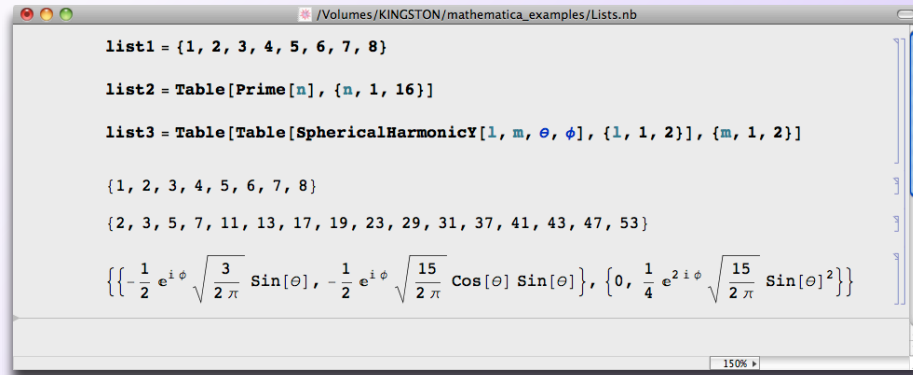




Mathematica can do everything.

Lists



The screenshot shows a Mathematica notebook window titled "/Volumes/KINGSTON/mathematica_examples/Lists.nb". The notebook contains the following code and output:

```
list1 = {1, 2, 3, 4, 5, 6, 7, 8}

list2 = Table[Prime[n], {n, 1, 16}]

list3 = Table[Table[SphericalHarmonicY[1, m,  $\theta$ ,  $\phi$ ], {1, 1, 2}], {m, 1, 2}]
```

The output of the code is:

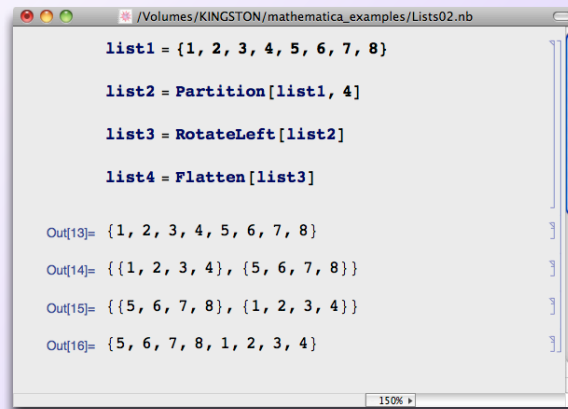
```
{1, 2, 3, 4, 5, 6, 7, 8}

{2, 3, 5, 7, 11, 13, 17, 19, 23, 29, 31, 37, 41, 43, 47, 53}

{{ $-\frac{1}{2} e^{i\phi} \sqrt{\frac{3}{2\pi}} \sin[\theta]$ ,  $-\frac{1}{2} e^{i\phi} \sqrt{\frac{15}{2\pi}} \cos[\theta] \sin[\theta]$ }, { $0$ ,  $\frac{1}{4} e^{2i\phi} \sqrt{\frac{15}{2\pi}} \sin[\theta]^2$ }}
```

The window also shows a zoom level of 150% at the bottom right.

Operations on Lists



The screenshot shows a Mathematica notebook window titled "/Volumes/KINGSTON/mathematica_examples/Lists02.nb". The notebook contains the following code and output:

```
list1 = {1, 2, 3, 4, 5, 6, 7, 8}

list2 = Partition[list1, 4]

list3 = RotateLeft[list2]

list4 = Flatten[list3]

Out[13]= {1, 2, 3, 4, 5, 6, 7, 8}
Out[14]= {{1, 2, 3, 4}, {5, 6, 7, 8}}
Out[15]= {{5, 6, 7, 8}, {1, 2, 3, 4}}
Out[16]= {5, 6, 7, 8, 1, 2, 3, 4}
```

The notebook interface includes a vertical scrollbar on the right and a zoom level indicator at the bottom right showing "150%".

Matrices

```

/Volumes/KINGSTON/mathematica_examples/Matrix01.nb

In[1]:= n = 4;
matrix = RandomReal[{-1, 1}, {n, n}]
MatrixForm[matrix]

Out[2]= {{-0.758582, 0.958944, -0.785218, -0.173281}, {-0.779154, 0.464907, -0.311536, 0.986671},
{-0.416901, -0.950035, 0.347925, 0.463686}, {-0.732051, 0.921863, -0.50381, -0.329546}}

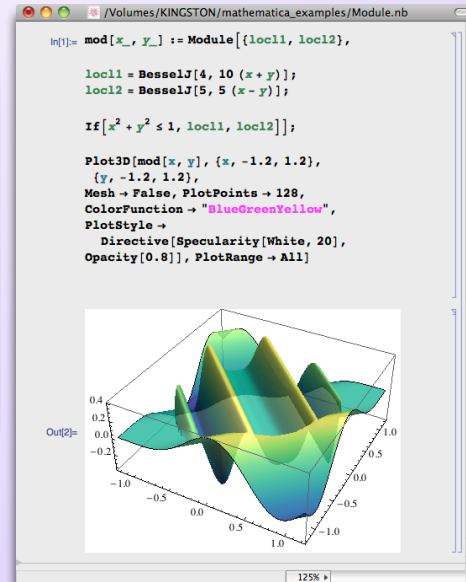
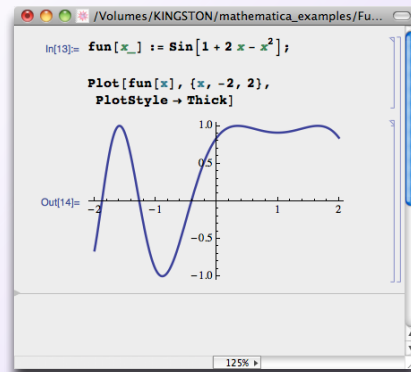
Out[3]/MatrixForm=

$$\begin{pmatrix} -0.758582 & 0.958944 & -0.785218 & -0.173281 \\ -0.779154 & 0.464907 & -0.311536 & 0.986671 \\ -0.416901 & -0.950035 & 0.347925 & 0.463686 \\ -0.732051 & 0.921863 & -0.50381 & -0.329546 \end{pmatrix}$$

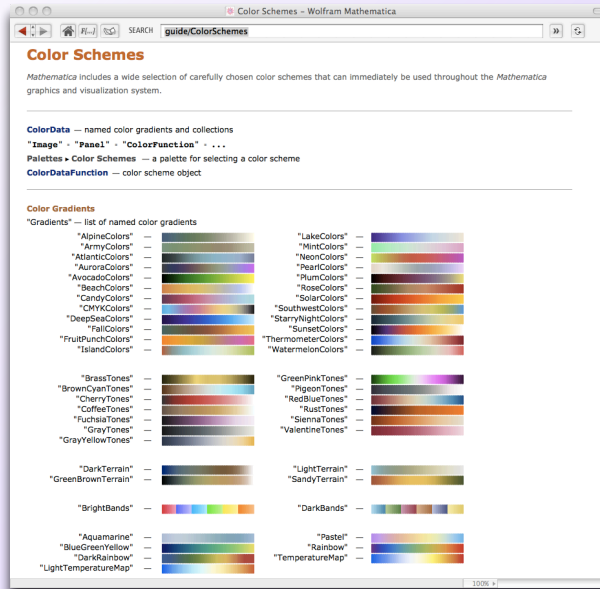

In[4]:= n = 3000;
matrix = RandomReal[{-1, 1}, {n, n}];
Timing[Eigensystem[matrix]];

Out[6]= {82.2568, Null}
```

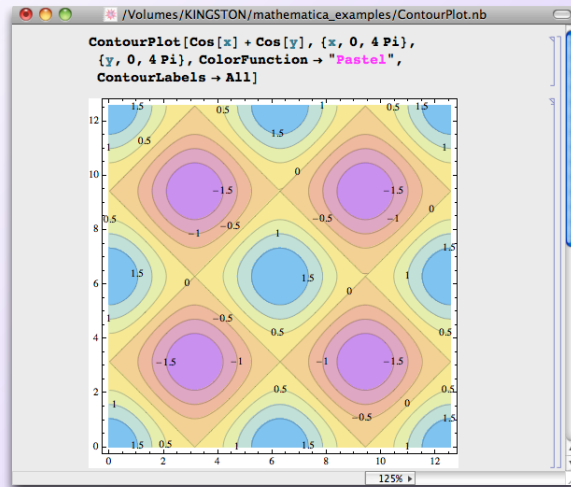
Functions and Modules



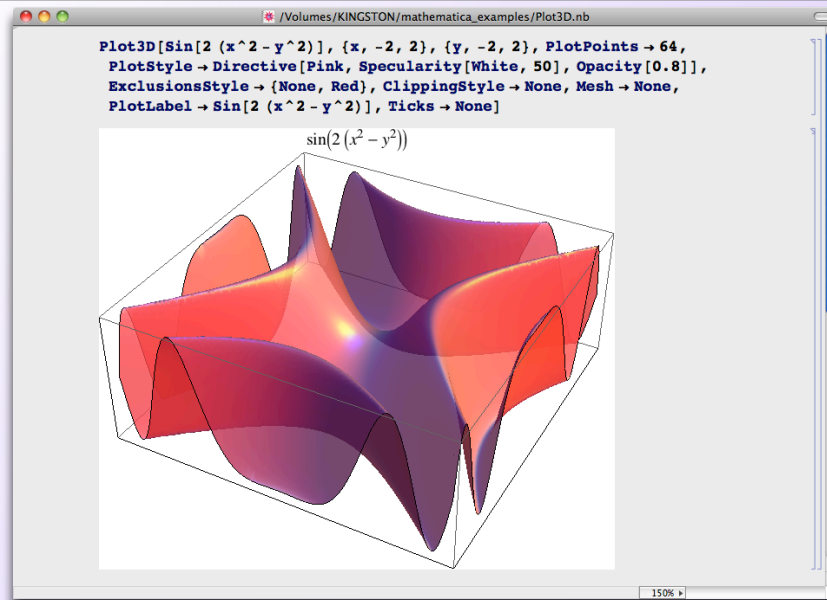
ColorFunctions



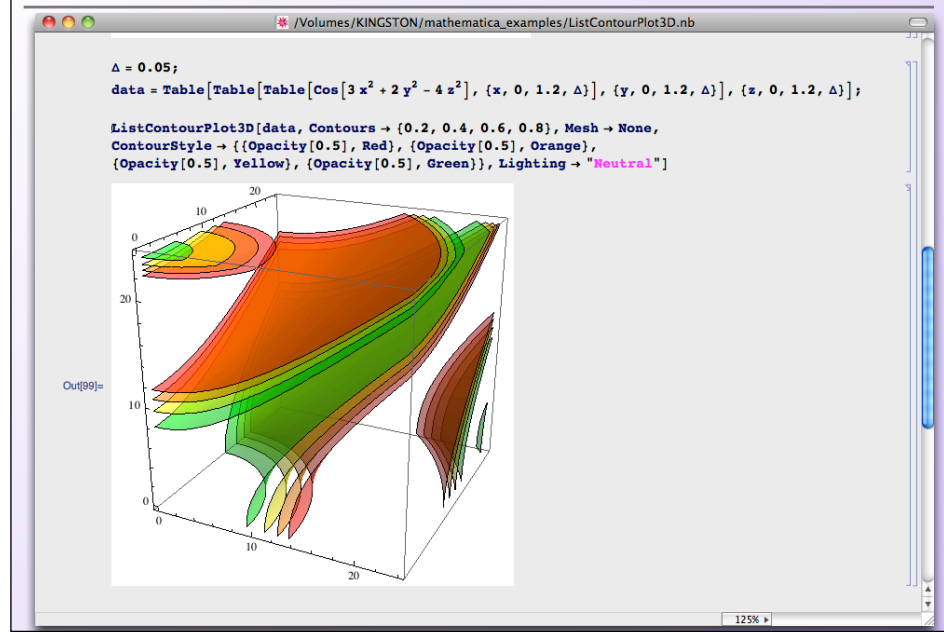
Graphics: ContourPlot



Graphics: Plot3D



Graphics: ListContourPlot3D



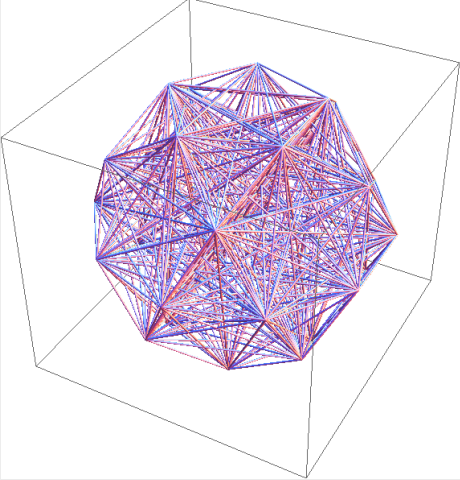
Graphics: Graphics primitives

```

/Volumes/KINGSTON/mathematica_examples/Tube.nb
In[5]:= vrtx = N[PolyhedronData["Icosidodecahedron", "VertexCoordinates"]];
Graphics3D[Table[Table[Tube[{vrtx[n1], vrtx[n2]}, 0.01], {n1, Length[vrtx]}], {n2, Length[vrtx]}]]

```

Out[6]=



125K v

Export/Importing ascii data

```

/Volumes/KINGSTON/mathematica_examples/Import.nb

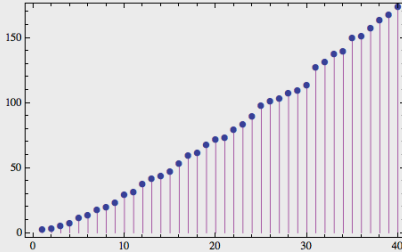
In[25]:= data1 = Table[Prime[n], {n, 40}]
Export["/Volumes/KINGSTON/mathematica_examples/datal.txt", data1]

Out[25]= {2, 3, 5, 7, 11, 13, 17, 19, 23, 29, 31, 37, 41, 43, 47, 53, 59, 61, 67, 71, 73, 79,
83, 89, 97, 101, 103, 107, 109, 113, 127, 131, 137, 139, 149, 151, 157, 163, 167, 173}

Out[26]= /Volumes/KINGSTON/mathematica_examples/datal.txt

In[48]:= data2 = ReadList["/Volumes/KINGSTON/mathematica_examples/datal.txt", Number]
plot = ListPlot[data2, Frame -> True, PlotMarkers -> Automatic, Filling -> Axis, FillingStyle -> Purple]
Export["/Volumes/KINGSTON/mathematica_examples/datal.PDF", plot, ImageSize -> 72 x 6]

Out[48]= {2, 3, 5, 7, 11, 13, 17, 19, 23, 29, 31, 37, 41, 43, 47, 53, 59, 61, 67, 71, 73, 79,
83, 89, 97, 101, 103, 107, 109, 113, 127, 131, 137, 139, 149, 151, 157, 163, 167, 173}

Out[49]=


Out[50]= /Volumes/KINGSTON/mathematica_examples/datal.PDF

```

Importing binary data

```
test.F90
Last Saved: 1/22/10 11:45:05 AM
File Path: /Volumes/KINGSTON/mathematica_examples/test.F90
test.F90 (no symbol selected)
1
2 program test
3
4 integer :: i
5 real (kind=selected_real_kind(12)) :: a(20)
6
7 do i = 1,20
8   a(i) = sin (0.1*float (i))
9 enddo
10
11 print *,a
12
13 open (unit=17,file="data_binary",form="unformatted")
14 write (17) a
15 close (17)
16
17 end program test
3 16 Fortran 9x Western (Mac OS Roman) Unix (LF)
```

```
/Volumes/KINGSTON/mathematica_examples/binary.nb
tmpry1 = BinaryReadList["data_binary", "Byte"]
tmpry2 = tmpry1[5 ;; -5];
BinaryWrite["/tmp/tmpy", tmpry2]; Close["/tmp/tmpy"];
data = BinaryReadList["/tmp/tmpy", "Real64"]
{160, 0, 0, 0, 0, 0, 224, 174, 142, 185, 63, 0, 0, 0, 32,
255, 109, 201, 63, 0, 0, 0, 160, 205, 233, 210, 63, 0,
0, 0, 224, 58, 236, 216, 63, 0, 0, 0, 128, 232, 174,
222, 63, 0, 0, 0, 32, 141, 17, 226, 63, 0, 0, 0, 96, 110,
157, 228, 63, 0, 0, 0, 192, 148, 244, 230, 63, 0, 0, 0,
160, 3, 17, 233, 63, 0, 0, 0, 128, 84, 237, 234, 63, 0,
0, 0, 96, 197, 132, 236, 63, 0, 0, 0, 160, 67, 211, 237,
63, 0, 0, 0, 120, 213, 238, 63, 0, 0, 0, 224, 205,
136, 239, 63, 0, 0, 0, 160, 122, 235, 239, 63, 0, 0, 0,
192, 129, 252, 239, 63, 0, 0, 0, 224, 183, 187, 239,
63, 0, 0, 0, 128, 194, 41, 239, 63, 0, 0, 0, 32, 23, 72,
238, 63, 0, 0, 0, 224, 246, 24, 237, 63, 160, 0, 0, 0}
{0.0998334, 0.198669, 0.29552, 0.389418, 0.479426,
0.564642, 0.644218, 0.717356, 0.783327, 0.841471,
0.891207, 0.932039, 0.963558, 0.98545, 0.997495,
0.999574, 0.991665, 0.973848, 0.9463, 0.909297}
```

netCDF

```

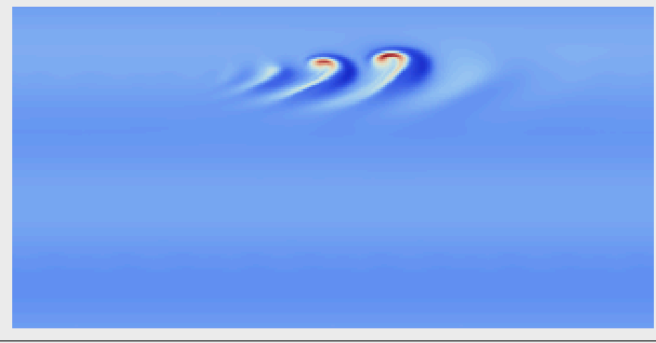
/Volumes/KINGSTON/mathematica_examples/netCDF.nb

In[2]:= Import["CSU_JBLN_ex01_lv106_sgm_a00.nc"]
Out[2]= {P0, lon, lat, lev, ilev, time, PHIS, PS, TS, T850, T300, Z700, Z500, Z300,
rel850, rel200, div850, div200, U850, U200, V850, V200, OMEGA850, OMEGA500,
P, T, Z3, rel, div, U, V, OMEGA, TRACER01, TRACER02, TRACER03, TRACER04}

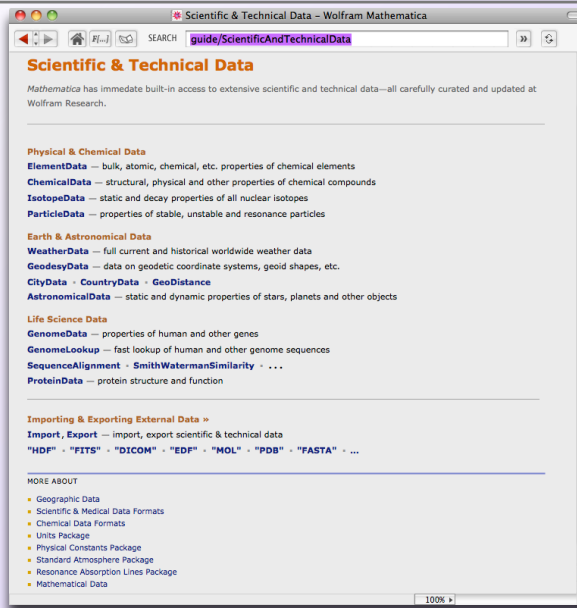
In[9]:= rel850 = Import["CSU_JBLN_ex01_lv106_sgm_a00.nc", {"Datasets", "rel850"}];
ArrayPlot[rel850[[10]], DataReversed -> True, ColorFunction -> "ThermometerColors",
ImageSize -> 72 x 8]

Out[10]=

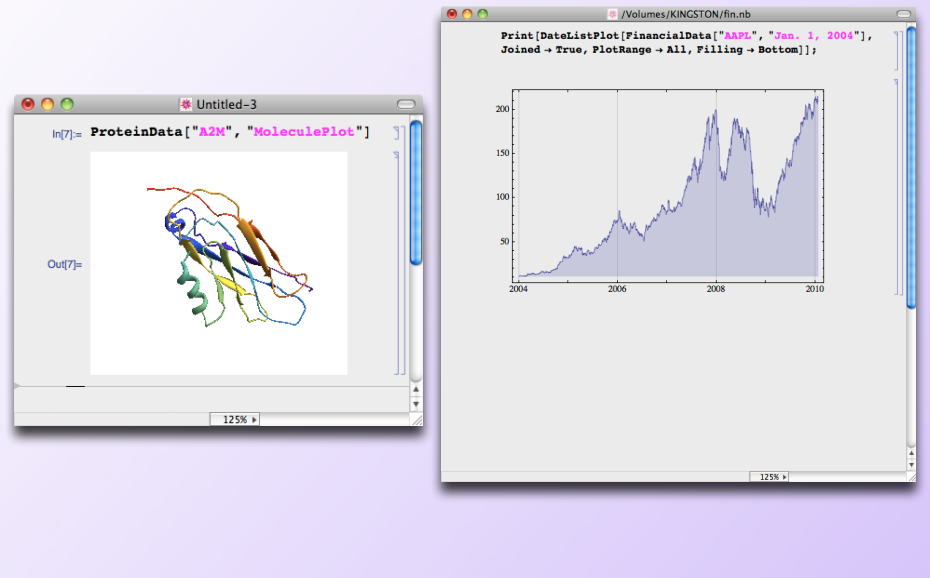
```



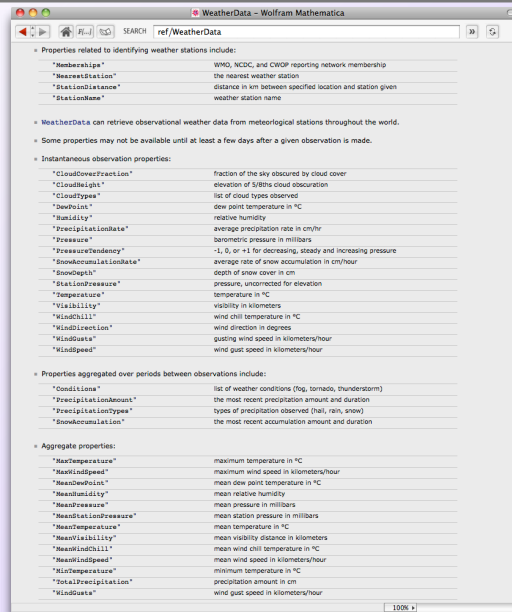
Data sets from mathematica



Data sets from mathematica



Data sets from mathematica



The screenshot shows the Wolfram Mathematica interface with the `WeatherData` documentation page open. The page is titled "WeatherData" and contains the following sections:

- Properties related to identifying weather stations include:**
 - `"membership"`: WMO, NCDC, and CNOF reporting network membership
 - `"nearestStation"`: the nearest weather station
 - `"stationDistance"`: distance in km between specified location and station given
 - `"stationName"`: weather station name
- WeatherData can retrieve observational weather data from meteorological stations throughout the world.**
- Some properties may not be available until at least a few days after a given observation is made.**
- Instantaneous observation properties:**
 - `"cloudCoverFraction"`: fraction of the sky obscured by cloud cover
 - `"cloudHeight"`: elevation of 5/8ths cloud obscuration
 - `"cloudTypes"`: list of cloud types observed
 - `"dewPoint"`: dew point temperature in °C
 - `"humidity"`: relative humidity
 - `"precipitationRate"`: average precipitation rate in cm/hr
 - `"pressure"`: barometric pressure in millibars
 - `"pressureTendency"`: -1, 0, or +1 for decreasing, steady and increasing pressure
 - `"snowAccumulationRate"`: average rate of snow accumulation in cm/hour
 - `"snowDepth"`: depth of snow cover in cm
 - `"stationPressure"`: pressure, uncorrected for elevation
 - `"temperature"`: temperature in °C
 - `"visibility"`: visibility in kilometers
 - `"windChill"`: wind chill temperature in °C
 - `"windDirection"`: wind direction in degrees
 - `"windGusts"`: gusting wind speed in kilometers/hour
 - `"windSpeed"`: wind gust speed in kilometers/hour
- Properties aggregated over periods between observations include:**
 - `"conditions"`: list of weather conditions (fog, tornado, thunderstorm)
 - `"precipitationAmount"`: the most recent precipitation amount and duration
 - `"precipitationTypes"`: types of precipitation observed (hail, rain, snow)
 - `"snowAccumulation"`: the most recent accumulation amount and duration
- Aggregate properties:**
 - `"MaxTemperature"`: maximum temperature in °C
 - `"MaxWindSpeed"`: maximum wind speed in kilometers/hour
 - `"MeanDewPoint"`: mean dew point temperature in °C
 - `"MeanHumidity"`: mean relative humidity
 - `"MeanPressure"`: mean pressure in millibars
 - `"MeanStationPressure"`: mean station pressure in millibars
 - `"MeanTemperature"`: mean temperature in °C
 - `"MeanVisibility"`: mean visibility distance in kilometers
 - `"MeanWindChill"`: mean wind chill temperature in °C
 - `"MeanWindSpeed"`: mean wind speed in kilometers/hour
 - `"MinTemperature"`: minimum temperature in °C
 - `"TotalPrecipitation"`: precipitation amount in cm
 - `"WindGusts"`: wind gust speed in kilometers/hour