RTK Setting Guide

Before proceeding to the following detailed guideline:

1. Confirm your RTK provider's **geographic coordinate system information**, which includes:

- **Datum Information, which includes**:
  - Ellipsoid parameters (semi-major axis, flattening)
  - Origin (center of the ellipsoid)
  - Orientation (alignment with the Earth)
- **Coordinate System, which includes**:
  - Angular units (degrees)
  - Prime meridian

  Note: our RTK device records Latitude and Longitude information instead of Northing and Easting. Please make sure that you are receiving Lat Long from your RTK CORS.

2. Confirm the **projection** of your interest: (Search for the projection in this website https://epsg.io/)

- You would need to have the projection EPSG information which includes parameters such as **central meridian**, **false northing and easting**, **latitude of origin**, and **scale factor**, etc.

Scenarios:

1. Transforming your point cloud data to the geographic coordinate system that is **the same as** your received signal from your RTK CORS provider.
2. Transforming your point cloud data to the geographic coordinate system that is **different from** your received signal from the RTK CORS provider.

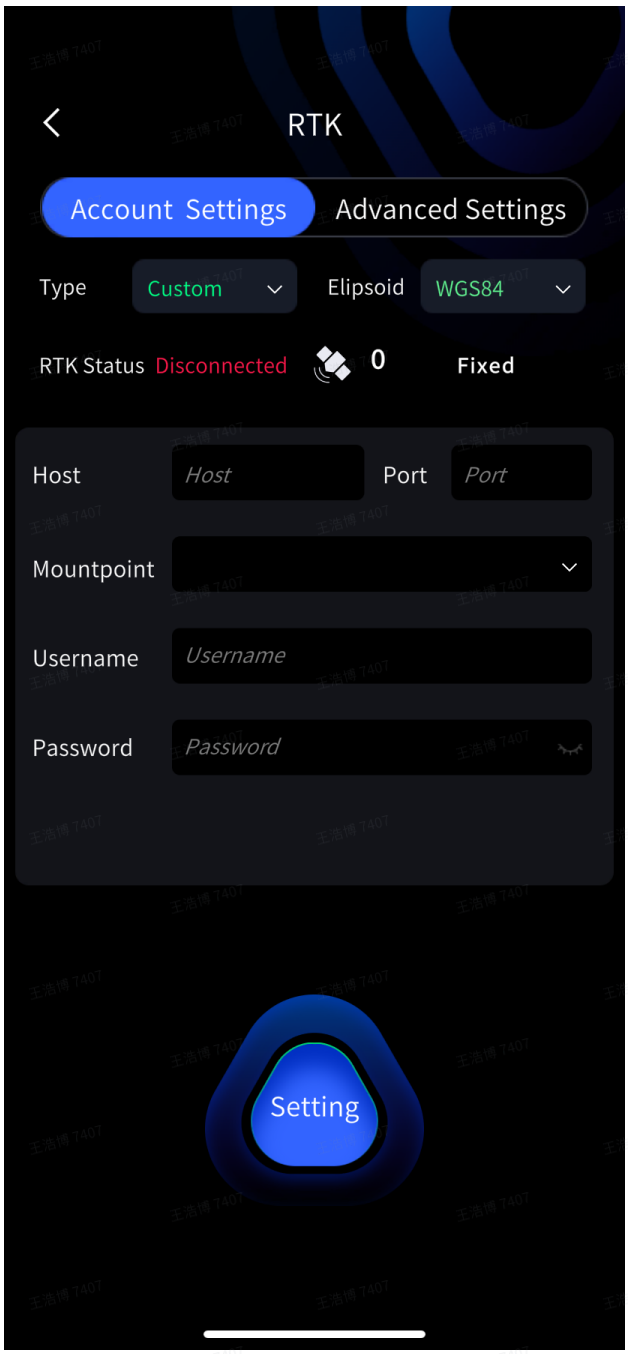
Scenario 1 (when source ellipsoid is the same as target ellipsoid):

In your RTK setting page on the Lixel Go app, set the rtk type and ellipsoid accordingly. If your RTK provider type is not shown in the dropdown list, choose "Custom". (For most of the times, if you are not located in Mainland China, you won't be able to use the provided RTK provider type in the dropdown list.)

Example 1.1 WGS84 to WGS84, project into UTM zone 2

For example, if you have received WGS 84 from your RTK provider and you would like to project your data to UTM zone 2.

Before scanning, you should set your RTK setting in Lixel go app to WGS84, and input your Port and Mountpoint.



After you have collected the data, in LixelStudio RTK setting, set the "source" and "source Ellipsoid" according to the real RTK information you received (in this case, WGS84).

Then, consult for UTM zone 2 parameters then enter them into the projection settings.

epsg.io powered by MapTiler

Search

EPSG:16002

Share on:

UTM zone 2N

Attributes

Data source: EPSG

Revision date: 1995-12-02

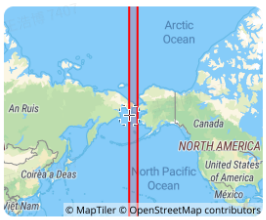
Scope: Engineering survey, topographic mapping.

Method: Transverse Mercator

Area of use: Between 174°W and 168°W, northern hemisphere between equator and 84°N, onshore and offshore.

Description: (0,)

Covered area powered by MapTiler

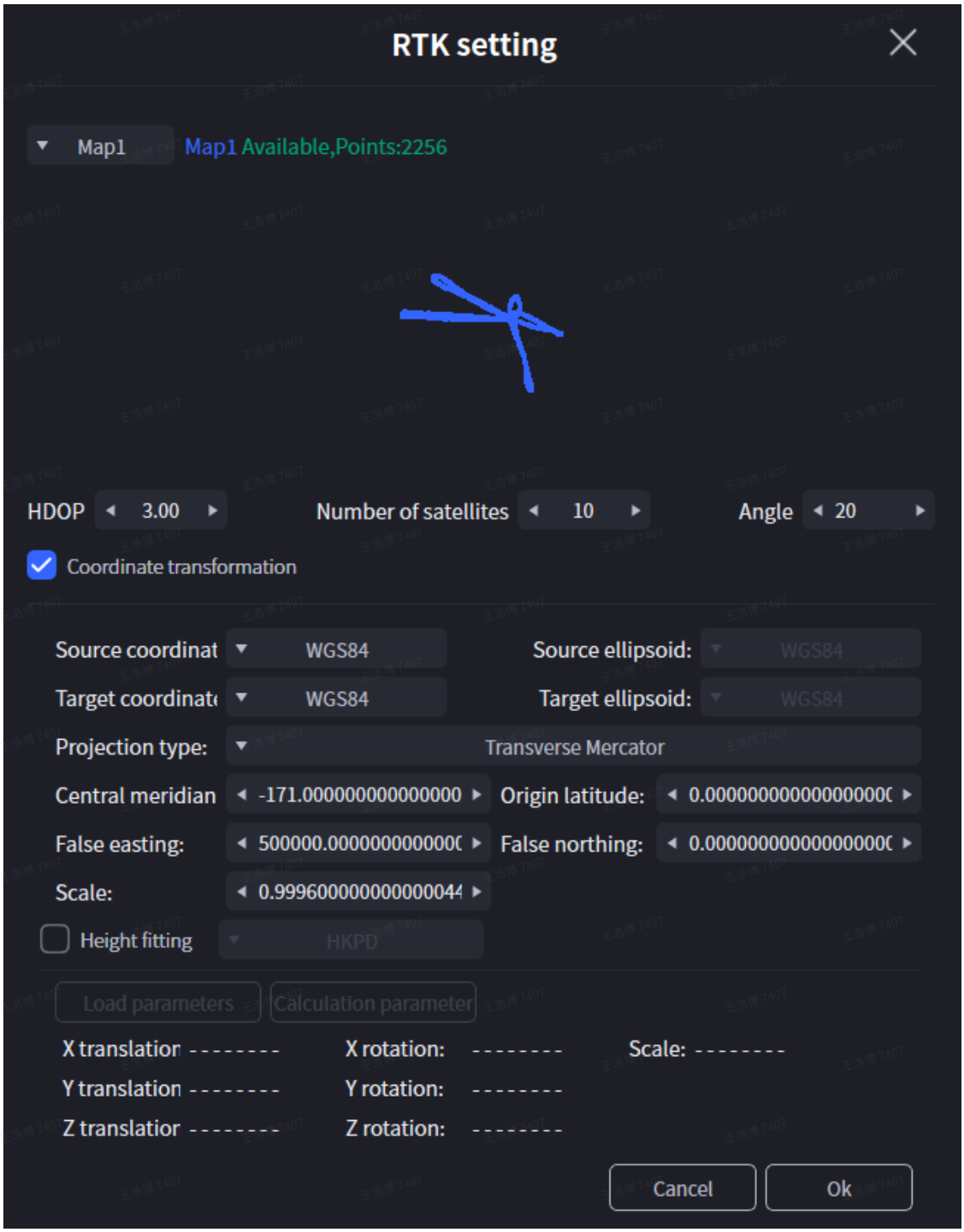


Between 174°W and 168°W, northern hemisphere between equator and 84°N, onshore and offshore.

UTM zone 2 parameters

```
PROJECTION["Transverse_Mercator"],
PARAMETER["latitude_of_origin",0],
PARAMETER["central_meridian",-171],
PARAMETER["scale_factor",0.9996],
PARAMETER["false_easting",500000],
PARAMETER["false_northing",0]
```

Then, at the projection parameters below, set them to the projection of your interest (in this case UTM Zone 2). In this way, you can project your point cloud into WGS 84 UTM zone 2.



Note: currently, only these following four projection types are supported:

Example 1.2 GRS67 to GRS67

If you are receiving an RTK signal that is not on the dropdown list in the Lixel Go app, for example GRS 67:

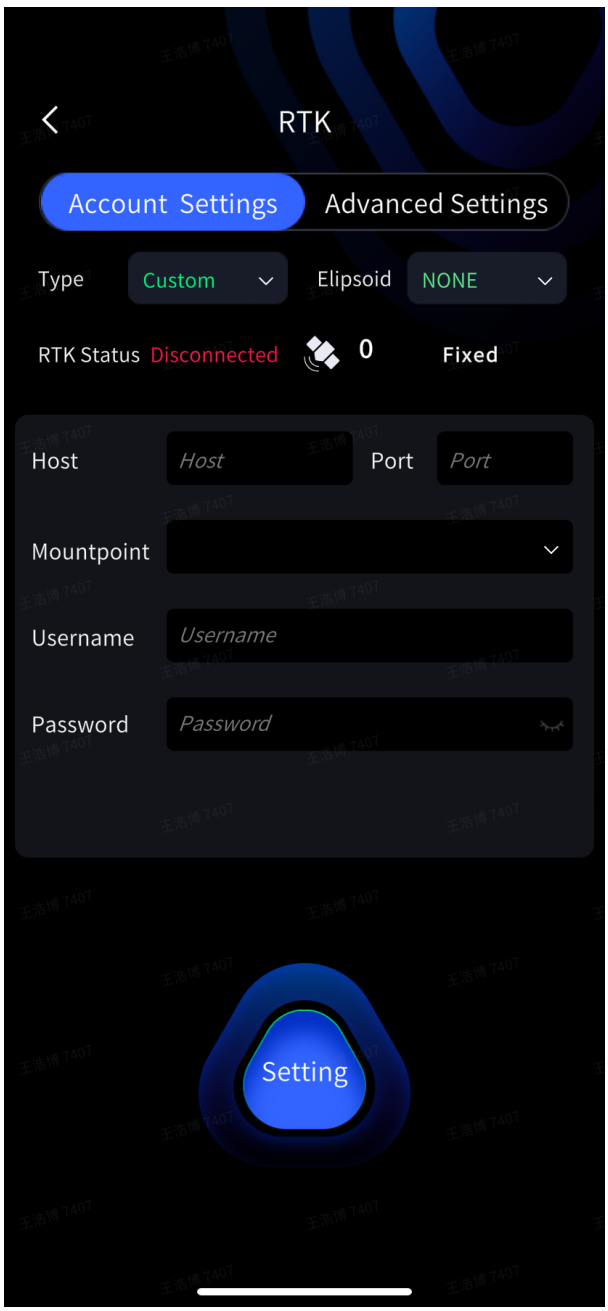
GRS 67 (Geodetic Reference System 1967)

Semi-major Axis (a): 6,378,160 meters

Inverse Flattening (1/f): 298.25

Usage: Used primarily in South America.

Before you collect the data, set the "Type" to "Custom" and set the ellipsoid to "NONE". Then enter your Port and Mountpoint.



And in Lixel Studio, set the source coordinate and source ellipsoid to "other". Then, set your target coordinate and target ellipsoid to "other" and set the projection information according to your need and proceed with project processing.

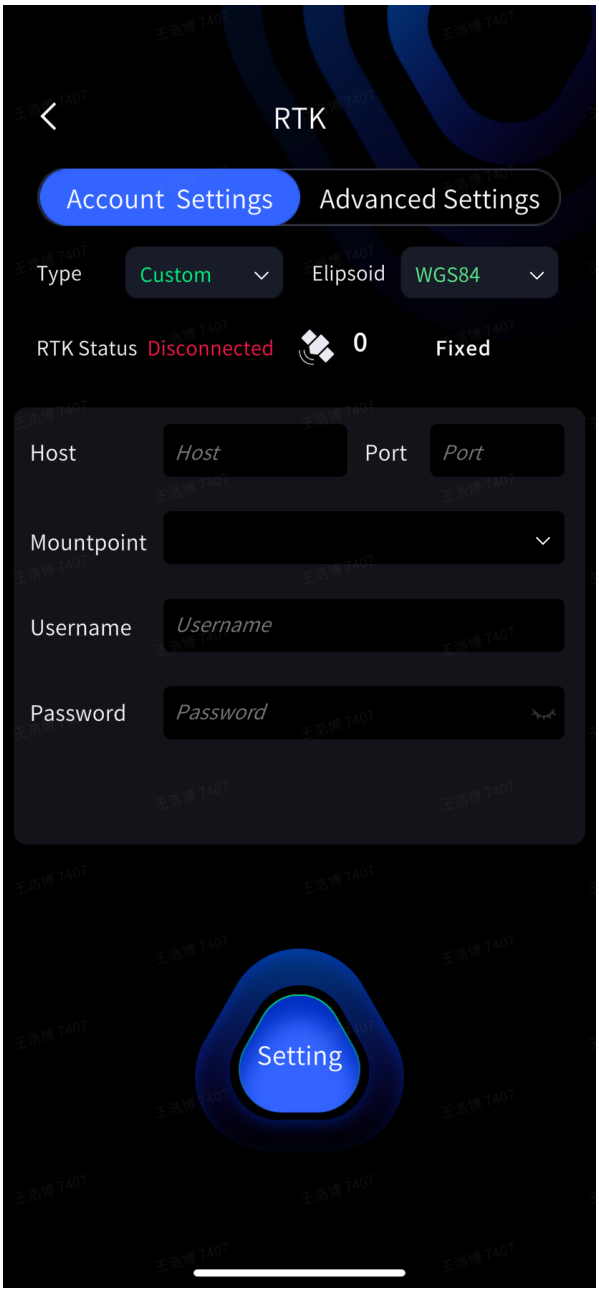
Note: whenever you choose "other" for source ellipsoid or target ellipsoid, you will be prompted to enter the ellipsoid's semi-major axis (a) and 1/f (where f is the ellipsoid flattening ratio). Please enter the correct a and 1/f value from your ellipsoid of interest at this step.

Scenario 2 (whenever source ellipsoid is different from target ellipsoid):

Whenever you received your RTK signal in one ellipsoid (for example WGS84), but you would like to project your point cloud to another ellipsoid (for example JGD2011), besides the projection information, you will also need to enter the seven parameters of Helmert transformation.

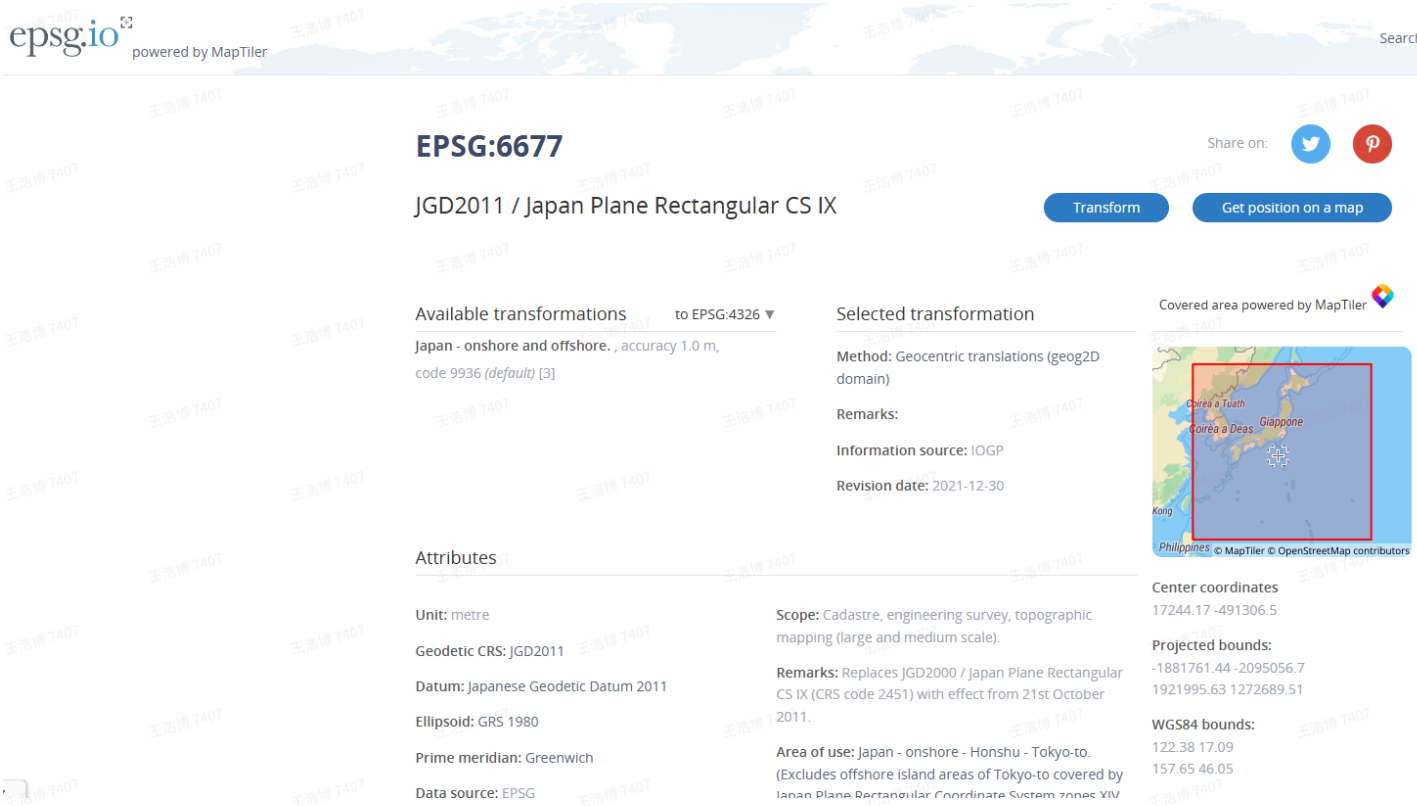
Example 2.1 WGS84 to JGD2011, project to Japan Plane Rectangular CS IX (EPSG:6677)

Before you collect the data, set the RTK type and ellipsoid information to Custom and WGS 84.



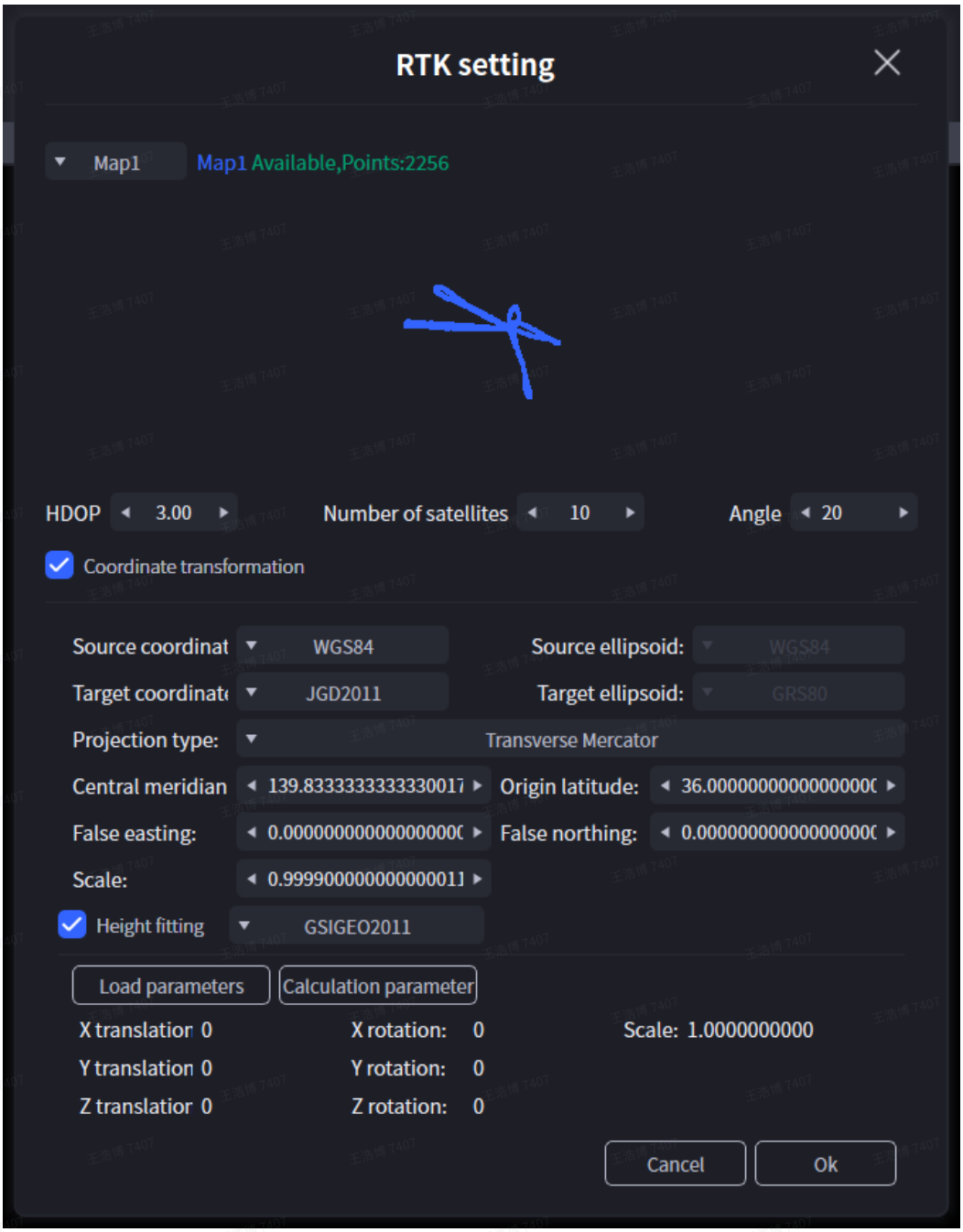
When processing the data, set the target coordinates to JGD2011 and the target ellipsoid will be fixed to GRS80 by default.

Consult the EPSG website for projection parameters and input those parameters to LixelStudio




```
PROJCS["JGD2011 / Japan Plane Rectangular CS IX",
    GEOGCS["JGD2011",
        DATUM["Japanese_Geodetic_Datum_2011",
            SPHEROID["GRS 1980",6378137,298.257222101],
            TOWGS84[0,0,0,0,0,0,0]],
        PRIMEM["Greenwich",0,
            AUTHORITY["EPSG","8901"]],
        UNIT["degree",0.0174532925199433,
            AUTHORITY["EPSG","9122"]],
        AUTHORITY["EPSG","6668"]],
    PROJECTION["Transverse_Mercator"],
    PARAMETER["latitude_of_origin",36],
    PARAMETER["central_meridian",139.833333333333],
    PARAMETER["scale_factor",0.9999],
    PARAMETER["false_easting",0],
    PARAMETER["false_northing",0],
    UNIT["metre",1,
        AUTHORITY["EPSG","9001"]],
    AUTHORITY["EPSG","6677"]]
```

Then choose the correct Height fitting (GSIGEO2011).



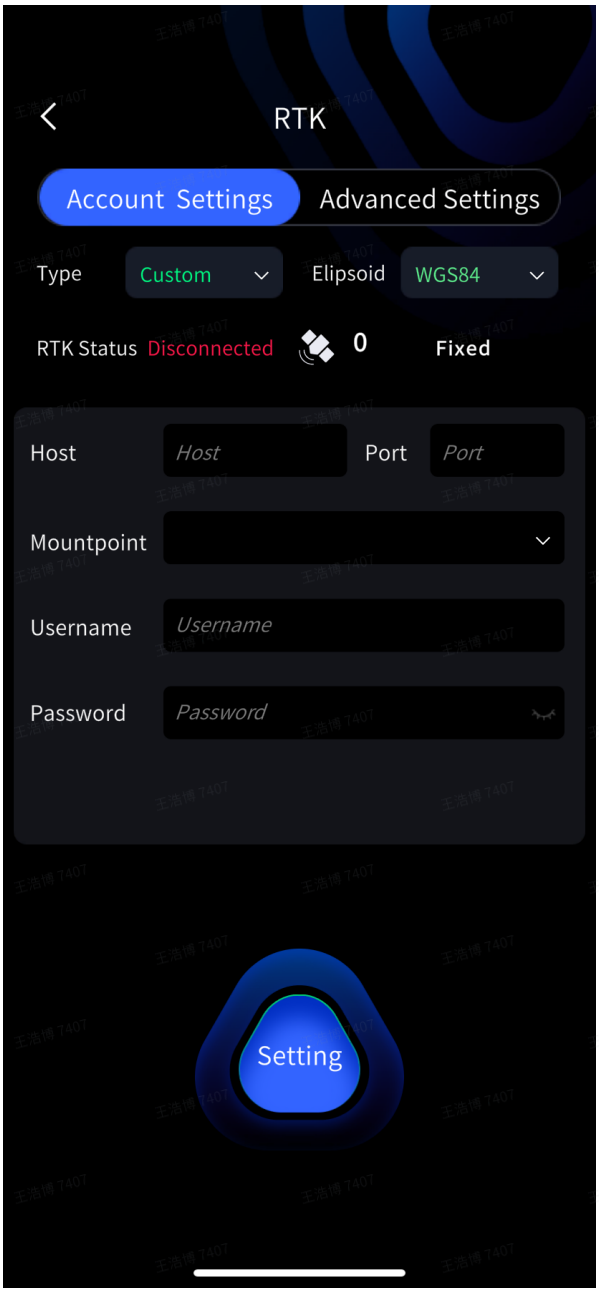
Finally, load the seven parameters. Currently, the software supports files in txt or csv format. The data must include seven parameters, namely three translation parameters, three rotation parameters, and one scale parameter: Dx, Dy, Dz, Rx, Ry, Rz, Scale.

In this case, to tranform WGS84 to GRS 80, it should be a txt file with 0 0 0 0 0 0 1 inside. Or a csv file with 0,0,0,0,0,0,1 inside. You can just download this file attached below and load it to the RTK setting.

7parameters_Japan.txt

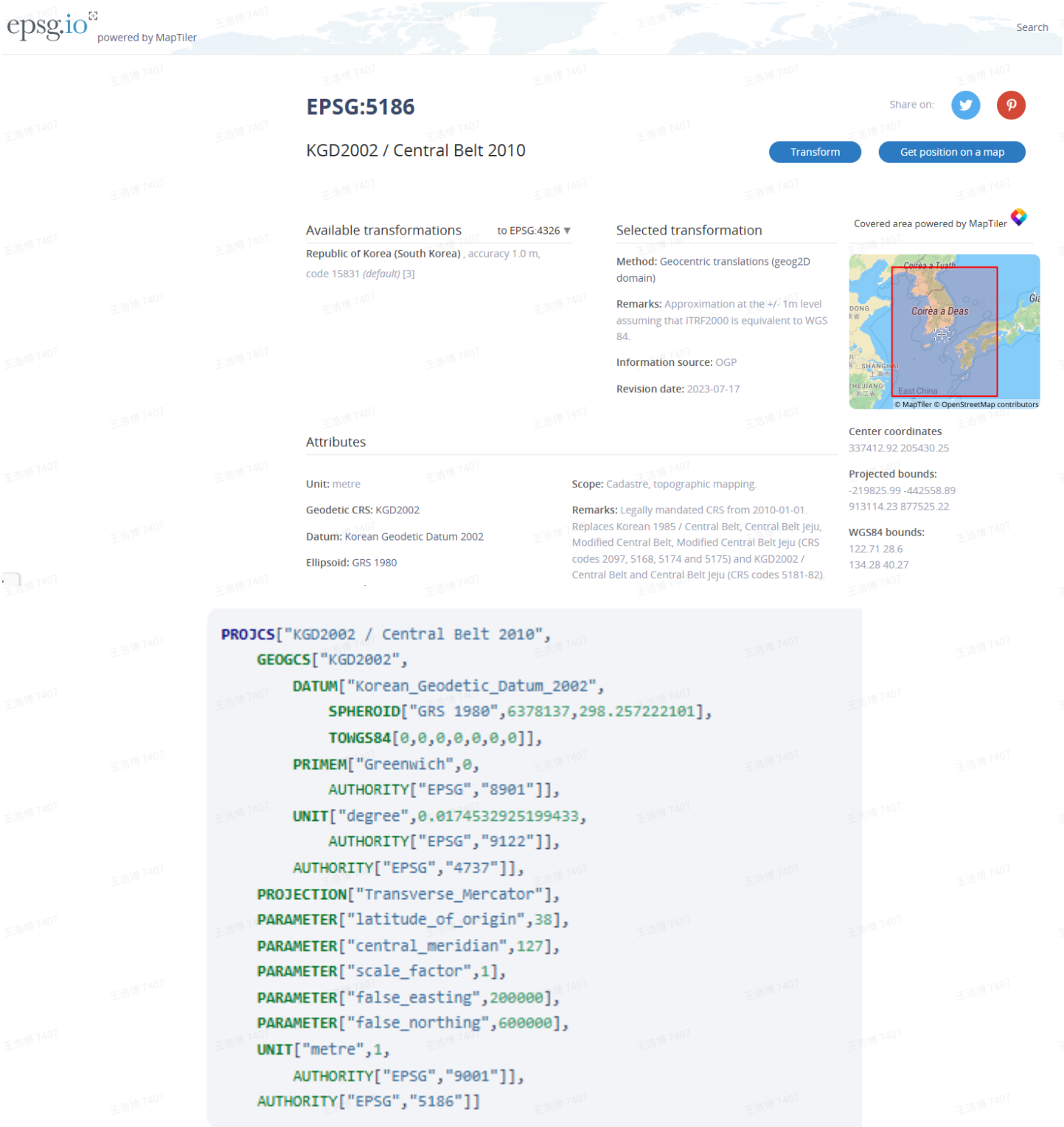
Example 2.2 WGS84 to KGD2002, project to Central Belt 2010 (EPSG:5186)

Similar to the previous example, set the RTK type and ellipsoid information to Custom and WGS 84.



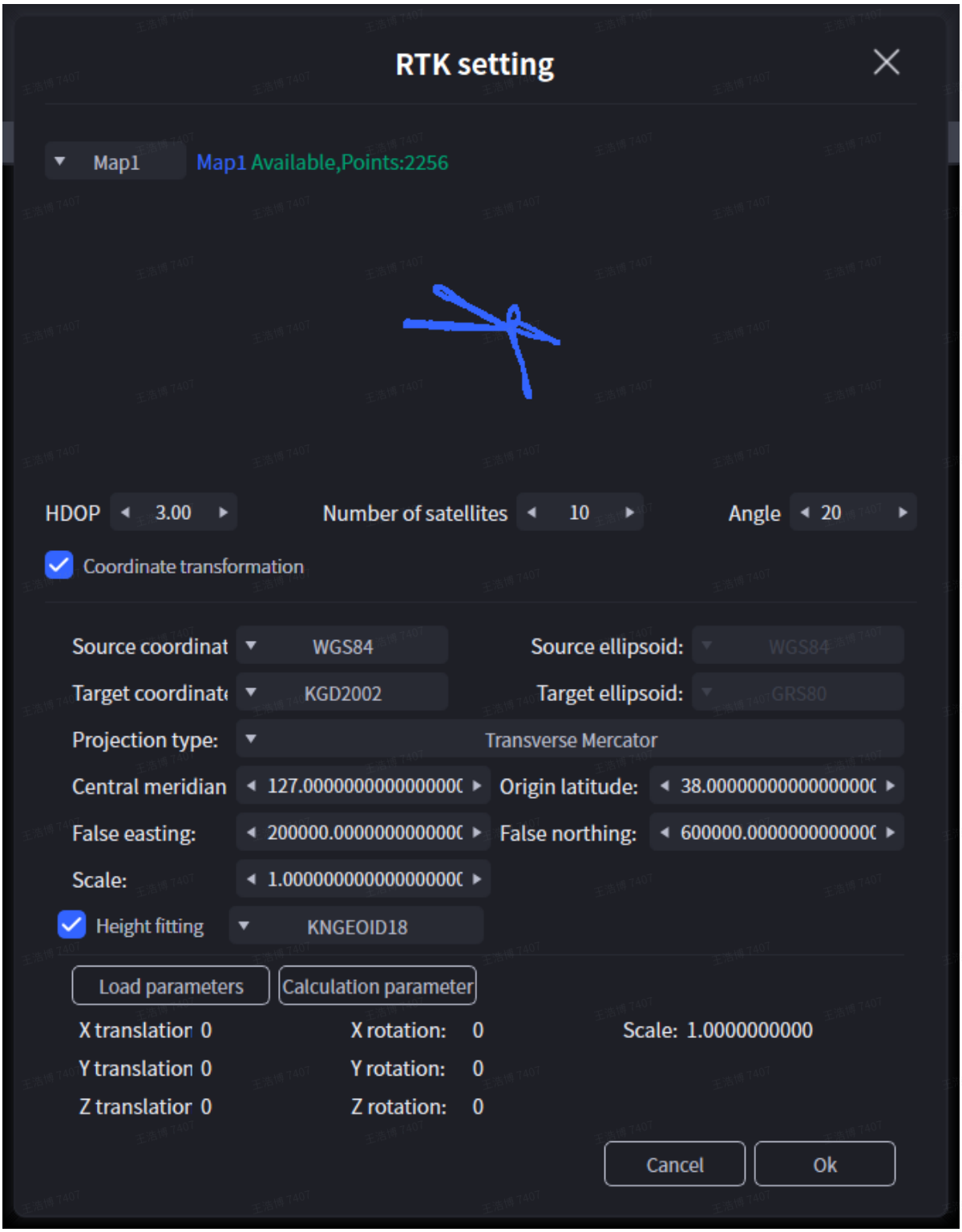
When processing the data, set the target coordinates to KGD2002 and the target ellipsoid will be fixed to GRS80 by default.

Consult the EPSG website for projection parameters and input those parameters to LixelStudio




```
PROJCS["KGD2002 / Central Belt 2010",
    GEOGCS["KGD2002",
        DATUM["Korean_Geodetic_Datum_2002",
            SPHEROID["GRS 1980",6378137,298.257222101],
            TOWGS84[0,0,0,0,0,0,0]],
        PRIMEM["Greenwich",0,
            AUTHORITY["EPSG","8901"]],
        UNIT["degree",0.0174532925199433,
            AUTHORITY["EPSG","9122"]],
        AUTHORITY["EPSG","4737"]],
    PROJECTION["Transverse_Mercator"],
    PARAMETER["latitude_of_origin",38],
    PARAMETER["central_meridian",127],
    PARAMETER["scale_factor",1],
    PARAMETER["false_easting",200000],
    PARAMETER["false_northing",600000],
    UNIT["metre",1,
        AUTHORITY["EPSG","9001"]],
    AUTHORITY["EPSG","5186"]]
```

Then choose the correct Height fitting (KNGEOID18).



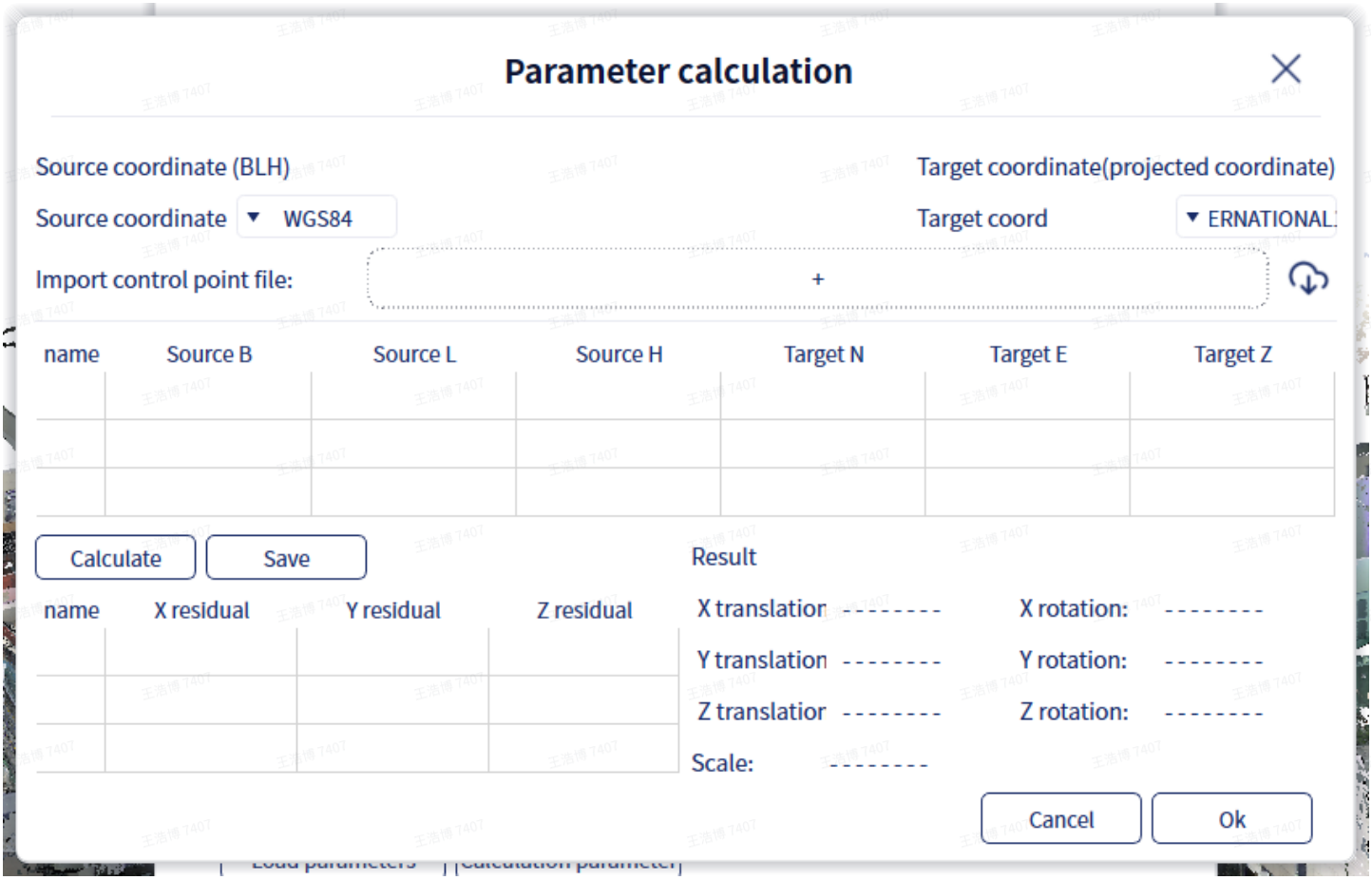
Finally, load the seven parameters. Currently, the software supports files in txt or csv format. The data must include seven parameters, namely three translation parameters, three rotation parameters, and one scale parameter: Dx, Dy, Dz, Rx, Ry, Rz, Scale.

In this case, to tranform WGS84 to GRS 80, it should be a txt file with 0 0 0 0 0 0 1 inside. Or a csv file with 0,0,0,0,0,0,1 inside. You can just download this file attached below and load it to the RTK setting.

7parameters_Korea.txt

Calculate parameters:

If you do not have the seven parameters, you can calculate them based on the control points (note these control points differ from the GCP you used for GCP transformation, see below for more details). Click "Calculate" to open the seven-parameter calculation interface.



Click the "Import File" button to import the control point file needed for calculating the seven parameters. The file format supports ".csv" or ".txt" formats. The control points file should include: Point Name, Source coordinate Latitude (degrees:minutes:seconds) [e.g., 121:32:11.235], Source coordinate Longitude (degrees:minutes:seconds), Source coordinate Height, Projected Plane Coordinate Northing X, Projected Plane Coordinate Easting Y, and Projected Elevation Z. In other words, Lat Long and Height are measured in source coordinate, and Northing Easting and Elevation are measured in projection of your interest.

Note: At least three or more valid control points are required to ensure the effectiveness of the seven-parameter calculation. The specific data format is shown below. You can click the button next to it to download the template.

After importing the file, click "Calculate" to perform the seven-parameter calculation. Click "Save" and choose a save path to save the calculated seven parameters. After clicking "OK," the calculated seven parameters will be applied to the coordinate transformation.

Parameter calculation

Source(BLH)

Source coord CGCS2000

Target(GAUSS PROJECTION)

Target coord XIAN80

Import control point file: J:/W

name	Src B	Src L	Src H	Target X	Target Y	Target H
J1	022:	13:52:	.77	24950	4875	0.74
J3	022:	13:5	0.8	24951	4875	0

Calculate Save

name	dX	dY	dZ
J1	0.0	-0.00	0.0
J3	0.0	0.0	-0.0

Calculation results

Dx:	-3	Rx:	-12
Dy:	-41	Ry:	1
Dz:	-33	Rz:	22
Scale:	1.00		

Cancel OK