

# *Function description of the GGM Transformations from LNOF to GRF tab*

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## Contents

ggm_transform_parallel.....	2
LNOF_2_GRF .....	3
plot_EGG_GGM_GRF .....	4
stats_GGM_GRF.....	5
*gps2utc.....	6
*utc2gps.....	6
References .....	6

## ggm\_transform\_parallel

### Description:

ggm\_transform\_parallel is used for the parallel computing of the transformation and for saving the computed variables and their corresponding reports in the GGM Transformations folder.

### Syntax:

```
[GGM_LNOF_2_GRF,close_ggm] =  
ggm_transform_parallel(datafortransform,GGM_data_0,  
counter_GGM_0,PSO_QAT_data_0,counter_PSO_QAT_0,GGM_c ,PSO_QAT_c)
```

### Input variables:

Variable name	Size	Description
datafortransform	17x1	Results from the 1st tab of the GUI for transformation. Contains info about the latitude, longitude, altitude, GPS time, gravity gradients in GRF and the quaternions in GRF.
GGM_data_0	1xn	Contains the GGM data.
counter_GGM_0	1x1	Counter, indicates if the GGM files have been uploaded successfully.
PSO_QAT_data_0	1xn	Contains the PSO_QAT data.
counter_PSO_QAT_0	1x1	Counter, indicates if the PSO_QAT products have been uploaded successfully.
GGM_c	1x1	Counter/ is needed for checks in the GUI.
PSO_QAT_c	1x1	Counter/ is needed for checks in the GUI.

### Output variables:

Variable name	Size	Description
GGM_LNOF_2_GRF.mat	37 x 1	The main output of the second tab. Contains info about the latitude, longitude, altitude, time, gravity gradients in GRF,IRF,EFRF,LNOF and the quaternions needed for the transformation between frames.
GGM_LNOF_2_GRF_Report.txt	-	Report regarding to the file format.
close_ggm	1 x 1	Counter/ is needed for checks in the GUI.

## LNOF\_2\_GRF

### Description:

LNOF\_2\_GRF processes the transformation from LNOF to GRF in the second tab - included is a quaternion interpolation code developed by D.Piretzidis (Piretzidis, 2014).

### Syntax:

```
[GGM_LNOF_2_GRF1] = LNOF_2_GRF(datafortransform, daily_data_GGM, daily_data_PSO_QAT,GGM_c ,PSO_QAT_c)
```

### Input variables:

Variable name	Size	Description
datafortransform	17x1	Results from the 1st tab of the GUI for transformation. Contains info about the latitude, longitude, altitude, GPS time, gravity gradients in GRF and the quaternions in GRF.
daily_data_GGM	nx9	The GGM file data.
daily_data_PSO_QAT	nx5	The PSO_QAT file data.
GGM_c	1x1	Counter/ is needed for checks in the GUI.
PSO_QAT_c	1x1	Counter/ is needed for checks in the GUI.

### Output variables:

Variable name	Size	Description
GGM_LNOF_2_GRF1	37x1	Contains info about the latitude, longitude, altitude, time, gravity gradients in GRF,IRF,EFRF,LNOF and the quaternions.

## plot\_EGG\_GGM\_GRF

### Description:

plot\_EGG\_GGM\_GRF returns the figures of the transformed gravity gradients in GRF in .jpeg and .fig format.

### Syntax:

```
[ w ] = plot_EGG_GGM_GRF(GGM_LNOF_2_GRF)
```

### Input variables:

Variable name	Size	Description
GGM_LNOF_2_GRF	19x1	The main output of the second tab. Contains info about the latitude, longitude, altitude, time, gravity gradients in GRF,IRF,EFRF,LNOF and the quaternions needed for the transformation between frames.

### Output variables:

Variable name	Size	Description
w	1x1	Counter/ is needed for checks in the GUI.
GG_GGM_GRF_date. jpeg	-	A figure in .jpeg is saved in the folder GGM Transformations/Gravity Gradients GGM GRF.
GG_GGM_GRF_date. fig	-	A figure in .fig is saved in the folder GGM Transformations/Gravity Gradients GGM GRF.

## stats\_GGM\_GRF

### Description:

stats\_GGM\_GRF computes the statistics of the transformed GGM's GGs in GRF.

### Syntax:

```
[ stats_GGM_Vij_GRF ] =stats_GGM_GRF( GGM_LNOF_2_GRF,currentFolder)
```

### Input variables:

Variable name	Size	Description
GGM_LNOF_2_GRF	37x1	The main output of second tab (GGs in GRF,IRF,LNOF).
currentFolder	-	The GGM Transformations folder.

### Output variables:

Variable name	Size	Description
stats_GGM_Vij_GRF.mat	nx6	Statistics of the GGM in GRF.
stats_GGM_Vij_GRF_Report.txt	-	Report regarding to the file format.

## \*gps2utc

### **Description:**

gps2utc converts GPS time tags to UTC(GMT) time accounting for leap seconds (Howat 2021).

<https://www.mathworks.com/matlabcentral/fileexchange/21194-gps-to-utc-gmt-time-conversion>

## \*utc2gps

### **Description:**

utc2gps corrects an array of GPS dates (in any matlab format) for leap seconds and returns an array of UTC datenums(Howat 2021).

<https://www.mathworks.com/matlabcentral/fileexchange/21193-utc-to-gps-time-coverter>

## References

Howat, I. (2020a) *GPS to UTC(GMT) time conversion, MATLAB Central File Exchange*.

Available at: <https://www.mathworks.com/matlabcentral/fileexchange/21194-gps-to-utc-gmt-time-conversion> (Accessed: 17 June 2020).

Howat, I. (2020b) *UTC to GPS time coverter, MATLAB Central File Exchange*. Available at:

<https://www.mathworks.com/matlabcentral/fileexchange/21193-utc-to-gps-time-coverter> (Accessed: 17 June 2020).

Piretzidis, D. (2014) *Study and data process of GOCE satellite mission, and approximation of the gravity field of the Earth in global and regional scale*. Aristotle University of Thessaloniki.