River Temperatures (NE)

Tags

Northeast U.S., River temperature, Thermal pollution

Summary

This dataset depicts modeling results from the Water Balance Model-Thermoelectric Power & Thermal Pollution Model (WBM-TP2M) for the northeast U.S. Together, these models incorporate climate, hydrology, river network dynamics and multi-plant impacts to quantify the following on a per power plant basis and at a regional scale:

- Thermal pollution
- Electricity generation
- Water withdrawal and consumption
- River temperatures and discharge
- Power plant efficiency losses associated with changes in available cooling water and climate conditions

Results here show monthly average temperature changes due to power plant thermal effluents for years 2000 – 2010 Rivers shown have a modeled average summertime discharge of 5 cubic meters/second and higher for the years 2000 – 2010. Temperature changes are given in degrees Celsius and results were computed at a daily time steps and a 5 km cell spatial resolution.

Description

Results of river discharge here are the average summer discharge between years 2000-2010, Rivers shown have a range of discharge of 5m^3/s and higher.

Thermal pollution (shown here as the temperature change in rivers due to thermal effluents from power plants) is computed by calculating the difference between a pristine (no power plant) scenario and a contemporary scenario (power plants modeled to operate as recorded or estimated for 2000 – 2010). The thermal pollution depicted shows impacts on fresh water only.

The methodology for calculating thermal pollution is as described in Miara & Vorosmarty (2013) and modeled for the Northeastern US as in Stewart et al. 2013 and Miara et al. 2013. Validation for the models was conducted in Stewart et al. 2013. Here, we used NCEP climate data, http://www.esrl.noaa.gov/psd/data/reanalysis/reanalysis.shtml to drive the models rather than MERRA climate data as in the publications.

Credits

CUNY Environmental Crossroads Initiative, Advanced Science Research Center
City College of New York

Use limitations

Extent

West -83.049988 East -67.099976
North 46.850098 South 36.500122

Scale Range
Maximum (zoomed in) 1:500,000
Minimum (zoomed out) 1:20,000,000

ArcGIS Metadata ►
Topics and Keywords ►
* CONTENT TYPE Downloadable Data
EXPORT TO FGDC CSDGM XML FORMAT AS RESOURCE DESCRIPTION No

Citation
* TITLE river_temp_model_ne_cuny
ALTERNATE TITLES Thermoelectric Power & Thermal Pollution Model (TP2M) results
PUBLICATION DATE 2015-07-20 00:00:00
PRESENTATION FORMATS * digital map

Citation Contacts
RESPONSIBLE PARTY
INDIVIDUAL'S NAME Ariel Miara
ORGANIZATION'S NAME CUNY Environmental Crossroads,
CONTACT'S POSITION Research Associate
CONTACT'S ROLE originator
CONTACT INFORMATION
E-MAIL ADDRESS arimiara10@gmail.com

Citations:

Miara, A., C.J. Vörösmarty, R. Stewart, W. Wollheim, and B. Rosenzweig (2013). Riverine Ecosystem services and the thermoelectric sector: Strategic issues facing the Northeastern United States. *Environ. Res. Lett*, 8: 025017, doi:10.1088/1748-9326/8/2/025017.

Stewart, R., W. Wollheim, A. Miara, C.J. Vörösmarty, B. Rosenzweig (2013). Horizontal Cooling Towers: Thermal Regulation By Rivers Support Electricity Generation in the Northeastern United States. *Environ. Res. Lett*, 8: 025010, doi:10.1088/1748-9326/8/2/025010.

Miara, A. and C.J. Vörösmarty (2013). A Dynamic Model to Assess Tradeoffs in Power Production and Riverine Ecosystem Protection. *Environ. Sci. Processes Impacts*, DOI:10.1039/C3EM00196B.

Resource Details

DATASET LANGUAGES * English (UNITED STATES)
DATASET CHARACTER SET utf8 - 8 bit UCS Transfer Format
STATUS completed
SPATIAL REPRESENTATION TYPE * vector
* PROCESSING ENVIRONMENT Microsoft Windows 7 Version 6.1 (Build 7601) Service Pack 1; Esri ArcGIS 10.3.0.4322
CREDITS
City College of New York

ARCGIS ITEM PROPERTIES
* NAME river_temp_model_ne_cuny

Extents
EXTENT
DESCRIPTION
Temporal range of modeling is January 2000 to December 2010.

GEOGRAPHIC EXTENT
BOUNDING RECTANGLE
EXTENT TYPE Extent used for searching
* WEST LONGITUDE -83.049988
* EAST LONGITUDE -67.099976
* NORTH LATITUDE 46.850098
* SOUTH LATITUDE 36.500122
* EXTENT CONTAINS THE RESOURCE Yes

TEMPORAL EXTENT
BEGINNING DATE 2000-01-01 00:00:00
ENDING DATE 2010-12-31 00:00:00

EXTENT IN THE ITEM'S COORDINATE SYSTEM
* WEST LONGITUDE -9245082.351501
* EAST LONGITUDE -7469535.114468
* SOUTH LATITUDE 4369657.415172
* NORTH LATITUDE 5917640.426558
* EXTENT CONTAINS THE RESOURCE Yes

Resource Points of Contact

POINT OF CONTACT
INDIVIDUAL'S NAME Ariel Miara
ORGANIZATION'S NAME City College of New York
CONTACT'S POSITION Doctoral Candidate and Research Associate
CONTACT'S ROLE originator

CONTACT INFORMATION
E-MAIL ADDRESS arimiara10@gmail.com

Resource Maintenance

RESOURCE MAINTENANCE
UPDATE FREQUENCY not planned

Spatial Reference

ARCGIS COORDINATE SYSTEM
* TYPE Projected
* GEOGRAPHIC COORDINATE REFERENCE GCS_WGS_1984
* PROJECTION WGS_1984_Web_Mercator_Auxiliary_Sphere
* COORDINATE REFERENCE DETAILS
PROJECTED COORDINATE SYSTEM
WELL-KNOWN IDENTIFIER 102100
X ORIGIN -22041257.952553775
Y ORIGIN -30241100
XY SCALE 144148035.48642668
Z ORIGIN -100000
Z SCALE 10000
M ORIGIN -100000
M SCALE 10000
XY TOLERANCE 0.001
Z TOLERANCE 0.001
M TOLERANCE 0.001
HIGH PRECISION true
LATEST WELL-KNOWN IDENTIFIER 3857
WELL-KNOWN TEXT PROJCS["WGS_1984_Web_Mercator_Auxiliary_Sphere",GEOGCS
["GCS_WGS_1984",DATUM["D_WGS_1984",SPHEROID
["WGS_1984",6378137.0,298.257223563]],PRIMEM["Greenwich",0.0],UNIT
["Degree",0.0174532925199433]],PROJECTION["Mercator_Auxiliary_Sphere"],PARAMETER
["False_Easting",0.0],PARAMETER["False_Northing",0.0],PARAMETER
["Central_Meridian",0.0],PARAMETER["Standard_Parallel_1",0.0],PARAMETER
["Auxiliary_Sphere_Type",0.0],UNIT["Meter",1.0],AUTHORITY["EPSG",3857]]

REFERENCE SYSTEM IDENTIFIER
* VALUE 3857
* CODESPACE EPSG
* VERSION 8.2.6

Spatial Data Properties

VECTOR
* LEVEL OF TOPOLOGY FOR THIS DATASET geometry only
GEOMETRIC OBJECTS
FEATURE CLASS NAME river_temp_model_ne_cuny
* OBJECT TYPE composite
* OBJECT COUNT 1625

ARCGIS FEATURE CLASS PROPERTIES ►
FEATURE CLASS NAME river_temp_model_ne_cuny
* FEATURE TYPE Simple
* GEOMETRY TYPE Polygon
* HAS TOPOLOGY FALSE
* FEATURE COUNT 1625
* SPATIAL INDEX TRUE
* LINEAR REFERENCING FALSE

Distribution

DISTRIBUTION FORMAT
* NAME File Geodatabase Feature Class

Fields

DETAILS FOR OBJECT river_temp_model_ne_cuny
* TYPE Feature Class
* ROW COUNT 1625

FIELD OBJECTID_1
* ALIAS OBJECTID_1
* DATA TYPE OID
* WIDTH 4
* PRECISION 0
* SCALE 0
* FIELD DESCRIPTION
Internal feature number.
* DESCRIPTION SOURCE
Esri
* DESCRIPTION OF VALUES
Sequential unique whole numbers that are automatically generated.

FIELD Shape ►
* ALIAS Shape
* DATA TYPE Geometry
* WIDTH 0
* PRECISION 0
* SCALE 0
* FIELD DESCRIPTION
Feature geometry.
* DESCRIPTION SOURCE
Esri
* DESCRIPTION OF VALUES
Coordinates defining the features.

FIELD TempC_2000_1
* ALIAS TempC_2000_1
* DATA TYPE Double
* WIDTH 8
* PRECISION 0
* SCALE 0

FIELD DESCRIPTION
Modeled average monthly temperature for January 2000.
DESCRIPTION SOURCE
Argonne National Laboratory

Note: Monthly data fields are sequentially numbered from TempC_2000_1 to TempC_2000_12, TempC_2001_1, … TempC_2010_12 with their values representing monthly average temperatures for the time period.

FIELD TempC_2000
* ALIAS TempC_2000
* DATA TYPE Single
* WIDTH 4
* PRECISION 0
* SCALE 0
FIELD DESCRIPTION
Modelled average temperature for 2000 in degrees Centigrade. (Computed from monthly averages.)
DESCRIPTION SOURCE
Argonne National Laboratory

Note: Annual data fields are sequentially numbered from TempC_2000 to TempC_2010 with their values representing annual average temperatures for the time period, computed from the monthly averages.

Metadata Details

* METADATA LANGUAGE English (UNITED STATES)
METADATA CHARACTER SET utf8 - 8 bit UCS Transfer Format
SCOPE OF THE DATA DESCRIBED BY THE METADATA * dataset
SCOPE NAME * dataset
* LAST UPDATE 2015-07-20

ARCGIS METADATA PROPERTIES
METADATA FORMAT ArcGIS 1.0
METADATA STYLE FGDC CSDGM Metadata
STANDARD OR PROFILE USED TO EDIT METADATA FGDC
CREATED IN ARCGIS FOR THE ITEM 2015-07-20 09:49:37
LAST MODIFIED IN ARCGIS FOR THE ITEM 2015-07-20 11:32:36
AUTOMATIC UPDATES
HAVE BEEN PERFORMED Yes
LAST UPDATE 2015-07-20 10:15:50

Metadata Contacts

METADATA CONTACT
INDIVIDUAL'S NAME Jim Kuiper
ORGANIZATION'S NAME Argonne National Laboratory
CONTACT'S POSITION Principal Geospatial Engineer
CONTACT'S ROLE user
CONTACT INFORMATION
PHONE
VOICE 630-252-6206
ADDRESS
TYPE physical
DELIVERY POINT 9700 S. Cass Ave.
CITY Darien
ADMINISTRATIVE
AREA IL POSTAL
CODE 60439
E-MAIL ADDRESS jkuiper@anl.gov

Metadata Maintenance

MAINTENANCE
UPDATE FREQUENCY not planned