Chapter 15 -- IMPORT and EXPORT

As previously discussed, data may be input to LTPlus in three different ways--manual digitizing, scanning and importing from an external application. The latter two utilize the **import** function to convert the data to the LTPlus working format. In most cases, data collected and processed by LTPlus is destined for use by other external applications (i.e., GIS). To this end, the **export** function is used to convert LTPlus data to any of a number of formats acceptable to other programs. The **export** files are *ascii* format. The **import** and **export** commands are also capable of accessing the DOS partition or DOS-formatted data disks directly. Typically, **import** and **export** *ascii* files are read from or written to the default **/u[sr]/ltp** directories of the same names.

IMPORT FORMATS

Imported raster information, which includes scanned data, is **import**ed directly into the current, active map's raster. Vector information is imported into a user-designated level of the current, active map and may be moved to the map's raster with the **level_dup** or **level_icopy** commands if desired. As an example, one of the more common routes involves importing information scanned by a Houston Instruments ScanCad system. The data is output by the HI system in a DOS raster format file with a .ras extension. To move this file into LTPlus, the user should execute the **import** command with the **ras** format type included as a parameter. The LTPlus import formats include:

asn A strip-run length encoded format; USFS GRAMS output.
cell This is a fairly generic format for handling raster, grid-based information. It is commonly used for importing data from MTHMAP and R2MAP.
cff Cartographic Feature File is the vector format associated with the base layer data supplied by the Geometronics Service Center (GSC).
digit.ascii An ascii vector format used by GRASS (CERL/SCS).
digit.att An ascii format holding attributes and their locations, used by GRASS (CERL/SCS).
dlg3 This is a comprehensive vector format developed by the U.S. Geological Survey and compatible with a variety of external applications, including the ARC/INFO GIS.
dxf Rapidly becoming the CAD industry standard, this vector format is most closely associated with the AutoCad software package.
gis This is an ERDAS raster (cell) format output file.
map Another LTPlus map.
moss (Import/Export format)
This is a data-intensive vector format which supports the MOSS GIS application.
optr9 A raster format developed to transport digital data generated by the Optronics scanner at GSC.
rdef2 Raster Data Exchange Format, developed for exchanging raster data among DWRIS, LIDES and LTPlus.
ras A specialized raster format generated by the Houston Instruments ScanCad system.
rstr A generic, bit-mapped raster format.
rlc A raster format output by Ideal Scanners.
rle1 A one-byte, Run Length Encoded raster format.
scsgef An SCS format that may consist of three or four files that hold header, segment coordinate pairs, points, and an optional feature file containing isolated segments. The line file is required for this category of import. The point and feature files may be useful as well. The header data is not currently used.

The **import** command reads data in various file formats and, depending on the format, places them on the raster (base level) or at the specified display/import level (35-95).

VECTOR FILES

Files in vector format **import**ed by the user are put onto an import/display level specified by the user. There are 61 of these levels available, numbered 35 - 95. From there, they can be displayed (graphics), used to modify raster-based data (**level_snap**), or duplicated onto the raster itself (**level_dup** or **level_icopy**). All (and only) **import** formats which include the l (level) parameter are of this type. They include:

cff **dlg3** **dxf** **moss**

RASTER AND CELL-BASED FILES

Other file formats include several types of raster and cell-based data. These are imported directly onto a new raster and destroy all old data for the map to which they are imported. Import formats of this type do not have the **l** (level) parameter. These include:

cell **optr** **rdef2** **ras** **rstr**

These types do not have explicit vector or topology information, but do have relative position information. In LTPlus, this is handled most efficiently by sizing a raster exactly to the file so that nothing is lost or distorted. This destroys the old raster coordinate system which links all of the old data together (on that map). If you want to bring this type of data onto an existing map, first **import** it into a blank map, **assemble** the data, then **export** a vector format file (i.e., **dlg3** or **moss**) and **import** that vector file onto an import/display level of the intended target map.

SPECIAL FILES

Another type of format includes attribute information only (an attribute string, object type to which it belongs, and location information). These include:

digit.att

Another type of special format is the **scsgef** format. The map data is distributed into three or four separate files. Only one **scsgef** file may be imported at a time! The coordinates are in lon/lat format, in decimal degrees. The files are:

header - contains name of digitized soil survey, map corner coordinates, map scale, etc.
line - contains coordinate pairs (lon/lat) of the segments. Both right and left polygons are listed along with their respective attributes.
point - contains location soil map symbols and/or soil point features.
feature - contains linear features that are not part of polygons. A digitized escarpment is the typical example of a linear feature. This is an optional file!

IMPORT COMMAND PARAMETERS

Different format types require different optional arguments **[p1]....[pn]**, which should be included in the indicated sequence following the file name. The **import** command takes different parameters depending on the format to be imported. Here are all of the different forms (one per format) with Options/arguments:

import asn iname
import cell iname n a
import cff iname l c lname
import digit.ascii iname l c lname
import digit.att iname c s ac
import dlg3 iname l lname
import dxf iname l c lname
import gis iname
import map iname l iname
import moss iname l c otype lname

import optr9 iname
import rdef2 iname a
import ras iname r t
import rstr iname b j
import rlc iname r t
import rle1 iname
import scsgef -ftype iname l lname

The various parameters displayed in this list are defined as follows:

a Attribute code:
- **1** = import objects only
- **2** = import attributes only
- **3** = import both objects and attributes

ac Action code (for attributes)
- **0** = Replace all attributes with a single new one
- **1** = Replace/set 1st attribute, leave others
- **2** = Replace/set 2nd attribute, leave others
- **3** = Insert new 1st attrribute, push others up by 1
- **4** = Prefix 1st existing attribute
- **5** = Suffix 1st existing attribute
- **6** = Add a new (additional) last attribute

b Bits-used code (1-255)
This value specifies the bits of each byte to be taken as raster data. To use the low four bits, set this value to 15; to use all eight bits, set this value to 255. In general, the bits used form an 8-bit binary integer, less the flag bits used.

c Coordinate type code
- **0** = raster pixels
- **1** = lon/lat, ddd/mm/ss.ss
- **2** = utm meters
- **3** = state plane feet
- **4** = digitizer1 coordinates
- **5** = digitizer2 coordinates
- **6** = map inches
- **7-9** = reserved
- **10-19** = user-defined coordinates

-ftype type of **scsgef** file where the type might be:
- **g** indicates file named by iname is to be imported as the header file
- **l** indicates file named by iname is to be imported as the line file
- **p** indicates file named by iname is to be imported as the point file
- **f** indicates file named by iname is to be imported as the feature file

iname Import file name
The **iname** parameter may be a file name (with or without a complete path), or a directory name. If **iname** does not contain the / character, it is assumed to be a file name in the default **import** directory (listed in the **config** file). If it does contain the / character, it is assumed to be a path name. The path is checked to see if it is a file or a directory. If it is a file, the file is **import**ed. If it is a directory, the program looks in that directory for a file which has the same name as the map. This is to allow easy batch **import**ing for a list of maps.

j Ratio of import file ascii lines per one scan line.

l Level number of base category

Each **dlg3** file may contain one or more data categories, with each category imported to one, user-designated LTPlus level which lies within the inclusive range of 35 and 95. It is suggested that an organized pattern of level usage be adopted. For example, all adjacent map data **import**ed (for edge matching) might be placed on levels 35-38, with the map to the west on level 35, etc. This allows much more efficient usage and makes it easier to track your data.

lname Default level name

This is the name that will be given to the level if the **dlg3** file doesn't have a category name. It will be used to prompt you when you need to select a level later on.

n Number of ascii characters per cell in a cell file; normally 1 or 2.

otype Object type code

Moss import/export type files hold only one type of object per file:
0 = points
1 = lines
2 = polygons

r Reduction factor for raster resolution of .ras files.

When raster resolution is reduced, several scan pixels are grouped into one raster pixel in LTPlus. A 3:1 linear reduction would convert a 3 x 3 block of scan pixels into a single LTPlus raster pixel. The allowable values are:
1 = no reduction
2 = 2:1 linear reduction
3 = 3:1 linear reduction
4 = 4:1 linear reduction
5 = 5:1 linear reduction
6 = 6:1 linear reduction
The advantages of reduction are speed in processing, and smaller file sizes. If the scan has much higher resolution than the original data, then reduction should be given serious consideration.

s Set number

Set number of map objects in the current, active map to which to assign the imported attributes. If an imported attribute location associates it with an object in set **s**, then the attribute will be assigned. Otherwise, the attribute will not be assigned.

t Fractional threshhold for use with **r**>1, above.

When raster resolution is reduced, several scan pixels are grouped into one raster pixel in LTPlus. The **t** value (fractional threshhold) allows the user to specify the portion of the original scan which must be on to produce an on raster pixel. If **t=.25**, then 25% of the original scan pixels in a reduced group would have to be on to get an on LTPlus raster pixel. The allowable values are between 0.0 and 0.1.

EXPORT FORMATS

Data may be **export**ed for input to a variety of other applications. **Export** files are typically placed in the **/u[sr]/ltp/export** directory. The *ascii* **export** file may also be written directly to a DOS partition or DOS-format floppy (as with the **import** command). The **export** function supports a number of popular data formats, including:

cell This is a fairly generic raster format for handling grid-based information. It is commonly used for importing data from MTHMAP and R2MAP.

cff Cartographic Feature File is the vector format associated with the base layer data supplied by the Geometronics Service Center (GSC).

dem Digital Elevation Model, a term created by the U.S. Geological Survey to describe topographic data stored as horizontal and vertical coordinates. This is a vector file.

digit Vector and attribute data for GRASS GIS (SCS).

dlg3 This is a comprehensive vector format developed by the U.S. Geological Survey and compatible with a variety external applications, including the ARC/INFO and GRASS GIS.

dxf Rapidly becoming the CAD industry standard, this vector format is most closely associated with the AutoCad software package.

moss This is a data-intensive vector format which supports the MOSS GIS application.

rdef2 Raster Data Exchange Format, developed for use with DWRIS, LIDES and LTPlus.

rstr A generic raster format.

scsgef This format was developed for use by SCS as the digital soil survey component of SSURGO data base.

EXPORT COMMAND PARAMETERS

The **export** command writes data in the format specified by type to the named file. If the specified file name does not contain the / character, then it is assumed that it is in the default path. The data is read from the active map. Different format types require different optional parameters **[p1]...[pn]**, which should be included in the indicated sequence following the file name. The parameters associated with each command are (note that parameters in brackets are optional):

cell fname t c w h x y d u r
cff fname c s
dem fname c w h g e1 e2 f
digit fname a c s
dlg3 fname a at c s
dxf fname a c s
moss fname a c otype s
rdef2 fname a rc
rstr fname b n m
scsgef fname [-f] [d]

The parameter definitions are:

a Attribute code:
1 = export objects only
2 = export attributes only
3 = export both objects and attributes

at Attribute type code:
1 = numeric code pairs
2 = text strings

b Bits-used code (1-255)
This value specifies the bits of each byte to be taken as raster data. To use the low four bits, set this value to 15; to use all eight bits, set this value to 255. In general, the bits used form an 8-bit binary integer, less he flag bits used.

c Coordinate type code:

0 = raster pixels
1 = lon/lat, ddd/mm/ss.ss
2 = utm meters
3 = state plane feet
4 = digitizer1 coordinates
5 = digitizer2 coordinates
b= map inches
7-9 = reserved
10-19 = user-defined coordinates

d Rotation (clockwise) in degrees

e1 Map attribute units:
1 = feet (* normal)
2 = meters

e2 Output dem units:
1 = feet
2 = meters (* normal)

f Smoothing
0 = none, no smoothing
1-3 = number of passes (normally 1)

fname Export file name
The **fname** parameter may be a file name (with or without a complete path), or a directory name. If **fname** does not contain the / character, it is assumed to be a file name in the default **export** directory (listed in the **config** file). If it does contain the / character, it is assumed to be a path name. The path is checked to see if it is a file or a directory. If it is a file, the file is imported. If it is a directory, the program looks in that directory for a file which has the same name as the map. This is to allow easy batch exporting for a list of maps.

-ftype Generates the optional line feature file

g Clipping coordinate type code:
0 = raster pixels
1 = lon/lat, ddd/mm/ss.ss
2 = utm meters
3 = state plane feet
4 = digitizer1 coordinates
5 = digitizer2 coordinates
6 = map inches
7-9 = reserved
10-19 = user-defined coordinates

h Cell height (pixels; normally 30)

m Maximum line length

n Mask:
Value of 0-255, inclusive, specifies byte to be combined with the data.

otype Object type code:

0 = any node
1 = any segment
2 = any polygon
3 = node with 0 branches: an isolated point
4 = node with 1 branch: a spur endpoint
5 = node with 2 branches: a node on a simple island
6 = node with 3 branches: a junction node
7 = node with 4 branches: a junction node
8 = segment with 2 free (spur) ends: a free segment
9 = segment with 1 free (spur) end: a spur
10= segment with no free ends
11= single links to islands (segment)
12= segments between polys with same attribute
13= possible segment contour attr. sequence error
14= interior polygon
15= exterior polygon (negative area)
16= map border exterior polygon (negative area)

r Number of rows in cell file

rc Registration code:

0 = omit registration
1 = include registration

s Set number of objects to be exported

sn State abbreviation and name of soil survey

st Smoothing type:

0 = none, no smoothing
1 = smooth all points
2-2000 = variable smoothing:

All **dem** grid points which are on a (**min**) profile section longer than **st** will be smoothed. **st** is in grid units: e.g. if the **dem** is on a UTM grid, then **st** is in meters. For a standard **dem** from 40 ft. contours, a value of 200-400 will normally do a good job of leaving well contoured areas untouched while smoothing areas of less than 5 - 2.5% slope. This removes streaking in flat areas typical of programs like this which use multiple profiles to calculate dems. **NOTE: lower numbers mean MORE smoothing, higher numbers mean LESS.**

t Characters per cell

u Number of columns in cell file

w Cell width

x Center x value, cell # 1

y Center y value, cell # 1