Enhanced Historical Land-Use and Land-Cover Data Sets of the U.S. Geological Survey: raster format files

Metadata:

Identification Information:

Citation:

Citation Information:

Originator: Curtis V. Price
Originator: Naomi Nakagaki
Originator: Kerie J. Hitt
Originator: Rick M. Clawges
Publication Date: 04/01/2007
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Citation Information:

Originator: Curtis V. Price
Originator: Naomi Nakagaki
Originator: Kerie J. Hitt
Originator: Rick M. Clawges
Publication Date: 04/01/2007
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Enhanced Historical Land-Use and Land-Cover Data Sets of the U.S. Geological Survey
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Online Linkage: https://pubs.usgs.gov/ds/2006/240/

Description:

Abstract:

This data set depicts land use and land cover from the 1970s and 1980s and has been previously published by the U.S. Geological Survey (USGS) in other file formats. This version has been reformatted to other file formats and includes minor edits applied by the U.S. Environmental Protection Agency (USEPA) and USGS scientists. This data set was developed to meet the needs of the USGS National Water-Quality Assessment (NAWQA) Program.

Purpose:

Land-use and land-cover data collected by the U.S. Geological Survey are useful for environmental assessment of land-use patterns with respect to water-quality analysis, growth management, and other types of environmental impact assessment.

The data are meant to be normally used by quadrangle, or among adjacent quadrangles where temporally contiguous. The data can be used in any geographic application where intermediate scale land-use data are appropriate and the source land-cover map dates are representative of the time period of interest.

Supplemental Information:

This data set is released as part of an enhanced version of previously published USGS land-use and land-cover data, edited to perform attribute and geographic corrections, recast to the North American Horizontal Datum of 1983, and reformatted to commonly used geospatial data file formats.

BACKGROUND

The following background information is extracted from:

U.S. Geological Survey, 1986, Land use and land cover digital data from 1:250,000- and 1:100,000-scale maps: Data User Guide 4, 25 p.

(This document is out of print, but was available online on July 1, 2005 at http://www.vterrain.org/Culture/LULC/Data_Users_Guide_4.html)

"The characteristics of the digital cartographic data base for land Use and land cover and associated maps reflect the parameters used in compiling the maps. The Land Use and Land Cover mapping program is designed so that standard topographic maps at a scale of l:250,000 can be used as a base for compilation and reproduction. In a few cases, the U.S. Geological Survey (USGS) has prepared Land Use and Land Cover and associated maps at a scale of 1:100,000 when the 1:100,000-scale topographic map base was available...

Land Use and Land Cover maps provide data to be used either by themselves or in combination with the other data sets produced in the program. The basic sources of land use compilation data are NASA high-altitude aerial photographs, and National High-Altitude Photography (NHAP) program photographs, usually at scales smaller than l:60,000. The l:250,000-scale topographic map series is generally used as the base map for the compilation of the Land Use and Land Cover maps and the associated overlays; 1:100,000-scale topographic map bases have been used on rare occasions. Although compilation of Land Use and Land Cover data is performed on a film-positive base usually enlarged to a scale of approximately l:l25,000, the associated overlays are both compiled and digitized at a scale of l:250,000.

Land Use and Land Cover data compilation is based upon the classification system and definitions of Level II Land Use and Land

Cover [codes, (see below)]... All features are delineated by curved or straight lines that depict the actual boundaries of the areas (polygons) being described. The minimum size of polygons depicting all Urban or Built-up Land (categories 11-17), Water (51-54), Confined Feeding Operations (23), Other Agricultural Land (24), Strip Mines, Quarries, and Gravel Pits (75) and urban Transitional areas (76), is 4 hectares (ha). All other categories of Land Use and Land Cover have a minimum polygon size of 16 ha. (Those sizes also are considered the minimum sizes to which polygons are digitized.) In the Urban or Built-up Land and Water categories, the minimum width of a feature to be shown is 200 m; (that is, if a square with sides 200 m in length is delineated, the area will be 4 ha). Although the minimum-width consideration precludes the delineation of very narrow and very long 4-ha polygons, triangles or other polygons are acceptable if the base of the triangle or minimum width of the polygon is 200 m in length and if the area of the polygon is 4 ha. Exceptions to this specification are limited access highways (14) and all double line rivers (51) on the 1:250,000-scale base which shall have a minimum width of 92 m. For categories other than Urban or Built-up Land and Water, the 16-ha minimum size for delineation requires a minimum-width polygon of 400 m. Line weight for delineating Land Use and Land Cover polygons and for neatlines is 0.l0 mm at the production scale of l:250,000."

LAND-USE AND LAND-COVER CODES

These data sets represent land use and land cover using an integer value that references the Anderson level II classification system.

The first digit represents the level 1 land-use and land-cover code, and the second digit (ones place) represents a subdivision, or level 2 code.

The Anderson Level II land use codes used in this data set are listed below:

1 Urban or built-up land

11 Residental
12 Commercial and services
13 Industrial
14 Transportation, communication, utilities
15 Industrial and commercial complexes
16 Mixed urban or built-up land
17 Other urban or built-up land

2 Agricultural land

21 Cropland and pasture

22 Orchards, groves, vineyards, nurseries, and ornamental horticultural
23 Confined feeding operations
24 Other agricultural land

3 Rangeland

31 Herbaceous rangeland
32 Shrub and brush rangeland
33 Mixed rangeland

4 Forest land

41 Deciduous forest land
42 Evergreen forest land
43 Mixed forest land

5 Water

51 Streams and canals
52 Lakes
53 Reservoirs
54 Bays and estuaries

6 Wetland

61 Forested wetland
62 Nonforested wetland

7 Barren land

71 Dry salt flats
72 Beaches
73 Sandy areas not beaches
74 Bare exposed rock
75 Strip mines, quarries, gravel pits
76 Transitional areas
77 Mixed Barren Land

8 Tundra

81 Shrub and brush tundra
82 Herbaceous tundra
83 Bare ground
84 Wet tundra
85 Mixed tundra

9 Perennial snow or ice

91 Perennial snowfields
92 Glaciers

PROCESSING DETAILS

The U.S. Environmental Protection Agency (USEPA) received the USGS land-use and land-cover data files from USGS in 9-track ASCII format, one file per quadrangle. Files were loaded onto the hard disk of the computer from tape. The data were then processed with the GIRASARC2 program written in Arc Macro Language (AML), which is part of the
ArcInfo Geographic Information System (GIS) software. This program was developed by the USGS to process the data into a consistent ArcInfo format.

The GIRASARC2 AML
<http://www.epa.gov/ngispgm3/spdata/EPAGIRAS/meta/girasarc2.aml>
program does the following:

-- Converts the USGS data files to polygon coverage format.
-- Reconstructs topology, creating line and polygon features.
-- Linearly scales the map coordinates to UTM using the registration points listed in the USGS data file, and then modifies the coordinates to Albers Equal Area projection.
-- Generates a quadrangle boundary polygon based on the mathematically-determined corners of the map.
-- Loads available documentation into a series of companion documentation files with each data set.

Another AML program (GIRASNEAT,
<http://www.epa.gov/ngispgm3/spdata/EPAGIRAS/meta/girasneat.aml>)
does the following:

--clips the data to the neatline data set.
--dissolves polygon boundaries between polygons with the same land use code.
--snaps exterior arcs to the arcs of the neatline cover with a tolerance of 40 meters.

Data were reviewed visually by the user responsible for executing the GIRASARC2 program.

The GIRASARC2 and GIRASNEAT programs were executed in AML to create each quadrangle
data set.

The processing described above was completed by the USEPA in the early 1990s. In 2001, the

USGS National Water-Quality Assessment (NAWQA) Program needed a seamless data base
of the conterminous United States, so data sets were further enhanced for use in the Program,
as described below.

Additional land use and land cover data sets for Hawaii and one map sheet in Alaska were converted using the same AML programs and edited in a similar manner. The Hawaii data sets were joined together into a single data set as they all are documented with the same source date and are more easily handled as a single data file.

These data files were then further edited to correct land-use coding errors caused by the misplacement of labels have also been corrected by visual inspection, checking the codes against the original labels in the GIRAS data files and ancillary land-cover data sets. An AML menu-based application was used to assist in this process.

In addition to the processing describe above, the data were processed to fill in all gaps between quadrangles so that the data fits together seamlessly. The polygon data were then transformed so that the horizontal coordinate data reference the North American Datum of 1983. (The raw GIRAS-format data and the USEPA version of it is referenced to the North American Datum of 1927.) The geographic data files were also projected into geographic coordinates (decimal degrees of latitude and longitude).

Additional polygon data sets that document the land-use and land-cover data sets in a geographic context were created from the USEPA quadrangle index coverages with further editing based on information in the USGS data files posted on the USGS FTP site at the USGS EROS Data Center at: ftp://edcftp.cr.usgs.gov/pub/data/LULC

A summary of this effort was published as:

Price, C., Naomi, N., Hitt, K., and Clawges, R., 2003, Mining GIRAS: Improving on a national treasure of land use data, _in_ Proceedings of the 2004 ESRI International User Conference, July 7-11, 2003, Environmental Systems Research Institute, Redlands Calif., 11p., available online at http://gis.esri.com/library/userconf/proc03/p0904.pdf

DATA FILE DESCRIPTIONS

Note that all data sets are referenced to the North American Datum of 1983.

1. tilepoly: Polygons representing each quadrangle tile.

2. src_poly: Polygons representing the extent of source files, with metadata about the source files used for each area. Some land-use files were merged from multiple GIRAS source files, some of which have different source dates.

3. gAABBB: Polygons for each 1:250,000 tile, where "AA" represents the latitude of the lower right corner and "BBB" represents the longitude

of the lower right corner of the map tile. These tile names are referenced in the polygon attributes of the tilepoly and src_poly polygon data sets described above.

The polygon data sets above are distributed as a collection of related files that make up the publicly documented ESRI shapefile format:

filename.shp ESRI shapefile geographic data file
filename.shx ESRI shapefile index data file
filename.dbf ESRI shapefile attribute file
filename.prj "Well-Known-Text" (WTK) format projection file
filename.shp.xml metadata file

The shapefiles use geographic (decimal degree) coordinate data referenced to the North American Datum of 1983.

4. girasX Raster-format data, stored in six image files, in GeoTIFF format (with georeferencing included in the internal image header file).

IMAGE	XMIN	YMIN	XMAX	YMAX	DESCRIPTION
giras1	-2380005	1874985	15	3200000	NW Conterminous US (Albers)
giras2	15	1874985	2300000	3172005	NE Conterminous US (Albers)
giras3	-2380005	199995	15	1874985	SW Conterminous US (Albers)
giras4	15	199995	2300000	1874985	SE Conterminous US (Albers)
giras5	369285	2081265	955575	2460585	Hawaii (UTM Zone 4)
giras6	499875	6762705	662145	6877755	Valdez, Alaska (UTM Zone 6)

The raster data sets are referenced to locations specified in projected coordinates (in meters). Image tiles giras1 through giras4 use standard parameters for the conterminous United States:

```
Projection    ALBERS
Datum         NAD83
Units         METERS
Spheroid      GRS1980
Xshift        0.0000000000
Yshift        0.0000000000
Parameters
 29 30  0.000 /* 1st standard parallel
 45 30  0.000 /* 2nd standard parallel
-96  0  0.000 /* central meridian
 23  0  0.000 /* latitude of projection's origin
0.00000 /* false easting (meters)
0.00000 /* false northing (meters)
```

giras5 (Hawaii) uses these projection parameters:

```
Projection    UTM
```

Zone 6
Datum NAD83
Units METERS
Spheroid GRS1980

giras6 (Valdez, Alaska) uses these projection parameters:

Projection UTM
Zone 4
Datum NAD83
Units METERS
Spheroid GRS1980

The raster data sets are distributed as a collection of related files:

girasX.tif Tagged-Image Format File (TIFF) with GeoTIFF georeferencing
girasX.tfw ESRI "World file", used for georeferencing
girasX.aux ESRI "aux file" file used by ArcGIS software
girasX.tif.xml metadata file

DISCLAIMERS

The use of trade, product, or firm names is for descriptive purposes only and does not imply endorsement by the U.S. Government.

Although this Federal Geographic Data Committee-compliant metadata file is intended to document the data set in nonproprietary form, as well as in ArcInfo format, this metadata file may include some ArcInfo-specific terminology.

Although these data have been used by the U.S. Geological Survey, U.S. Department of the Interior, no warranty expressed or implied is made by the U.S. Geological Survey as to the accuracy of the data.

Time Period of Content:

Time Period Information:

Range of Dates/Times:

Beginning Date: 1970
Ending Date: 1985

Currentness Reference:
publication date

Status:

Progress:

Complete

Maintenance and Update Frequency: None planned

Spatial Domain:

Description of Geographic Extent:
Bounding Coordinates:

West Bounding Coordinate: -160.5000
East Bounding Coordinate: -66.0000
North Bounding Coordinate: 50.0000
South Bounding Coordinate: 18.750

Keywords:

Theme:

Theme Keyword Thesaurus: USGS Thesaurus
Theme Keyword: land
Theme Keyword: landuse
Theme Keyword: landcover
Theme Keyword: GIRAS
Theme Keyword: LULC
Theme Keyword: digital
Theme Keyword: geographic
Theme Keyword: inlandWaters

Theme:

Theme Keyword Thesaurus: ISO 19115 Topic Category
Theme Keyword: geoscientificInformation
Theme Keyword: inlandWaters
Theme Keyword: environment

Theme:

Theme Keyword Thesaurus: USGS Metadata Identifier
Theme Keyword: USGS:7ec07f95-4cd9-4240-b3fd-12e5dcae5447

Place:

Place Keyword Thesaurus: Geographic Names Information System
Place Keyword: United States
Place Keyword: USA

Access Constraints: none
Use Constraints:
Not for use at scales greater than 1:250,000. Please note the data set depicts historical land use

and is not suitable for applications requiring current land use information.

Point of Contact:

Contact Information:

Contact Organization Primary:

Contact Organization: U.S. Geological Survey
Contact Person: Dakota Water Science Center

Contact Electronic Mail Address: cprice@usgs.gov

Browse Graphic:

Browse Graphic File Name:
https://www.sciencebase.gov/catalog/file/get/631405b7d34e36012efa2f9d?name=ds240_landuse_raster.png
Browse Graphic File Description:
Illustration of the data set.
Browse Graphic File Type: PNG

Security Information:

Security Classification System: None
Security Classification: Unclassified
Security Handling Description: None

Native Data Set Environment:

Microsoft Windows XP Version 5.1 (Build 2600) Service Pack 2; ESRI ArcCatalog 9.0.0.535

Cross Reference:

Citation Information:

Originator: James R. Anderson
Originator: Ernest E. Hardy
Originator: John T. Roach
Originator: Richard E. Witmer
Publication Date: 1976
Title:
A Land Use and Land Cover Classification System for Use with Remote Sensor Data, USGS Professional Paper 964
Publication Information:

Publication Place: Reston, Virginia
Publisher: U.S. Geological Survey

Online Linkage: http://landcover.usgs.gov

Cross Reference:

Citation Information:

Originator: U.S. Geological Survey
Publication Date: 1990
Title:
USGeoData 1:250,000 and 1:100,000 Scale Land Use and Land Cover and Associated Maps Digital Data
Publication Information:

Publication Place: Reston, Virginia
Publisher: U.S. Geological Survey

Online Linkage: http://eros.usgs.gov/#/Find_Data/Products_and_Data_Available/LULC
Online Linkage: http://landcover.usgs.gov
Online Linkage: http://www.vterrain.org/Culture/LULC/Data_Users_Guide_4.html

Cross Reference:

Citation Information:

Originator: U.S. Environmental Protection Agency
Publication Date: 1994
Title:
epagiras
Geospatial Data Presentation Form: vector digital data
Publication Information:

Publication Place: Washington, DC, USA
Publisher: U.S. Environmental Protection Agency

Online Linkage: http://www.epa.gov/waterscience/BASINS/metadata/giras.htm

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Data Quality Information:

Logical Consistency Report:

Polygon consistency checked in ArcInfo. (No overlaps or seams present.)

Completeness Report:
Visually checked against land use and land cover data sets.
Lineage:

Source Information:

Source Citation:

Citation Information:

Originator: U.S. Geological Survey
Publication Date: 1990
Title:
USGeoData 1:250,000 and 1:100,000 Scale Land Use and Land Cover and Associated Maps Digital Data
Publication Information:

Publication Place: Reston, Virginia
Publisher: U.S. Geological Survey

Online Linkage: http://landcover.usgs.gov

Source Scale Denominator: 250000
Type of Source Media: digital data
Source Time Period of Content:

Time Period Information:

Range of Dates/Times:

Beginning Date: 1970
Ending Date: 1985

Source Currentness Reference:
ground condition (air photographs collected c. 1970-1985)

Source Citation Abbreviation:
giras
Source Contribution:
polygon geography and attributes

Process Step:

Process Description:

The data was reformatted from the USGS published information to ArcInfo coverage format, edited and polygon topology built, followed by conversion to ArcInfo EXPORT format.

See Supplemental_Information element of this metadata record more details.

Process Date: 01/01/2003
Process Contact:

Contact Information:

Contact Person Primary:

Contact Person: Edward Partington
Contact Organization: U.S. Environmental Protection Agency

Contact Position: Computer Specialist
Contact Address:

Address Type: mailing and physical address
Address: 401 M St SW
City: Washington
State or Province: DC
Postal Code: 20460
Country: USA

Contact Voice Telephone: (202) 260-3106
Contact Facsimile Telephone: (202) 401-8390
Contact Electronic Mail Address: partington.ed@epamail.epa.gov
Contact Instructions: email or phone

Process Step:

Process Description:

The ArcInfo EXPORT format data sets were retrieved from the EPA server, and edited by USGS to to correct minor attribute and geography errors, followed by coordinate projection and data format translation. The final data set is seamless and very closely match together at quad boundaries (although exact edgematching processing was not done, only tiny gaps exist between quadrangle tiles).

The quadrangles from Alaska and Hawaii were not available from EPA's collection of EXPORT files. They were downloaded from the USGS EROS
ftp site at ftp://edcftp.cr.usgs.gov/pub/data/LULC. The GIRAS format files were converted to ArcInfo Coverage format. The Hawaii files were into a single data ArcInfo coverage, which was was given the tile label G18154.

This work was completed by Curtis Price, Naomi Nakagaki, Kerie Hitt, and Rick Clawges in support of the USGS National Water-Quality Assessment Program.

A description of this process has been published in

Price, C., Naomi, N., Hitt, K., and Clawges, R., 2003, Mining GIRAS: Improving on a national treasure of land use data, in Proceedings of the 2004 ESRI International User Conference, Environmental Systems Research Institute, Redlands Calif. [on-line] (Accessed November 3, 2004,
from http://gis.esri.com/library/userconf/proc03/p0904.pdf)

See the Supplemental Information element of this metadata record for more details.

Process Date: 01/01/2003
Process Contact:

Contact Information:

Contact Organization Primary:

Contact Organization: U.S. Geological Survey

Contact Position: Ask USGS -- Water Webserver Team
Contact Address:

Address Type: mailing address
Address: 445 National Center
City: Reston
State or Province: VA
Postal Code: 20192
Country: USA

Contact Voice Telephone: 1-888-275-8747 (1-888-ASK-USGS)
Contact Electronic Mail Address: mierardi@usgs.gov

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Spatial Data Organization Information:

Direct Spatial Reference Method:

Raster
Raster Object Information:

Raster Object Type: Grid Cell
Row Count: 99400
Column Count: 154133
Vertical Count: 1

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Spatial Reference Information:

Horizontal Coordinate System Definition:

Planar:

Map Projection:

Map Projection Name: Albers Conical Equal Area
Albers Conical Equal Area:

Standard Parallel: 29.500000
Standard Parallel: 45.500000
Longitude of Central Meridian: -96.000000
Latitude of Projection Origin: 23.000000
False Easting: 0.000000
False Northing: 0.000000

Planar Coordinate Information:

Planar Coordinate Encoding Method: row and column
Coordinate Representation:

Abscissa Resolution: 30.000000
Ordinate Resolution: 30.000000

Planar Distance Units: meters

Planar:

Map Projection:

Map Projection Name: NAD 1983 UTM Zone 6N
Transverse Mercator:

Scale Factor at Central Meridian: 0.9996
Longitude of Central Meridian: -147.0
Latitude of Projection Origin: 0.0
False Easting: 500000.0
False Northing: 0.0

Planar Coordinate Information:

Planar Coordinate Encoding Method: row and column
Coordinate Representation:

Abscissa Resolution: 30.000000
Ordinate Resolution: 30.000000

Planar Distance Units: meters

Planar:

Map Projection:

Map Projection Name: NAD 1983 UTM Zone 4N
Transverse Mercator:

Scale Factor at Central Meridian: 0.9996
Longitude of Central Meridian: -159
Latitude of Projection Origin: 0.0
False Easting: 500000.0
False Northing: 0.0

Planar Coordinate Information:

Planar Coordinate Encoding Method: row and column
Coordinate Representation:

Abscissa Resolution: 30.000000
Ordinate Resolution: 30.000000

Planar Distance Units: meters

Geodetic Model:

Horizontal Datum Name: North American Datum of 1983
Ellipsoid Name: Geodetic Reference System 80
Semi-major Axis: 6378137.000000
Denominator of Flattening Ratio: 298.257222

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Entity and Attribute Information:

Detailed Description:

Entity Type:

Entity Type Label: Raster_attribute_table
Entity Type Definition:
List of unique raster values in data set
Entity Type Definition Source:
The way this is represented is software-specific

Attribute:

Attribute Label: Value
Attribute Definition:

Land use classification code number

Attribute Definition Source:

U.S. Geological Survey land use and land cover digital data files

Attribute Domain Values:

Codeset Domain:

Codeset Name: Anderson Level 2 land use classification codes
Codeset Source: Anderson, J.R., Hardy, E.E., Roach J.T., and Witmer R.E., 1976. A Land Use and Land Cover Classification System for Use with Remote Sensor Data. USGS Professional Paper 964, U.S. Geological Survey, Reston, VA. Also see: http://landcover.usgs.gov

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Distribution Information:

Distributor:

Contact Information:

Contact Organization Primary:

Contact Organization: U.S. Geological Survey
Contact Person: GS ScienceBase

Contact Address:

Address Type: mailing address
Address: Denver Federal Center, Building 810, Mail Stop 302
City: Denver
State or Province: CO
Postal Code: 80225
Country: United States

Contact Voice Telephone: 1-888-275-8747
Contact Electronic Mail Address: sciencebase@usgs.gov

Resource Description: Downloadable Data
Distribution Liability:

Although this data set has been used by the U.S. Geological Survey, U.S. Department of the Interior, no warranty expressed or implied is made by the U.S. Geological Survey as to the accuracy of the data and related materials. The act of distribution shall not constitute any such warranty, and no responsibility is assumed by the U.S. Geological Survey in the use of this data, software, or related materials. Any use of trade, product, or firm names is for descriptive purposes only and does not imply endorsement by the U.S. Government. Although this Federal Geographic Data Committee-compliant metadata file is intended to document the data set in nonproprietary form, this metadata file may include some vendor-specific terminology.

Standard Order Process:

Digital Form:

Digital Transfer Information:

Format Name: Digital Data

Digital Transfer Option:

Online Option:

Computer Contact Information:

Network Address:

*Network Resource Name:*https://doi.org/10.5066/P9MY8D4K

Fees: None

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Metadata Reference Information:

Metadata Date: 11/17/2020
Metadata Contact:

Contact Information:

Contact Organization Primary:

Contact Organization: U.S. Geological Survey
Contact Person: Water Mission Area

Contact Address:

Address Type: mailing
Address: 12201 Sunrise Valley Dr
City: Reston
State or Province: VA
Postal Code: 20192

Contact Electronic Mail Address: GS-W-model-data@usgs.gov

Metadata Standard Name: FGDC Content Standards for Digital Geospatial Metadata
Metadata Standard Version: FGDC-STD-001-1998

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