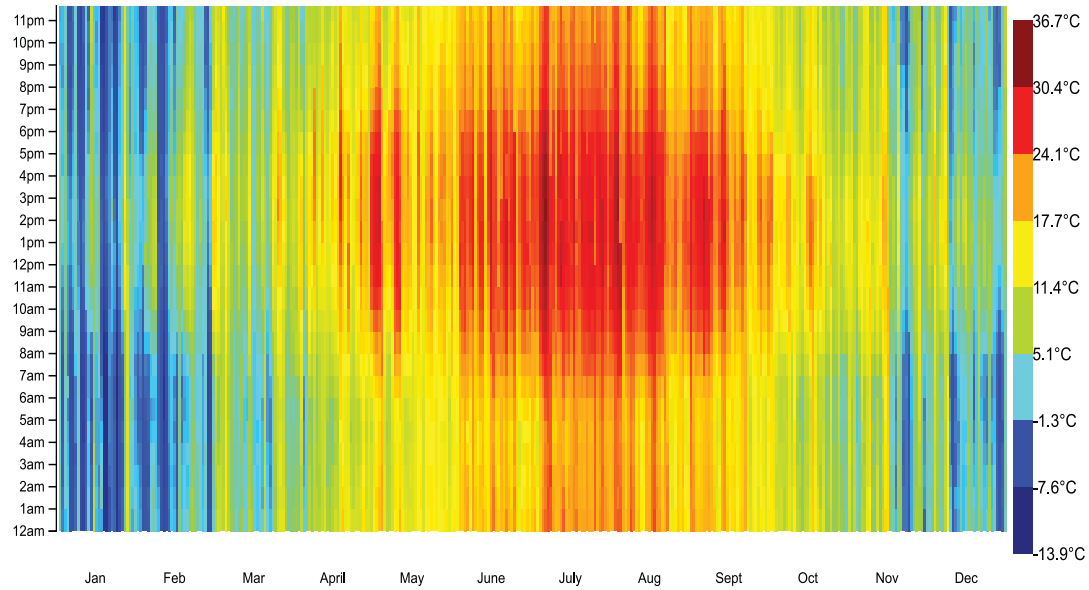
# Philadelphia Intl Airport Weather Data Report

ARCH 633

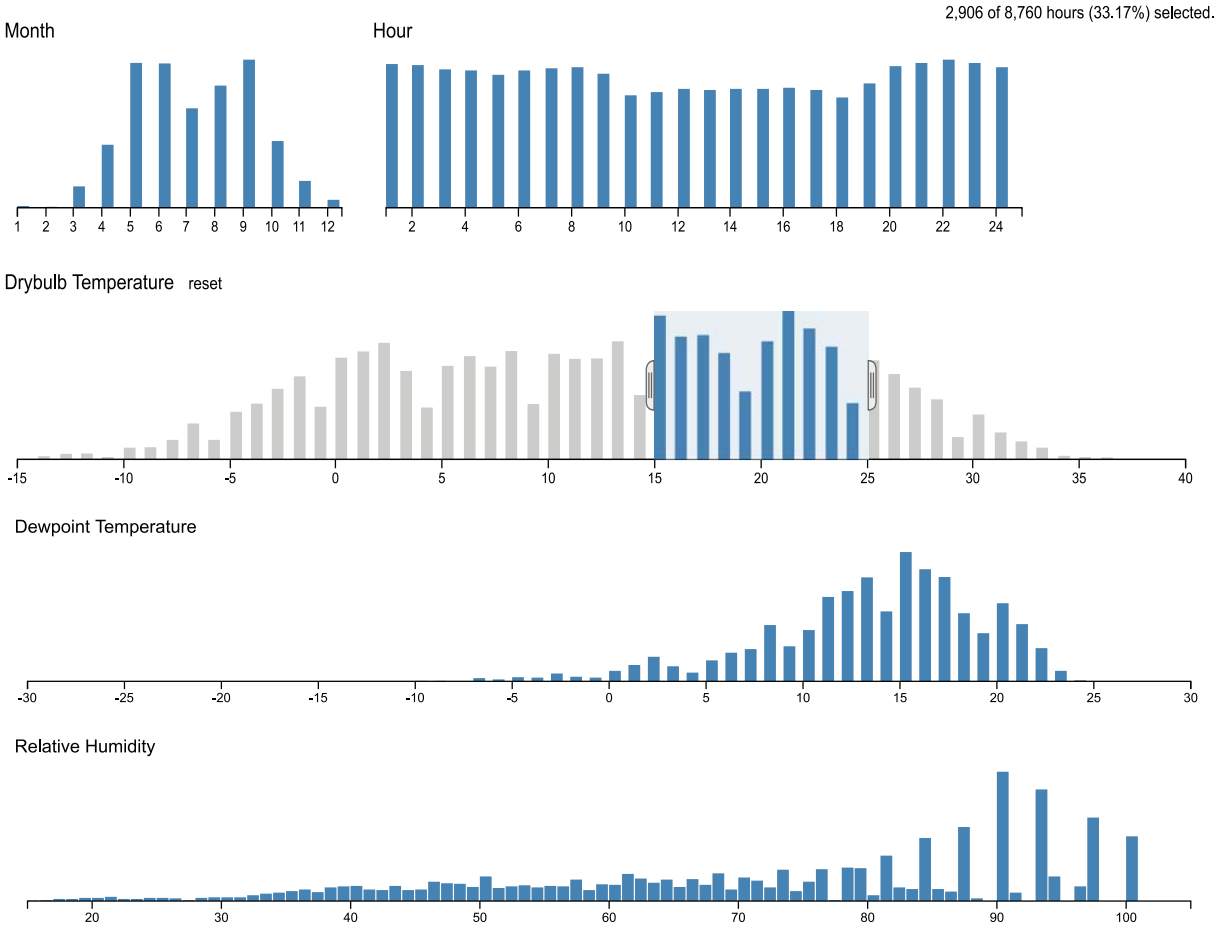
Alexandra Adamski

## Drybulb Temperature Floodplot




## Thermal Comfort

Hours between 15°C and 25°C.




Source: https://mdahlhausen.github.io/epwvis/

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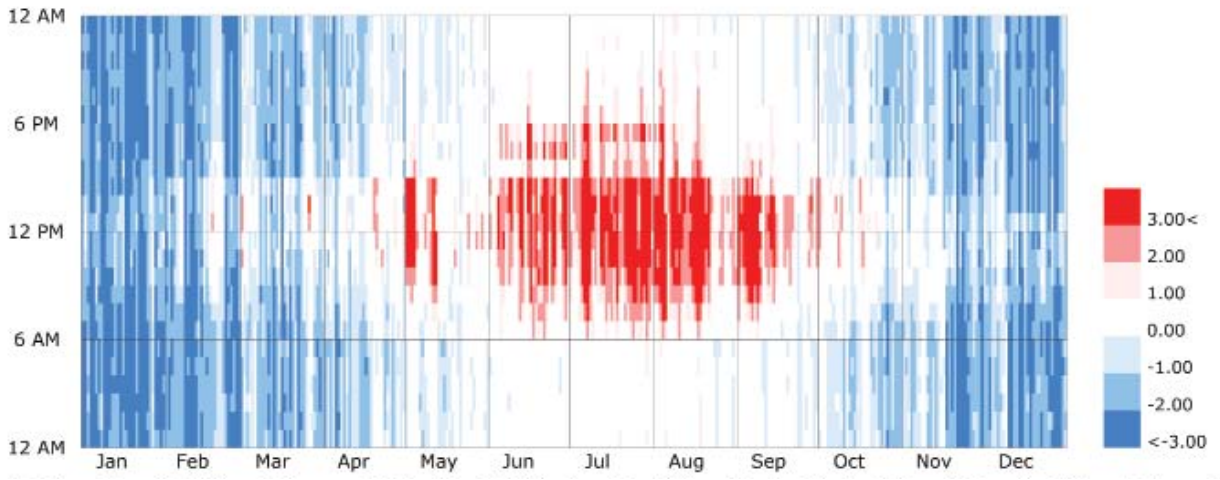
## Oudoor Thermal Comfort

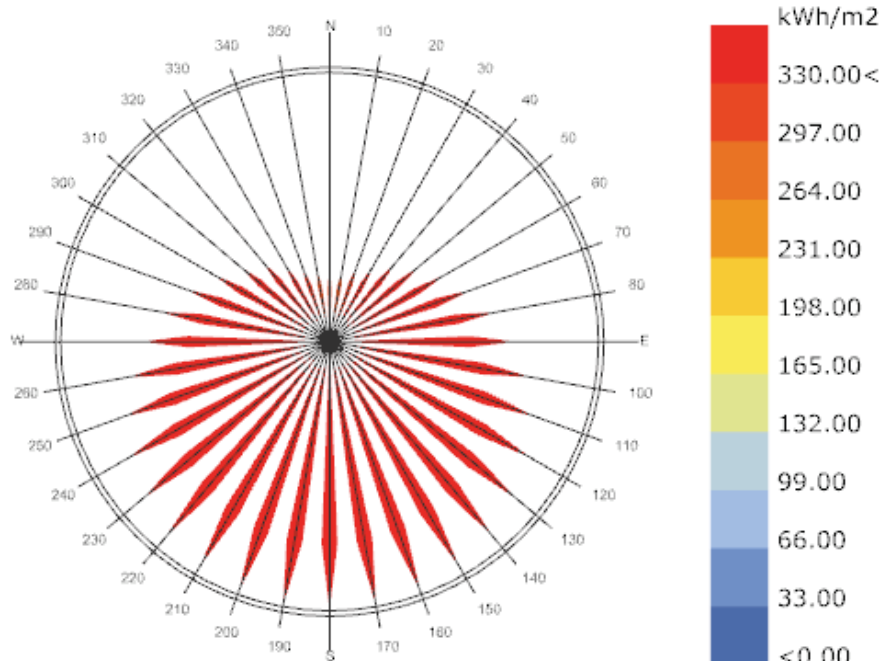



**Outdoor Comfort (Hourly)**
Philadelphia Intl Airport // PA, USA

| | |
|---|---|
| **Comfortable:** | 39.38% |
| **Short Pd Comfort:** | 19.29% |
| **Heat Stress:** | 8.97% |
| **Cold Stress:** | 32.35% |

| | |
|---|---|
| 3 | Extreme Heat |
| 2 | Hot |
| 1 | Warm |
| 0 | Comfort |
| -1 | Cool |
| -2 | Cold |
| -3 | Extreme Cold |

## Radiation Rose




Total Radiation (kWh/m)
Philadelphia International Ap PA, USA
1 JAN 1:00 - 31 DEC 24:00

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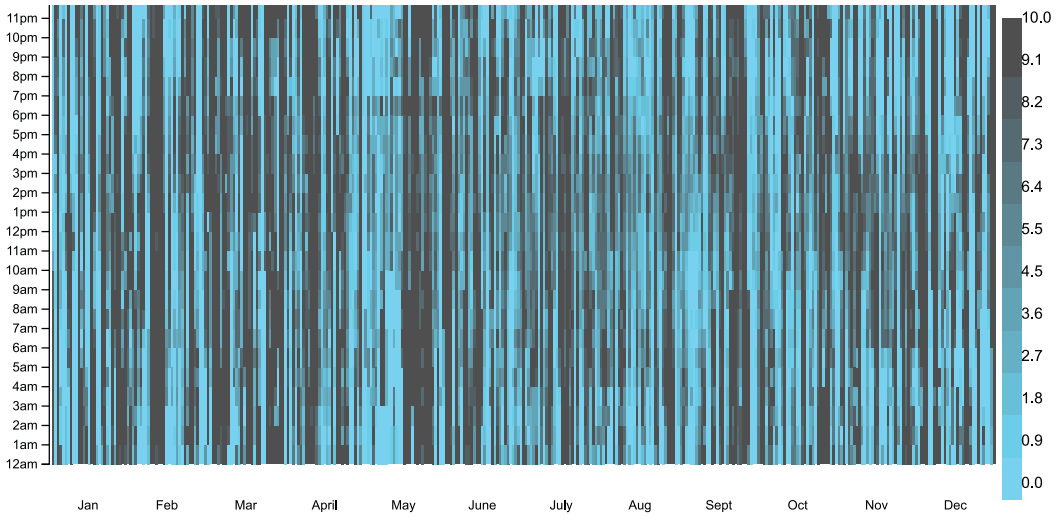
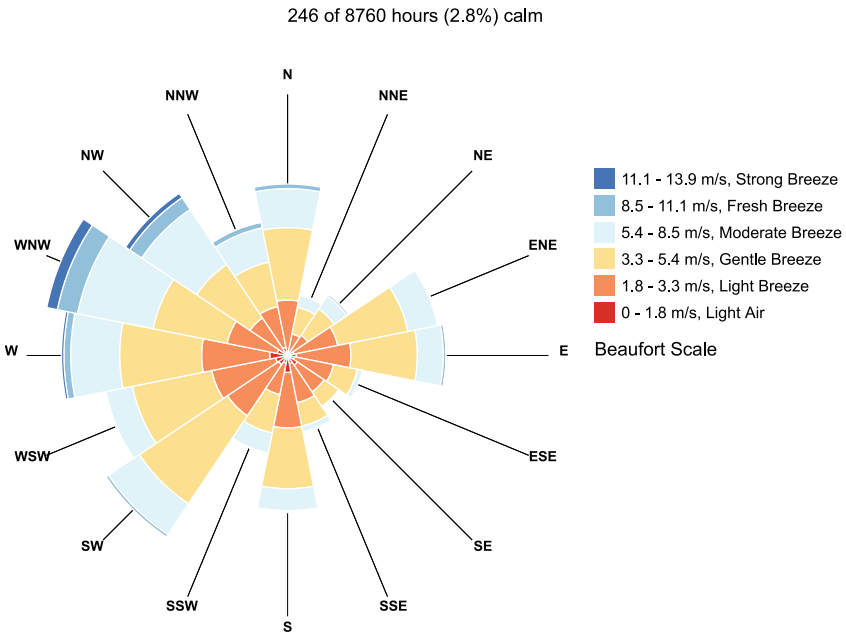
## Cloud Cover Floodplot

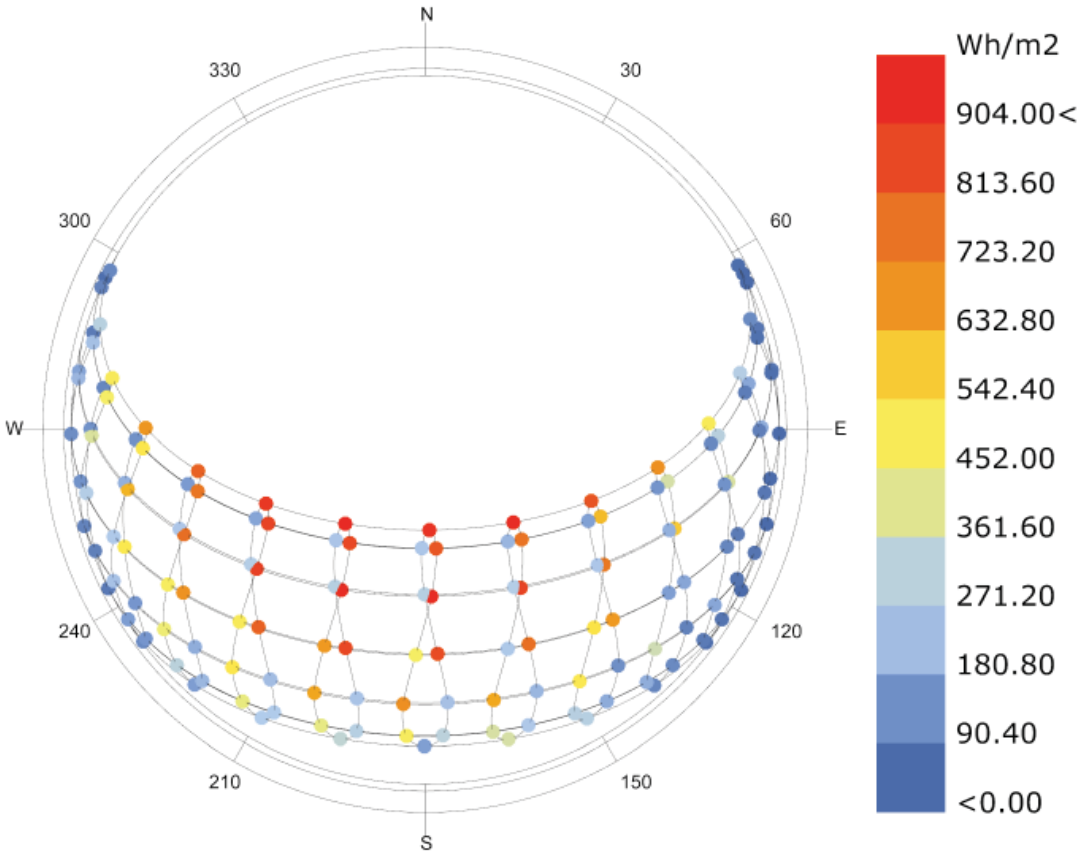



## Wind Rose



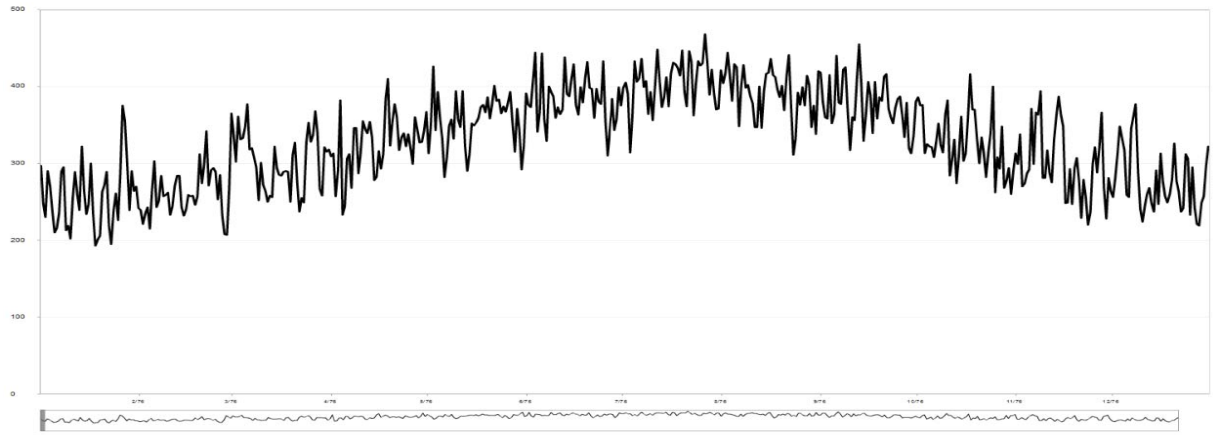

Source: https://mdahlhausen.github.io/epwvis/

## Sun Path and Radiation



## Dry Bulb Temperature (C) + Relative Humidity

## Infrared Sky Radation (Wh/m2)

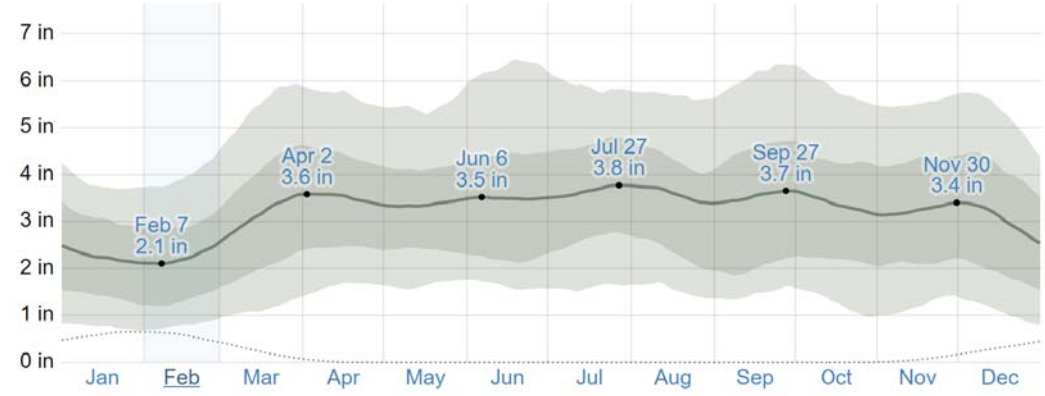


Source: Elements

## Daily Chance of Precipitation


*The percentage of days in which various types of precipitation are observed, excluding trace quantities: rain alone, snow alone, and mixed (both rain and snow fell in the same day).*

## Average Monthly Rainfall




*The average rainfall (solid line) accumulated over the course of a sliding 31-day period centered on the day in question, with 25th to 75th and 10th to 90th percentile bands. The thin dotted line is the corresponding average liquid-equivalent snowfall.*

Source: Weatherspark

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## Important Passive Design Strategies

### 1. Passive Heating / Cooling

Philadelphia experiences a high range of dry bulb temperatures and humidity over the course of a year, so both passive heating and cooling strategies would be relevant to incorporate into building designs. Passive heating takes advantage of solar radiation and captures internal heat gains. Using a well-insulated envelope with elements that minimize energy losses, passive solar heating stores and harnesses solar gains to offset energy requirements. This strategy employs elements such as building orientation to the sun, sun spaces, high-performance windows (clear, low-e), mixed-mode heat recovery ventilation (HRV), low window to wall area ratio (N/E), high window to wall area ratio (S/W), operable external shading, high-performance insulation, thermal mass, and minimized infiltration.[1]

Passive cooling blocks solar gains and removes internal heat gains with methods such as using cool external air for ventilation, or storing excess heat in thermal mass. Passive cooling can utilize earth-tempering ducts, passive evaporative cooling, stacked windows, nocturnal cooling, passive ventilation, low window to wall area ratio (S/W), and operable external shading.[2]

### 2. Ventilation

Working together with other passive cooling strategies, passive ventilation can be used to cool buildings in Philadelphia during hot, humid summers. The city experiences the strongest winds from the west at an average speed of 3-8 m/s, so operable windows and openings would perform the best facing this direction. Using naturally occurring air flow around a building, passive ventilation replaces air in occupied spaces while also possibly cooling those spaces. Elements used for this strategy include operable windows, buffer spaces and double-facades, orientation to air flow direction, openings in corridors and other transition spaces, central atriums and lobbies, and wind towers.[3]

### 3. Shading

Philadelphia experiences a lot of radiation and high dry bulb temperatures during the summer, so passive shading strategies could also be important to employ in building design and outdoor spaces. This would help increase thermal comfort in the summer by reducing heat stress and also reduce energy costs in cooling systems. Shading should aim to block direct sun from the east, south, and west during the summer while still allowing solar gain during the winter.

[1, 2, 3, 4] Source: https://climatecolab.org/contests/2014/buildings/c/proposal/1309226