# Manual

geotrafo
Date: 2013-05-12

With geotrafo you can convert between different coordinate systems.
Either individual points are transformed, ASCII-Files imported/exported
or one or more selected Text-Files automatically converted.

Furthermore, you can convert the contents of the left (input) window.
The results are outputed at right window.
From there you can possibly exported it into a file.

A list of available coordinate systems, You can see at the Homepage
(www.geotrafo.com) or under *Help-> Systemlist*.

Description:
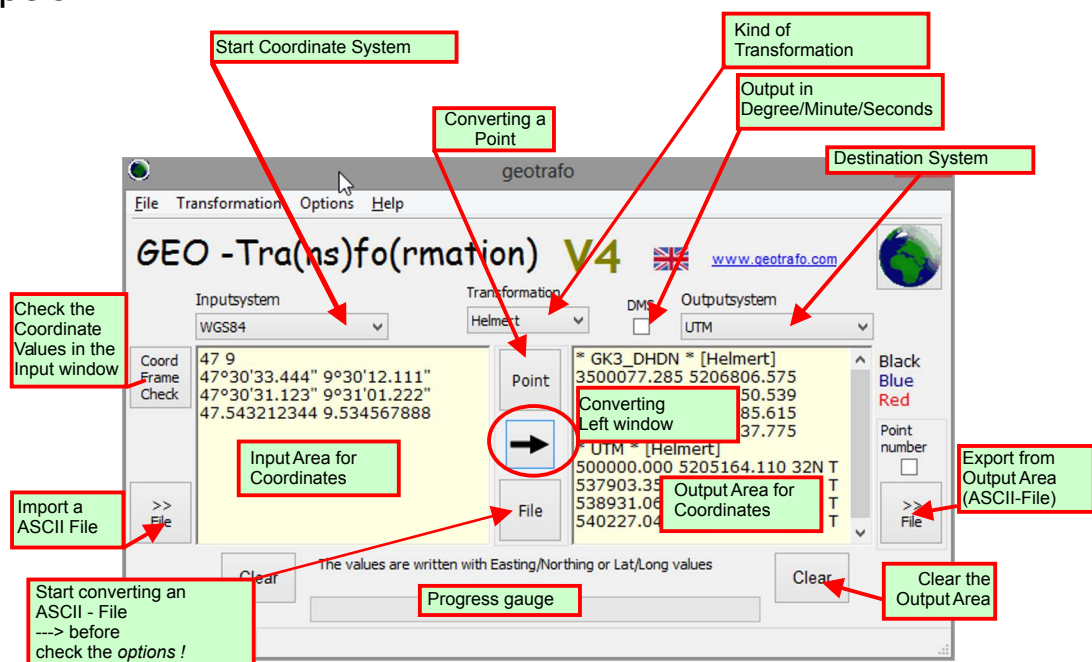
The here described version is geotrafo v 4.26

Input of single Points

First please select the start and target system.
Then press the **point** - button in the middle region.
Now depending on the system kind the appropriate input mask appears.
Note: In the Gauß/Krüger projection the y-Value is the abscissa,
In the UTM-projection the y-axis is the axis of ordinates !
The Input of geographic Coordinates is done as decimal value or
with degrees/minutes/seconds. Here it is also possible to input decimal minutes.
In the UTM-Mask You can enter MGRS-Values and convert it to UTM.
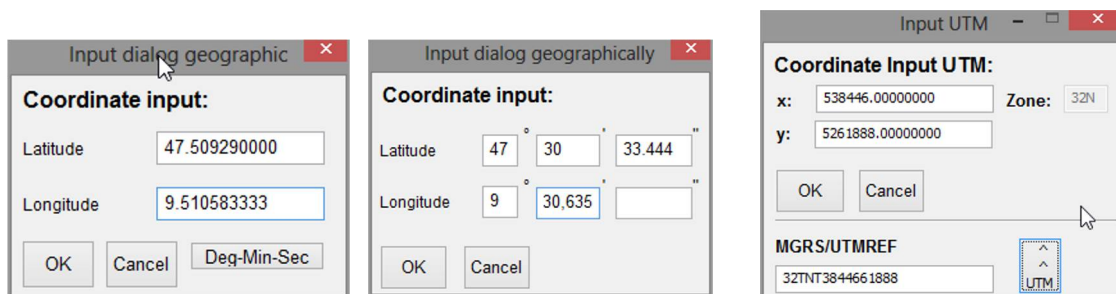
The Altitude can be set in the Options -> Settings (->"Reference Altitude").
This is just an approximate value, and often not necessary.
The altitude is only important with big altitude values, because the effect to the
conversion is minor, so the transformation difference eg from M34 to WGS84
and a height difference of 1000m is only 1 cm (!) in the location.
The precise ellipsoid altitudes, that are necessary for the conversion, are often
unknown. ("Undulation for the regions")
So it is sufficient to set the **Reference altitude** in the Options-> Settings Menu.

Alternative to the single points, it is possible to input values into the
Input Coordinate Window (left side Window). For MGRS this is a single value,
for all other systems two values are given, separated with one ore more blanks.
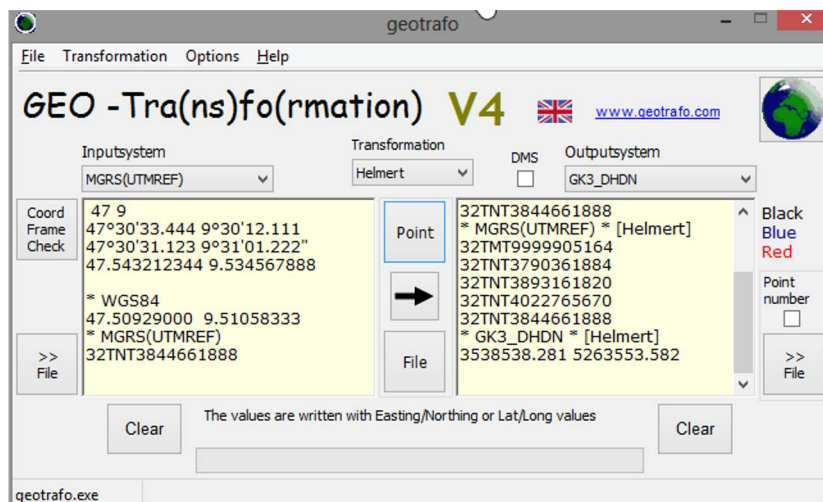The order is analogous the single-point input, so y/x for Gauss/Krüger,
Lambert or Krovak and x/y for UTM-coordinates.
Geographic Coordinates are always written in the usual manner Lat/Long.
For the input of values in degree/minute/second inputting the "-" Sign is not necessary.
A MGRS-coordinate is always **one** value **without** blank or separator.

With the button **Coo-Frame-Check** You can check the values in the left window in combination with the coordinate systems, so if some point lie out of the coordinateframes, they are highlighted in blue. Of course first the input system must be selected.

MGRS-Coordinates in the Input window are highlighted blue, if the characters of the grid square does not fit to the UTM-section (char. after the Zone).
Wrong values are marked with red colour.
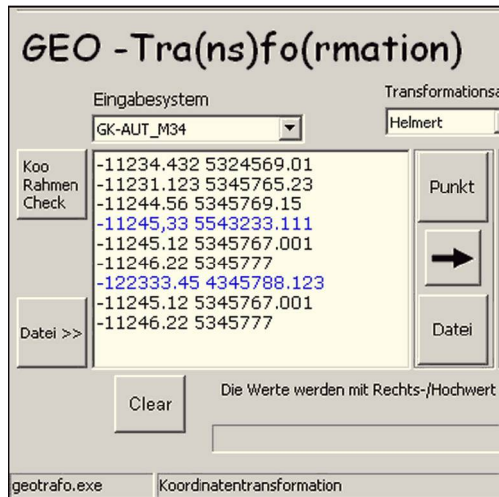
The conversion of the left window ist started with the **arrow**-button.

Is the resulting point out of the coordinate frame, then the coordinate values are blue.
You can find the coordinate frames in the Menu Help->**Coordinateframes**.

If the result is far away of the central meridian (with cylinder projection) or far from the standard parallels (Lambert conical projection), then the projection may be relatively inaccurate.

Is the output system UTM (this is the automatic mode), the Zone and section is added too.

You can further use the Coordinate values with copy/paste or export it into an ASCII-File.

Geographic values also can be written in degrees/minutes/seconds, for that please activate the check box "**DMS**"

Settings

Here You can define some global options, this is the reference altitude, the column order and the column delimiter. (Tabulator/blank, comma or semicolon).
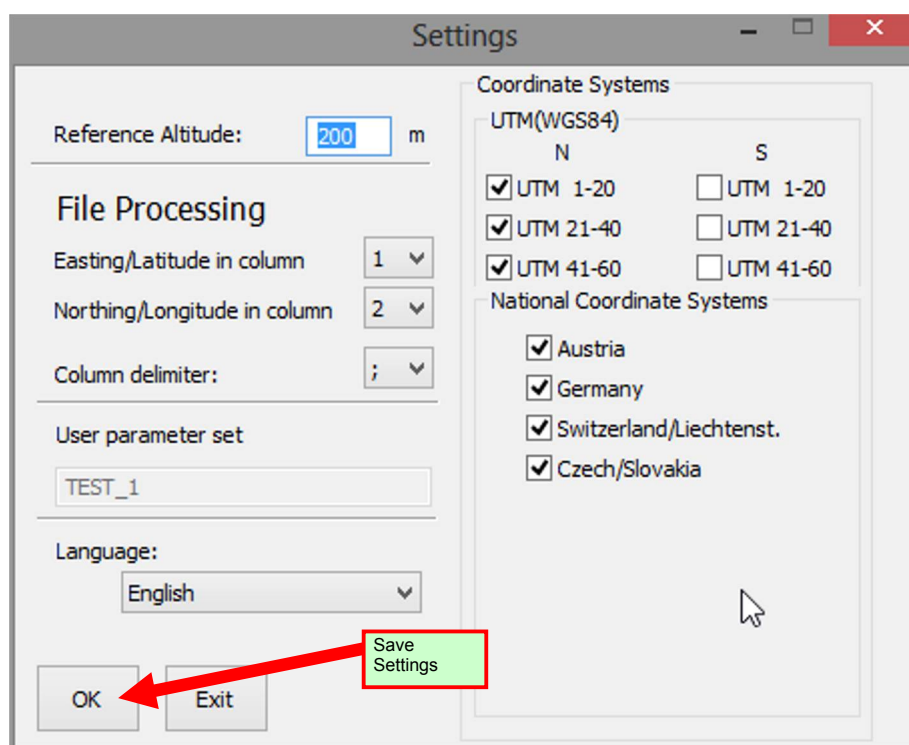The actual user-param-setting is only displayed here.
You can change it in the Menu **Manual parameter entry**.

Furthermore You can choose the language, and preselect the coordinate systems.
These appear later in the pull-down menus in the main window.
They are collected in groups for the national systems or UTM regions.
WGS84, MGRS and USER is always shown.

The Settings are saved with th OK-Button in a file named geotrafo.cfg.
This file is always retrieved after the start of the program.
If not existing yet, it will be generated (in the same directory).
When an older version of the .cfg-File exists, i think there is no problem for the new program to load it.

File - processing

One (ore more) textfile(s) could directly be converted into (one) new File(s) ,
and also You can import a file into the coordinate input window (**File >>**),
then perhaps checked, converted into the right window and then exported into a new File.
(**>>File**)

The base is a textfile with the input coordinates in an uniform manner,
the values in consistent columns. Delimiters can be set in the Option menu.
csv-Files are always used with semicolon, no matter what is set in the options.
Please check also the numbers of the columns for the y/x or Lat/Long values.
But the number of columns in the file does not matter.

Again, first select the start- and the target system, and not forget checking
the settings of the column numbers.
The directly converting is started with the **File**-button.
In the Explorer the source is selected.
After the conversion the number of points is displayed, and the name and place of the
generated File(s). This is the same directory as from the source.
The target Files get the characters "_cvt" before the suffix.

In the first line of this file the start/target-systems and the transformation method is written
down.
Only correct coordinate pairs are processed, - the other rows taken over unchanged.
Geographic coordinates can be produced in degree/minutes/seconds, if the **DMS**-Box is activated.

Example:
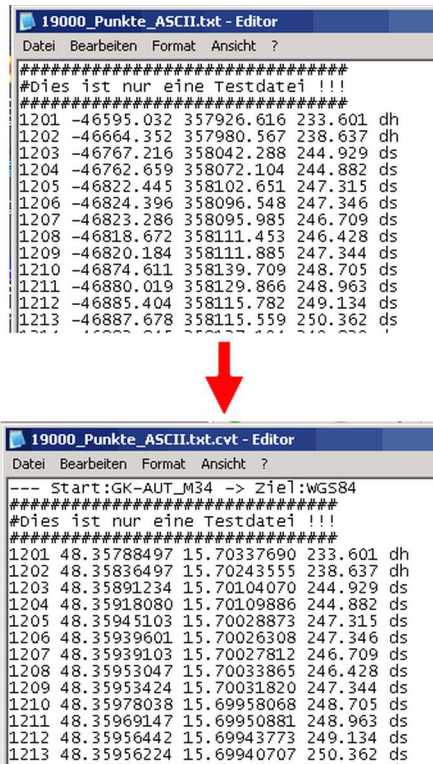
If exporting a file from the right coordinate window (with **File >>**), then a point number can be added to each line. This is always the first entry in the data rows.

The order, in which the values are written is determined by the entries in the settings, however, only relating to the two values y/x - x/y or Lat/Long - Long/Lat.

Parameter

With this form a coordinate system can be defined,
which consists of the parameters of the datum, the ellipsoid and the options of the projection.
Pay attention to the correct sign of datum values.
In the so-named Position-Vector-Rotation the signs of the rotation angles are reversed
to the Coordinate-Frame-Rotation method.
The values refer to the converting from WGS84/ETRS89 to the national/user-defined system.

Using the file management (save/load) whatever optional coordinate system could be defined.
They are saved to the place of the program, but You can load it from any place of Your PC.

With the OK-button the **USER**-set is active and then usable in the main window for conversion.
Which user is active is also seen in the settings and with them storable.
Deleting a user set means only the actual setting reset, or deleting also the parameterfile
in the directory (gtp-File).

Since version 4.0 additional parameters for conical projection are saved,
in the new gtp-Files are therefore more entries.
But it is no problem to import the older gtp-Files too (and save it with the new format).

In the older program versions (before 4.0) the newer parameterfiles can also be used,
however, excluding the function of the conical projection.

Grid-Shift

Since version 3.24 is it possible to use GridShift instead of the usual Helmert - transformation.
This method was developed in Canada, is called Ntv2 and can be used also for the
national systems of Germany (BeTA2007), Austria (AT-Grid) and Switzerland (CHENYX06).

It uses a grid in binary files (ASCII also exists) with Shift-values between the
national Datum (DHDN,MGI,...) and ETRS89.
In case of Switzerland this is the shift between CH1903 and the newer CH1903+.
BeTA2007 contain shift-values in the whole region (see coordinate frame),
while the AT-grid only have values inside Austria.

With interpolation of the shifts arround the input coordinate a shift value for
the exact position is processed.

This (binary) files can be obtained for free in various internet sites.
For Germany eg from the EU-CRS site, for Austria from the BEV - site,
and for Switzerland from the Swisstop - site. (Links are visible on the Homepage)

Please copy this files into the directory, where the geotrafo program is.
If now the transformation is choosen with the pull down box in the middle
this method will be used. (but only for the relevant region)

So a transformation from CH1903 into GK-AUT-M28 will be better, here CH1903 goes with
Helmert to ETRS89 and then with AT-Grid to the austrian GK-AUT system.
Another possibility is with CHENYX06 from CH1903 to the CH1903+ , to ETRS89 and then
with Helmert-transformation into GK-AUT.
But only <u>one</u> GridShift variant can be used at one time.

Are coordinates out of the GridShift regions or no values available, are the values colored red.
This is for the <u>false</u> output values and also for the input coordinates.