

Appendix 2. Graphical User Interface: PROCESSNOAA

Below are instructions (updated March 2014) for running PROCESSNOAA. The software (executable file), source code, and test files are available for downloading from the indicated Web address: <http://pubs.usgs.gov/sir/2013/5166>

Purpose

The purpose of creating the Graphical User Interface (GUI) called PROCESSNOAA was to automate the process of extracting, processing, and calculating rainfall and wind direction and speed variables from National Oceanic and Atmospheric Administration (NOAA) data files. Barometric pressure data are also extracted. The NOAA data files are local climatological data collected at airports that contain measurements of rainfall, wind speed, wind direction, and barometric pressure. PROCESSNOAA allows users to view plots and tables of processed rainfall, wind-speed, and wind-direction data. In addition, users can merge field measurements of *E.coli* with NOAA data files and save processed data in a format ready for direct import into Virtual Beach.

Requirements for Using PROCESSNOAA

To use PROCESSNOAA, a free MATLAB Runtime Library 2012a (32-bit) version 7.17 needs to be installed on the computer that will run PROCESSNOAA. The MATLAB compiler is available for download at MathWorks: <http://www.mathworks.com/products/compiler/mcr/>

Steps to Download NOAA Data Files

NOTE: You will need a subscription or Government access to pull these files.

- Go to the following NOAA download site:
 - Quality Controlled Local Climatological Data after 2005 <http://cdo.ncdc.noaa.gov/qclcd/QCLCD?prior=N>
- Follow windows to the airport of interest and select data for the desired month.
 - Select the entire month and click on “ASCII Download (Hourly Obs) (10A).”
- Copy, paste, and save data as a text file.
 - Select all the data using ctrl+A, copy using ctrl+C, and paste all the data into Notepad using ctrl+V.

NOTE: Data in Notepad file must be displayed with “Hourly obs” and “Month/Year” on separate lines, as follows:

```
Hourly obs
Month/Year: 08/2012
```

- Repeat steps 1–3 for multiple months of data. Place all data pertaining to a particular airport in the same folder.

Steps to Use PROCESSNOAA

- Use the menu bar to select “File” and open NOAA text files:
 - File → Open NOAA *.txt files → Select all downloaded NOAA text files for a particular airport.
 - Hold down the Ctrl key to select multiple months of data.
- PROCESSNOAA automatically extracts, processes, and calculates the variables of interest such as rainfall, wind speed, and wind direction; variables are based on the time of sampling being near 8:00 a.m. A main rainfall parameter of interest is a 24-hour sum of rainfall (R_{d-1}). The original NOAA data are displayed in a table called “Hourly Data.” The processed NOAA data is displayed in a table called “Daily Data.”
 - Day of the year** is the day of the calendar from 1 to 365.
 - Wind Speed Inst** is the instantaneous wind speed at approximately 8:00 a.m.
 - Wind Direction Inst** is the instantaneous wind direction at approximately 8:00 a.m.
 - Lagged and weighted precipitation are automatically calculated and placed in the “Daily Data” table.
 - Airport Rain (R_{d-1})** is the total amount of rain that fell in the previous 24 hours up to the time of sampling (near 9:00 a.m. to 8:00 a.m.).
 - Airport Rain (R_{d-2})** is the total amount of rain that fell in the 24-hour period 2 days before sampling. It is Airport Rain (R_{d-1}) lagged 1 day.
 - Airport Rain (R_{d-3})** is the total amount of rain that fell in the 24-hour period 3 days before sampling. It is Airport Rain (R_{d-1}) lagged 2 days.
 - Airport Rain 48 weighted (Rw48)** is cumulative rainfall in the past 48 hours, with the most recent rainfall receiving the most weight.

2 Developing and Implementing Predictive Models for Estimating Recreational Water Quality at Great Lakes Beaches

- **Airport Rain 72 weighted (Rw72)** is cumulative rainfall in the past 72 hours, with the most recent rainfall receiving the most weight.
 - **Barometric Pressure Inst** is the instantaneous barometric pressure at approximately 8:00 a.m.
3. ****Optional**** If measured *E.coli* data are available, use the menu bar to select and open an Excel file containing *E.coli* data pertaining to the beach of interest near the NOAA airport site. PROCESSNOAA will merge *E.coli* data with the NOAA data for dates that overlap. The first column of the Excel file containing the measured *E.coli* data must contain the sampling date in the following format: mm/dd/yyyy. The second column of the Excel file containing the measured *E.coli* data must contain the measured *E.coli* data. The measured *E.coli* data should not be \log_{10} transformed. Other data parameters (such as field variables) can be placed after the measured *E.coli* column in any order.
- Options → Merge *E.coli* data (*.xls)
 - Note: PROCESSNOAA will open a Microsoft Excel 97-2003 Worksheet (*.xls) and a Microsoft Excel Worksheet (*.xlsx). The default file type that PROCESSNOAA accepts is a *.xls file. To open a *.xlsx file, use the “File of type” drop-down menu in the open file dialog window and select “All Files.”
4. Use the menu bar to save the “Hourly Data” and the “Daily Data” tables as an Excel file. The saved Excel files will automatically be placed in the same directory containing the NOAA text files. If *E.coli* data are merged with NOAA data, then the saved Excel file should be ready for direct import into Virtual Beach. Column names are written in a format that Virtual Beach accepts. NOTE: The daily data are used for Virtual Beach.
- Save → Save Daily Data (.xls)—this file is used for predictive modeling
 - Save → Save Hourly Data (.xls)—optional

Additional Features of PROCESSNOAA

PROCESSNOAA has many additional features that allow users to gain more insight and knowledge about NOAA data and measured *E. coli* data. These additional features include the following:

- Time-series plots of Airport Rain (R_{d-1}) and instantaneous wind speed and direction near 8:00 a.m. Access the different plots by using the drop-down menu below the time-series plot.
- If measured *E. coli* data are merged with the NOAA data, then frequency plots of $\log_{10} E. coli$, Airport Rain (R_{d-1}) and instantaneous wind speed and direction near 8:00 a.m. are made available through the options menu.
 - Options → View → Precipitation Frequency (these are rounded to the nearest 0.1 inch)
 - Options → View → Wind Speed Frequency
 - Options → View → Wind Direction Frequency (each wind direction value on the x-axis is ± 15 degrees)
 - Options → View → *E. coli* Frequency (these are rounded to the nearest 0.1 \log_{10})
- If measured *E. coli* data are merged with NOAA data, the time-series plot changes to plot $\log_{10}(E. coli)$ versus Airport Rain (R_{d-1}), wind speed, and wind direction. Access the different plots by using the drop-down menu below the plot.

Additional Help

Contact Jeremiah Lant, U.S. Geological Survey Kentucky Water Science Center, jlant@usgs.gov