What is MWO?

• A private, nonprofit, member-supported institution with a mission to advance understanding of the natural systems that create Earth’s weather and climate.
  • Weather Operations
  • Research & Product Testing
  • Education

• Funding: Membership, Sponsors, Donations, Program Fees, Grants & Contracts
MWO History

• Established 1932
• April 12, 1934: 231 MPH
• Buildings:
  • Stage Office (1932-1937)
  • "Old House" (1937-1980)
  • Sherman Adams Building (1980-Present)
MWO Norms & Means

- Annual average wind speed: **35 MPH**
- Annual average temperature: **27.3 F**
- Annual average snowfall: **281.2"**
- Annual average liquid equivalent precipitation: **96.87"**
- Annual average days with fog: **220/365** (approximately 60%)
MWO Extremes

- Maximum Instantaneous Wind Speed: **231 MPH** (April 1934)
- Minimum Air Temperature: **-47 F** (Jan 1934)
- Maximum Seasonal Snowfall Total: **566.4"** (1968-69)
- Maximum Annual Liquid Equivalent: **130.14"** (1969)

Information from internal data records
'Home of the World's Worst Weather?'

- Topography
- Frequency of Storms
- Venturi Effect
'Home of the World's Worst Weather?'

Harney Peak
7,242 feet

Mt. Mitchell
6,684 feet

Mt. Washington
6,288 feet

Prevailing Winds
'Home of the World's Worst Weather?'

- Prevailing Winds W-NW
- 100+ MPH recorded from all directions
'Home of the World's Worst Weather?'
'Home of the World's Worst Weather?'

Tropopause

Surface

25 MPH

100 MPH
The Life & Work of a MWO Observer

- Observation
- Forecasting
- Education
- Research
"Typical" Work Week

- 8 Days On/ 6 Days Off
- Wednesday Shift Change
- Two Shifts of Three Observers Each
  - Two on Day Shift (0500-1700)
  - One on Night Shift (1700-0500)
  - Seasonal Intern on each shift
What Goes Into an Ob?

- Temperature/ DP/ RH
  - Sling Psychrometer
- Wind speed and Direction
  - Anemometer
- Air Pressure
  - Barometer
- Precipitation
  - Precipitation Can
Thermometers
Wind Data
Barometers

802.85 mbar

1012.27 mbar
Precipitation
Human Senses

- Visibility
- Sky conditions
- Verifying readings
- Determining Precipitation Types
Snow Board
Significant Clouds
Varying Visibility
Precipitation Nearby
Maintenance
What is the Value of MWO Observations?

• Production of Model Output Statistics (MOS) for Forecasting

• Constant Upper-Level Atmospheric Data
  • Wind Speed, Lapse Rates, Moisture
  • Used in mixed precipitation events, fire weather forecasts

• Mountain hydrology data for runoff and spring flooding

• Unparalleled climate data for mountain/complex terrain investigation

• Data helps determine aircraft icing and turbulence

• Recreational and operational forecast information
The Higher Summits Forecast

- Produced twice daily
- 48-hour forecast window
- Peaks >4,000ft in the White Mountains
- Users:
  - Backcountry community (hiking, climbing skiing)
  - Mountain operations (MWAR, The Cog, MWSP)
  - SAR, aviation, etc.

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**Monday Night**
Mostly in the clouds under mostly cloudy skies with a chance of snow showers. Possible snow accumulation of 1-3 inches. Windy!

- **Temperature** (°F): Around 0 falling to around 20 below
- **Winds**: W shifting NW 105-125 mph with gusts up to 165 mph, decreasing to 95-115 mph with gusts up to 140 mph
- **Wind Chill** (°F): Falling to 75 below to 85 below

**Tuesday**
In and out of the clouds becoming in the clear under clearing skies. Windy!

- **Temperature** (°F): Around 20 below
- **Winds**: NW 95-115 with gusts up to 135 mph, decreasing to 80-95 mph with gusts up to 115 mph
- **Wind Chill** (°F): 75 below to 85 below

**Tuesday Night**
Mostly in the clear under partly cloudy skies. Windy!

- **Temperature** (°F): Around 25 below
- **Winds**: NW 80-100 mph with gusts up to 115 mph, decreasing to 70-90 mph with gusts up to 110 mph
- **Wind Chill** (°F): 70 below to 80 below

**Wednesday**
In the clear under increasingly cloudy skies.

- **Temperature** (°F): Around 20 below rising to around 30 below
- **Winds**: NW shifting W 60-80 mph, decreasing to 55-70 mph with gusts up to 100 mph early
- **Wind Chill** (°F): 70 below to 80 below
Research & Product Testing
Current Projects

• Long-term Visibility Analysis
• MWO Regional Mesonet Technical Paper
• FAA Anemometer Testing
• Next Generation Pitot Anemometer
Educational Programs

- Distance Learning
- Science in the Mountains
- WeatherX Curriculum
- Extreme Mount Washington Museum
Questions?

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Day in the Life
Transportation
High Winds
De-Icing
Living Quarters
Climate Change on Mount Washington

Mount Washington, NH Mean Annual Temperature 1935-2020

- Warmest Year: 30.4°F/-0.9°C (2012)
- Coldest Year: 24.5°F/-4.1°C (1943)
- 1935-2020 Mean: 27.3°F/-2.5°C

* 1935-2020 mean temperature trend calculated using Theil-Sen's slope

Ryan Knapp, Weather Observer/Meteorologist
Mount Washington Observatory
Climate Change & Wx on Mount Washington

• Warming expected
• Shorter winter season
• Shallower snow depths
• More melt out events
• More intense large precip events
• Similar to Northeast US Region
• Unknowns remain

(Kelsey et al. in prep) (USGCRP 2018)