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MSP Geographic Translator (GEOTRANS) Version 3.10

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1. SCOPE

1.1 IDENTIFICATION

This document is the Release Notes for Version 3.10 of the MSP Geographic Translator (GEOTRANS).

1.2 SYSTEM OVERVIEW

GEOTRANS is an application that allows you to convert geographic coordinates among a wide variety of coordinate systems, map projections, grids, European Petroleum Survey Group (EPSG) codes, and datums. GEOTRANS runs in Microsoft Windows and Red Hat Linux environments.

The user interface of GEOTRANS consists primarily of a single window. To convert coordinates, select the EPSG code or the coordinate reference frame and datum in which your coordinates are defined, enter any associated parameters, and enter the coordinates in the upper half of the window. Then select the EPSG code or the coordinate reference frame and datum to which you want the coordinates to be converted, and enter any associated parameters, in the lower half of the window. Click on the Convert Upper-to-Lower button, and the resulting coordinates will be displayed in the lower half of the window. You can convert additional coordinate sets from the same source by just entering the new coordinates and clicking on the Convert Upper-to-Lower button. You can change any of the coordinate reference frame, datum, or parameter selections at any time. Also, you can reverse the roles of input and output by using the Convert Lower-to-Upper button. Currently, forty-one different types of coordinate systems, map projections, grids, and coding schemes are supported, as well as more than two hundred different horizontal datums and one hundred thirty EPSG codes.

GEOTRANS can also be used to efficiently convert large numbers of coordinates contained in text files. The file format is very simple. A multi-line file header specifies the coordinate reference frame and datum of the coordinates contained in the file, including any associated parameter values. Following the header, each line contains a single set of coordinates, separated by commas followed by at least one space. Using the GEOTRANS file processing interface, you can select an existing file of coordinates to be converted. You can then set the coordinate reference frame and datum to which you want to convert the coordinates, along with any associated parameter values. Finally, you can specify the name and location of the output file that is to be created. GEOTRANS then converts all of the coordinates in the input file and creates the output file as a single operation.

1.3 DOCUMENT OVERVIEW

This document (MSP GEOTRANS 3.10 Release Notes) describes what has changed between the MSP GEOTRANS 3.9 release and the 3.10 release. It also describes the installation process.

GEOTRANS software is provided via the world wide web (WWW), SIPRNet, and JWICS networks. It can also be requested via CD-ROM or DVD media. Both the source code and executable software are available for user download. The executable software for GEOTRANS 3.10 was built for four platforms: Windows 11 (64-bit), Windows 10 (64-bit), Red Hat Enterprise Linux (RHEL) 8 (64-bit), and RHEL 9 (64-bit). It should also work on all later versions of these operating systems.

The provided GEOTRANS software consists of the Coordinate Conversion Service (CCS) libraries and the GEOTRANS application. GEOTRANS CCS libraries are written in C++. The GEOTRANS software version for Windows (which works for both Windows 11 and Windows 10) was built using Microsoft Visual Studio 2022 (64-bit). The RHEL 8 version was built using GNU Compiler Collection (GCC) v8.5.0, and the RHEL 9 version was built using GCC v11.4.1. The GEOTRANS application Graphical User Interface (GUI) is written in Java and requires the Java Runtime Environment (JRE) version 1.8 or later to execute. We recommend using JRE version 1.8 update 392 or later to address all known vulnerability issues in the earlier versions of JRE.

Software Integrators should refer to the Programmer's Guide for information regarding the GEOTRANS software structure, the programming environment in which it was developed, the Application Programming Interface (API), and the process for building and modifying the GEOTRANS software.

Users should refer to the User's Guide for information regarding the capabilities and use of the GEOTRANS GUI for interactive coordinate conversion.

2. REFERENCES

For a list of references, see the Programmer's Guide or the User's Guide for MSP GEOTRANS.

3. RELEASE NOTES DESCRIPTION

3.1 INVENTORY OF MATERIAL

The MSP GEOTRANS 3.10 release provides executables and libraries built for four operating systems (using three different compilers, see Table 1): Windows 11 (64-bit), Windows 10 (64-bit), RHEL 8 (64-bit), and RHEL 9 (64-bit). Dynamic link libraries (.so for Linux and .dll for Windows) and static link libraries (.a for Linux and .lib for Windows) are provided in this release.

The GEOTRANS software was designed to reduce operating system (OS) dependencies and, therefore, should work on all later versions of these operating systems. If not, the source code is provided for rebuilding on the user's platform of choice. For information regarding the GEOTRANS software structure and building the software from the source code, refer to the Programmer's Guide.

3.2 SYSTEM REQUIREMENTS

The hardware requirements for GEOTRANS software are minimal. It is designed to run on 64-bit processor with 512MB (or more) of memory and 300MB (or more) of available disk space.

GEOTRANS software operates on Windows and Linux operating systems.

Table 1. Supported Operating Systems and Compilers

Platform	OS and Version	Compiler and Version
PC	RHEL 8 64-bit multi-thread	GCC 8.5.0
PC	RHEL 9 64-bit multi-thread	GCC 11.4.1
PC	Windows 11 64-bit multi-thread	Visual Studio 2022
PC	Windows 10 64-bit multi-thread	Visual Studio 2022

3.3 ADDITIONAL SOFTWARE REQUIRED

3.3.1 JAVA RUNTIME ENVIRONMENT

The GEOTRANS application GUI is written in Java and requires JRE to execute. JRE version 1.8.0.392 resolves all known vulnerabilities and was used for testing MSP GEOTRANS 3.10. It

is recommended that GEOTRANS users also use 1.8.0.392 or later. JRE 1.8.0.392 (or the latest JRE) can be downloaded from Amazon Corretto 8:

<https://docs.aws.amazon.com/corretto/latest/corretto-8-ug/downloads-list.html>

3.3.2 VISUAL STUDIO REDISTRIBUTABLE PACKAGE

GEOTRANS libraries on Windows are compiled using Microsoft Visual Studio C++ compilers, and they required the runtime components of Visual C++ libraries to run. If the system does not have the required runtime components of Visual C++ libraries, GEOTRANS users will need to install the Microsoft Visual C++ Redistributable Package.

Microsoft Visual C++ Redistributable Package can be downloaded from the following website:

<https://www.microsoft.com/en-us/download/details.aspx?id=48145>

3.4 SUMMARY OF SOFTWARE CHANGES

The MSP GEOTRANS 3.10 release repairs several issues and provides support for new platforms.

NOTE: Beginning in GEOTRANS 3.2 an iterative algorithm has been used in the Geocentric to Geodetic conversion to achieve better accuracy. If a user needs to revert back to the legacy non-iterative GEOTRANS algorithm, then an environment variable MSPCCS_USE_LEGACY_GEOTRANS needs to be defined before starting GEOTRANS.

The following tables describe: the resolved Discrepancy Reports (DRs) and Enhancement Requests (ERs) included in the MSP GEOTRANS 3.10 release (Table 2); the Open Discrepancy Reports remaining in the MSP GEOTRANS 3.10 release for implementation in a future release (Table 3); and the Open Enhancement Requests for consideration in a future release (Table 4). Priority values assigned to DRs comply with the definitions in the NGA Configuration Management Plan (NCMP). Priority 9 is used to designate an ER.

Table 2. MSP GEOTRANS 3.10 Resolved DRs and ERs

ID	Title	Pri	Impact	Resolution/Workaround
GTRM-6 (29974)	GeoTrans Setting of Data Directory has Problems	4	GeoTrans relies on the setting of an environmental variable to set the data directory. A user reports a problem and a related desired enhancement. The problem is with copying to memory that has not been allocated when the MSPCCS_DATA environmental variable is not present. The related enhancement is to centralize and simplify the setting of the data directory and to offer an alternative to setting an environmental variable.	All function calls to determine the GeoTrans data directory were changed to now use common code. This common code was written in a manner that ensures that not setting the MSPCCS_DATA environment variable will not cause GeoTrans to crash. It is not possible to remove the environment variable altogether, as GeoTrans needs to know where the data files are located on the user's file system.
GTRM-13	Update Spreadsheet Tester expect results	3	Due to changes in the GeoTrans software, the expected results in the GeoTrans spreadsheet tester need to be updated.	Updated the set of Spreadsheet Tester test files to match with results of GeoTrans 3.10.
GTRM-34	GeoTrans file-based processing ignores UTM zone override	3	In GeoTrans 3.9, the UTM Zone override is ignored for file-based processing when converting coordinates to UTM. This functionality did work properly in GeoTrans 3.7 and 3.8.	The problem was introduced in GeoTrans 3.9 when adding support for EPSG. The problem occurred when the code clears the EPSG choice before checking the UTM override button in file MasterPanel.java. The fix is to check if EPSG is active before clearing EPSG choice.
GTRM-35	MGRS still using southwest corner for 100,000 meter cells	3	In GeoTrans 3.8, we updated the conversions from MGRS to use the center of the cell instead of the southwest corner per the guidance in NGA.SIG.0012_2.0.0_UTMUPS. However, when the cell size is 100,000 meters, the code is still using the southwest corner instead of the center. The bug is in mgrs.cpp in the function breakMGRSString below the section of code where the variable halfMulti is computed. In the else clause of the "if (n > 0)" test, the easting and northing should be set to 50,000.0 instead of 0.0 to yield the center of the 100,000 meter cell.	Applied the fix as mentioned in the description, i.e. in function breakMGRSString, in file mgrs.cpp, and in the else clause of the "if (n > 0)" test, set the easting and northing to 50,000.0 instead of 0.0.

ID	Title	Pri	Impact	Resolution/Workaround
GTRM-39 (27158)	GEOTRANS in the Java, Look and Feel mode, Enter does not remove the “Help, About” GUI	4	Minor. User cannot close the “Help About” GUI using the Enter key from the keyboard when Java Look and Feel mode selected.	The Java MetalLookAndFeel package implementation lacks a default button event handler. Implemented a new event handler for this About dialog to trap the ENTER keystroke and close the dialog.
GTRM-40	Add support for Windows 11, RedHat 8, and RedHat 9	9	Add support for new platforms: Windows 11, RedHat Enterprise Linux (RHEL) 8, and RHEL 9.	Built and tested Geotrans on Windows 11 64-bit using Visual Studio 2022, RHEL 8 using GCC 8.5.0 and RHEL 9 using GCC 11.4.1
GTRM-51	File Based Processing Not Reading Enough Characters	3	A user reported a problem with the reading of the header fields that define certain properties of coordinate systems for file-based processing (such as origins, standard parallels, orientation angles, etc.). We reviewed the code and found that the code is not reading enough characters for the worst-case sizes for latitude-based and longitude-based fields. For longitude-based fields the worst-case size needs to be 15 characters (DDD:MM:SS.SSSSH), and for latitude-based fields the worst-case size needs to be 14 characters (DD:MM:SS.SSSSH).	Updated with the correct number of characters read by the C++ fscanf function in file fiomeths.cpp.

Table 3. MSP GEOTRANS 3.10 Open DRs

ID	Title	Pri	Impact	Resolution/Workaround
29600	GEOTRANS does not accept latitude of origin at 90 degrees	4	The Belgium Lambert 1972 projection specifies a latitude of origin of 90 degrees. MSP does not allow latitudes of origin above 89:59:59.	None.
29645	Update GEOTRANS Lat/Lon Error Message	4	None. When user enters an improperly formatted latitude or longitude, an "out of range" message is displayed, which does not indicate improper format.	None
29966	GeoTrans Error Message Should be Enhanced	4	When the New Zealand Map Grid is either the "To" or the "From" coordinate system and the datum is NOT set to "GEO: Geodetic Datum 1949, NZ", the buttons turn red. If the user attempts to make a conversion the error message states "Ellipsoid must be International" (something similar to those words). However, there are many datums that use the International Ellipsoid including all EUR datums, so this error message should be enhanced.	Geotrans should either set the datum automatically to GEO or the error message should state "Datum must be GEO".

ID	Title	Pri	Impact	Resolution/Workaround
30396	Correct problem with GEOREF coordinate system	3	<p>The following issues need to be corrected: 1) Geodetic coordinates are rounded instead of truncated to get GEOREF. 2) GeoTrans rounds at 50 minutes instead of 30 minutes. 3) At 1 degree of precision, 0:51E ON converts to NGAA1. Attempting to convert back to geodetic gives an error. At 1 degree of precision, 0:51E 0:51N converts NGAA11. Converting back to geodetic at 1 min precision gives 0:1E 0:1N, which is wrong. 4) Allowing 10 minute precision is a mistake. 0:35E 0:45N converts to NGAA4050. But, this is indistinguishable from 1 min precision. 5) At 1 min precision, 1:59.5E 0:59.5N becomes NCBA5960. The 60 should not appear. It should be NCBB5900.</p>	None

Table 4. MSP GEOTRANS 3.10 Open ERs

ID	Title	Pri	Impact	Resolution/Workaround
23926	Gauss-Kruger projection	9	Many users do not realize that the Gauss-Kruger projection is a member of the transverse Mercator family. Listing the Gauss-Kruger as a projection type would streamline the workflow of users.	The resolution is to list the Gauss-Kruger as a projection type.
25411	GEOTRANS GUI File - > Load Setting returns an error	9	Users of GEOTRANS installed as a shared application on a network cannot Save and Load personal settings.	The resolution is to provide the capability to save and restore settings to/from a User's Home directory, instead of to/from the installed directory.
26200	MSP should allow for third party coordinate conversions	9	Users are limited to the coordinate conversions provided by GEOTRANS.	The resolution is to design the capability for a "plug-in" coordinate conversion.
26551	Add UTM units option of US Survey Feet	9	Surveyors in the US who use units of US Survey Feet with UTM coordinates cannot use GEOTRANS to/from UTM coordinates.	The resolution is to add the US Survey Feet as a selectable unit for UTM Easting and Northing values.
26987	MSP GEOTRANS should add new transformation model	9	GEOTRANS users cannot use the seven-parameter model described in NATO STANAG 2211.	The resolution is to add the transformation to the CCS and to the GEOTRANS GUI as described in NATO STANAG 2211.
27339	Add an "administrative rules" button to the UTM coordinate option	9	Users cannot convert to True UTM coordinates in the special regions over Southern Norway and Svalgard, without specifying a zone override.	The resolution is to add an "Administrative Rules" button to the GEOTRANS GUI to control whether True UTM coordinates are returned or the special rules for UTM zones are returned.
27813	GeoTrans User Defined Spherical Radius	9	Modify GeoTrans to allow a user entered radius for all spherical models of the earth.	The resolution is to modify GeoTrans to allow a user entered radius for all spherical models of the earth.
27814	Coordinate Conversion Service report Point Scale factor and Convergence of Meridian	9	Coordinate Conversion Service to report Point Scale and Convergence of Meridians for conformal mappings.	Modify Coordinate Conversion Service to report Point Scale and Convergence of Meridians for conformal mappings. This is a change to the CCS API. It is not needed for the GeoTrans GUI.

ID	Title	Pri	Impact	Resolution/Workaround
28084	Z Pass Through option for batch coordinate conversions	9	A user in the bathy group at NGA uses GeoTrans to convert between Degrees Minutes Seconds and Decimal Degrees and would like the Z value to be a pass through. In addition, UTM's to geographics (DD or DMS) with a "z pass through" is needed for for hydrographic work. Hydrographic survey work, commercial or DOD (Naval Oceanographic Office and Army Corps of Engineers) is routinely in UTMs, normally WGS84, but frequently in State Plane; in the case of data received from other international partner, it may be in a local, national datum as well.	No workaround.
29536	Allow users to save their own settings	9	Configuration settings are saved in setting.xml in the MSPCCS_DATA directory and the changes are common for all users. This forces users to copy the data files into their home directory structure to save settings. It would be nice to have a separate environment variable for the settings directory in order to give users the option to save the settings as well as custom datums in their own directory.	The workaround is to have different installation for each user.
29573	Add setting methods to class UPSCoordinates class	9	A user reports that currently UPSCoordinates class only provides a single method to set hemisphere, easting and nothing all at the same time. It is an inconvenience not to be able to set the values individually. Recommend adding the following methods: setHemisphere, setEasting, setNorthing to UPSCoordinates class.	The resolution is to add setting methods as recommended.

ID	Title	Pri	Impact	Resolution/Workaround
29739	Enhance Constant definitions for GeoTrans	9	Constants such as PI and PI/2 are defined multiple times in the GeoTrans code. Sometimes they are defined using #define and other times they are global C++ constant double.	The resolution is to define global constants in one place.
30083	Enhance GeoTrans to support third party geoids	9	Some geotrans users have geoids that define mean sea level for their area of interest and they would like to be able to use these geoids with geotrans without have to do external calculations.	This enhancement is to allow a user to drop a geoid into geotrans and have it available for use on the ellipsoid drop-down menu.
GTRU-1	EGM 2020	9	GEOTRANS does not currently have support for EGM 2020	No workaround.
GTRU-18	Add Deir az Zor Datum	9	GEOTRANS does not currently have support for the Deir az Zor datum.	User can enter the parameters manually for a custom datum.
GTRU-17	Add Reference Frame WGS-84 Realizations to GeoTrans	9	GEOTRANS does not currently have support for the WGS-84 realizations.	No workaround.

3.5. INSTALLATION INSTRUCTIONS

The MSP GEOTRANS 3.10 release can be downloaded from the WWW, SIPRNet, or JWICS networks—or it can be delivered via CD-ROM or DVD media by request. It is provided in zip format for Windows platforms and tgz format for Linux platforms and does not require a registration key or a license key to install or run. The MSP GEOTRANS download page addresses are as follows:

WWW – <https://earth-info.nga.mil/>

SIPRNet – <https://www.geoint.nga.smil.mil/products/gandg/update/index.php>

JWICS – <https://www.geoint.nga.ic.gov/products/gandg/update/index.php>

The GEOTRANS 3.10 application requires JRE to operate. JRE version 1.8.0 update 392 or later is recommended. The startup script may need to be modified to set the correct version of the JRE.

The startup script for Linux systems is found in:

<install dir>/geotrans3.10/GEOTRANS3/linux/runGeotrans.csh

For Windows systems, it is found in:

<install dir>\geotrans3.10\GEOTRANS3\win\runGeotrans.bat.

For Linux systems, using an editor of your choice, open the runGeotrans.csh start up script and modify the following line so that the parameter JAVA_HOME is set to Java's home directory. For example:

```
setenv JAVA_HOME /usr/jdk1.8.0_392
```

For Windows systems, using an editor of your choice, open the runGeotrans.bat startup script and modify the following line so that the path to the JRE is set correctly. For example,

change:

```
@javaw -Xss1024k -jar MSPCCS.jar
```

to

```
@“C:\Program Files\java\jre1.8.0_392\bin\javaw.exe” -Xss1024k -jar MSPCCS.jar
```

For Linux systems please ensure to set LC_NUMERIC to en_US.UTF-8 or equivalent such that a dot character (".") is interpreted as a decimal point in the ellips.dat data file.

GEOTRANS 3.10 for Windows can also be self-installed using the InstallAnywhere package. After downloading the “Self-Installer” GEOTRANS file, double click on install.exe and follow the on-screen instructions to complete the installation.

The GEOTRANS 3.10 InstallAnywhere package supports silent installation. To perform silent installation:

1. Create the properties file installer.properties in C:\Temp directory

```
C:\> install.exe -r c:\Temp
```

2. Specify the installation directory by modifying C:\Temp\installer.properties.

3. Perform silent installation

```
C:\> install.exe -i silent -f C:\Temp\installer.properties
```

3.6 MSP HELP DESK SUPPORT

For help with the installation, to request a delivery on CD-ROM or DVD media, to report an issue, or for general help of any kind, contact the MSP Help Line at MSP_Help@nga.mil.

GEOTRANS Enhancement Requests can also be reported to the MSP Help Line.

APPENDIX A – ACRONYMS

API	Application Programming Interface
CCS	Coordinate Conversion Service
CD-ROM	Compact Disk – Read Only Memory
DR	Discrepancy Report
DVD	Digital Versatile/Video Disk
EGM	Earth Gravity Model
EPSG	European Petroleum Survey Group
ER	Enhancement Request
GCC	GNU Compiler Collection
GEOTRANS	Geographic Translator
GUI	Graphical User Interface
JRE	Java Runtime Environment
MB	MegaByte
MS	Microsoft
MSL	Mean Sea Level
MSP	Mensuration Services Program
NGA	National Geospatial-Intelligence Agency
RHEL	Red Hat Enterprise Linux
WWW	World Wide Web