

GOCEPARSER - A program to parse GOCE level 1b and level 2 data

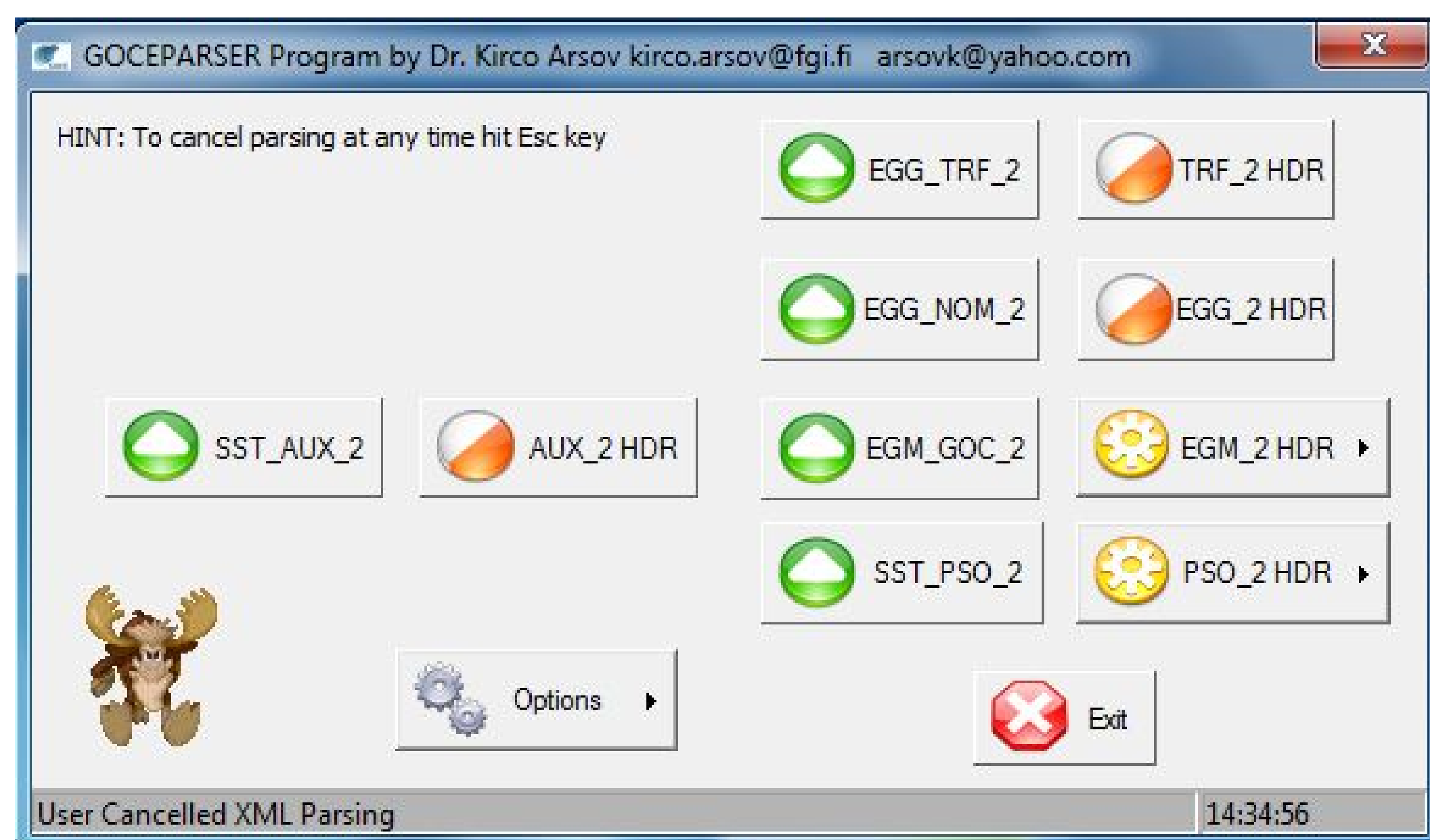
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Motivation

Since its launch on March 17th 2009, ESA's GOCE mission continuously provides huge amount of gravity-related data in terms of high sensitive gradiometer measurements together with GOCE high precise orbits and other ancillary data. After only one few months repeat cycle of GOCE mission, the first GOCE gravity models became available to the geodetic community. GOCE data products of Level 1b and level 2 are summarized in the well known ESA GOCE mission documentation. ESA provides these data sets packed in the XML data format. Extracting GOCE data from this XML files sometimes is pretty tedious task due to the big amount of data contained in the GOCE XML files. Because of abovementioned facts, we decided to do our own GOCEPARSER program. It is not classical XML parser. It just extracts the GOCE level 1b and level 2 products from the XML files following the data structure as given in the ESA level 1 and level 2 products description handbooks. We noticed that if we use the official GOCE XML parser as provided by ESA, parsing of some GOCE level 2 products was relatively slow and relatively big amount of CPU and memory was needed to extract GOCE products. Also some very advanced shelling was necessary as well as pre installation of Perl and complicated installation procedure described on 39 pages in the manual was necessary. All in all at the end if lucky one obtains one very slow and complicated parser using some xml parsing libraries. Most of today's XML parsing libraries load the complete XML document in the memory and then loop in order to extract the desired descriptors, data etc. Normally XML data files used in web communication or other IT tasks represent relatively short amount of data. In the case of GOCE products however we have relatively big data sets. Just to name an example, the SST_PSO precise science orbits for example have size of about 450Mb for only one orbit day. Loading this to memory and looping over XML records to extract single data record might be pretty long task if we use some XML libraries.

Screenshot of GOCEPARSER program



GOCEPARSER program description

- **C++** used as programming language
- **MFC** libraries used for GUI
- Relatively **fast parser** (for SST_PSO2 orbits needs about 7 min for daily file which is slowest product parsing)
- **No need of any pre-installations** (ex Perl, C++ compiler, etc)
- **No need of any shell typing commands** etc. The only "skill" needed is to know how to click the mouse and know where the xml files are located on disk
- **Fully automatic parsing**, no interruption etc
- **Very simple** installation, simply copy the GOCEPARSER.exe (size: 8Mb) and start parsing
- Needs only the runtime libraries
- **Freely available** to geodetic community for use with GOCE data

```
<Data Block>
<EGG_TRF_2>
<List_of_GG_spatial_Records count="86400">
<GG_spatial_Record>
<Time_Information>
<GPS_Time>940982415.428829312</GPS_Time>
</Time_Information>
<Position>
<Radius_from_Geocenter unit="m">
6626847.2540
</Radius_from_Geocenter>
<Phi unit="deg">34.349954778</Phi>
<Lambda unit="deg">97.777981550
</Lambda>
</Position>
<Gravity_Gradients unit="1/s^2">
<XX>-1.37145295E-06</XX>
<YY>-1.36835101E-06</YY>
<ZZ>-2.73981976E-06</ZZ>
<XY>-2.59108991E-11</XY>
<XZ>7.98362318E-09</XZ>
<YZ>2.92570413E-11</YZ>
</Gravity_Gradients>
<Sigmas unit="1/s^2">
<XX>1.53336886E-11</XX>
<YY>7.42530111E-11</YY>
<ZZ>1.06823490E-10</ZZ>
<XY>1.49509649E-11</XY>
<XZ>1.02717619E-11</XZ>
<YZ>4.11142544E-12</YZ>
</Sigmas>
<Flags>
<XX>2</XX>
<YY>2</YY>
<ZZ>2</ZZ>
<XY>2</XY>
<XZ>2</XZ>
<YZ>2</YZ>
</Flags>
</GG_spatial_Record>
```

Figure 1: GOCE xml data example

- Complete **source code** available to the community for further improvement and scientific use
- How to obtain the program: <ftp://ftp.fgi.fi> user: **slrpublic** password: **publicslr**. Located at GOCEPARSER directory

GOCEPARSER ToDo(s)

- Finish level 1 data parsing in reasonable time
- Allow users interactively to decide what type of format they need for output products
- Add additional logic in deciding what record belongs to what structure in parsing
- Flexibility if some unknown record comes in the future, ex if ESA decides to add additional records in xml files
- Option on computing the gravity field derivatives (ex. Δg , N , ξ , η) from GOCE models
- Option on computing grid of gravity field values from GOCE gravity models
- Option on evaluating the GOCE models wrt terrestrial gravity data
- Option on entering the GOCE standards values (ex GM, R, etc)
- Option on visualization of arcs of GOCE orbit from the PSO files for example

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