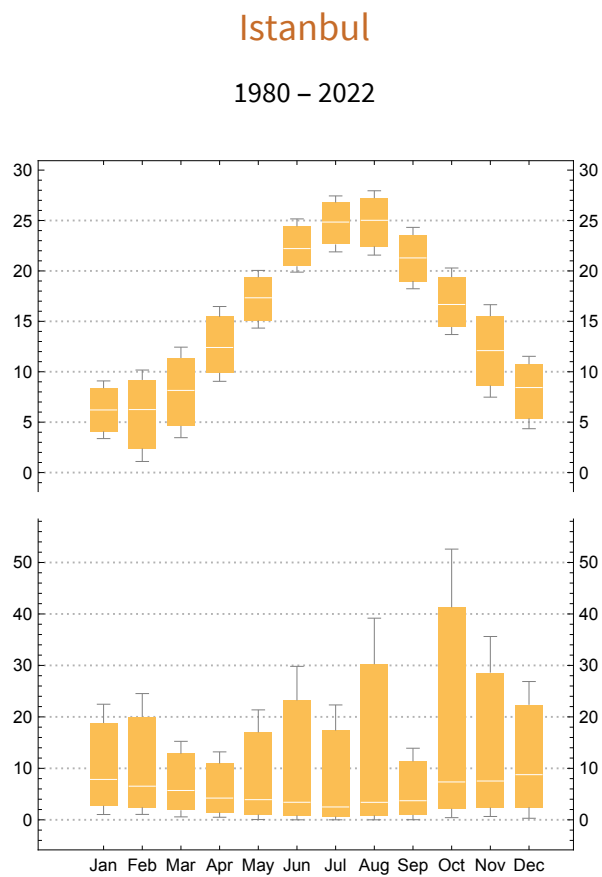
Out[348]=

Example 4: This call uses options to not show an outer frame.

In[349]:=

```
climograph[ Istanbul CITY , Frame → False]
```

Out[349]=

Istanbul

1980 – 2022

Example 5: This call uses options to show the inner frame with a particular style.

In[350]:=

```
climograph[
  Tokyo CITY
  , InnerFrame → True
  , InnerFrameStyle → Directive[Red, Dotted, Thick]
]
```

Out[350]=