Historical Weather and Climate Data Available from Environment Canada

K. Tiongson
National Archives and Data Management Branch
Downsview, Ontario,
M3H 5T4

- Historically the MCS has been the primary source of meteorological and climatological observations.
- Earliest data from our Archives dates back to 1840.
- Data are available in various medium:
  - Digital Datasets
  - Books and Publications
  - Paper documents
  - Microfilms
  - Microfiche
Basic Access to Observational Data

- Internet Access
- Canadian Climate Normals (1971-2000)
- Canadian Daily Climate Data CD-ROM (CDCD)

Internet Access

- Launched on July 31, 2003
- Provides users with basic access to historical weather and climate data:
  - One day of hourly data
  - One month of daily data
  - One year of monthly data
- Elements include:
  - Hourly – temperature, humidity, wind speed/direction, atmospheric pressure, and weather that occurred
  - Daily and Monthly – maximum/minimum temperature, precipitation, and snow depth
**Internet Access …**

- Although designed primarily for the general public, the data is also useful for the renewable energy and building sector:
  - For example: provides hourly weather conditions to investigate an energy system performance at a given location.

- **Enhancements and New Data Access Features:**
  - Plans to introduce other elements (e.g. solar radiation).
  - Access to larger datasets in various downloadable formats (comma delimited, text files, excel, etc…)
  - Introduction of a daily almanac (daily temperatures, extremes, probability of precipitation)
  - Interactive maps to help identify locations.
To display climate data directly from the database, first specify a date, data interval, and then select a city on the map.

For more locations, select a province or territory or click on customized search.
# Hourly Temperature for July 31, 2003

![Hourly Temperature Graph for July 31, 2003](image)

- **Temperature (°C):** 1 to 28
- **Hour (Local Standard Time):** 00:00 to 24:00

## Table 1

<table>
<thead>
<tr>
<th>Time (Local Standard Time)</th>
<th>Temperature (°C)</th>
</tr>
</thead>
<tbody>
<tr>
<td>00:00</td>
<td>1.0</td>
</tr>
<tr>
<td>01:00</td>
<td>1.2</td>
</tr>
<tr>
<td>02:00</td>
<td>1.5</td>
</tr>
<tr>
<td>03:00</td>
<td>1.8</td>
</tr>
<tr>
<td>04:00</td>
<td>2.2</td>
</tr>
<tr>
<td>05:00</td>
<td>2.5</td>
</tr>
<tr>
<td>06:00</td>
<td>2.8</td>
</tr>
<tr>
<td>07:00</td>
<td>3.0</td>
</tr>
<tr>
<td>08:00</td>
<td>3.2</td>
</tr>
<tr>
<td>09:00</td>
<td>3.5</td>
</tr>
<tr>
<td>10:00</td>
<td>3.8</td>
</tr>
<tr>
<td>11:00</td>
<td>4.0</td>
</tr>
<tr>
<td>12:00</td>
<td>4.2</td>
</tr>
<tr>
<td>13:00</td>
<td>4.5</td>
</tr>
<tr>
<td>14:00</td>
<td>4.8</td>
</tr>
<tr>
<td>15:00</td>
<td>5.0</td>
</tr>
<tr>
<td>16:00</td>
<td>5.2</td>
</tr>
<tr>
<td>17:00</td>
<td>5.5</td>
</tr>
<tr>
<td>18:00</td>
<td>5.8</td>
</tr>
<tr>
<td>19:00</td>
<td>6.0</td>
</tr>
<tr>
<td>20:00</td>
<td>6.2</td>
</tr>
<tr>
<td>21:00</td>
<td>6.5</td>
</tr>
<tr>
<td>22:00</td>
<td>6.8</td>
</tr>
<tr>
<td>23:00</td>
<td>7.0</td>
</tr>
<tr>
<td>24:00</td>
<td>7.2</td>
</tr>
</tbody>
</table>

**Notes:**
- All times are specified in Local Standard Time (EST).
- Add 1 hour to adjust for Daylight Saving Time where and when it is observed.
- Data Quality:
  - Toronto Lester B. Pearson Int'l A.
  - Ontario

---

### Previous Day

- **Return to Data Table**

### Next Day
Canadian Climate Normals (1971-2000)

- The Canadian Climate Normals are a basic, but significant source of Canadian climatic summary information.
- Available on the MSC Internet site as basic Internet tables: [http://www.climate.weatheroffice.ec.gc.ca/climate_normals/index_e.html](http://www.climate.weatheroffice.ec.gc.ca/climate_normals/index_e.html)
- Comprised primarily of 30-year averages and extremes of basic observational data:
  - Daily maximum/minimum temperatures, and precipitation
  - Averages of hourly elements such as wind, solar radiation, and humidity will be added in the near future.
  - Updated after the end of every decade.

---

Canadian Daily Climate Data CD-ROM (CDCD)

- Provides all of the MSC daily climate data for more than 7,000 Canadian climate observing sites. (Entire period of record)
- Climate Data includes: daily temperatures, rainfall, snowfall, total precipitation, and depth of snow on the ground.
- 2 disc volume (East and West/North Canada)
- Accompanying software provides various viewing and output options.
- Updated annually (most recent = 2001CDCD)
### Specialized Products and Data Sets

- **Canadian Weather Energy and Engineering Data Sets (CWEEDS Files)**
- **Canadian Weather Year for Energy Calculation (CWEC Files)**
- **CERES (Canadian Renewable Energy Resource CD)**
Canadian Weather Energy and Engineering Data Sets (CWEEDS)

- Long-term hourly weather records for 146 Canadian locations (1953-2001)
- CWEEDS are electronic files in a fixed-column format.
- Uses WYEC2 format (Weather Year for Energy Calculation), developed by ASHRAE.

CWEEDS …

- Various uses:
  - Standard hourly weather data files
  - Renewable and building energy applications such as system design or evaluation of system performance characteristics.
  - Input to hourly building or renewable energy simulation models.
  - Provides estimated hourly solar radiation amounts for locations at which solar radiation is not observed.
    » MAC model – physical-empirical model based on the earth-sun geometry, cloud layer types and amounts.
Canadian Weather Year For Energy Calculation (CWEC)

- Data sets created from CWEEDS files (1953-1993).
- Contain an artificial year of 8760 hourly records.
- TMY (typical meteorological year):
  - Statistical algorithm that determines which data from each month from the long-term record is the most “typical” with respect to building energy use.
  - A CWEC file may include January from 1973, February from 1991, etc.
  - WYEC2 file format. Used for building energy simulation software to determine typical energy loads on buildings.
- Files available for more than 47 Canadian locations.
Canadian Renewable Energy Resource CD (CERES)

- Database of wind and solar radiation summary information for CWEEDS locations (1974-1993)
- Accompanied software allows users to browse through the data, view and print summary information in tabular and graphical form.
- Useful for planning and sizing solar energy systems.

CERES: Examples of the graphical output of solar radiation on several geometric surface orientations.
CERES: Examples of wind summaries in tabular output

<table>
<thead>
<tr>
<th>Mean Wind Speed (km/hr)</th>
<th>Recorded Wind Energy (MJ/m²)</th>
</tr>
</thead>
</table>

Observing Networks

- MSC observing networks have undergone significant changes in the last few years.
- Before automation, data were mainly collected by human observers.
- Technological, organizational, and budget changes in the mid 1990s:
  - Fewer observing locations
  - Increase in the number of automated observing locations
  - Increase in the number of data that is being processed automatically
  - Monitoring networks will be subjected to full life cycle management.
    - Results in a stable network
    - Maximum accessibility to data (public)
    - Operation to standards
Observing Networks…

• Wind
  • The advent of automatic observing stations has resulted in more wind observing locations.
  • Locations also observe hourly temperature and humidity.

• Solar Radiation
  • # of locations with available solar radiation data is currently decreasing.
  • Currently there are 38 active observing locations.
  • Time taken for data to reach the archive from the time it is recorded = few years.
  • Backlog of QC data is due to the fact that the procedure to process and QC the data is manually intensive.

Observing Networks…

• Future of the Solar Radiation Network
  • Addition of new observing stations (Target of 50 stations).
  • Development of a new automated QA/QC system at which time the processing backlog will be cleared.
  • The availability of solar radiation at one-minute resolution.
  • Data will be available in near-real-time.
**Summary**

- Data from Environment Canada is increasingly available via the Internet to help the renewable energy and building energy sector.
- Modernization of Environment Canada networks will result in improved solar radiation data availability.
- The MSC is encouraged to make data as easily and inexpensively available as possible.
Questions and Suggestions

For More information:

National Archive On-Line:
http://www.climate.weatheroffice.ec.gc.ca

Contact Climate Services at:
climate.services@ec.gc.ca