GISsurfer
USNG and MGRS Coordinates
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This PDF file is online at
https://mappingsupport.com/p2/help/gissurfer-usng-and-mgrs-coordinates.pdf

The GISsurfer homepage is at
https://gissurfer.com

This link will start GISsurfer and display a USNG grid

https://mappingsupport.com/p2/gissurfer.php?center=14S_MH_8178_2090&zoom=5&basemap=USA_basemap

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1.   About GISsurfer

GISsurfer (https://gissurfer.com) is a general purpose web map with broad support for displaying data hosted on various kinds of geographic information system (GIS) servers. For a list of **video and PDF tutorials** see https://mappingsupport.com/p2/gissurfer-help.html.

2.   Why are USNG coordinates important?

The Federal Emergency Management Agency (FEMA) has formally adopted the U.S. National Grid (USNG) coordinate system as its "standard geographic reference system for land-based operations".
https://www.dco.uscg.mil/Portals/9/CG-5R/nsarc/USNGDirective(2015_10_15_1802)_(3).pdf

This was done in large part so that emergency responders can have a common 'language of location'. Using latitude longitude to express locations does not provide a common 'language of location' since there are a number of different ways to write and speak them. Here are just a few:

Decimal degrees	40.68921,-74.04466
	N 40.68921 W 74.04466
	40.68921 N 74.04466 W
Degrees and decimal minutes	40° 41.353' -74° 2.680'
	N 40° 41.353' W 74° 2.680'
	N 40D 41.353M W 74D 2.680M
Degrees, minutes, seconds	40° 41' 21" -74° 2' 41"

UTM coordinates are also not a good choice because even if you ignore the UTM zone designation, you still need to deal with about 12 digits in order to provide a location.
          18T 580722,4504697

In some of the past large scale hurricanes, responders that came from all over used different types of coordinate systems and formats since that is what they trained with at home. In the after-action reports, that disorganized approach was widely recognized as causing locational chaos. There had to be a better way. A task force was appointed and in due course it recommended that the **U.S. National Grid (USNG)** be adopted as a coordinate system that was easy to learn, easy to use and easy to represent on maps. USNG is based on the Military Grid Reference System (MGRS) which U.S. ground forces have already used for decades. In fact, for all practical purposes, ==USNG is the same as MGRS except USNG coordinates are written with some spaces for easier legibility==.

Referring to location problems during Hurricane Katrina rescues, here is a description by USNG advocate Larry Moore on how USNG coordinates can solve those problems.
http://www.fleyo.com/ge/help_usng.html#editorial

One big advantage of the USNG coordinate system is that it provides an easy way to shorten the coordinates that need to be spoken or written during an emergency. While here is an example of a full USNG coordinate, USNG 18T WL 8072 0469, the first two parts define a large area. If an emergency response is taking place within that large area then to describe a 100 meter square within that area only takes 6 digits: 807 046. Describing a 10 meter square within that large area only takes 8 digits: 8072 0469.

The MGRS version of this same coordinate simply eliminates the spaces: 18TWL80720469.

Do you have a GPS? Look at the list of coordinate systems it can display. A great many GPSs can display USNG and/or MGRS coordinates.

3.   What can you do with USNG coordinates and GISsurfer?

GISsurfer has a variety of features that deal with coordinates. Most of those features include support for both USNG and MGRS coordinates. Here is a brief description of how GISsurfer helps you use USNG.   Anything you can do with USNG coordinates in GISsurfer, you can also do with MGRS coordinates.

a.   Display USNG grid lines and labels

The default coordinate format is decimal degrees. To change the coordinate format to USNG:
Click **Menu ==> UTM - USNG/MGRS - LatLng**
Select USNG. If the map shows a world view, then zoom in a bit.

The grid lines are muted black and white so they are easy to see on basemap areas that are both very light and very dark. The grid line labels are color coded to help people learn to "read right - then up". If you keep zooming in the eventually you will see a 100 meter grid.

b.   Display USNG coordinates for map center and cursor location

After you select USNG (see above) the coordinates for the center of the map appear in one corner. On a desktop/laptop you will also see the cursor's coordinates.

c.   Display USNG coordinates for any spot on the screen

Desktop/laptop users: **Rightclick** the map anywhere.
The popup that appears shows the USNG coordinate plus other coordinate formats for the spot that you clicked.

Mobile users: Do a **simulated rightclick**.
Tap the angle at the left side of the screen and then drag the crosshair that appears. Tap that symbol and the rightclick popup appears. To remove this crosshair from the map, tap the angle at the left side of the screen.

d.   Geocode any address and get USNG coordinates

1. Turn on the USNG grid as described above.
2. Click **Menu ==> Search**
3. Enter the address in the search bar above the map and then click "Search".

The map will center at that address.
The USNG coordinate for the center of the map is displayed in the lower right corner (desktop/laptop) or upper right corner (mobile).

e.　Search on USNG coordinates

Menu ==> Search
Enter a USNG coordinate and then click "**Search**" at the far right.
If you want to see a blue marker at the spot you search for, then click "**Search and Mark**".

To remove the marker, do another search and click "Search".

When you search on a USNG coordinate the map will usually be centered in the middle of that grid box as a result of your search.

You can also search on MGRS coordinates, UTM coordinates, most reasonable ways to write latitude longitude, addresses and many place names.

f.　Geolocation (mobile only)

Menu ==> My location
The symbol that is displayed will follow you as you walk, just like on a GPS.
Touch the symbol to see your coordinates.
The coordinates are displayed using the current coordinate format you selected (see above).

If you display your coordinates and then touch the "Link to this spot" button, a GISsurfer link will be displayed. You can email or text that link to anyone. That person can touch/click the link and GISsurfer will open in their browser and the map will show a symbol at your position. If that symbol is touched/clicked then your coordinates will be displayed. If someone needs to know your position and they can receive a text or an email, this feature is a good way to share your location with that person.

Touch Menu ==> 'My location' again to turn this feature off.

g.　Get a link to replicate the map on your screen including USNG

Click **Menu ==> Link to this map**
The link that is displayed will replicate the map on your screen. If USNG is displayed on your screen then USNG will also be displayed on the screen of anyone that clicks that link.

You can also rightclick the map anywhere. The popup that appears has a button at the top labeled "Link to this spot". If USNG is already turned on when you do this, then the link that appears will open GISsurfer centered at the spot you clicked and the USNG grid will be displayed.

h.　Get a link to open the map centered at your USNG location

Mobile users:
1. Menu ==> UTM - USNG - LatLng. Select USNG.
2. Menu ==> My location. The map will center at your position.

3. Tap the location symbol at the center of the screen
4. Tap the button "Link to this spot"

The link that is displayed will open GISsurfer at that location.

i.   Get a link to open at any USNG coordinate

The way the map looks when it opens on the screen is controlled by parameters that you can add to the GISsurfer link. For a full list of the parameters please see the following pdf file:
https://mappingsupport.com/p2/help/GISsurfer-link-parameters.pdf

Here is an example of how to write the parameter to center the map at a USNG coordinate when the map opens: &center=10T ET 4970 7237

Here is a basic GISsurfer link using the above USNG coordinate:
https://mappingsupport.com/p2/gissurfer.php?center=10T_ET_4970_7237

Note the underscores in the USNG coordinate. Although they are not required, it is generally a **bad practice to make links that include spaces**. Various email programs and other software will not correctly handle links that include spaces.

j.   Convert between USNG - Latitude Longitude (D, DM, DMS) - UTM

There are several different ways to convert coordinates. Chose the approach best suited for your needs:

*   Rightclick a spot on the map

*   Do geolocation (mobile only). Touch the symbol to get your location in the current format style, change the format style (via Menu) and then touch the location symbol again.

*   Search on USNG, UTM or latitude longitude. Then change the coordinate format and then look at the corner of the screen where it shows the coordinate for the center of the screen.

k.   Display a USNG grid on top of GIS data

GISsurfer has a number of pre-made map links that can display multiple layers of GIS (Geographical Information System) data related to disasters and recreation. Click Menu ==> "Recreation maps" and scroll down a bit to the links. Open any of those maps, zoom in to your area of interest and then click Menu ==> UTM - USNG/MGRS - LatLng. Select USNG and the grid and labels will appear.

4.   911 dispatching and responding

Problem: The hypothetical county Rolling Rock dispatches first responders to USNG coordinates. However, few people that call 911 know their location in USNG coordinates. Instead, many callers provide coordinates they get from their cell phone or GPS. These coordinates are latitude longitude expressed as decimal degrees, or degrees and decimal minutes, or degrees minutes seconds. Other callers report their location in UTM coordinates. Other callers provide an address.

The problem at the Rolling Rock 911 dispatch center is how to convert any of these different ways to express location into USNG coordinates so responders can be sent out.

Solution: The following GISsurfer link is one way to solve this problem:
      https://mappingsupport.com/p2/gissurfer.php?center=14S_MH_7885_4830&zoom=5&basemap=USA_basemap

To search on most reasonable ways to write coordinates, including USNG coordinates, do **Menu ==> Search** and enter the coordinates into the search window at the top of the screen. GISsurfer will figure out the type of coordinate you entered and center the map at that location. **The USNG coordinates for the center of the screen are always displayed in one corner of the map.** Rolling Rock county uses those USNG coordinates to dispatch responders.

There is no required way for entering coordinates. GISsurfer will understand most reasonable ways to write any of the common coordinate formats. However, in the interest of eliminating needless typing, here is a suggested format for entering coordinates:

dd.dddddd	47.290201 -91.2838722
dd mm.mmm	47 17.412 -91 17.032
dd mm ss	47 17 25 -91 17 2
utm	15T 629760 5238842
usng	15T XN 2975 3884
mgrs	15TXN29753884

> Note that GISsurfer uses **latitude bands** as part of UTM coordinates. The USA is in latitude bands R, S, T and U. This method for expressing UTM coordinates is also used by Garmin on its GPS units. This method has also now been adopted by the USGS.

If an address is entered in the search window then GISsurfer will use ESRI's address search in the background and return the result.

5.   Sources for more USNG information

Video introductions to USNG
https://youtu.be/F-qduWx45pE

Excellent introduction to USNG! Power point slides.
http://gis.co.dakota.mn.us/content/dakco/usng/ppt/USNG-GISLISspring09.ppt

Another good introduction to USNG.
https://napsgfoundation.org/wp-content/uploads/2014/01/Implementation-Guide-to-The-USNG.pdf

USNG center and more links.
http://usngcenter.org/
http://usngcenter.org/portfolio-item/general-presentations/

Florida was the first state to officially adopt USNG coordinates as a standard.
http://www.floridadisaster.org/gis/usng/
http://www.floridadisasterengineers.org/USNG_Files/FDE_posting1/USNG_GENERAL/Start_using_US-National-Grid.pdf

Minnesota has adopted USNG coordinates as a standard. One place USNG coordinates are being used is on trail signage in two of the counties north of Lake Superior.
http://www.co.lake.mn.us/departments/emergency_management/arrowhead_trail_marker_project.php
http://www.mngeo.state.mn.us/committee/emprep/download/USNG/
http://www.co.lake.mn.us/departments/emergency_management/arrowhead_trail_marker_project.php

Lament from a **Georgia** SAR responder.
http://www.mountainpathfinder.com/georgia_sar_us_national_grid.html