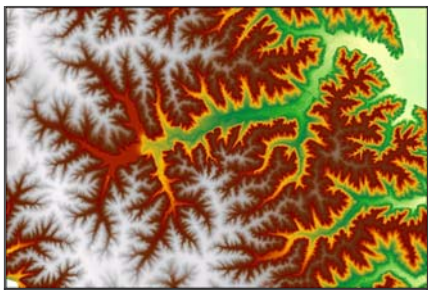
The Iowa HUC12 P-Library: Elevation Rasters at 2-meter resolution



Tags

hydrologic enforcement, LiDAR, Iowa, elevation, elevation, 2-meter

Summary

The Iowa P-Library series of elevation data are watershed-scale, high-resolution rasters that have been hydro-conditioned to remove artifacts of the LiDAR collection process. These data should be considered 'bare earth data' and are suitable for large scale examination of the landscape using a variety of terrain analysis methods and visualization techniques.

Description

The Iowa P-Library series of elevation data are LiDAR point-cloud derived, 2 meter resolution rasters that have been hydro-conditioned. The P-Library series of elevation data have been assembled using a HUC12 watershed framework consisting of 1,657 watersheds for the state of Iowa. These data should be considered 'high-resolution bare earth' and are suitable for large scale examination of the landscape using terrain analysis methods. Two production processes were used in the development of these data, see below.

The first process involves creating a digital elevation model (DEM) from the raw LiDAR point cloud data. Bare-earth elevation points are imported into an ESRI Terrain dataset using custom pyramid and thinning settings to reduce unnecessary points. The Terrain is then converted into an DEM and elevation differences smaller than 1 centimeter (cm) are truncated. This centimeter-resolution DEM is analyzed for flow characteristics to remove artifacts of processing the LiDAR that are singular “pits” in the surface. These pits are, in essence, one-cell sinks or depressions of one-cell extent that cannot be resolved using traditional processing techniques available in ArcGIS. The “pit filling” process removes all one-cell sinks.

A second process, termed “hole punching”, involves defining depressions that are significant enough to maintain in the elevation model, these typically represent natural depressions or pot holes. This involves iteratively filling the DEM, defining regions where the DEM was filled, and calculating the maximum fill depth and total area filled of each region. Regions deeper than the 10 cm are considered significant depressions. The deepest point in these significant depressions is set to “Null” so that water can “flow” out the “Null” cell, and the process of filling the DEM is repeated until no significant depressions remain. In the final step, the “Null” cells are replaced with the original DEM values to create a fully populated elevation raster. The result of the “hole punching” process is a hydro-conditioned DEM with small depressions (less than 10 cm) filled. The “hole punched” DEMs are moved into the P-series DEM library.

Credits

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Brian Gelder, Department of Agricultural and Biosystems Engineering, Iowa State University, Ames, Iowa

Use limitations
There are no access and use limitations for this item.

Extent
There is no extent for this item.

Scale Range
Maximum (zoomed in) 1:5,000
Minimum (zoomed out) 1:50,000

ArcGIS Metadata ►

Topics and Keywords ►

THEMES OR CATEGORIES OF THE RESOURCE elevation

CONTENT TYPE Downloadable Data
EXPORT TO FGDC CSDGM XML FORMAT AS RESOURCE DESCRIPTION No

PLACE KEYWORDS Iowa

THEME KEYWORDS hydrologic conditioned, LiDAR, Iowa, elevation, 2-meter

THEME KEYWORDS elevation

THESAURUS ►
TITLE ISO 19115 Topic Categories

Hide Thesaurus ▲

Hide Topics and Keywords ▲

Citation ►

TITLE The Iowa HUC12 P-Library: Elevation Rasters at 2-meter resolution
PUBLICATION DATE 2016-02-15

PRESENTATION FORMATS digital map
FGDC GEOSPATIAL PRESENTATION FORMAT remote-sensing image

Hide Citation ▲

Citation Contacts ►

RESPONSIBLE PARTY
ORGANIZATION'S NAME David james, USDA/ARS National Laboratory for Agriculture and the Environment, Geographic Information Specialist
CONTACT'S ROLE originator

Hide Citation Contacts ▲

Resource Details ►

DATASET LANGUAGES English
DATASET CHARACTER SET utf8 - 8 bit UCS Transfer Format

STATUS completed
SPATIAL REPRESENTATION TYPE grid

PROCESSING ENVIRONMENT Microsoft Windows 7 Version 6.1 (Build 7601) Service Pack 1; Esri ArcGIS 10.3.1.4959

CREDITS
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ARCGIS ITEM PROPERTIES
* LOCATION file://\\MW25-NSTL-216F\Data\ACPF\ACPF_Database\ACPF_MetaData\IA_DEM2m\D-Lib2m_metadata (1)
* ACCESS PROTOCOL Local Area Network

Hide Resource Details ▲

Extents ►

EXTENT
DESCRIPTION
The D-Series 2m digital elevation models (DEM) are available state-wide. 1,657 HUC12-based DEMs have been generated, although some of these only represent that portion of the watershed that lies within Iowa and the extent of the original LiDAR data collection.

GEOGRAPHIC EXTENT
BOUNDING RECTANGLE
WEST LONGITUDE -96.8
EAST LONGITUDE -89.9
SOUTH LATITUDE 40.2
NORTH LATITUDE 43.8
EXTENT CONTAINS THE RESOURCE Yes

Hide Extents ▲

Resource Points of Contact ►

POINT OF CONTACT
INDIVIDUAL'S NAME David James
ORGANIZATION'S NAME USDA/ARS National Laboratory for Agriculture and the Environment
CONTACT'S POSITION Geographic Information Specialist
CONTACT'S ROLE point of contact

CONTACT INFORMATION ►
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Hide Contact information ▲

Hide Resource Points of Contact ▲

Resource Maintenance ►

RESOURCE MAINTENANCE
UPDATE FREQUENCY not planned

Hide Resource Maintenance ▲

Spatial Data Properties ►

GEORECTIFIED GRID ►
NUMBER OF DIMENSIONS 2

AXIS DIMENSIONS PROPERTIES
DIMENSION TYPE row (y-axis)
DIMENSION SIZE 7524

AXIS DIMENSIONS PROPERTIES
DIMENSION TYPE column (x-axis)
DIMENSION SIZE 13000

CELL GEOMETRY area

TRANSFORMATION PARAMETERS ARE AVAILABLE No

CHECK POINTS ARE AVAILABLE No

Hide Georectified Grid ▲

Hide Spatial Data Properties ▲

Data Quality ►

SCOPE OF QUALITY INFORMATION ►
RESOURCE LEVEL dataset

Hide Scope of quality information ▲

Hide Data Quality ▲

Lineage ►

LINEAGE STATEMENT
The Iowa DP-Library series of elevation data are LiDAR point-cloud derived, 2 meter resolution rasters that have been hydro-conditioned to remove artifacts of the LiDAR collection process. The P-Library series of elevation data have been assembled using a HUC12 watershed framework consisting of 1,657 watersheds for the state of Iowa. These data should be considered 'high-resolution bare earth' and are suitable for large scale examination of the landscape using terrain analysis methods. Two production processing steps were used in the development of these data,

PROCESS STEP ▶

WHEN THE PROCESS OCCURRED 2016-01-15 00:00:00

DESCRIPTION

The first process involves creating a digital elevation model (DEM) from the raw LiDAR point cloud data. Bare-earth elevation points are imported into an ESRI Terrain dataset using custom pyramid and thinning settings to reduce unnecessary points. The Terrain is then converted into an DEM and elevation differences smaller than 1 centimeter (cm) are truncated. This centimeter-resolution DEM is analyzed for flow characteristics to remove artifacts of processing the LiDAR that are singular "pits" in the surface. These pits are, in essence, one-cell sinks or depressions of one-cell extent that cannot be resolved using traditional processing techniques available in ArcGIS. The "pit filling" process removes all one-cell sinks. Inputs to this process included the Iowa state-wide bare-earth LiDAR point cloud collection in HUC12 watershed framework as derived from the Iowa state-wide LiDAR point cloud collection in 2km tiles. contact the originator for details.

Hide Process step ▲

PROCESS STEP ▶

WHEN THE PROCESS OCCURRED 2016-01-15 00:00:00

DESCRIPTION

A second process, termed "hole punching", involves defining depressions that are significant enough to maintain in the elevation model, these typically represent natural depressions or pot holes. This involves iteratively filling the DEM, defining regions where the DEM was filled, and calculating the maximum fill depth and total area filled of each region. Regions deeper than the 10 cm are considered significant depressions. The deepest point in these significant depressions is set to "Null" so that water can "flow" out the "Null" cell, and the process of filling the DEM is repeated until no significant depressions remain. In the final step, the "Null" cells are replaced with the original DEM values to create a fully populated elevation raster. The result of the "hole punching" process is a hydro-conditioned DEM with small depressions (less than 10 cm) filled. The "hole punched" DEMs are moved into the P-series DEM library.

Hide Process step ▲

SOURCE DATA ▶

DESCRIPTION

Iowa state-wide LiDAR point cloud collection in 2km tiles

Hide Source data ▲

SOURCE DATA ▶

DESCRIPTION

Iowa state-wide bare-earth LiDAR point cloud collection in HUC12 watershed framework

Hide Source data ▲

Hide Lineage ▲

Fields ►

DETAILS FOR OBJECT ed2m102802010406.tif.vat ►

FIELD OID ►

FIELD DESCRIPTION

Internal feature number.

DESCRIPTION SOURCE

ESRI

DESCRIPTION OF VALUES

Sequential unique whole numbers that are automatically generated.

Hide Field OID ▲

FIELD VALUE ►

FIELD DESCRIPTION

The elevation of the cell in centimeters (cm) above mean sea level (MSL)

DESCRIPTION SOURCE

originator

ACCURACY INFORMATION

EXPLANATION

+- 18 cm

Hide Field VALUE ▲

FIELD COUNT ►

FIELD DESCRIPTION

The number of cells at a discrete elevation

DESCRIPTION SOURCE

ESRI

ACCURACY INFORMATION

EXPLANATION

1

Hide Field COUNT ▲

Hide Details for object ed2m102802010406.tif.vat ▲

Hide Fields ▲

Metadata Details ►

METADATA LANGUAGE English

METADATA CHARACTER SET utf8 - 8 bit UCS Transfer Format

SCOPE OF THE DATA DESCRIBED BY THE METADATA dataset

LAST UPDATE 2016-02-02

ARCGIS METADATA PROPERTIES
METADATA FORMAT ArcGIS 1.0
STANDARD OR PROFILE USED TO EDIT METADATA FGDC
METADATA STYLE FGDC CSDGM Metadata

CREATED IN ARCGIS FOR THE ITEM 2016-02-02 10:24:32
LAST MODIFIED IN ARCGIS FOR THE ITEM 2016-02-03 10:08:37

AUTOMATIC UPDATES
HAVE BEEN PERFORMED No

ITEM LOCATION HISTORY
ITEM COPIED OR MOVED 2016-02-02 10:24:32
FROM D:\Data\ACPF\ACPF_Database\ACPF_MetaData\IA_DEM2m\D-Lib2m_metadata
TO \\MW25-NSTL-216F\Data\ACPF\ACPF_Database\ACPF_MetaData\IA_DEM2m\D-Lib2m_metadata (1)

Hide Metadata Details ▲

Metadata Contacts ►

METADATA CONTACT
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Hide Contact information ▲

Hide Metadata Contacts ▲

Metadata Maintenance ►

MAINTENANCE
UPDATE FREQUENCY not planned

Hide Metadata Maintenance ▲

Thumbnail and Enclosures ►

THUMBNAIL
THUMBNAIL TYPE JPG

ENCLOSURE
ENCLOSURE TYPE File
DESCRIPTION OF ENCLOSURE original metadata
ORIGINAL METADATA DOCUMENT, WHICH WAS TRANSLATED yes
SOURCE METADATA FORMAT fgdc

Hide Thumbnail and Enclosures ▲

FGDC Metadata (read-only) ▼