

GP190

GEOMLIB (β)

**MARINE ENGINEERING GEOPHYSICAL
DATA PROCESSING TOOLBOX**

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23.11.2019

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1 gP190 functions set description

MatLab functions set for reading and writing U.K.O.O.A. P1/90 files. Functions based on IOGP document P1-90, 28 June 1990; used Record's Type 1 "Grid or geographical coordinates", without Item 16 (RecordId='R': Receiver group records for 3-D offshore surveys). The functions are presented show in *Table 1*.

Table 1 gP190 functions

| Function name | Function description |
|----------------|---|
| gP190Read | Read P190-files |
| gP190Write | Write P190-files |
| gP190DTEN2P190 | Create P190 structure using DTEN fields (from data sets; see Example 3 and Example 4) |
| gP1902Cat | Create coordinates catalog file |
| gP1902PL | Convert P190 structure to PL structure |

P190-files content read into P190Head (P190 header) and Head (P190 data) structures. The P190Head structure fields:

- P190Head(nn).fNameN – name of file number “nn” were read;
- P190Head(nn).HType – Record Identifier 'H' + Header Record Type + Header Record Type Modifier (A1+I2+I2) for file “nn”;
- P190Head(nn).HDescript – Parameter Description (A27) for file “nn”;
- P190Head(nn).HData – Parameter Data (A48) for file “nn”.

Each new line data from P190 file contained in HType/HDescript/HData column. Example:

```
>> P190Head(1).HType(:,1)
ans =
H
0
1
0
0
```

Head structure fields:

- Head(nn).RecordId – Char; Record identification (COL1; A1): 'S'=Centre of Source; 'G'=Receiver Group; 'Q'=Bin Centre; 'A'=Antenna Position; 'T'=Tailbuoy Position; 'C'=Common Mid Point; 'V'=Vessel Reference Point; 'E'=Echo Sounder; 'Z'=Other, defined in H0800.
- Head(nn).LineName – Char; Line name (left justified, including reshoot code) (COL2-13 A12);
- Head(nn).Spare1 – Char; Spare (COL14-16 A3);
- Head(nn).VesselId – Char; Vessel ID (COL17 A1);
- Head(nn).SourceId – Char; Source ID (COL18 A1);
- Head(nn).OtherId – Char; Tailbuoy / Other ID (COL19 A1);

- Head(nn).PointNum – Float; Point number (right justified) (COL20-25 A6);
- Head(nn).GpsLat – Float; Latitude in d.m.s. N/S (COL26-35 2(I2), F5.2, A1) or in grads N/S (COL26-35 F9.6, A1);
- Head(nn).GpsLon – Float; Longitude in d.m.s. E/W (COL36-46 I3, I2, F5.2, A1) or in grads E/W (COL36-46 F10.6, A1);
- Head(nn).GpsE – Float; Map grid Easting in metres (COL47-55 F9.1) or in non metric (COL47-55 I9);
- Head(nn).GpsN – Float; Map grid Northing in metres (COL56-64 F9.1) or in non metric (COL56-64 I9);
- Head(nn).WaterDepth – Float; Water depth defined datum defined in H1700 (COL65-70 F6.1) or elevation in non metric (COL65-70 I6);
- Head(nn).GpsDay – Float; Date (date number 1 corresponds to Jan-1-000; the year 0000 is merely a reference point); calculated using Julian Day of year (COL71-73 I3);
- Head(nn).GpsTime – Float; Second in day; calculated using time h.m.s., GMT or as stated in H1000 (COL74-79 3I2);
- Head(nn).Spare2 – Char; Spare (COL80 1X);

Item 16 (Receiver group records for 3-D offshore surveys) is not used.

Each new line data from P190 file contained in new column. Example:

```
>> Head(1).LineName(:,1)'
```

```
ans =
```

```
XCD05507PT70
```

2 P190 functions

2.1 Read P190-files

function [P190Head,Head]=gP190Read(fName,PYear)

Read P190 Type_1 (Grid or Geographical coordinates) without Item 16 (RecordId='R': Receiver group records for 3-d offshore surveys).

Parameters:

fName – name of file/folder (with files) will be read;

PYear – year for P190 survey data;

P190Head – structure with P190 header;

Head – structure with P190 data.

Examples:

```
>> [P190Head,Head]=gP190Read('d:\P190\A1002_2DU_GUN.190',2017);
```

```
>> [P190Head,Head]=gP190Read('d:\P190\',2017);
```

2.2 Write P190-files

function gP190Write(DirNameNew,P190Head,Head,flDateSet,flagM)

Write P190 Type_1 (Grid or Geographical coordinates) without Item 16 (RecordId='R': Receiver group records for 3-d offshore surveys).

Parameters:

DirNameNew – name of New-file/New-folder will be write (the files names will not change if new folder define);

P190Head – structure with P190 header;

Head – structure with P190 data.

flagM – metric flag for Head.GpsLat, Head.GpsLon, Head.GpsE, Head.GpsN, Head.WaterDepth; symbols "M" (metric) or "N" (non-metric) are used. Example: 'NNMMM' - Lat and Lon will saved in d.m.s.

if flDateSet then P190Head.HData created for HType=='H0201'; value for set is "datestr(Head.GpsDay(1),'dd mmmm yyyy')".

Examples:

```
>> gP190Write('d:\P190\A1002_2DU_GUN.190',P190Head,Head,1,'NNMMM');
```

```
>> gP190Write('d:\P190\',P190Head,Head,1,'NNMMM');
```

2.3 Create P190 structure using DTEN fields

function [P190Head,PHead]=gP190DTEN2P190(MainHead,Head,NavP,NavOutGeog,NavOutProj, fP190Head,RecordId,Spare1,VesselId,SourceId,OtherId,Spare2,flagM)

Create P190 structure (P190 Type_1, without Item 16) using DTEN fields from Dataset (sgy, xtf, etc).

Parameters:

MainHead – converted MainHead(1..n) structure (XtfHead, SgyHead, etc);

Head – converted Head(1..n) structure;

NavP – (see gNavCoord2Coord) navigation datum for Project, fields: EllipParam, ProjParam, ProjForvFunc, ProjRevFunc, TargCode;

NavOutGeog – (see gNavCoord2Coord) navigation datum for Output Geographic, fields: EllipParam, ProjParam, ProjForvFunc, ProjRevFunc, EllipTransParam, EllipForvTransFunc, EllipRevTransFunc, TargCode;

NavOutProj – (see gNavCoord2Coord) navigation datum for Output Projection, fields: EllipParam, ProjParam, ProjForvFunc, ProjRevFunc, EllipTransParam, EllipForvTransFunc, EllipRevTransFunc, TargCode;

fP190Head – file name which contains P190Head (header for P190);

RecordId – char or chars vector for Head.RecordId (P190 structure);

Spare1 – 3-chars or 3-chars vector for Head.Spare1 (P190 structure);

VesselId – char or chars vector for Head.VesselId (P190 structure);

SourceId – char or chars vector for Head.SourceId (P190 structure);

OtherId – char or chars vector for Head.OtherId (P190 structure);

Spare2 – char or chars vector for Head.Spare2 (P190 structure);

[P190Head,PHead] – P190 structure fields.

Examples:

```
>> NavP=struct('EllipParam',[6378137 0.081819190842],'ProjParam',[0 142 0.9996 500000], 'ProjForvFunc','gNavGeog2ProjUtm','ProjRevFunc','gNavProjUtm2Geog','TargCode',6);
>> NavOutGeog=struct('EllipParam',[6378137 0.081819190842],'ProjParam',[0 142 0.9996 500000], 'ProjForvFunc','gNavGeog2ProjUtm','ProjRevFunc','gNavProjUtm2Geog','TargCode',2);
>> NavOutProj=struct('EllipParam',[6378137 0.081819190842],'ProjParam',[0 142 0.9996 500000], 'ProjForvFunc','gNavGeog2ProjUtm','ProjRevFunc','gNavProjUtm2Geog','TargCode',1);
>> [P190Head,PHead]=gP190DTEN2P190(XtfHead,Head,'HMessageNum',NavP,NavOutGeog,NavOutProj,'c:\temp\P190_Header.txt','S',' ','1','1','');
```

2.4 Create coordinates catalog file

function gP1902Cat(P190Head,Head,fName,fHeadStr,stp)

Convert P190 structure to coordinates-catalog-file in txt.

Parameters:

P190Head – structure with P190 header;

Head – structure with P190 data;

fName – name of file for catalog-data write;

fHeadStr – string will be write in txt-file before each P190;

stp – step for survey points.

Catalog rows values: 1) file name from P190Head.fNameN; 2) Head.PointNum; 3) Head.GpsDay; 4) Head.GpsTime; 5) Head.GpsLat; 6) Head.GpsLon; 7) Head.GpsE; 8) Head.GpsN; 9) Head.WaterDepth.

Title for each file, was included to catalog; the title is: FileName, PointNum, Date, Time, Latitude, Longitude, Easting, Nosting, WaterDepth. Additional title can be define in fHeadStr.

Catalog includes first and last points from survey line.

Used functions: gNavTime2Time,gNavAng2Ang

Examples:

```
>> [P190Head,Head]=gP190Read('d:\P190\',2017);gP1902Cat(P190Head,Head,'d:\P190.txt',10);
```

2.5 Convert P190 structure to PL structure

function PL=gP1902PL(Head,KeyLineDraw)

Convert P190 structure to Poly-line structure (can access to PL functions and mapping).

Parameters:

Head – structure with P190 data.

keyLineDraw – string key for line drawing: '-r','xb', etc;

PL – output structure: PL(n).PLName; PL(n).Type; PL(n).KeyLineDraw; PL(n).GpsKP; PL(n).GpsE;

PL(n).GpsN; additional fields: PL(n).GpsDay, PL(n).GpsTime, PL(n).WaterDepth.

Examples:

```
>> PL=gP1902PL(PHead,'-b');gMapPLDraw(100,PLLine,'PLName');axis equal;
```

3 Examples

Example 1

%Read P-190 file

```
>> [P190Head,Head]=gP190Read('c:\temp\NW1_UHR_Source_P190_Header.txt',2017);
```

%Print to screen P190Head

```
>> [P190Head.HType' P190Head.HDescript' P190Head.HData']
```

ans =

```
H0100 Survey area          ##### 1, Chukchi Sea
H0102 Vessel details      S#####
H0103 Source details      Geo-Spark16/Geo-Source800 (Sparker)
H0104 Streamer details    Geo-Resourse48 (gel filled, 48 channels)
H0200 Survey date        02 September to 01 November ####
H0201 Tape date          10 S 2017
H0202 Tape version       UK00A P1/90
H0300 Client             #####
H0400 Geophysical contractor #####
H0500 Positioning contractor #####
H0700 Positioning system C-Nav 3050 (primary), Veripos LD5 (secondary)
H0800 Shotpoint position Center of Sparker
H1000 Clock time         GMT 0.0 hours
H1400 Geodetic Datum: Survey WGS84      WGS 1984  6378137.000 298.2572235630
H1700 Vertical datum     SL : Echo Sounder
H1800 Projection         001 UTM Zone 01N
H2000 Grid unit          1 International Metre      1.00
H2001 Height unit        1 International Metre      1.00
H2002 Angular unit       1 Degrees
H2200 Central Meridian   177 00 00.000 W
H2301 Grid Origin        0 00 00.000 N
H2302 Grid coordinates at Origin500000.00 E 0.00 N
H2401 Scale factor        0.9996
H2600 Water depth        MBES-data for current sea surface
H2600....1.....2.....3.....4.....5.....6.....7.....8
```

%Read P-190 files from folder

```
>> [P190HeadZ,HeadZ]=gP190Read('c:\temp\1_P190\',2017);
```

%Change P190Head for all files from folder

```
>> for nn=1:numel(P190HeadZ), P190HeadZ(nn)= P190Head;end;
```

%Write P190-files to new folder

```
gP190Write('c:\temp\2_P190\',P190Head,Head,1,'MMMMM');
```

%Write all P190-files data to catalog in txt-file

```
gP1902Cat(P190Head,Head,'c:\temp\Cat_P190.txt',10);
```


Example 2

```
%Read P-190 files
>> [P190HeadZ,HeadZ]=gP190Read('c:\temp\1_P190\',2017);
%Write P190-files to new folder, with coordinates in DDMMSS.SS
gP190Write('c:\temp\2_P190\',P190Head,Head,1,'NNMMM');
```

Example 3

```
%Read sgy data-set
>> [SgyHead,Head,Data]=gSgyDatasetImport('d:\2\',",[],[],[],'TraceSequenceFile','SourceX','SourceY',[],
[],[],1);
%Set navigation datum
>> NavP=struct('EllipParam',[6378137 0.0818191908426215],'ProjParam',[0 141 0.9996 500000 0],
'ProjForvFunc','gNavGeog2ProjUtm','ProjRevFunc','gNavProjUtm2Geog','TargCode',6);
>> NavOutGeog=struct('EllipParam',[6378137 0.0818191908426215],'ProjParam',[0 141 0.9996 500000
0], 'ProjForvFunc','gNavGeog2ProjUtm','ProjRevFunc','gNavProjUtm2Geog','TargCode',2);
>> NavOutProj=struct('EllipParam',[6378137 0.0818191908426215],'ProjParam',[0 141 0.9996 500000
0], 'ProjForvFunc','gNavGeog2ProjUtm','ProjRevFunc','gNavProjUtm2Geog','TargCode',1);
%Extract P1/90 structure from sgy data-set
>> [P190Head,PHead]=gP190DTEN2P190(SgyHead,Head,NavP,NavOutGeog,NavOutProj,'c:\temp\P19
0_Header.txt','S',' ',' ',' ',' ');
%Create coordinates catalog using P1/90 structure
>> gP1902Cat(P190Head,PHead,'d:\zzz.txt','Ex2019y',10);
%Write P1/90 files
>> gP190Write('d:\2\p190\',P190Head,PHead,1,'NNMMM');
```

Example 4

```
%Read xtf data-set
>> NavS=struct('TargCode',2);
>> NavP=struct('EllipParam',[6378137 0.0818191908426215],'ProjParam',[0 141 0.9996 500000 0],
'ProjForvFunc','gNavGeog2ProjUtm','ProjRevFunc','gNavProjUtm2Geog','TargCode',6);
>> [XtfHead,Head,Data]=gXtf000DatasetImport('d:\3\',",[],0,[],[],'HPingNumber','HShipYcoordinate',
'HShipXcoordinate', NavS,NavP,[]);
%Set navigation datum
```

```

>> NavOutGeog=struct('EllipParam',[6378137 0.0818191908426215],'ProjParam',[0 141 0.9996 500000
0], 'ProjForvFunc','gNavGeog2ProjUtm','ProjRevFunc','gNavProjUtm2Geog','TargCode',2);
>> NavOutProj=struct('EllipParam',[6378137 0.0818191908426215],'ProjParam',[0 141 0.9996 500000
0], 'ProjForvFunc','gNavGeog2ProjUtm','ProjRevFunc','gNavProjUtm2Geog','TargCode',1);
%Extract P1/90 structure from xtf data-set

>> [P190Head,PHead]=gP190DTEN2P190(XtfHead,Head,NavP,NavOutGeog,NavOutProj,'
d:\3\p190\P190_Header.txt','S',' ','1','1',' ',' ');
%Write P1/90 files

>> gP190Write('d:\3\p190',P190Head,PHead,1,'NNMMM');
%Create coordinates catalog using P1/90 structure

>> gP1902Cat(P190Head,PHead,'d:\3\cat\zzz.txt','Ex2019y',10);
%Extract PL-structure from P1/90 structure

>> PL=gP1902PL(PHead,'-b');
%Draw PL-structure (Figure 1)

>> gMapPLDraw(100,PL);axis equal; gMapTickLabel(100,'% .2f',8);
%Create AutoCAD script from PL-structure

>> gMapPL2AcadExport('d:\3\cat\SSS_scr',PL,[7 0 0 0 3],[1 1000],[6 0 5000 0],2,1,1);

```

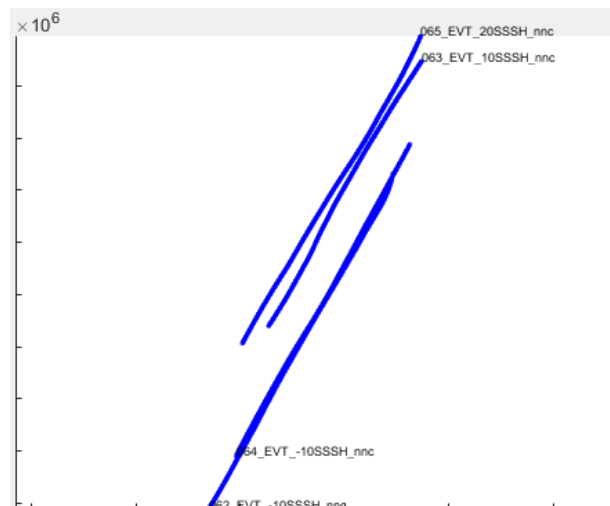


Figure 1 gMapPLDraw result

Citation

- 1) U.K.O.O.A. P1/90 POST PLOT DATA EXCHANGE TAPE 1990 FORMAT // Prepared by The Surveying and Positioning Committee For The U.K.O.O.A. Exploration Committee, Version: 28 June 1990.