04/09/97

BASELINE97

THEME: DEM (DIGITAL ELEVATION MODELS)

This CD product contains the current set of raw DEMs and all respective ARC/INFO lattices that have been fully processed at SSCGIS as of 04/03/97. With the expection of 19 Oregon-Nevada border quads, all quads for the state of Oregon are accounted for and available.

Data History

The data were collected from the US Geological Survey (USGS), the US Forest Service (USFS), and the Bureau of Land Management (BLM). The BLM converted all USGS based source data into lattices and verified quad location. The BLM also provided a number of lattices derived from their own database; WODDB (Western Oregon Digital Database). The USFS provided source DEMs for which the SSCGIS converted into lattices and verified quad location.

Since the USFS periodically sent over their DEMs to USGS for updating and incorporation into USGS's database and as well as sending DEMs directly to the SSCGIS, overlaps of different USFS versions surfaced. The USFS versions identified from the USGS dataset were considered more up to date and were thereby retained over the versions directly received from the USFS. In the separate case where a USGS, USFS, and BLM DEM version existed for the same quad, all versions were retained. This was done to allow the user to make the choice of which version to utilize. Also the user, if attempting to edgematch quads for a contiguous area, could then keep to a consistent source base.

CD Content & Structure

2 CDS

CD I) statewide ARC/INFO LATTICE EXPORT FILES
CD II) statewide raw DEM SOURCE FILES

File Extraction Procedure

All files have been compressed and packaged into the 'pkzip' format. To extract the data use PKUNZIP on the PC platform and the 'unzip' utility on the UNIX platform. To obtain the UNIX version for the respective UNIX platforms refer to the following.

NOTE: BASELINE97 is packaged on this CD using Info-ZIP's compression utility. The installation program uses UnZip to read zip files from the CD. Info-ZIP's software (Zip, UnZip and related utilities) is free and can be obtained as source code or executables from various bulletin board services and anonymous-ftp sites, including CompuServe's IBMPRO forum and ftp.uu.net:/pub/archiving/zip/*.

or refer to the website:
http://www.sscgis.state.or.us/data/format.html

USGS Catalog Scheme - OHIO-CODE

OHIO-CODE	i.e. 42120A1
latitude of SE corner of quad (first 2 characters)	i.e. 42
longitude of SE corner of quad (next 3 characters)	i.e. 120
1 deg. block of latitude & longitude = 64 quads (8 rows of quads -along latitude by 8 columns of quads -along longitude)	i.e. 42120
A-H lettering scheme (the columns of the 1 deg. block)	i.e. A (bottom most quad in column)
1-8 numbering scheme (the rows of the 1 deg. block)	i.e. 1 (right most quad in row)

BASELINE97 directory structure based on OHIO-CODE format

{1deg block}/{column code}

i.e. 42120/a

-each "column code" sub-directory will contain filenames based on an abbreviated version of the OHIO-CODE format, filetype, and source provider.

OHIO-CODE abbreviated	=	ohio-code with the first number of the latitude degree, '4', dropped off.
FILETYPE	=	'l' for lattice export file d' for raw DEM source file

SOURCE PROVIDER = 'g' for USGS (sole source)
'f' for USFS (either directly from
USFS or via USGS dataset)
'b' for BLM (WODDB)

i.e. 3120e5lg = 43120E5 quad - lattice - derived from USGS sole source

METADATA FIELD DESCRIPTIONS

The quad metadata file is provided as either a dbase, ARC/INFO export,
or comma-delimited ASCII file. Its root name is "QUADMETA".

fields

COLUMN	ITEM NAME	WIDTH	OUTPUT	TYPE	N.DEC	ALTERNATE NAME	INDEXED
1	OHIO_CODE	7	7	C	-		-
8	QUADNAME	30	30	C	-		-
38	PROVIDER	8	8	C	-		-
46	MAP_CTR	7	7	C	-		-
53	LEVEL	6	6	C	-		-
59	RMSE_VER	2	2	C	-		-
61	CELLSIZE	8	8	F	3		-
69	NCOLS	4	4	B	-		-
73	NROWS	4	4	B	-		-
77	E_BND_CRD	8	15	F	6		-
85	N_BND_CRD	8	16	F	7		-
93	W_BND_CRD	8	15	F	6		-
101	S_BND_CRD	8	16	F	7		-
109	MEAN	8	12	F	6		-
117	STDV	8	12	F	6		-
125	Z_MAX	8	16	F	7		-
133	Z_MIN	8	16	F	7		-
141	UTM_RAW	2	2	C	-		-
143	X_Y_UN_RAW	2	2	C	-		-
145	Z_UN_RAW	2	2	C	-		-
147	ORG_DATE	10	10	C	-		-
157	REV_DATE	10	10	C	-		-

ohio-code		(see above USGS catalog scheme)
quadname		(name of 7.5 min quad)
provider	*	(either USFS or USGS/BLM or BLM)
map_ctr	*	(Mapping Center -either EMC,WMC,MCMC,RMMC,GPM2,CONT or FS = USFS)
level	*	(Code 1=DEM-1 2=DEM-2 3=DEM-3)
rmse_ver	*	(7 = 7m RMSE, 15 = 15m RMSE)
cellsize		(standard cellsize in feet)
ncols		(number of columns)
nrows		(number of rows)

e_bnd_crd		(east bounding coordinate)
n_bnd_crd		(north bounding coordinate)
w_bnd_crd		(west bounding coordinate)
s_bnd_crd		(south bounding coordinate)
mean		(mean elevation)
stdv		(standard deviation)
z_max		(maximum elevation)
z_min		(minimum elevation)
utm_raw	*	(raw source DEM UTM zone; either 10 or 11)
x_y_un_raw	*	(raw source DEM x_y units; 1=feet 2=meters)
z_un_raw	*	(raw source DEM elevation unit; 1=feet 2=meters)
org_date	*	(raw source DEM's original generation date; YYMM two-digit year & two-digit month - if available)
rev_date	*	(raw source DEM's revision date; YYMM two-digit year & two-digit month - if available)

The level and rmse_version are specific to the quality of the DEM.
Refer to the main "METADATA" text document for definitions and explanation of the level and rmse fields. In general, a 7 meter RMSE and a level 2 DEM are what are desirable in terms of the highest quality of DEM. Several future USGS replacements for the 15m RMSE DEMs are already in progress.

Metadata on the raw source DEMs is included with the lattice metadata; the (*) fields.

All lattices have been projected into the Oregon's Standard Lambert Projection; refer to our homepage (http://www.sscgis.state.or.us) for further information or to the main "METADATA" text document.

A hypertext guide for 7.5min DEMs is available at:
<http://edcwww.cr.usgs.gov/glis/hyper/guide/7_min_dem>

Softcopies in ASCII format on the main DEM guide and standards is available at:
<ftp://www-nmd.usgs.gov/pub/ti/DEM/demguide>
<ftp://www-nmd.usgs.gov/pub/ti/DEM/demstnds>

Notes:

Potential Problems:

a) LEVEL 1 DEM profile "striping" artifact

All LEVEL 1 DEMS have the potential of exhibiting systematic vertical elevation shifts (all within acceptable elevation tolerance) which may become apparent if contours are generated from the DEM and in analyses that make use of DEM derived slope data.

The following is an explanation of this processing artifact as describe by a USGS representative:

-Despite the 'corn rows' or striping artifacts found in the manually profiled DEMs, the data is good for most uses, dependent on how stringent or robust the modeling requirements are for the elevation data. The data was accurate for the 7meter and 15meter databases established at that time. The visual striping artifacts of these DEMs is a result of the profiling technique used in the photogrammetric collection process. The use of photogrammetric collection was defined as a "Level 1" DEM process that could have a vertical accuracy of 15m. Current methodology utilizes map contour data to make the DEM, and is defined as a "Level 2" DEM. Please consider the following possible limitations of Level 1 DEMs:

1) Hydrologic Modeling - where surface flows are dependent on criteria for modeling i.e. 5 meters or less. (The profiled DEM is within the 7 meter accuracy with the methods used at that time.)

2) Use of slope and aspect - civil engineering (planning purposes).

3) Soil and vegetative studies.

4) The production of contours from a DEM conform to the row artifacts instead of providing a smooth transition.

5) Visual impact of the artifacts as depicted in a shaded relief.

As for 'what causes' the striping? -
Basically the manual profile method of collection consisted of a person that had to keep a 'floating dot' on the ground of a stereo image in a East/West direction, where the floating dot tended to 'dig' in one direction and 'float' in the other.

Possible filtering and manipulating of the data? -
The use of image processing techniques can improve the data considerably, dependent on its desired uses. General convolution filters alone will not correct the systematic error.

USGS standard DEM:
The standard USGS DEM can be described as an ASCII formatted elevation file preceded by a metadata header file which consists of one long continuous 1024 byte ACSII record (a single record).

b) Merging ARC/INFO lattices - line gap effect

The Baseline97 (Phase I) effort for the DEMs did not include edgematching between quads other than what had already been done by USGS,BLM, & USFS. Eventual comprehensize edgematching and quality control for this effort is expected to be part of future efforts under the umbrella of maintenance and update (Phase II). All LATTICE quads were individually projected from their native UTM projection to the Oregon Lambert Standard Projection (see Spatial_Reference_Information section under METADATA.TXT or website www.sscgis.state.or.us/coord/project/gpl.html). In keeping with the standard projection for LATTICES this has posed a potential problem for resultant

merged products. Reprojecting, in certain cases, has caused the number of rows or columns to possibly reduce by one or two less due to area and positional diffrences. As describe in ESRI's online help for the PROJECT command:

> The cells of a grid will always be square and of equal area, in map coordinate space, although the shape and area a cell represents on the surface of the Earth will never be constant across a grid. This is because no map projection can preserve both shape and area simultaneously. The area represented by the cells will vary across the grid. Therefore, the output cell size and the number of rows and columns may change.

This results in potential line gaps of NODATA between merged quads where edgematching had been done. The only way to solve this problem is by converting the raw SOURCE DEMs into native projection LATTICES, to perform the merge of all the quads of the state under the native projection, and then clip the entire state DEM by a quad outline coverage to regain the quad tiling structure. Even this method would not be prefect since the UTM projection comprises two zones (10 & 11) which act as two independently different projections. The border between the two zones for Oregon is the 120 degree meridian. Therefore the process would involve two composite merged areas for each zone. To join the two zones, either of the zones would have to temporarily be projected to the other's zone parameters and thus potentially result with a line gap along in specific places along the 120 degree meridian. Fortunately there is an ARC/INFO GRID function that can fill in a 1-3 wide line gap.

Help will be availble to ARC/INFO users through the form of an AML and possibly include an SML equivalent for PC users. The AML will be placed on the website for downloading once the site has been updated. It will automatically perform the merge upon interactive entry, by ohio-code, of the quads to merge. Areas of interest that include mixed UTM zone quads would require use of the GRID module.

Please give me a call at 503-378-4583 (Tu-Fr: 8:00am - 6:30pm)
or E-Mail at C.Fred.WEIGMAN@state.or.us.

Sincerely,

Fred Weigman
BASELINE97 technical coordinator