

# **Advanced School on Understanding and Prediction of Earthquakes and other Extreme Events in Complex Systems**

**26 September - 8 October 2011**

## **CompiCat Program**

### **Exercises**



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2011

### Exercise 1. Importing catalog from web site


- 1) Using your favorite Internet browser (e.g., Internet Explorer) open the URL <http://www.ncedc.org/anss/catalog-search.html> that will bring you to the Advanced National Seismic System (ANSS) global catalog search.
- 2) Make catalog search of magnitude 6 or larger earthquakes in 2002-2005: (a) use *ANSS composite catalog (1898-present)*; (b) *output catalog in readable format*; (c) chose - *Start date, time* = 2002/01/01,00:00:00 ; *End date, time* = 2006/01/01,00:00:00 ; *Min magnitude* = 6.0 ; (d) *send output to an anonymous FTP file on the NCEDC*; (e) *submit the request*, wait, then download the output into ...\\work directory. Specifically, click mouse right button on the output URL and *Save target as catsearch*.
- 3) Run CompiCat: (a) import catsearch (you may either use *File->Import* or *Import* button  in the horizontal File bar at the top; (b) browse to the ...\\work directory and open catsearch; (c) use *File->Save as* or *Save as* button  in the horizontal File bar at the top to save the catalog in the CompiCat standard format (i.e., csf) as m6-2002-2005 in the ...\\work directory.

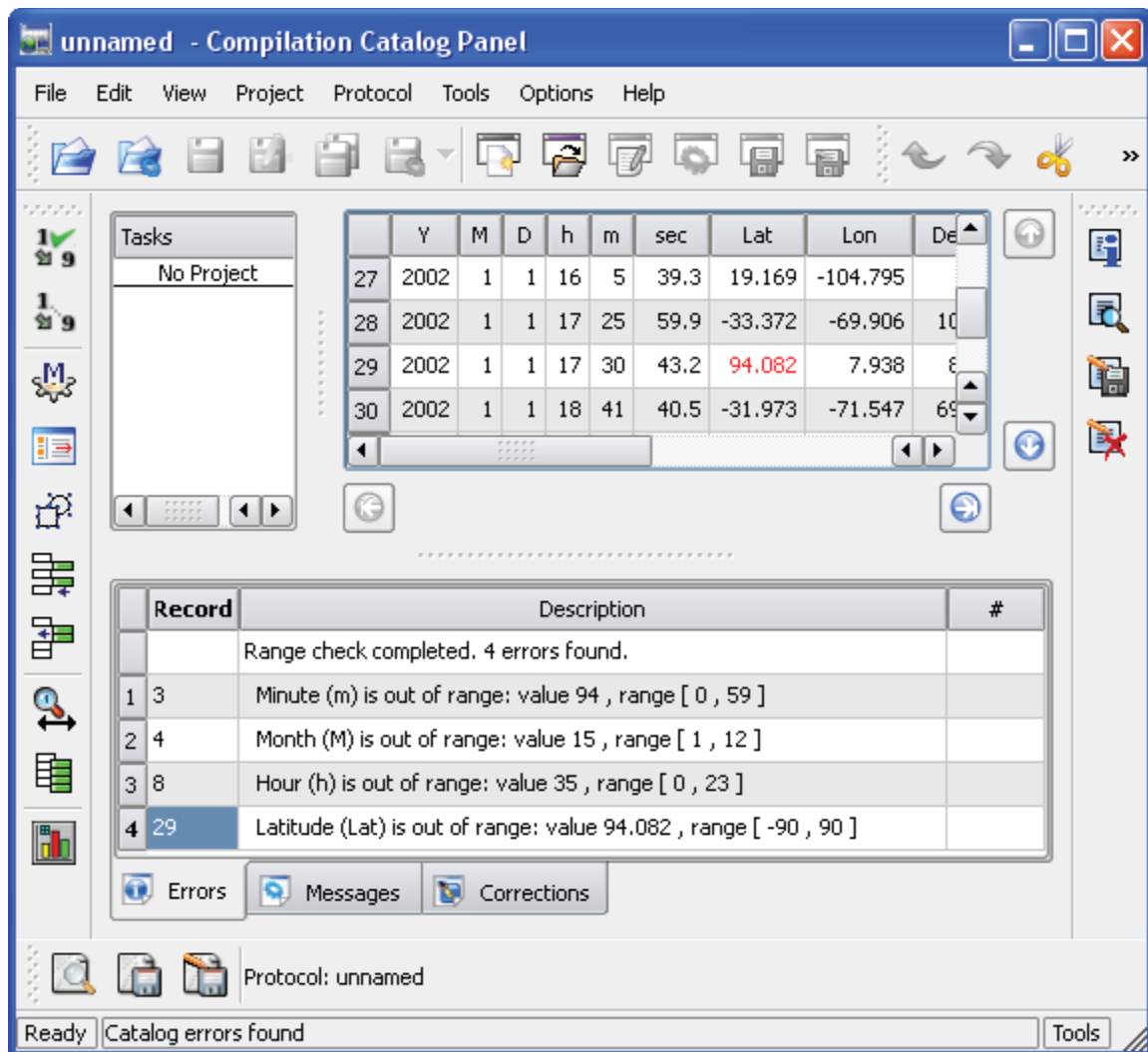
In Appendix B of the Manual you will find some other URLs to the earthquake catalogs available.

In the next exercises you will be using the catalogs already prepared for specific tasks that illustrate different modes and capabilities of the CompiCat program.

### Exercise 2. Editing the catalog.

Catalogs have errors. When finding an error you may wish to introduce some corrections. CompiCat facilitates in correcting earthquake catalog entries, in finding and, if needed, sorting temporal disorder.

- 1) Run CompiCat: Click *Import* button  in the vertical Tools bar on the left; Open the file ...\\ecp\\exercises\\ex2checkerr.txt.
- 2) Check in the lower plate on tab Errors and correct corresponding entries in the right upper plate one by one the evident mistakes identified in the catalog by CompiCat. For details of editing catalog entries see Manual part 6 - The catalog editor. Don't forget saving each segment of corrections, the last one, in particular.



Correct records according to the following suggestions::

1: fields: minute

1: 2002 1 1 2 **94** 17.06 37.216 -3.702 0.7 0 0 1.5 0 0

Change for 1: 2002 1 1 2 44 17.06 37.216 -3.702 0.7 0 0 1.5 0 0

2: fields: month

2: 2002 **15** 1 3 44 14.5 -33.948 -70.361 113.9 0 0 3.1 0 0

Change for 2: 2002 1 1 3 44 14.5 -33.948 -70.361 113.9 0 0 3.1 0 0

3: fields: hour

3: 2002 1 1 **35** 23 23.68 44.566 7.192 9 0 0 2.2 0 0

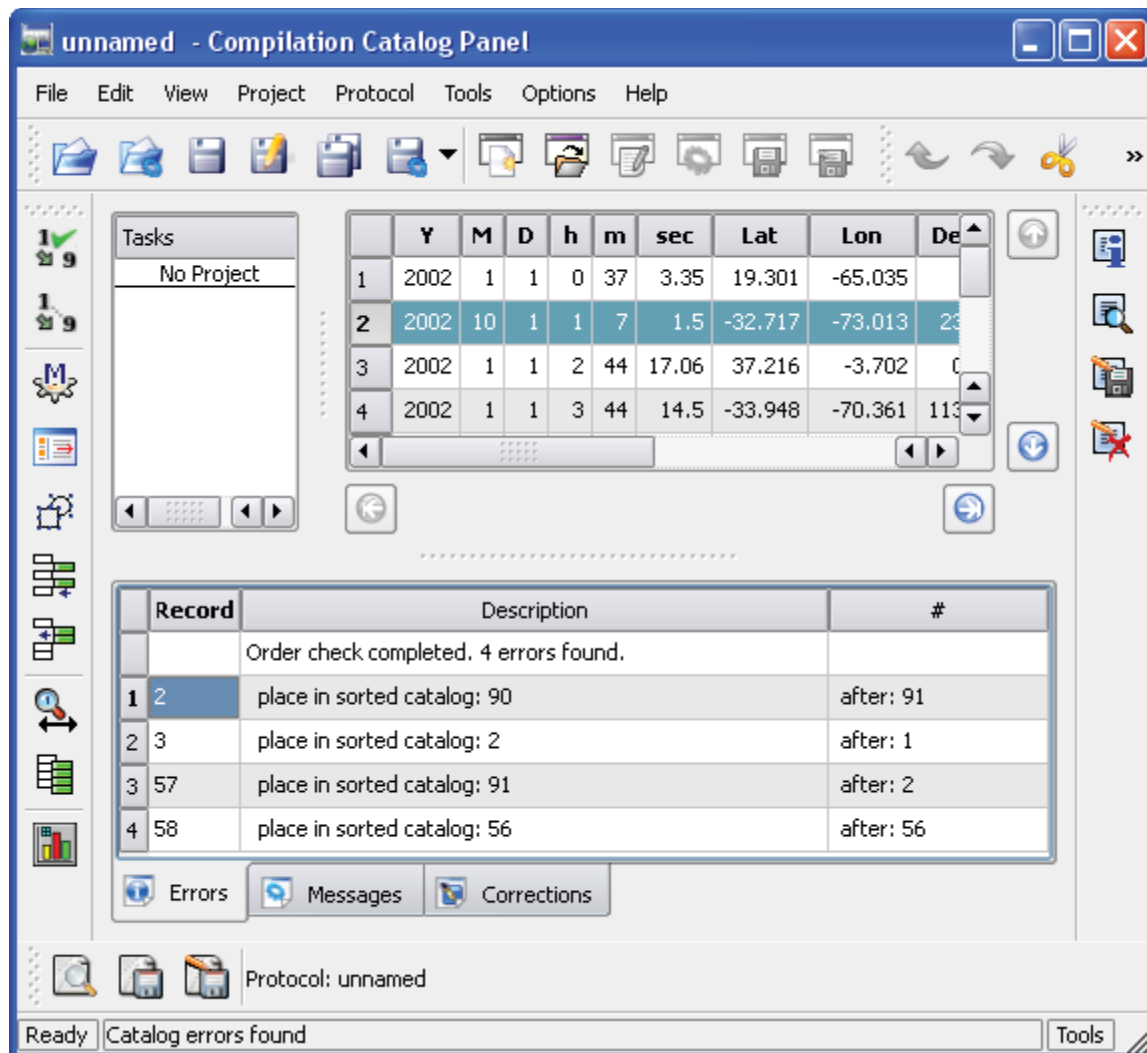
Change for 3: 2002 1 1 5 23 23.68 44.566 7.192 9 0 0 2.2 0 0

4: fields: latitude

4: 2002 1 1 17 30 43.2 **94.082** 7.938 8.7 0 0 1.9 0 0

Change for 4: 2002 1 1 17 30 43.2 34.082 7.938 8.7 0 0 1.9 0 0

3) After getting from you the corrections of all identified errors CompiCat checks the catalog for disorder in time and, if it finds any, await for your decision either to sort the catalog by time or to correct the entries resulting the identified disorder.




Correct records according to the following suggestions::

1: fields: month

1: 2002 **10** 1 1 7 1.5 -32.717 -73.013 23.1 0 0 3.5 0 0  
 Change for 1: 2002 1 1 1 7 1.5 -32.717 -73.013 23.1 0 0 3.5 0 0


2: fields: month


2: 2002 **11** 2 5 23 1.89 -18.019 -178.564 631.4 5 0 5.3 0 0  
 Change for 2: 2002 1 2 5 23 1.89 -18.019 -178.564 631.4 5 0 5.3 0 0

4) Use *File->Save as* or *Save as* button  in the horizontal File bar at the top to save the catalog with corrections in the CompiCat standard format (i.e., csf) as ex2checked in the ...\\work directory.

### Exercise 3. Converting magnitudes

Catalogs may report magnitudes of different kind, e.g., mb, Ms, Mw, etc., that measure earthquake size. To avoid ambiguities, the question of calibrating these measures to a single one, adequate for the study considered, should be resolved first of all.

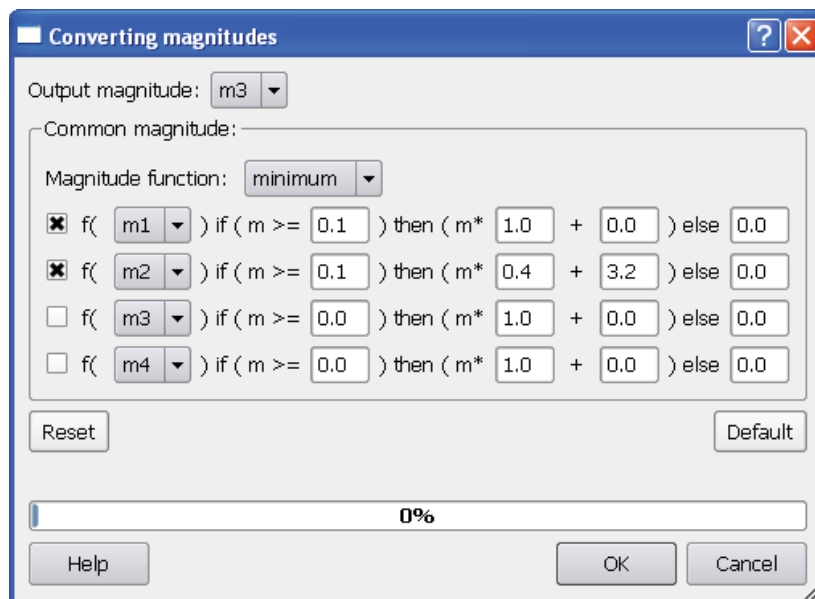
1) Run CompiCat: Click *Open* button  in the horizontal File bar at the top. Open the file ...\\ecp\\exercises\\ex3convertmags.csf. The catalog reports the two magnitudes - m1 of the mb type and m2 of the Ms type.

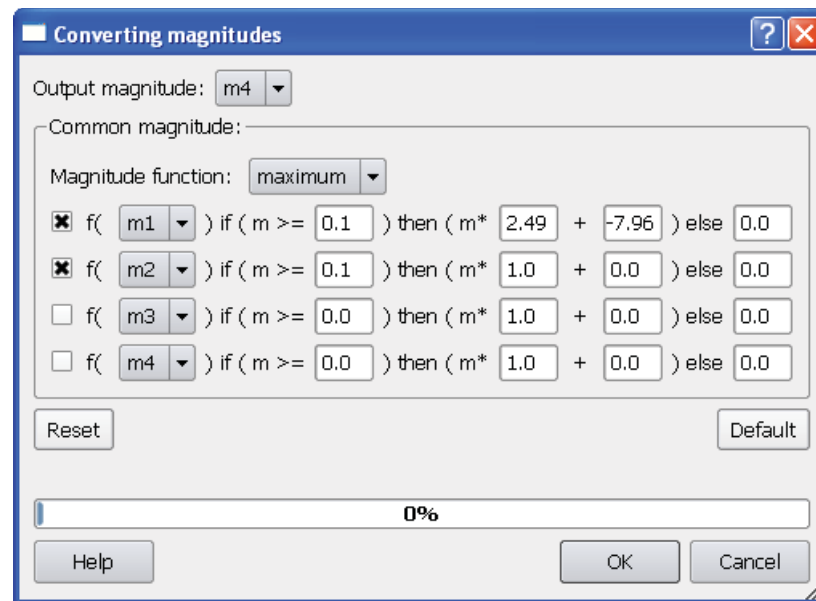
2) Click *Convert magnitudes* button  in the vertical Tools bar on the left. Leave m1 and m2 intact, while (i) filling m3 with the minimum of m1 and the result of conversion of m2 into mb type and (ii) filling m4 with the maximum of m2 and the result of conversion of m1 into the Ms type.

For conversions use the equations  $mb = 0.4 Ms + 3.2$  and  $Ms = 2.49 mb - 7.96$  (Zobin, 1999). Avoid using absent magnitude values, which are zeros in the input, by choosing the magnitude cutoffs equal to 0.1.

3) Save the resulting catalog as ex3converted in the ...\\work directory.


Prompt:






#### Exercise 4. Removing duplicates

Catalogs may have duplicate entries referring to the same events, which situation may obscure evaluation of quantitative counts. CompiCat allows the user to make search for duplicates and either to delete or to leave intact the candidates that appear to duplicate each other.

1) Run CompiCat: Click *Open* button  in the horizontal File bar at the top. Open the file ...\\ecp\\exercises\\ex4removedouble.csf. For simplicity, this artificial catalog reports just 26 events attributed with one magnitude value (M1).

2) Click *Remove duplicates* button  in the vertical Tools bar on the left. Change the strict Proximity limits to Time = 120 sec, Latitude = Longitude = 0.5 degree, Depth = 100 km, and Magnitude = 9 (that guarantee no limitation on magnitude). Use *Automatic* mode along with the default values of all the other remaining parameters. Click *Apply*.

The program automatically identifies 7 duplicates.

3) Change to *Interactive* mode and click *Apply* again.

The program starts search for duplicates, pauses when finding the first pair, and shows it in the lower part of the Tool window. To remove record 5 in the 1st pair; click *Next*; To remove record 7 in the 2nd pair, click *Next*, etc; proceed with automatic removal by clicking *OK* button.

After 100% appear in process progress bar click *OK* again to confirm duplicate removal. The program will perform actual removal of the identified duplicates and closes the Tool window.

4) Save the resulting catalog as ex4removed in the ...\\work directory.

Prompt:

**Remove duplicates** [?] [X]

Proximity limits: Criterion for autoremoval:

Proximity limits:

Time: 120 Latitude: 0.5 Longitude: 0.5 Depth: 100 Magnitude: 9.0

Common magnitude:

Magnitude function: value

☒ f ( m1 ) if ( m >= 0.0 ) then ( m \* 1.0 + 0.0 ) else 0.0

☒ f ( m2 ) if ( m >= 0.0 ) then ( m \* 1.0 + 0.0 ) else 0.0

☒ f ( m3 ) if ( m >= 0.0 ) then ( m \* 1.0 + 0.0 ) else 0.0

☒ f ( m4 ) if ( m >= 0.0 ) then ( m \* 1.0 + 0.0 ) else 0.0

Reset Default

Help Apply OK Cancel

**Remove duplicates**

Proximity limits: Criterion for autoremoval:

Duplicate removal:  
☐ Automatic ☒ Interactive

Remove by magnitude: value greater

Priority:  
☒ m1  
☒ m2  
☒ m3  
☒ m4

Then by order:  
☒ first ☐ second

Reset Default

Found so far: 2 Remove record <6> by magnitude: "value greater" > <6>:7.50; <7>:8.50

	Y	M	D	h	m	sec	Lat	Lon	Dep	M1	M2	M3	M4	I	#
6	1942	10	21	0	22	0	32.97	-116	0	7.5	0	0	0	0	
7	1942	10	21	0	22	0	32.97	-116	0	8.5	0	0	0	0	
Leave															Leave intact

24%


Next

Help Apply OK Cancel

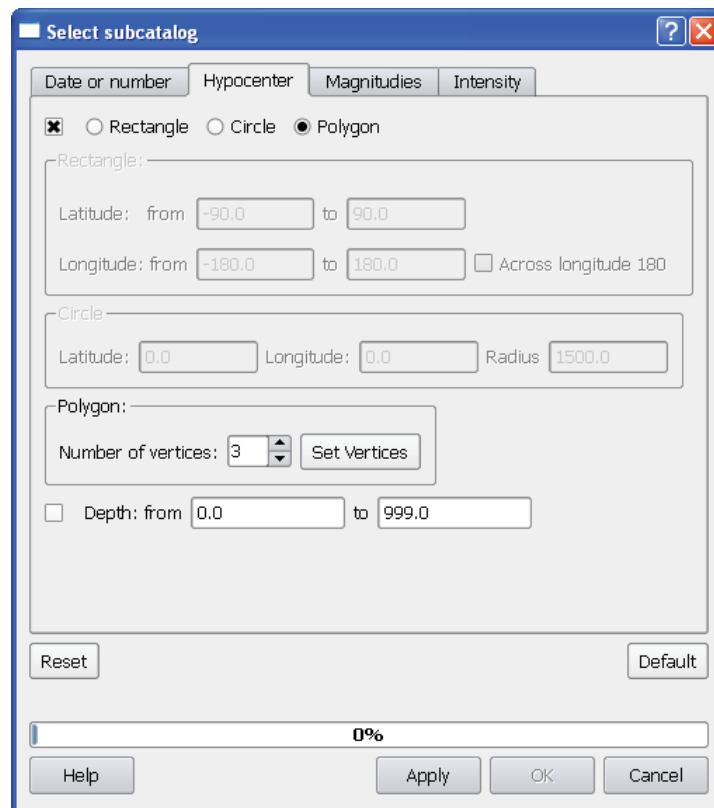
### Exercise 5. Selecting subcatalogs

CompiCat allows the user to make different searches of subcatalogs by time, location, and magnitude. The two simplest examples of searches are considered in the tasks below. For details on other optional possibilities see 7.3 [Select subcatalog](#).

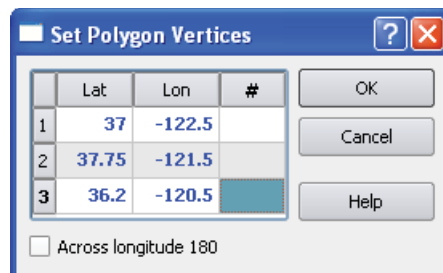
**Task 1:** Select subcatalog of earthquakes, which epicenters are located inside the triangle {(37, -122.5); (37.75, -121.5); (36.2, -120.5)}.

- 1) Run CompiCat: Open the file ...\\ecp\\exercises\\ex5select.csf.
- 2) Click *Select* button  in the vertical Tools bar on the left.





Open *Hypocenter* tab and set the requested coordinates of the three vertices: Check on the box ☐ in its upper leftmost corner and make sure that other tabs for being checked off. In *Hypocenter* tab choose *Polygon* radio button and proceed by clicking *Set vertices* button to *Set polygon vertices* window. Change the default coordinates for those of the Task 1.



Click *Apply*.

The program displays the choice of search parameters and asks for confirmation. If the parameters are confirmed, the program runs the search and will report the actual number of records (118 records) in the output subcatalog.

3) Click *OK* button and save the resulting subcatalog as ex5selected in the ...\\work directory.

**Task 2:** Find out how many earthquakes from the catalog created in Task 1 did happen before the 1989 Loma Prieta earthquake (1989/10/18 00:04:15.2, M7.0) ?

1) Select subcatalog of the events in request: Click *Select* button in the vertical Tools bar on the left. Open *Date or Number* tab to set the requested time limit. Check on the box ☐ in its upper leftmost corner and make sure that other tabs for being checked off. In *Date or Number* tab choose *Date* radio button and change the ending date to the requested one. Click *Apply*.

The screenshot shows a 'Select subcatalog' dialog box with the following elements:

- Tabbed interface: 'Date or number' (selected), 'Hypocenter', 'Magnitudes', 'Intensity'.
- Selection options: ☒ (checked), ☐ DateTime, ☐ Number.
- Date section: 'Date:' field with '1984/04/24 21:15:18'. 'Date: from' and 'to' fields with values '1984/04/24 21:15:18' and '1989/10/18 00:04:15' respectively. A text field below shows '2001/07/03 19:02:50'.
- Number section: 'Number:' field with '1'. 'Number: from' and 'to' fields with values '1' and '118' respectively. A text field below shows '118'.
- Buttons: 'Reset', 'Default', 'Help', 'Apply', 'OK', 'Cancel'.
- Status: 'Process completed: 28 records selected.' and a progress bar at '100%'.


The program displays the choice of search parameters and asks for confirmation. If the parameters are confirmed, the program runs the search and will report the actual number of records in the output subcatalog. Thus, the task is completed.

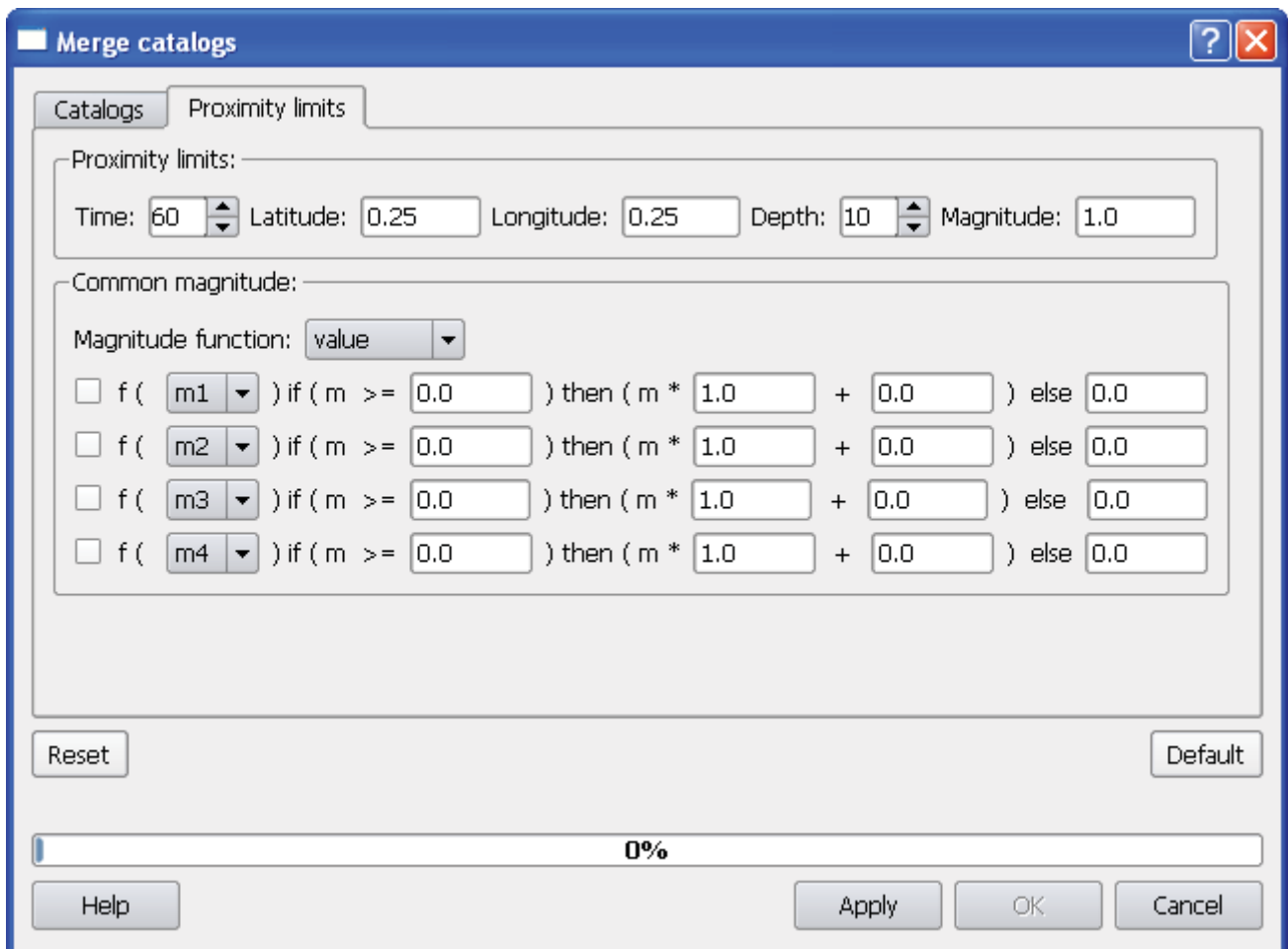
2) Click *Cancel* to close the window.

## Exercise 6. Merging catalogs

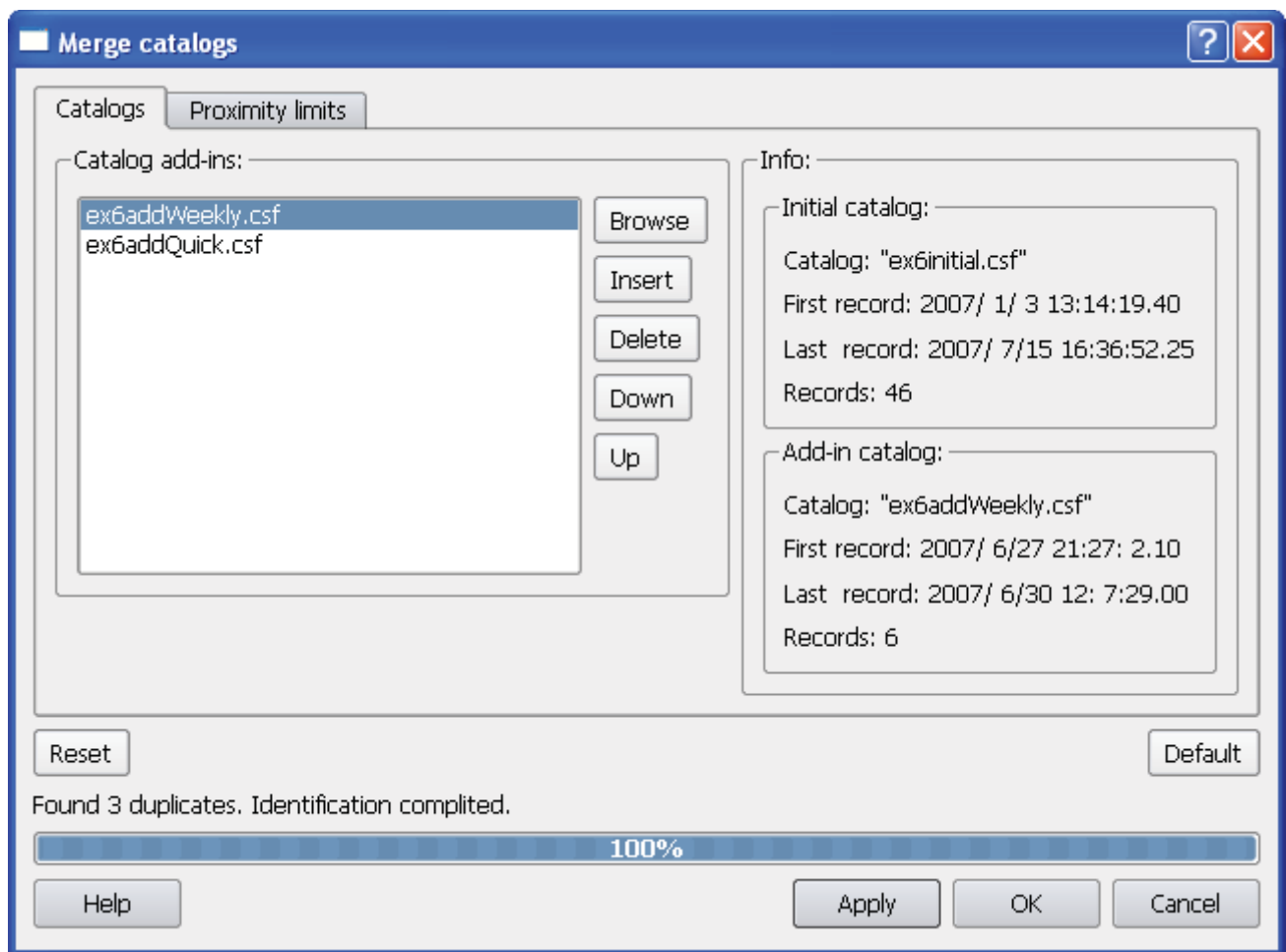
CompiCat allows the user to merge together different catalogs from different sources, which is a routine practice when dealing with a number of regional and local seismographic networks that record and report seismic events from the region of interest. CompiCat makes use of duplicate identification algorithm described in [7.4 Merge catalogs](#).

**Task:** Merge the three catalogs: ex6initial.csf, ex6addWeekly.csf, and ex6addQuick.csf. Use the following proximity limits: time = 60 sec, latitude = longitude = 0.25, depth = 10, and no limit on magnitude difference.

- 1) Run CompiCat: Open the file ...\\ecp\\exercises\\ex6initial.csf.
- 2) Click *Merge* button  in the vertical Tools bar on the left. Open *Proximity limits* tab and set the requested limits of time, latitude, longitude, and depth and check off the four ☐ boxes of *Common magnitude* block.



- 3) Return to *Catalogs* tab and open the two add-ins requested (i.e., ex6addWeekly.csf and ex6addQuick.csf). *Browse* for the first one and *Insert* the second. (Note that, since the two files are in the same directory, it is possible to open simultaneously both of them.)




Click *Apply*.

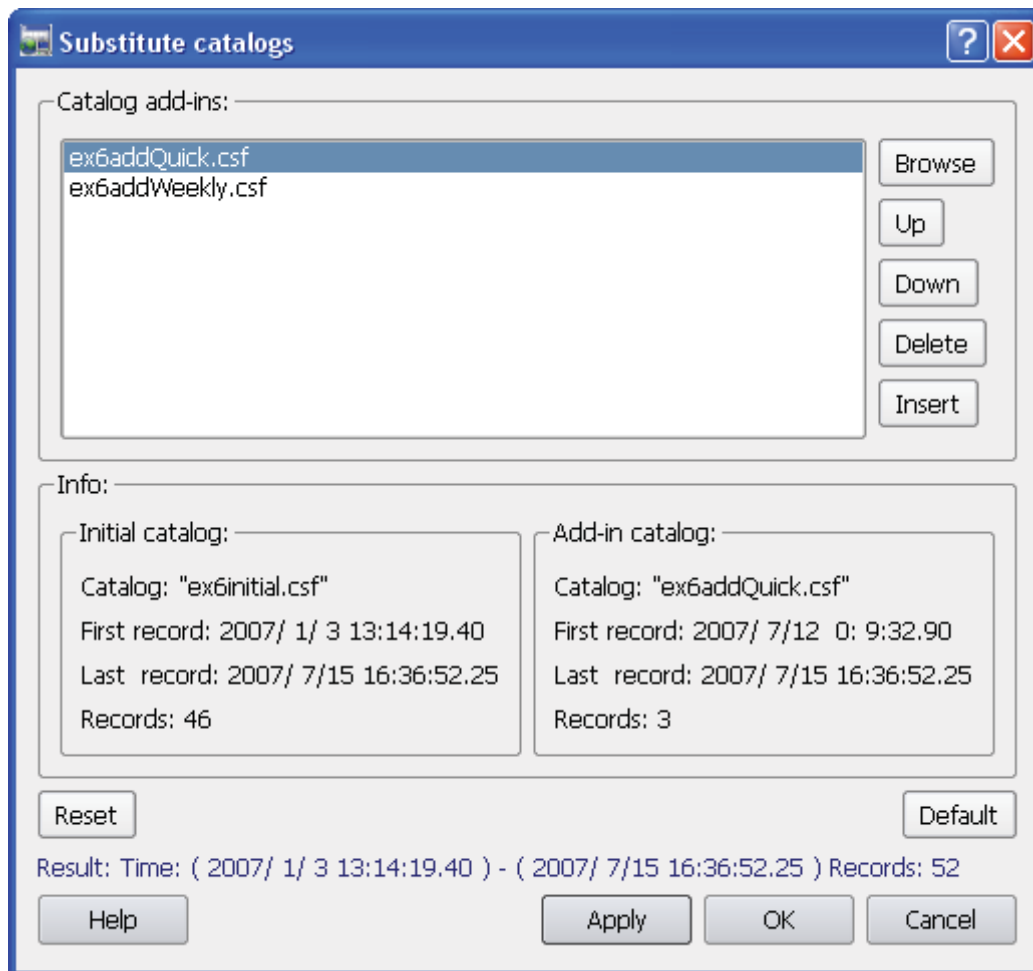
4) Click *OK* button and save the resulting merged catalog as ex6merged.csf in the ...\\work directory.

### Exercise 7. Substituting parts of catalog

CompiCat allows the user to substitute different parts of the initial catalog when more accurate and complete data becomes available. For details of the procedure see [7.5 Substitute catalog parts](#).

**Task:** Substitute the data from the initial catalog with data from the later updates. Use the catalogs from Exercise 6, i.e., ex6initial.csf, ex6addWeekly.csf, and ex6addQuick.csf.

- 1) Run CompiCat: Open the file ...\\ecp\\exercises\\ex6initial.csf.
- 2) Click *Substitute* button  in the vertical Tools bar on the left.
- 3) Open the two add-ins for the update requested (i.e., ex6addWeekly.csf and ex6addQuick.csf) and make sure that weekly is below quick data.



Click *Apply*.


- 4) Click *OK* button and save the updated catalog as ex7updated.csf in the ...\\work directory.

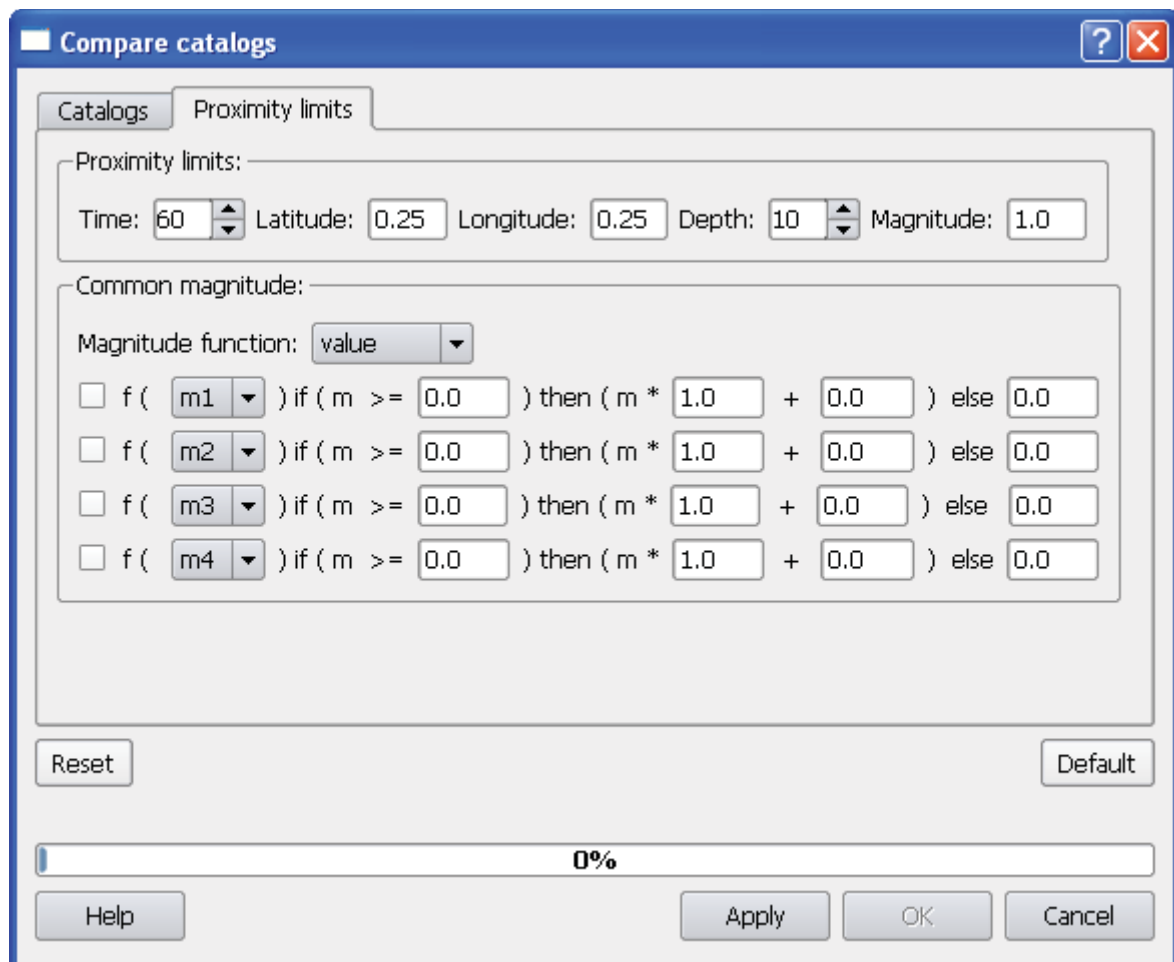
### Exercise 8. Comparing two catalogs

CompiCat allows different kinds of comparison of the two catalogs, which are described in [7.6 Compare catalogs](#).

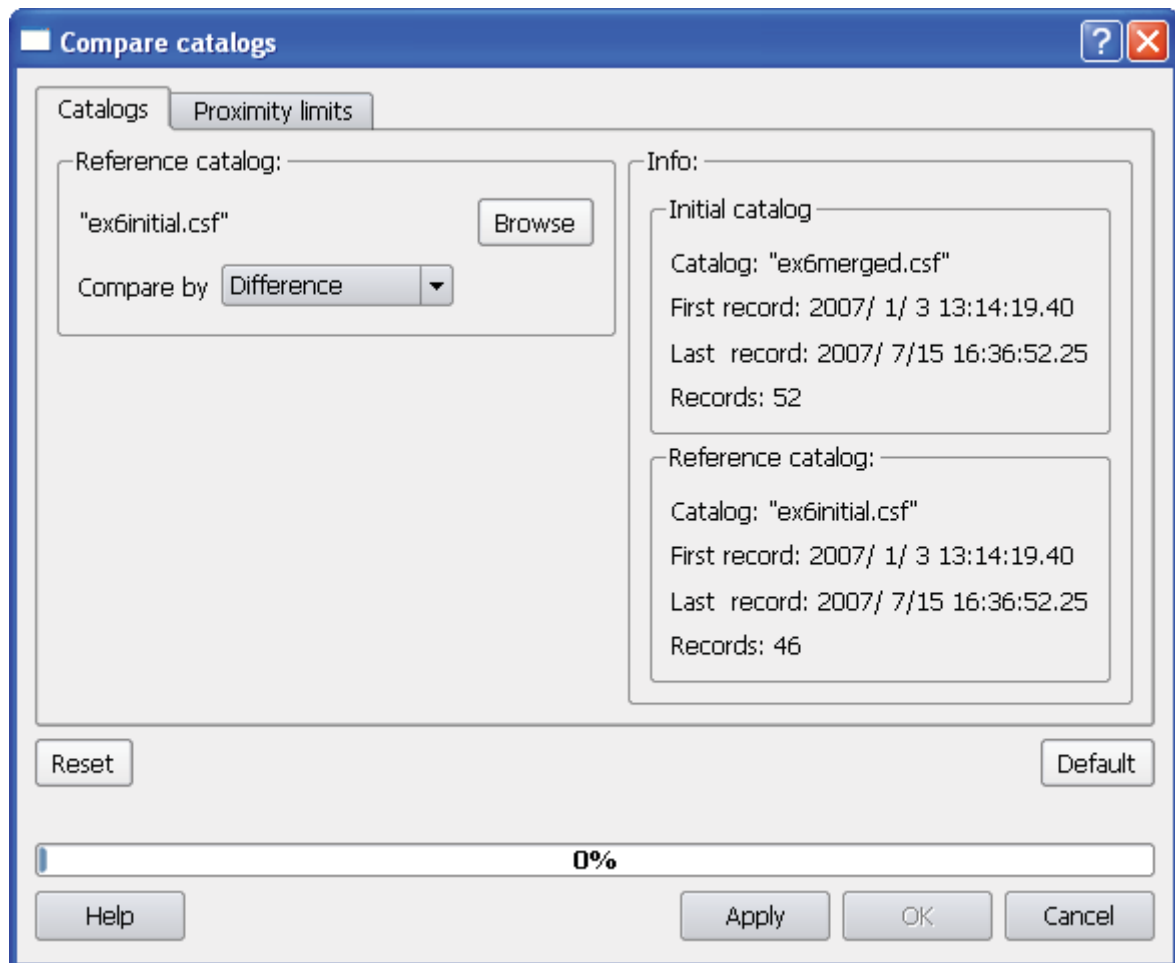
**Task 1:** Compare the initial and the resulting catalogs of Exercise 6, i.e. ex6initial.csf and ex6merged.csf. Use the proximity limits same as in Exercise 6: time = 60 sec, latitude = longitude = 0.25, depth = 10, and no limit on magnitude difference. Chose *Difference* as the mode of comparison.

1) Run CompiCat: Open the file ex6merged.csf from the ...\\work directory that you have saved earlier.

2) Click *Compare* button  in the vertical Tools bar on the left. Open *Proximity limits* tab and set the requested limits of time, latitude, longitude, and depth and check off the four ☐ boxes of *Common magnitude* block.



3) Return to *Catalogs* tab and open the reference catalog ...\\ecp\\exercises\\ex6initial.csf. Make the choice of *Compare by Difference*.




Click *Apply*.

4) Click *OK* button and save the resulting catalog as ex8difference.csf in the ...\\work directory.

**Task 2:** Compare the result of Task 1 (i.e., ex8difference.csf) and one of the two add-ins of Exercise 6 (i.e., ex6addWeekly.csf). Use the same proximity limits. Chose *Equivalence* as the mode of comparison.

If you did not close CompiCat after performing Task 1, the following first two steps are not necessary (the program keeps the parameters of the previous task).

1) Run CompiCat: Open the file ex8difference.csf from the ...\\work directory that you have saved earlier.

2) Click *Compare* button  in the vertical Tools bar on the left. Open *Proximity limits* tab and set the requested limits of time, latitude, longitude, and depth and check off the four ☐ boxes of *Common magnitude* block.


3) Return to *Catalogs* tab and open the reference catalog ...\\ecp\\exercises\\ex6addWeekly.csf. Make the choice of *Compare by Equivalence*.

Click *Apply*.

4) Click *OK* button and save the resulting catalog of marked duplicate entries as ex8equivalent.csf in the ...\work directory.

**Task 3:** Compare the results of Exercises 6 and 7. Use the default proximity limits. Chose *Nonequivalence* as the mode of comparison.

1) Run CompiCat: Open the file ex6merged.csf from the ...\work directory that you have saved earlier.

2) Click *Compare* button  in the vertical Tools bar on the left. Open *Proximity limits* tab and make sure that its parameters are set to default by clicking *Default* button.

3) Return to *Catalogs* tab and open the reference catalog ex7updated.csf from the ...\work directory. Make the choice of *Compare by Nonequivalence*.

Click *Apply*.

4) Click *OK* button and save the resulting catalog of marked nonequivalent entries as ex8nonequiv.csf in the ...\work directory.




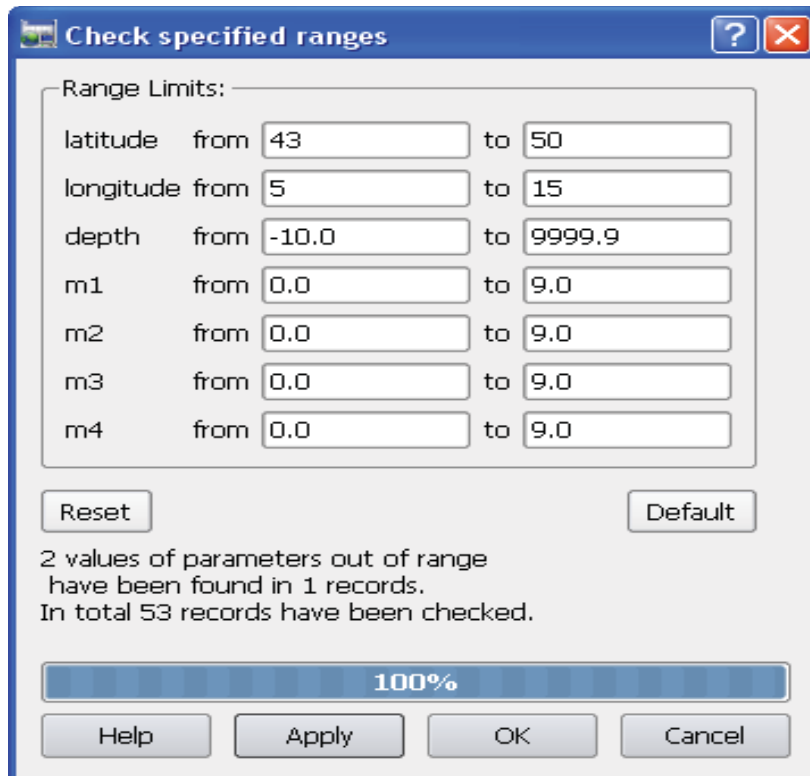
### Exercise 9. Checking specified ranges

CompiCat allows to check if the initial catalog contains records, which parameters fall outside the user defined ranges. For details of the procedure see [7.7 Check specified ranges](#)

**Task:** Check the initial catalog for records with coordinates outside the rectangle {from 43 N to 50 N and from 5 E to 15 E}.

1) Run CompiCat: Open the file ...\\ecp\\exercises\\ex9initial.csf.

2) Click *Range* button  in the vertical Tools bar on the left and input the limits on latitude and longitude, (i.e., (43, 50) and (5, 15))



Range Limits:			
latitude	from	43	to 50
longitude	from	5	to 15
depth	from	-10.0	to 9999.9
m1	from	0.0	to 9.0
m2	from	0.0	to 9.0
m3	from	0.0	to 9.0
m4	from	0.0	to 9.0

Reset Default

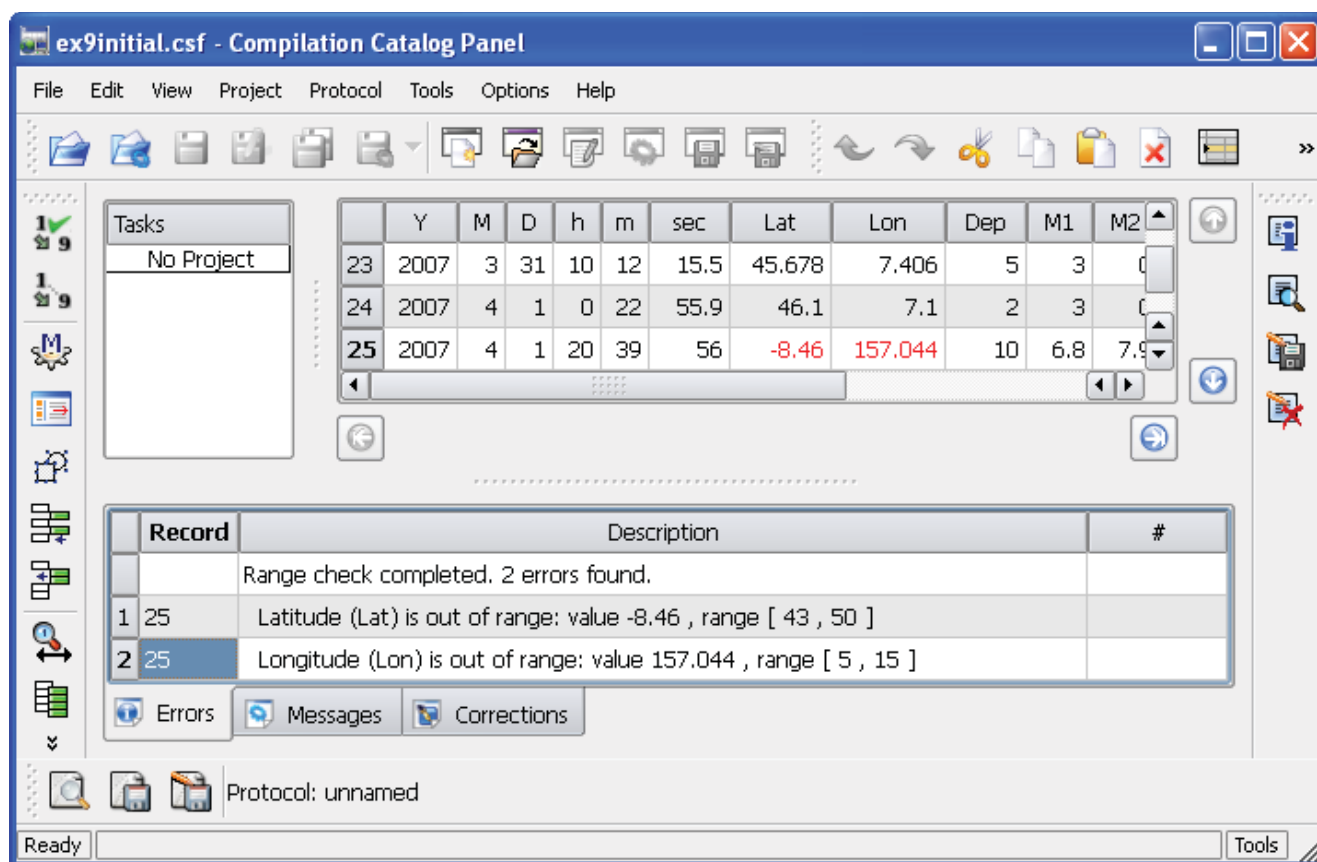
2 values of parameters out of range  
have been found in 1 records.  
In total 53 records have been checked.

100%

Help Apply OK Cancel

Click *Apply*.

4) Click **OK** button to see the listing of misfits in *Errors* tab page of the *Protocol* frame. Click the record number to see the misfit highlighted in *Catalog* frame.





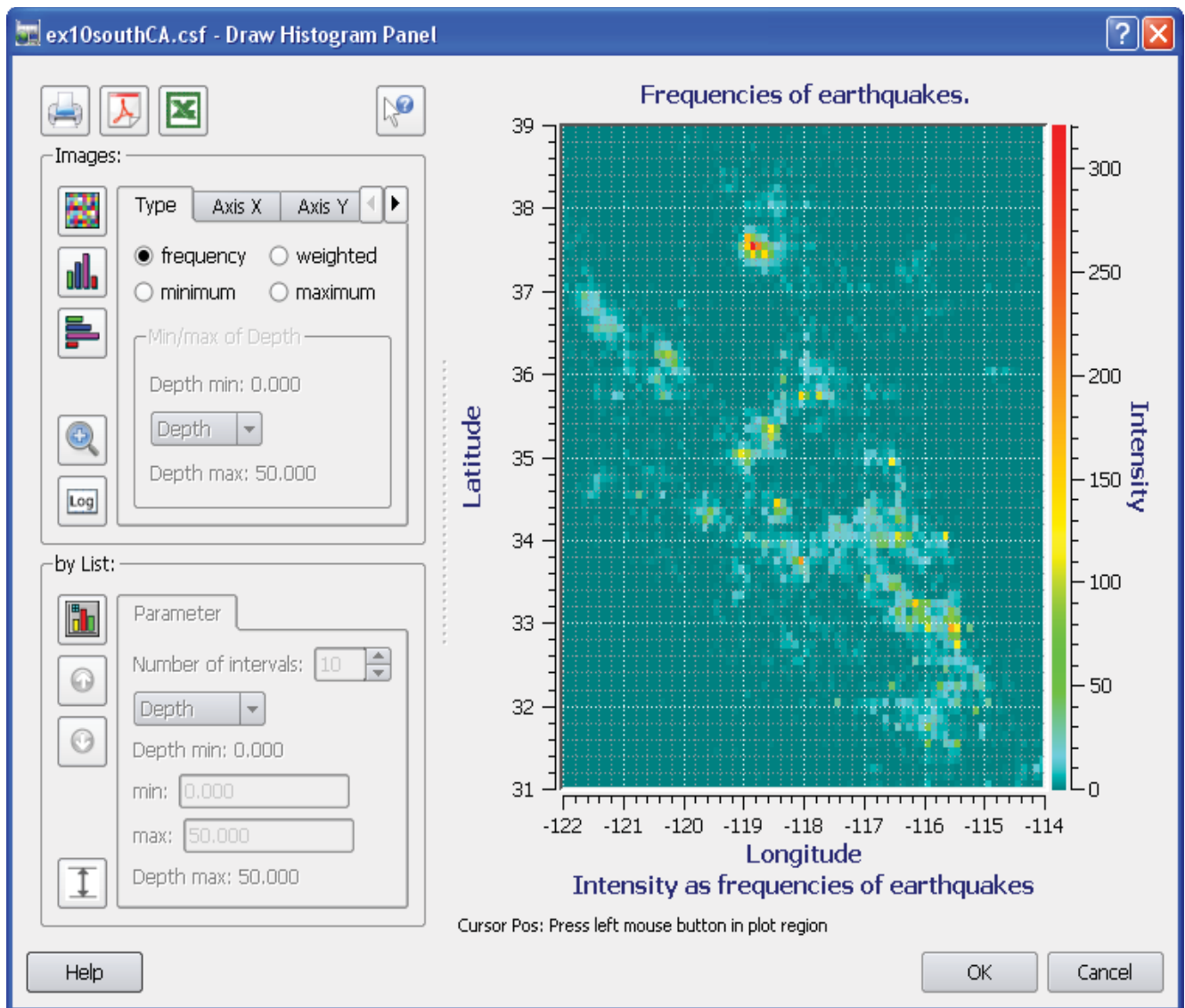
## Exercise 10. Drawing histograms


CompiCat allows the user to display graphically different kinds of histograms. For details see [7.8 Draw histograms](#)

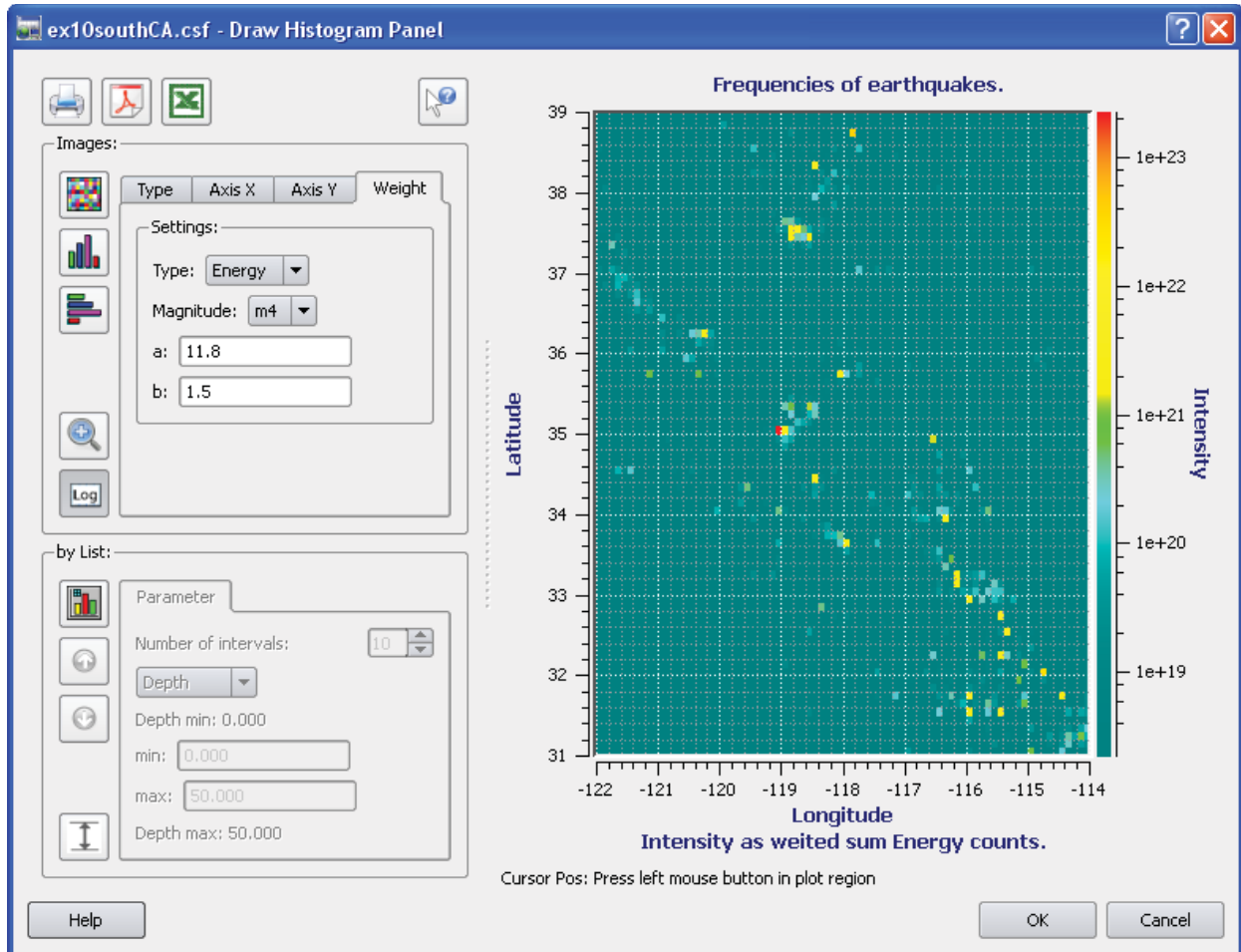
**Task 1:** Plot frequencies of the earthquake occurrence inside 0.1 by 0.1 degree cells on the map within latitudes from 31 N to 39 N and longitudes from 122 W to 114 W.

1) Run CompiCat: Open the file ...\\ecp\\exercises\\ex10southCA.csf.

2) Click *Draw histograms* button  in the vertical Tools bar on the left. Open XY-axes tabs in the *Images* frame and type in the appropriate limits on latitudes and longitudes: axis X (longitude) min -- 122, max -- 114; axis Y (latitude) min - 31.00, max - 39.00 . Change the *Number of intervals* to 80 on both axes X and Y tabs, so that to satisfy the 0.1 by 0.1 degree cell size requirement. Click *Draw 2-D histogram* button .




3) To get an insight on distributions of the energy release, or the area ruptured, or the total length of ruptures *Redraw histograms* using the Energy, or Area, or Length options in the *Weight* tab. For this purpose check on the radio button *on* in the *Images* frame of *Weight* tab, select m4 as the *Magnitude*, select Energy as the *Type*, and re-Draw 2-D histogram button  Toggle the *Linear/Log10 scale* button to view both options of the histogram display.

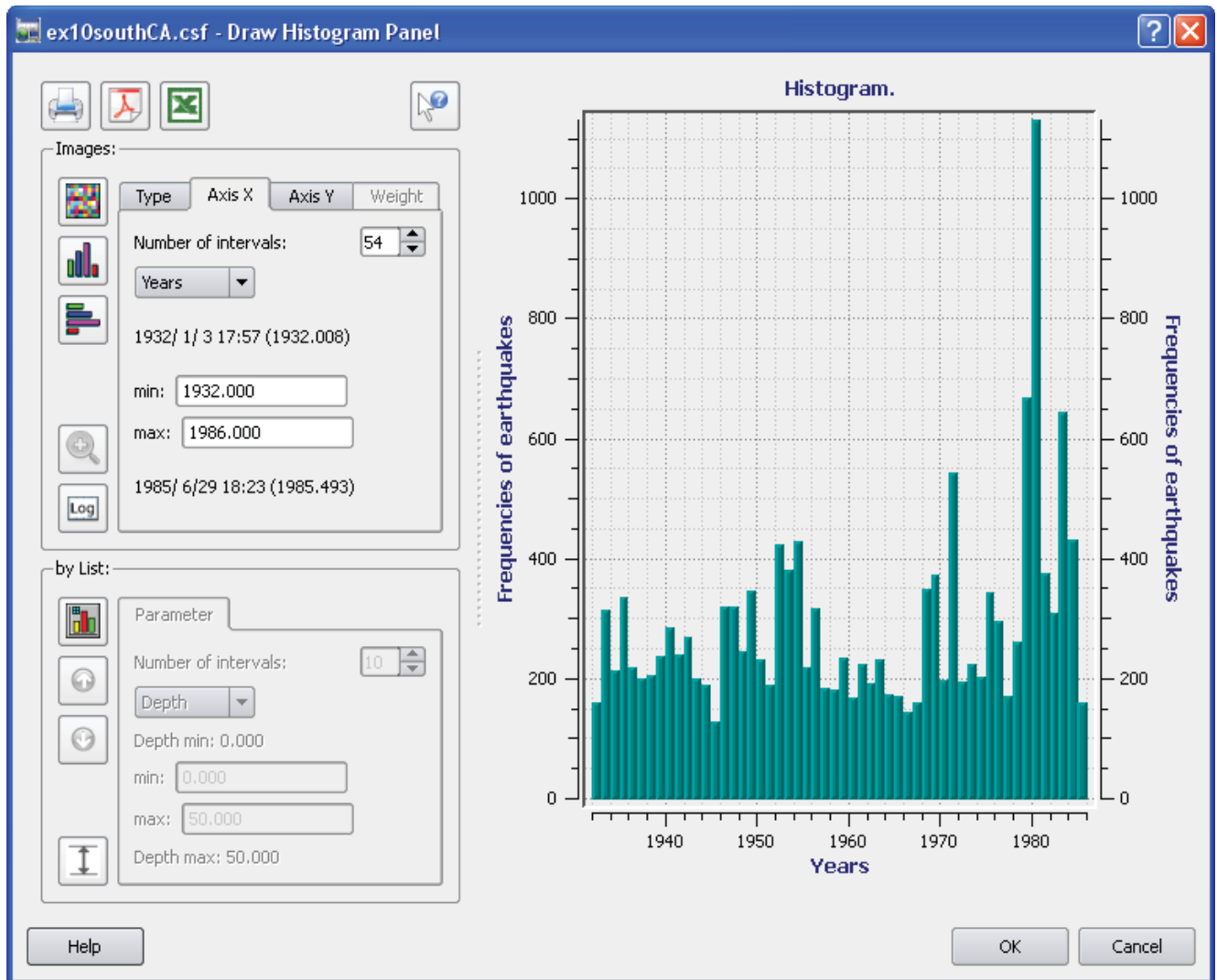


4) If you wish, save any image of resulted histograms as PDF or PS in the ...\\work directory.


**Task 2:** Plot the annual frequencies of the earthquake occurrence in 1932-1986.

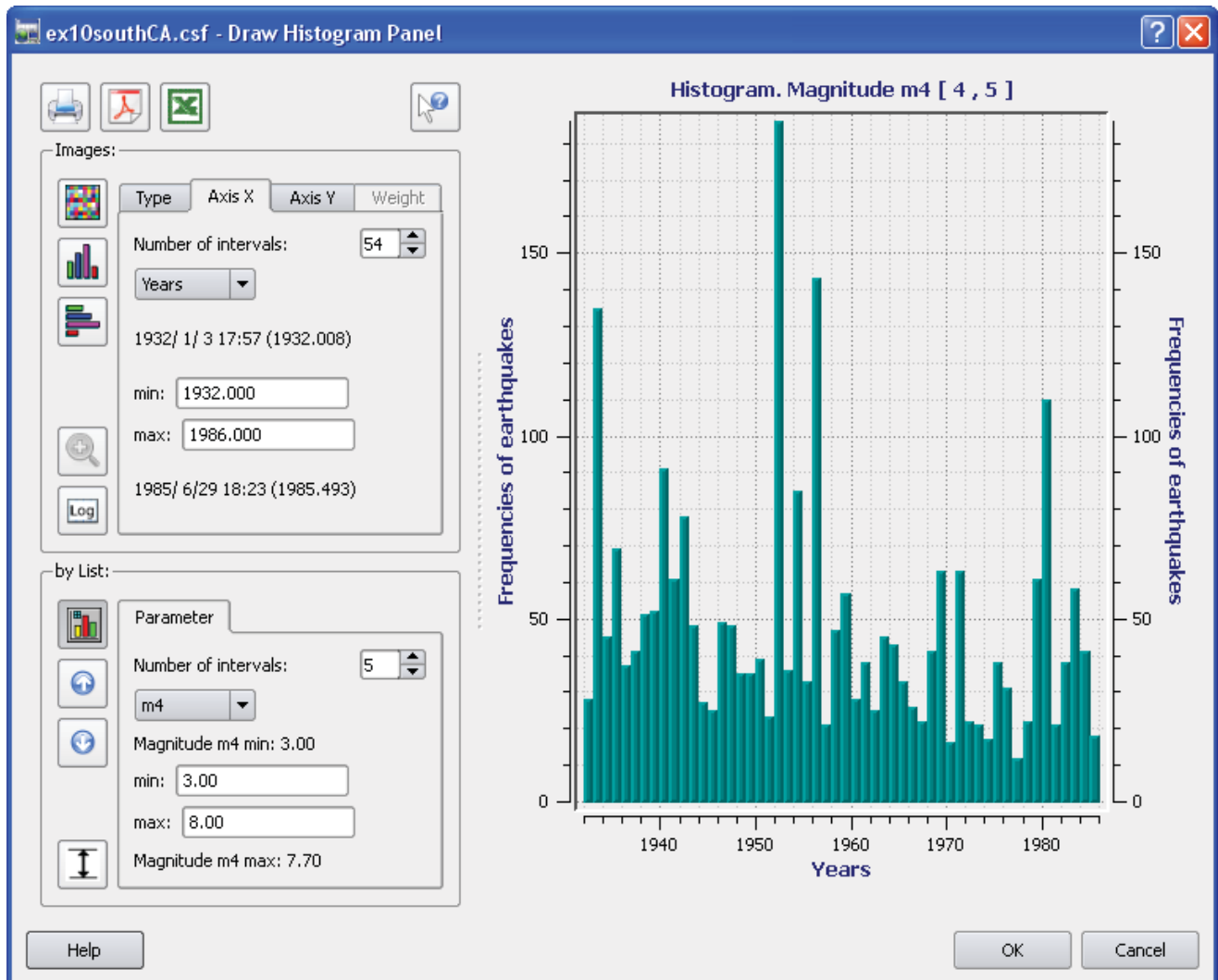
1) Make sure that the radio button *off* in the *Images* frame of *Weight* tab is checked on.

2) Change *X-axis* tab for *Years* and type in the requested *min* and *max* limits (i.e., 1932.0 and 1986.0, correspondingly). Make sure that the Number of intervals equals 54, so that to fit the request for the annual frequencies, and click *Draw 1-D histogram* button .



**Task 3:** Plot *by List* the annual frequencies of occurrence of the earthquake from magnitude ranges between 3 and 4, 4 and 5, 5 and 6, 6 and 7, and 7 and 8 in 1932-1986.

1) Toggle *Invoke by List* button . Select m4 as the by list parameter. Set the minimal magnitude to 3, the maximal one to 8, and the *Number of intervals* to 5.



2) Click *Draw 1-D histogram* button . Click  or  button to display the previous or the next histogram in a series.

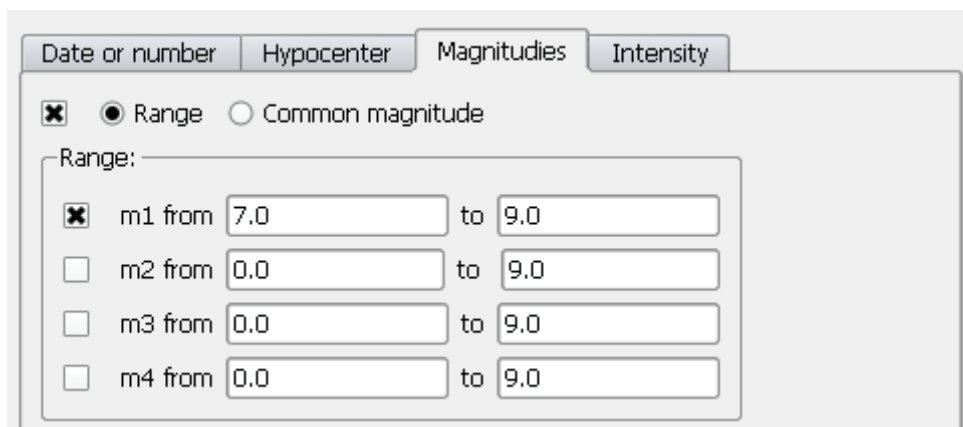
These tasks represent the simplest examples of histograms that may help analyzing the spatial, temporal, and energy structure of earthquake sequences from a given catalog. There are many other kinds of histograms that facilitate understanding of seismic dynamics of the tectonic region under study.

### Exercise 11. Managing projects of catalog compilation.

CompiCat allows a user to create project files. Each project is defined as a sequence of operations with catalogs for implementation. Saving a project description, i.e., a project file, facilitates application of the same sequence of operations with fixed parameters to different catalogs in question. There are two ways to create a project file. In the first one, using the tools, fitting their parameters, and controlling the results step by step a researcher may create a new project combining the tasks fulfilled in the current run of CompiCat. In this case, *Parameters of Tasks* must be set to *Currently defined* and the appropriate tasks must be added into *List of Tasks*. The second way makes use of the CompiCat *Default*. In this case a researcher must (i) set *Parameters of Tasks* to *Default*, (ii) add the appropriate tasks into *List of Tasks*, and fix the parameters of each task. The first way allows choosing parameters and controlling the results interactively, while the second way takes less time.

**Task:** Make a project file for catalog search of records with magnitudes  $m_1$  in the range from 7 to 9.

- 1) Run CompiCat: Open the file ...\\ecp\\exercises\\ex11-select-1.csf
- 2) Click *Select* button . in the tools bar on the left. Open *Magnitudes* tab.



Check on the box ☐ in its upper leftmost corner; invoke *Range* radio button; check on the box ☐ in the  $m_1$  row; set the requested  $m_1$  magnitude range. Click *Apply*. Click *OK*.

- 3) Click *New Project* button . on the top.

In the frame *Parameters of Tasks* choose *Currently defined* radio button. In the frame *Tasks* choose *Optional Tasks* radio button. In *Optional Tasks* list select *Select subcatalog* row. Click *Add ->* button. *Select subcatalog* task will appear in *List of Tasks*. Click *Next->* button. The following *Project Wizard Page* will appear.

**Project Wizard - New Project**

**Select subcatalog**  
Define search parameters

**Date or number   Hypocenter   Magnitudes   Intensity**

☒ ☒ Range   ☐ Common magnitude

Range:

☒ m1 from 7.0 to 9.0   ☐ m3 from 0.0 to 9.0  
☐ m2 from 0.0 to 9.0   ☐ m4 from 0.0 to 9.0

Common magnitude::

Magnitude function: value from 0.0 to 9.0

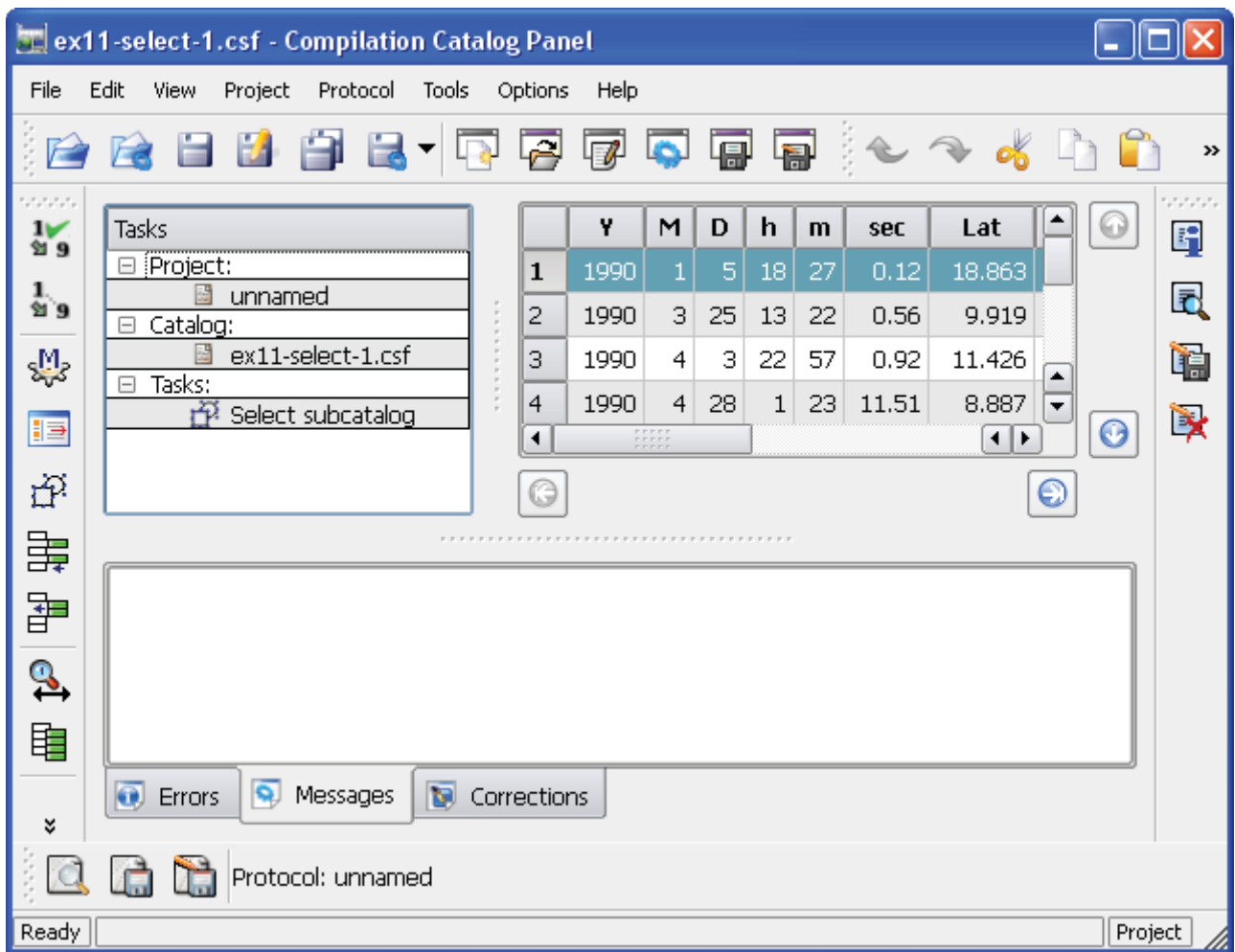
☒ f ( m1 ) if ( m >= 0.0 ) then ( m \* 1.0 + 0.0 ) else 0.0  
☒ f ( m2 ) if ( m >= 0.0 ) then ( m \* 1.0 + 0.0 ) else 0.0  
☒ f ( m3 ) if ( m >= 0.0 ) then ( m \* 1.0 + 0.0 ) else 0.0  
☒ f ( m4 ) if ( m >= 0.0 ) then ( m \* 1.0 + 0.0 ) else 0.0

Reset   Project   Default

< Back   Finish   Cancel   Help

Note that due to the choice of *Parameters of Tasks* set to *Currently defined* all the parameters of the task appear as defined above in 2). Click *Finish* button. The Main window should appear as follows:

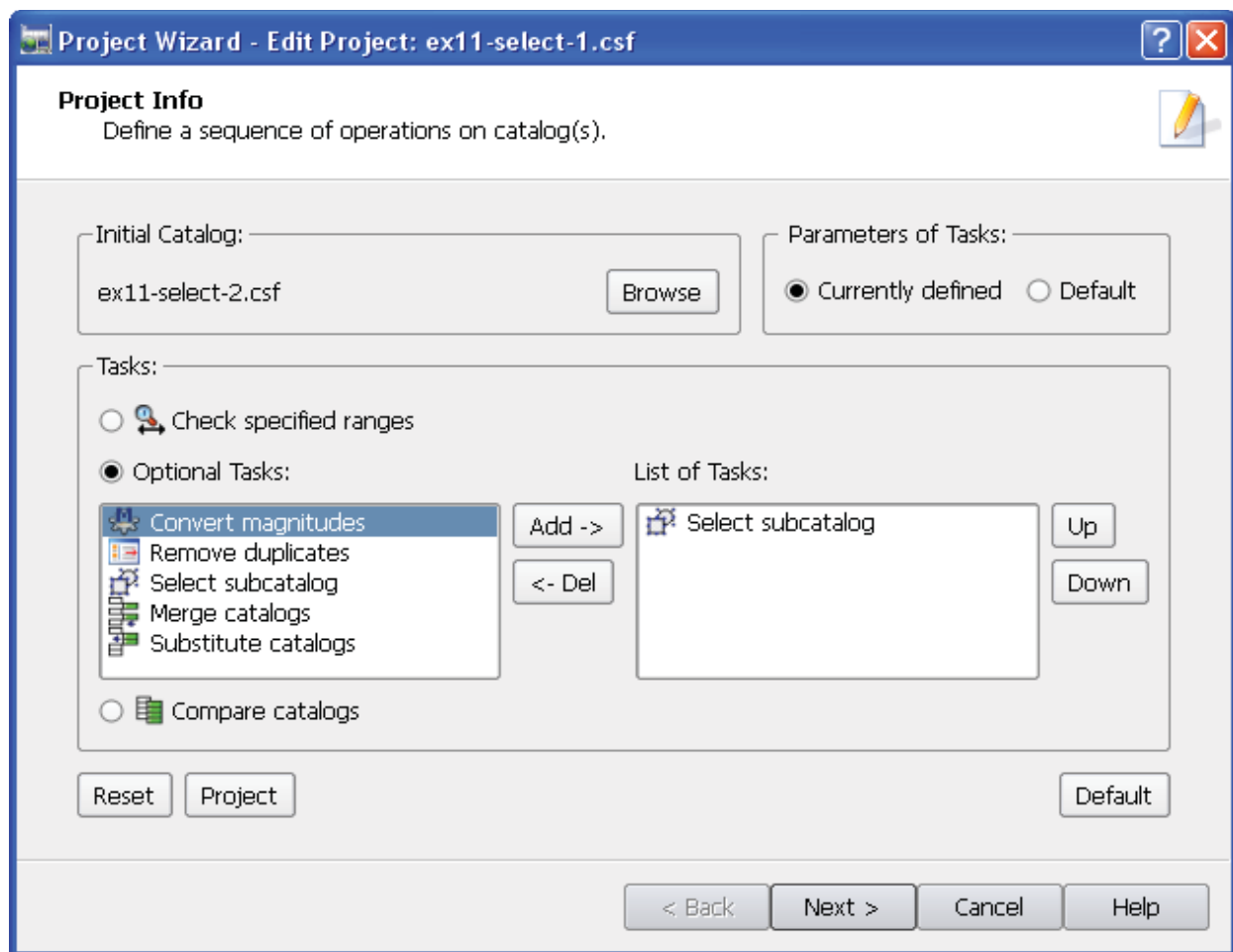




Nota bene: At this point CompiCat completes formation of the project, however, to create the project file a researcher must click *Save Project As* button . and save project file. Save the project file under the name ex11-projectselect in the ...\\work directory.

4) Click *Execute Project* button . on the top. Save the resulting catalog under the name ex11-select-1-m7 in the ...\\work directory. Exit CompiCat program.

5) Run CompiCat once again. To open the existing project click *Open Project* button . on the top bar. Browse to the ...\\work directory and select ex11-projectselect.pro saved in 3). Click *Edit Project* button . .



Change the initial catalog by clicking *Browse* button of *Initial Catalog* frame. Browse to directory ...\\ecp\\exercises and select ex11-select-2.csf file. Click *Next>* button. Click *Finish* button. Click *Execute Project* button . . Save the resulting catalog under the name ex11-select-2-m7 in the ...\\work directory. Exit CompiCat program.

Note that the two resulting catalogs were obtained by using the same parameters of the sample task, except for the initial catalog in question.

## Exercise 12. One example of complex compilation.

Updating catalogs is one of the most common routines of data management. Here is an artificial, rather complex example of compilation that combines merging catalogs and their updates.

**Task:** Make the project file for compilation of the catalog where the initial catalog reports magnitude m1, while the other five report the same kind of magnitude as m3. The resulting catalog should contain all earthquakes of magnitude m3 in the range from 3 to 4, which epicenters fall within the following limits of coordinates (inclusively): latitude from 42 to 48 and longitude from 6 to 12.

The project must include the following tasks:

1. Convert magnitudes of the initial catalog.
2. Merge with other two catalogs from different sources.
3. Substitute with three catalogs from different sources.
4. Select subcatalog containing records within the prefixed ranges of coordinates and magnitudes.

1) Run CompiCat. Open the file ...\\ecp\\exercises\\ex12initial.csf

2) Use *Convert magnitudes* tool to move m1 to m3. The tool window should have the following settings for *Output magnitude* m1 and m3, correspondingly:

Converting magnitudes

Output magnitude: m1

Common magnitude: value

Magnitude function: value

☒ f( m1 ) if ( m >= 9.0 ) then ( m \* 1.0 + 0.0 ) else 0.0

☐ f( m2 ) if ( m >= 0.0 ) then ( m \* 1.0 + 0.0 ) else 0.0

☐ f( m3 ) if ( m >= 0.0 ) then ( m \* 1.0 + 0.0 ) else 0.0

☐ f( m4 ) if ( m >= 0.0 ) then ( m \* 1.0 + 0.0 ) else 0.0

Reset Default

0%

Help OK Cancel

Converting magnitudes

Output magnitude: m3

Common magnitude: value

Magnitude function: value

☒ f( m1 ) if ( m >= 0.0 ) then ( m \* 1.0 + 0.0 ) else 0.0

☐ f( m2 ) if ( m >= 0.0 ) then ( m \* 1.0 + 0.0 ) else 0.0

☐ f( m3 ) if ( m >= 0.0 ) then ( m \* 1.0 + 0.0 ) else 0.0

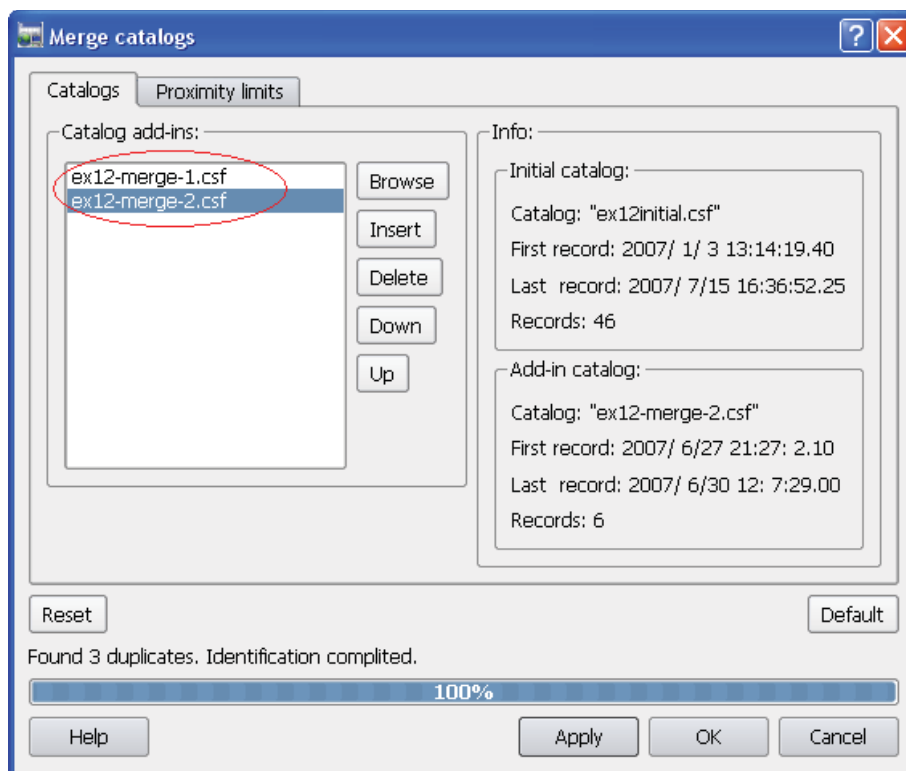
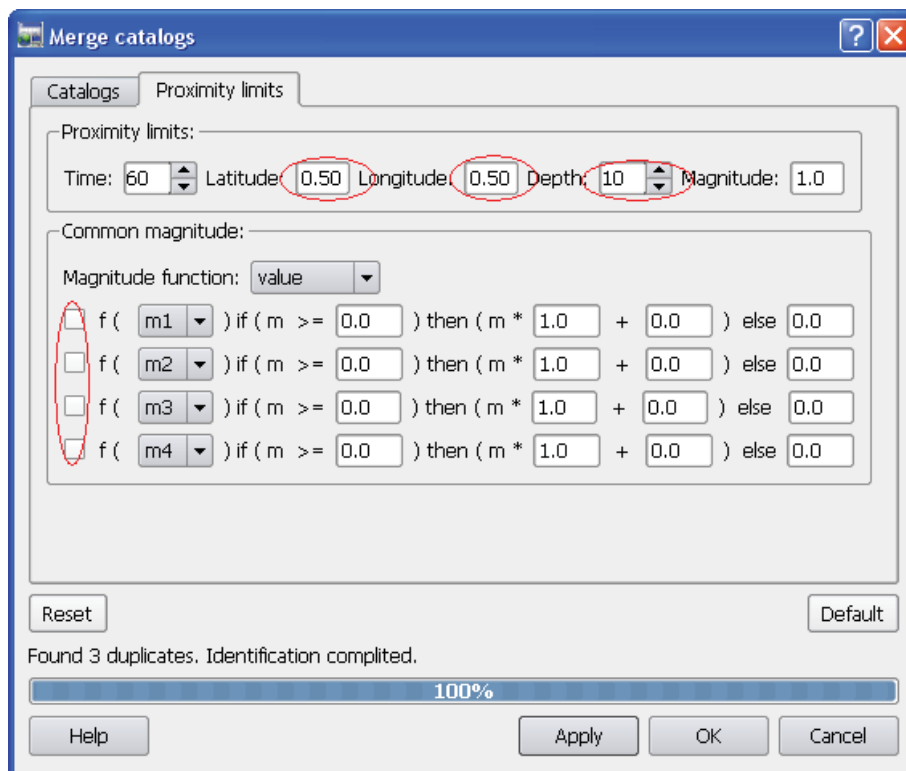
☐ f( m4 ) if ( m >= 0.0 ) then ( m \* 1.0 + 0.0 ) else 0.0

Reset Default

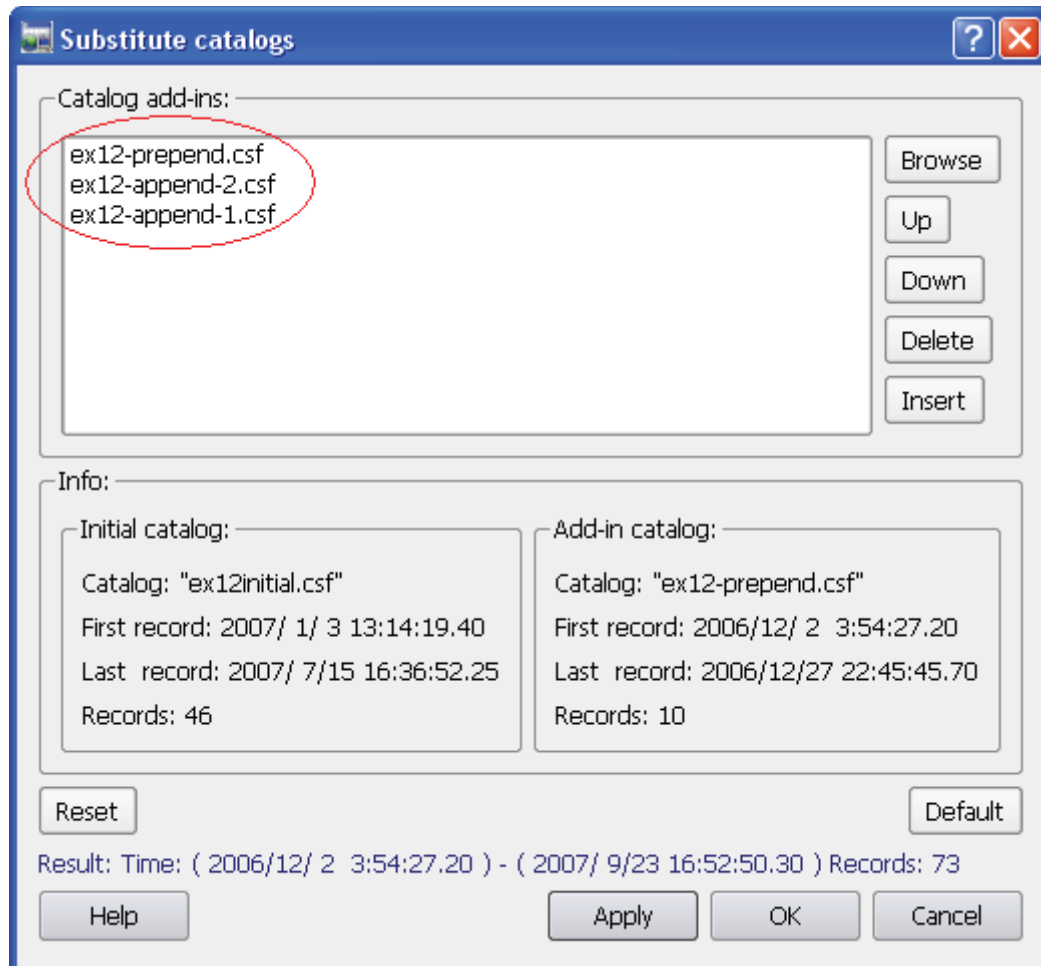
0%

Help OK Cancel

3) Use *Merge* tool for merging the catalog with converted magnitudes and the two *Catalog add-ins* ...\\ecp\\exercises\\ex12-merge-1.csf and ...\\ecp\\exercises\\ex12-merge-2.csf. Tool windows of *Proximity limits* and *Catalogs* should be set as follows:




4) Use *Substitute* tool for substituting the parts of the current catalog with data from the following three *Catalog add-ins*: ...\\ecp\\exercises\\ex12-prepend.csf , ...\\ecp\\exercises\\ex12-append-1.csf , and ...\\ecp\\exercises\\ex12-append-2.csf. The tool window should appear as follows:

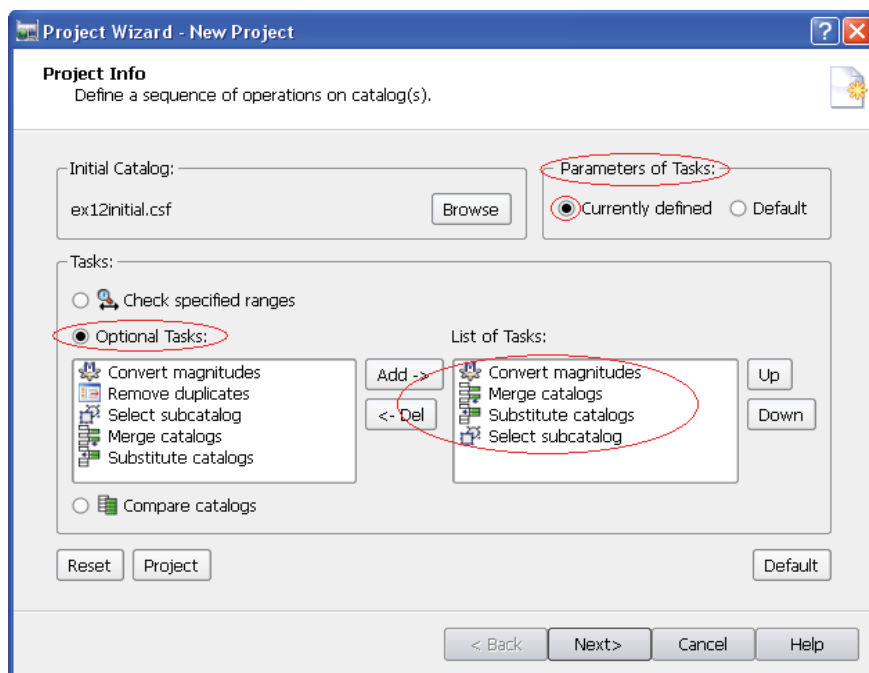


5) Use *Select* tool for searching the subcatalog of earthquakes, which epicenters have latitude from 42 to 48, longitude from 6 to 12, and which magnitude m3 is in the range from 3 to 4. The tool windows of *Hypocenter* and *Magnitudes* should appear as follows:

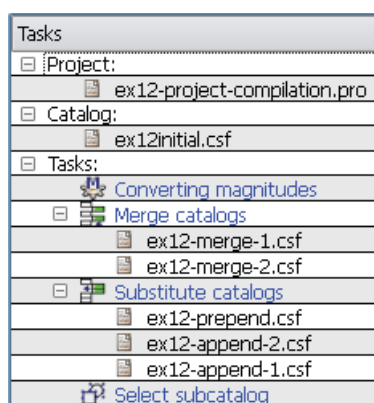
The screenshot shows the 'Select subcatalog' dialog box with the 'Hypocenter' tab selected. The 'Rectangle' radio button is selected and circled in red. Below it, the 'Rectangle' section has 'Latitude: from 42 to 48' and 'Longitude: from 6 to 12' fields, which are also circled in red. The 'Across longitude 180' checkbox is unchecked. The 'Circle' and 'Polygon' sections are visible but not selected. At the bottom, there are 'Reset', 'Default', 'Help', 'Apply', 'OK', and 'Cancel' buttons. A progress bar at the bottom shows 0%.

The screenshot shows the 'Select subcatalog' dialog box with the 'Magnitudes' tab selected. The 'Range' radio button is selected and circled in red. Below it, the 'Range' section has four rows: 'm1 from 0.0 to 9.0', 'm2 from 0.0 to 9.0', 'm3 from 3 to 4' (circled in red), and 'm4 from 0.0 to 0.0'. The 'Common magnitude' section is visible but not selected. At the bottom, there are 'Reset', 'Default', 'Help', 'Apply', 'OK', and 'Cancel' buttons. A progress bar at the bottom shows 100% and the text 'Selected 35 records.Process of subcatalog creation is completed.'


6) Create a project file for compilation of catalogues that combine the four tasks described above. Click *New Project* button  on the top. In *Parameters of Tasks* frame choose *Currently defined* radio button; in *Tasks* frame choose *Optional Tasks* radio button; in *Optional Tasks* list choose tasks according to tasks of the project (these to appear in *List of Tasks* list on the right). As a result *Project Wizard* window should appear as follows:




7) Click *Next->* button on this page and on all the following ones but *Finish* button on the last page. *Project Wizard* window will close and *Main Central Window* will appear with the following *Protocol* frame.



8) Click *Save Project As* button  and save project file under the name *ex12-project-compilation* in the ...work directory.

9) Click *Execute Project* button  and get the resulting subcatalog, which is created by executing all the four tasks of the project.


10) Save the result of requested compilation under the catalog name ex12-project-compilation in the ...work directory.

Nota bene: Any time a researcher runs CompiCat program he or she may wish saving protocol file by clicking *Save Protocol As...* button . This protocol file contains details of tasks carried out during the run of CompiCat, such as all parameters, lists of errors and duplicates, etc. The protocol files could be used in the future as the comprehensive reference of the catalog compilation. In case, of managing projects it is convenient to save Project and Protocol files using the same core name.


### Exercise 13. A few other options of CompiCat

The previous exercises were given to assist in learning the basics of CompiCat program. In a brief introductory exercises it is not possible to provide a comprehensive demonstration of all the other options of CompiCat tools. In the tasks below some helpful options are considered.

#### Task 1. Import options.

Click *Import*  button. Browse directory ../ecp/Import and screen the files in this directory from the top to the bottom: These files have been retrieved from site links listed in [Appendix B](#). The directory ../ecp/ref contains description of all these formats.

#### Task 2. Export options.

CompiCat allows exporting catalogs in the three formats: (i) 20 bytes - Standard Binary Format , (ii) 41 bytes - Standard Text Format, and (iii) 68 bytes - Standard Wide Text Format. The first two formats are used in the console applications developed at MITP. Open a small file in the standard csf format from ../ecp/exercises , toggle *Export*  button, and export the file into each of the three formats one by one. View the two files exported as ASCII.

#### Task 3. Help offline Manual.

Run Windows explorer. Browse directory ../ecp/doc and open mainindex.html file. Please, scroll the program Manual.

Visit the MITPAN web site ( <http://www.mitp.ru/> ). Click *Software* on the left, then *Earthquake Catalog Processing* to find the CompiCat manual ( <http://www.mitp.ru/soft/ecp/doc/mainindex.html> ).

#### Task 4. Help online.

Click *Content* entry of *Help* menu (keyboard hot-key F1) to open the program Manual. Invoke any of the CompiCat task tools and click *Help*. button. See details in 10. [Help online](#) .

#### Task 5. Help Browser.

Click *Content* entry of *Help* menu. Please, scroll the program Manual and make bookmarks of some pages for further reference. Try *Manage bookmarks* option described in 5. [Help Browser](#)