

## Changes in NATL's GIS layers for its 50-meter grid and grid points

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One of the first improvements to NATL was the establishment of a 50x50m grid to make it easy to establish the location of any feature of interest and to allow monitoring of changes in NATL from a large number of uniformly distributed points. In 1995-96, volunteers from the Student Geomatics Association [SGA] surveyed the initial grid and three years later new volunteers resurveyed it and drove iron rods into the ground to permanently mark the gridline intersections. Subsequently, other volunteers extended the grid into new areas as NATL expanded. Some details of these activities may be found in Principal Improvements to NATL (<http://natl.ifas.ufl.edu/enhance.htm>) and with the grid maps in Maps and Aerial Photographs Gallery (<http://natl.ifas.ufl.edu/aerigall.html>).

In 2008, the NATL Graduate Teaching Assistant used ArcGIS to produce a 14-layer, digital map of NATL. One of these layers showed gridline intersections (Grid Points layer) and another showed the gridlines themselves (50m Grid layer). In 2010, a sub-meter GPS device revealed discrepancies between the geodetic coordinates of the “on-the-ground” grid points (as marked by iron rods) as compared with those used to establish the Grid Points GIS layer. This led to the changes described below.

### NATL-west

Fig. 1 shows the initial and corrected versions of the Grid Points and 50m Grid GIS layers in NATL-west. The initial version was apparently established using the SGA coordinates for grid point E10 and from that point projecting a 50m grid in which the bearing of gridline E was true north and other gridlines were parallel or perpendicular to it. However, as evident near gridline D, SGA had established its N-S gridlines parallel to the N-S fence separating the DPI compound from NATL. That fence is along a property line that bears more than 0.5 degree east of true north. This discrepancy required that the NATL-west portion of the initial grid-related layers be rotated clockwise around grid point E10 until it agreed with the SGA values as found in <http://natl.ifas.ufl.edu/GPSgridpts.xls>. This rotation caused grid points distant from E10 to be displaced several meters or more from their position in the initial Grid Points layer. For the point most distant (J1) the displacement was 8.7 m.

### NATL-east

Fig. 2 shows the initial and corrected versions of the Grid Points and 50m Grid GIS layers in NATL-east. The changes required probably relate to initial uncertainties as to the exact footprint of NATL-east and its geodetic placement—which were reported to be based on lines drawn on an aerial photograph rather than on-the-ground surveys. Whatever the causes, the effect of the changes was to shift the grid about 2.5 m south and 4.5 m east. The changes included a slight counterclockwise rotation that resulted in the eastward shift

being about 1 m greater in the south than in the north and the southward shift being about 0.4 m greater in the west than in the east.

Figure 3 displays grid points mapped from the geodetic coordinates supplied by SGA at the time of their survey in NATL-east in relation to the corrected GIS grid and grid points. The reasons for the mismatch are not known [but the SGA faculty advisor will be consulted]. A spreadsheet at <http://natl.ifas.ufl.edu/GPSgridpts.xls> lists the geodetic coordinates of the gridpoints in NATL-east as read from the current Grid Points GIS layer (as well as the ones supplied by SGA).

The red line on the right of Figure 3 is the property line between NATL and private property to the east, based on UF's 1995 survey by John W. Myers & Associates. The box beneath is an enlargement showing recent GPS determinations of the geodetic coordinates of the survey marker at the south end of the property line and the southeast corner of the NATL fence. The distance between these two points is ca. 6 meters.

### **How reliable were the GPS readings that prompted the changes?**

Figure 4 addresses the repeatability of the GPS readings used to correct the placement of the grid in NATL-east. In that figure, GPS grid #1 is based on five sets of measurements (made November 2009 to March 2010) that collectively included all NATL-east grid points, whereas GPS grid #2 is based on four sets of measurements (made in April 2010) at grid points M6, M7, and M8. The two grids are so close as to be barely distinguishable on the main map. The maximum distance between the two grids is 0.68m--at the south ends of the n-s gridlines. Insets show the scatter of individual readings at L6, M6, and M11. In the insets, the initial GIS grid is also shown. The final, corrected GIS grid (as shown in Figures 2 and 3) is, of course, based on all data points from the two grids of Fig. 4 and falls in between them.







