

Recipe book for NCF-SAR Analysis

Download NCF-SAR MATLAB program along with example data from this website (<https://github.com/Rahulkaushaloo9/NCFSAR-tool>).

(1.1) To make an NCF-SAR protocol in analyst, one example file TNLW-3.SEQ is given for the ease of users. This sequence editor file (.SEQ) can be used to modify as per user requirement.

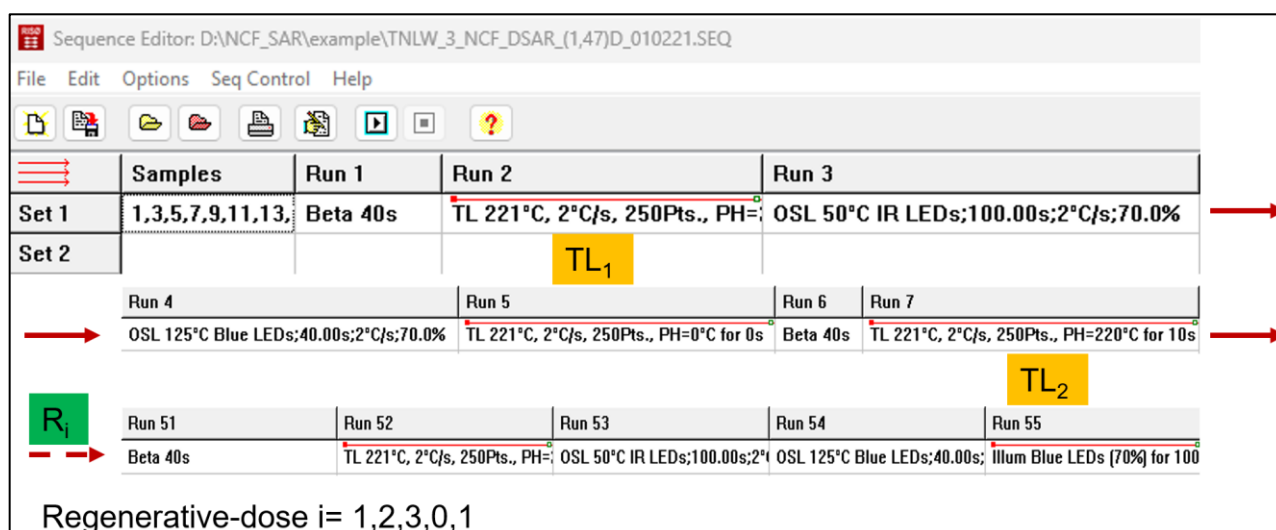


Fig.S1- Snapshot of sequence editor for NCF-SAR protocol. TL₁ and TL₂ is recorded at Run2 and Run7 respectively.

(1.2) Open Relevant Analyst file → Go to top menu bar in Analyst → Records → Unselect All → Every Record

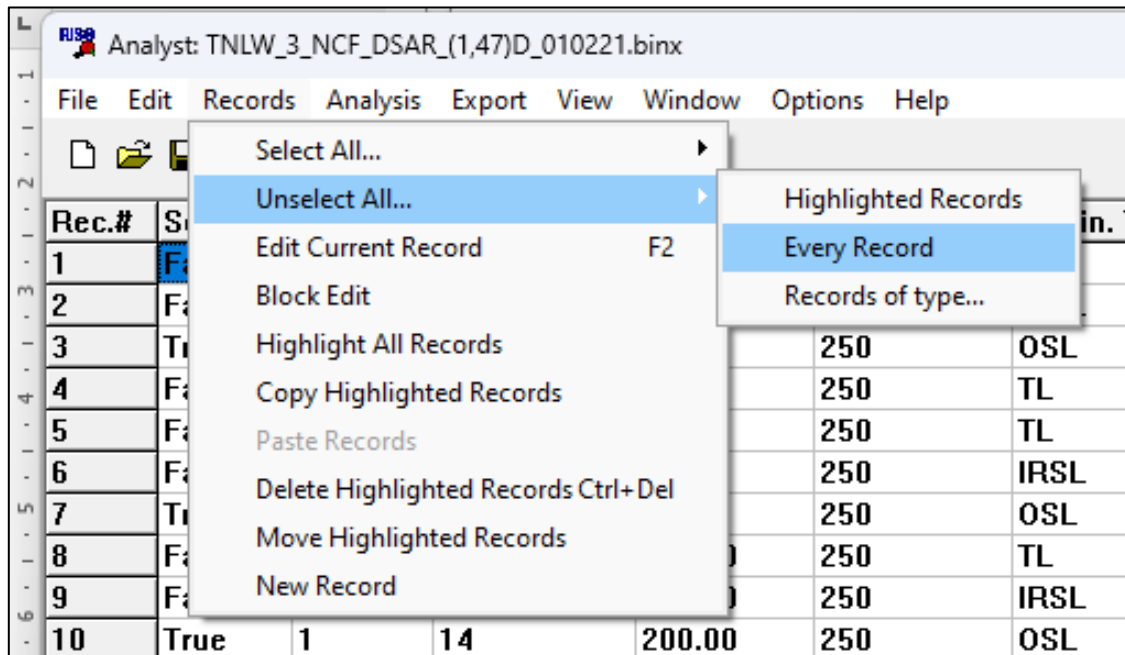


Fig.S2- To unselect records.

(1.3) Records tab → Select All → Records of type → Select records of OSL → Click on SAR button → A Single Aliquot Analysis: window will open

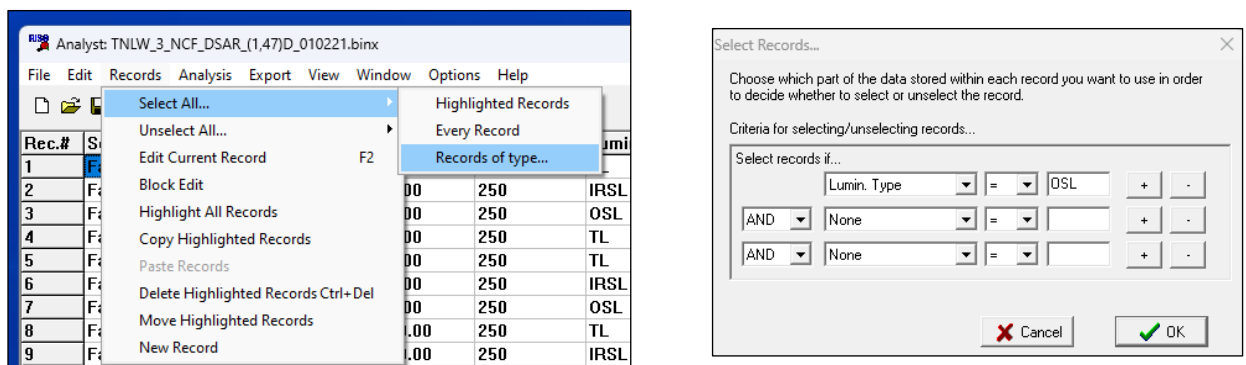


Fig. S3- select records

(1.4) Choose Integration Limits for Signal and Background → Go to Curve Fitting → Select exponential fit → Set acceptance Criteria: - Recycling ratio limit (%) = 10; Max. test dose error (%) = 10; Max. paleodose error (%) = 10; Max. Recuperation (%) = 5; Tick () on Incorporate error on curve fitting.

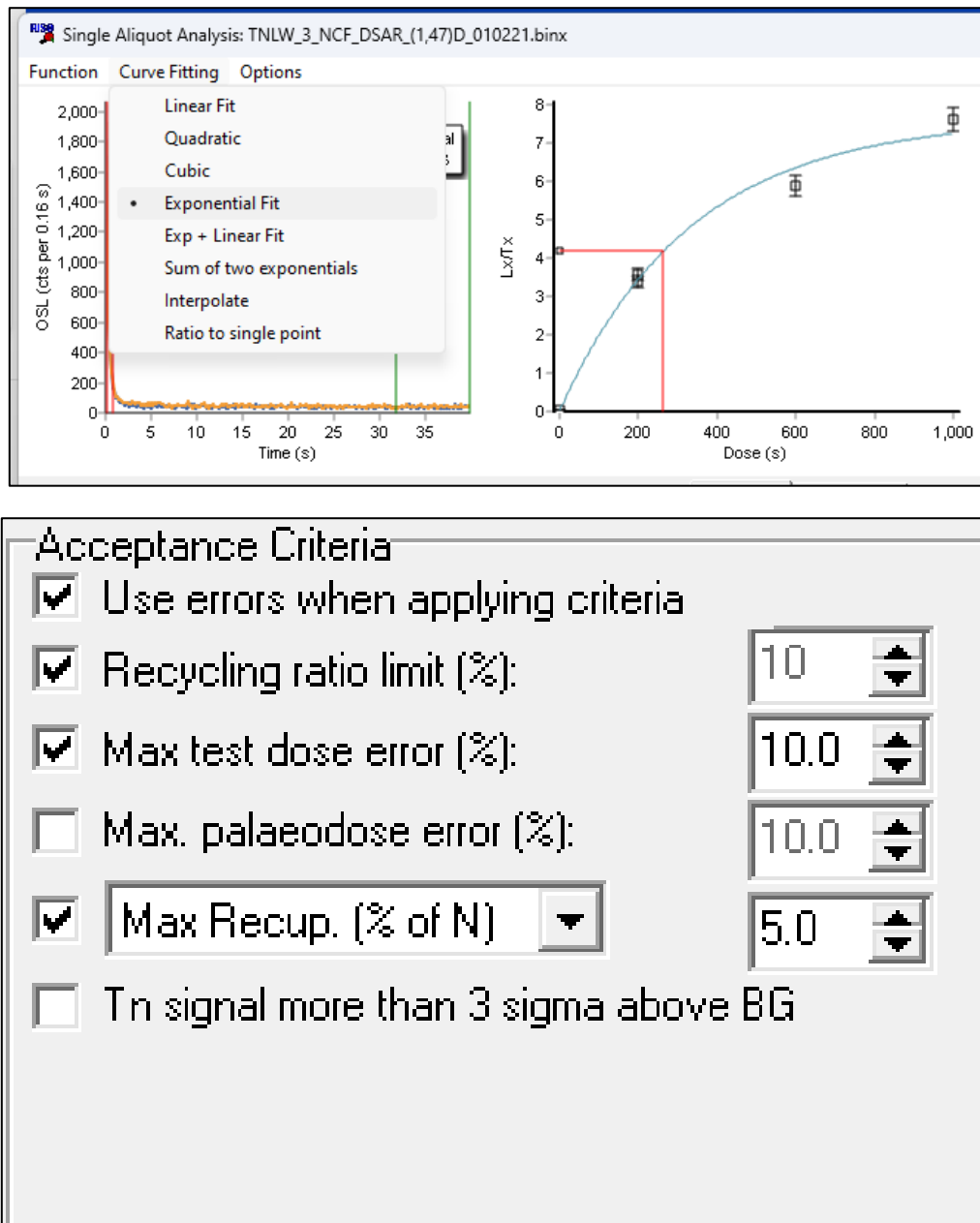


Fig.S4- Select acceptance criteria.

(1.5) Now Go to Function tab → Analyse All Grains by accounting all acceptance Criteria

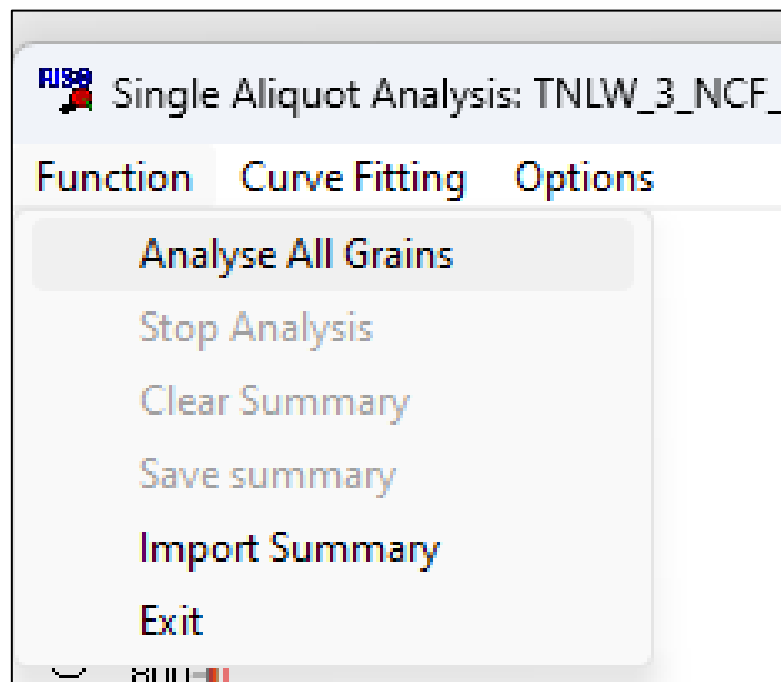


Fig.S5- Analyse all grains.

(1.6) Go to Summary Data tab → Select all aliquots that has passed criteria and gave De values (use Shift + Right arrow on keyboard) → Right click on selected area → Copy data to clipboard with headers → Paste it to any *.txt file or excel file

Lx/Tx Data		Summary Data		<input checked="" type="checkbox"/> Only show those that pass criteria			
#	Selected	Pass_Criter	Filename	Disc#	Grain#	ED	Et
1	TRUE	TRUE	TNLW_3_M	1	0	263.71	25
2	TRUE	TRUE	TNLW_3_M	3	0	273.56	22
3	TRUE	TRUE	TNLW_3_M	5	0	339.12	30
4	TRUE	TRUE	TNLW_3_M	7	0	278.29	14
5	TRUE	TRUE	TNLW_3_M	9	0	254.78	26
6	TRUE	TRUE	TNLW_3_M	11	0	252.62	16
7	TRUE	TRUE	TNLW_3_M	13	0	276.39	27
8	TRUE	TRUE	TNLW_3_M	15	0	278.37	28

Fig.S6- Export aliquots that has passed criteria.

(1.7) From this data, select only following columns which will be used for NCF analysis and copy them in a excel sheet-

(1) Filename (2) Disc (3) ED (4) ED_err (5) L_n/T_n (6) L_n/T_{n_err} (7) Param1 (8) Error1 (9) Param2 (10) Error2 (11) Param3 (12) Error3

A	B	C	D	E	F	G	H	I	J	K	L
File name	Disc position	EDSar(s)	error	Lx/Tx	Error	a	ae	b	be	c	ce

Fig.S7- Select required columns.

(1.8) To extract data for the TL₁ and TL₂ counts- follow step-1 again and make sure Selected column show 'False'.

From Display information menu → Click on Integral1 to integrate counts around the peak±15°C region.

(For example: lower and upper integration limit was 85°C and 105°C respectively for the TNLW-3 sample)

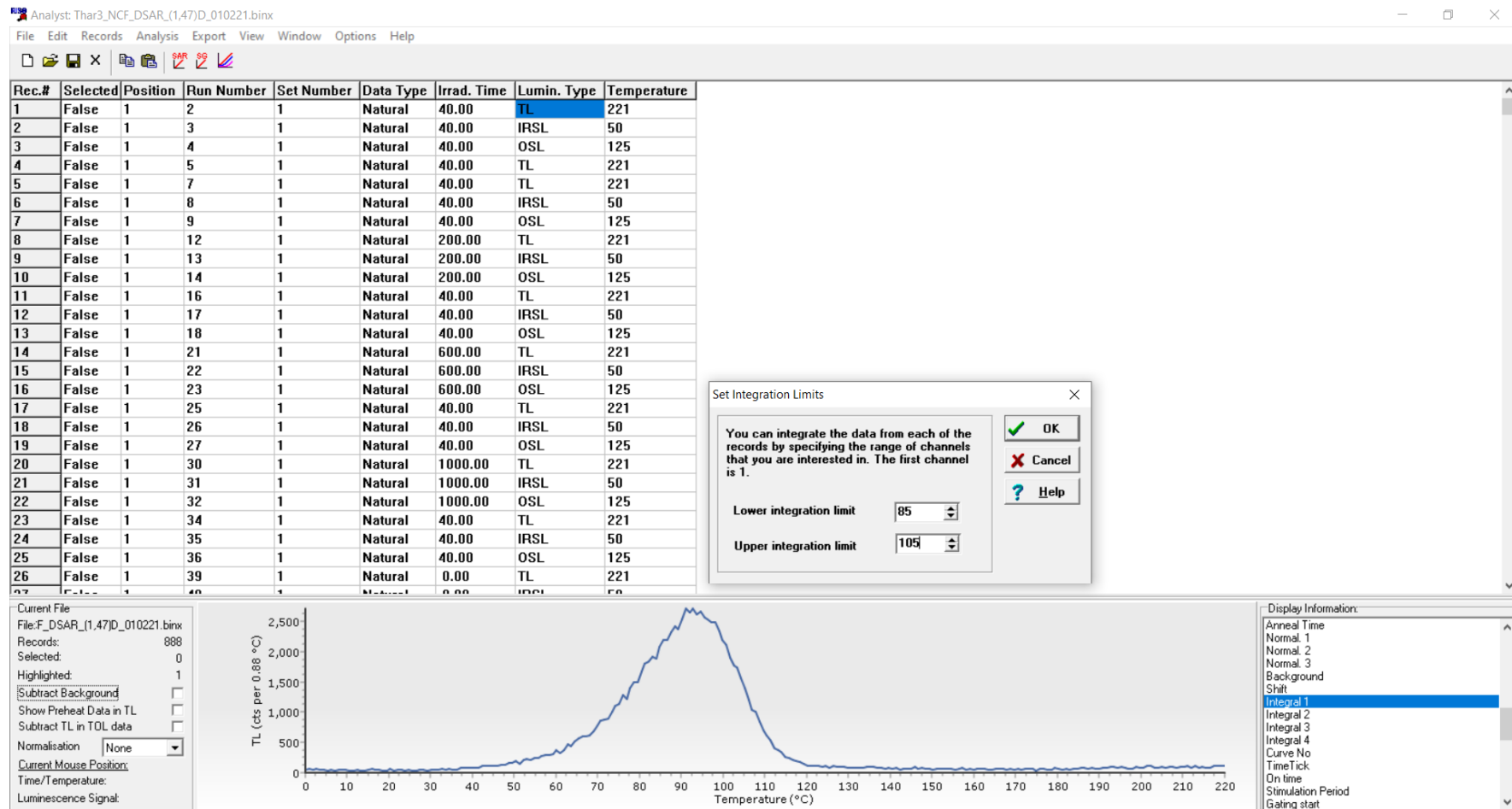


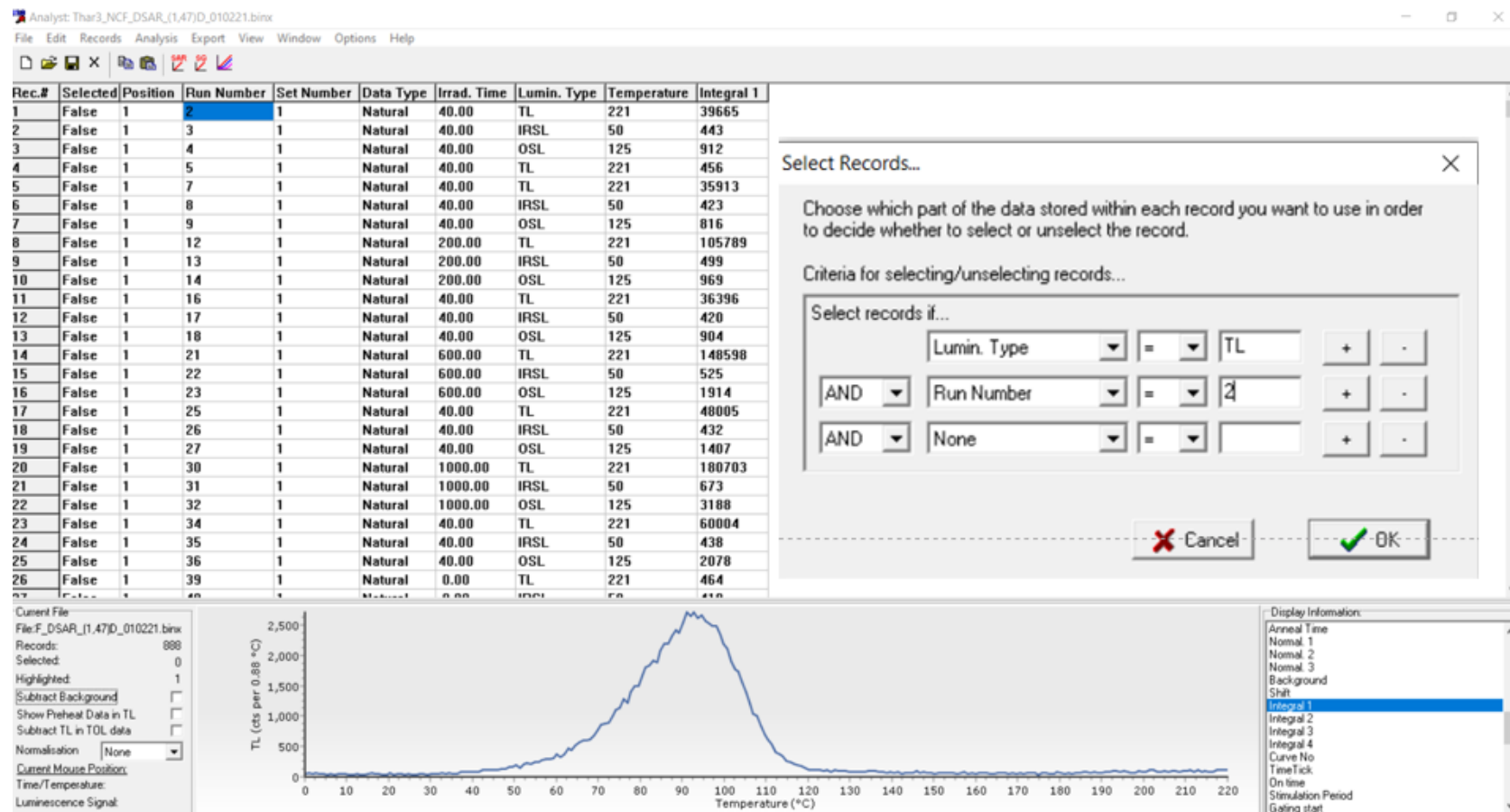
Fig. S8- set integration limits for TL1.

(1.9) Repeat Fig. S8 step to obtain TL₂ Integral counts.

(1.10) To export TL₁ and TL₂ integrated counts; Carefully choose Lumin. Type and Run Number as per Table-2 NCF-SAR protocol steps.

(For example: Lumin. Type = TL And Run Number = 2 → will select TL₁ integrated counts)

(For example: Lumin. Type = TL And Run Number = 7 → will select TL₂ integrated counts)



Analyst: Thar3_NCF_DSAR_(1,47)D_010221.binx

File Edit Records Analysis Export View Window Options Help

Rec.#	Selected	Position	Run Number	Set Number	Data Type	Irrad. Time	Lumin. Type	Temperature	Integral 1
1	False	1	2	1	Natural	40.00	TL	221	39665
2	False	1	3	1	Natural	40.00	IRSL	50	443
3	False	1	4	1	Natural	40.00	OSL	125	912
4	False	1	5	1	Natural	40.00	TL	221	456
5	False	1	7	1	Natural	40.00	TL	221	35913
6	False	1	8	1	Natural	40.00	IRSL	50	423
7	False	1	9	1	Natural	40.00	OSL	125	816
8	False	1	12	1	Natural	200.00	TL	221	105789
9	False	1	13	1	Natural	200.00	IRSL	50	499
10	False	1	14	1	Natural	200.00	OSL	125	969
11	False	1	16	1	Natural	40.00	TL	221	36396
12	False	1	17	1	Natural	40.00	IRSL	50	420
13	False	1	18	1	Natural	40.00	OSL	125	904
14	False	1	21	1	Natural	600.00	TL	221	148598
15	False	1	22	1	Natural	600.00	IRSL	50	525
16	False	1	23	1	Natural	600.00	OSL	125	1914
17	False	1	25	1	Natural	40.00	TL	221	48005
18	False	1	26	1	Natural	40.00	IRSL	50	432
19	False	1	27	1	Natural	40.00	OSL	125	1407
20	False	1	30	1	Natural	1000.00	TL	221	180703
21	False	1	31	1	Natural	1000.00	IRSL	50	673
22	False	1	32	1	Natural	1000.00	OSL	125	3188
23	False	1	34	1	Natural	40.00	TL	221	60004
24	False	1	35	1	Natural	40.00	IRSL	50	438
25	False	1	36	1	Natural	40.00	OSL	125	2078
26	False	1	39	1	Natural	0.00	TL	221	464

Select Records...

Choose which part of the data stored within each record you want to use in order to decide whether to select or unselect the record.

Criteria for selecting/unselecting records...

Select records if...

	Lumin. Type	=	TL	+	-
AND	Run Number	=	7	+	-
AND	None	=		+	-

Fig. S9- Select records of TL1 and TL2 integrated counts.

(1.11) Export TL1 to .txt file.

Analyst: Thar3_NCF_DSAR_(1.47)D_010221.binx

File Edit Records Analysis Export View Window Options Help

Rec.#	Selected	Position	Run Number	Set Number	Data Type	Irrad. Time	Lumin. Type	Temperature	Integral 1
1	True	1	2	1	Natural	40.00	TL	221	39665
2	False	1	3	1	Natural	40.00	IRSL	50	443
3	False	1	4	1	Natural	40.00	OSL	125	912
4	False	1	5	1	Natural	40.00	TL	221	456
5	False	1	7	1	Natural	40.00	TL	221	35913
6	False	1	8	1	Natural	40.00	IRSL	50	423
7	False	1	9	1	Natural	40.00	OSL	125	816
8	False	1	12	1	Natural	200.00	TL	221	105789
9	False	1	13	1	Natural	200.00	IRSL	50	499
10	False	1	14	1	Natural	200.00	OSL	125	969
11	False	1	16	1	Natural	40.00	TL	221	36396
12	False	1	17	1	Natural	40.00	IRSL	50	420
13	False	1	18	1	Natural	40.00	OSL	125	904
14	False	1	21	1	Natural	600.00	TL	221	148598
15	False	1	22	1	Natural	600.00	IRSL	50	525
16	False	1	23	1	Natural	600.00	OSL	125	1914
17	False	1	25	1	Natural	40.00	TL	221	48005
18	False	1	26	1	Natural	40.00	IRSL	50	432
19	False	1	27	1	Natural	40.00	OSL	125	1407
20	False	1	30	1	Natural	1000.00	TL	221	180703
21	False	1	31	1	Natural	1000.00	IRSL	50	673
22	False	1	32	1	Natural	1000.00	OSL	125	3188
23	False	1	34	1	Natural	40.00	TL	221	60004
24	False	1	35	1	Natural	40.00	IRSL	50	438
25	False	1	36	1	Natural	40.00	OSL	125	2078
26	False	1	39	1	Natural	0.00	TL	221	464
27	False	1	40	1	Natural	0.00	IRSL	50	410

Export data

Export data for...

☐ All records

☒ Selected records

Orientation

☒ Horizontally, as shown

☐ Rotate grid through 90°

Include...

☒ Record Numbers

☒ Column Titles

☐ Selected/Unselected

☐ Every data channel

Separator...

☐ Comma

☐ Space

☒ TAB

Cancel Save File

Current File

File: F_DSAR_(1.47)D_010221.binx

Records: 888

Selected: 24

Highlighted: 1

☐ Subtract Background

☐ Show Preheat Data in TL

☐ Subtract TL in TOL data

Normalisation: None

Current Mouse Position:

Time/Temperature:

Luminescence Signal:

Display Information:

Anneal Time

Normal. 1

Normal. 2

Normal. 3

Background

Shift

Integral 1

Integral 2

Integral 3

Integral 4

Curve No

TimeTick

On time

Stimulation Period

Gating start

Fig.S10- Export TL1 integrated count data to text file.

(1.12) Re-Arrange columns of 1.7 step with TL integrated counts.

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S
File name	date	Disc position	EDSar (s)	error	ncf peak -1	ncf peak -2	Lx/Tx	Error	a	ae	b	be	c	ce	NCF Test dose	Machine Dose Rate (Gy/min)	Machine calibration date (D-M-YYYY)	Experiment date (D-M-YYYY)
V_3_NCF_DSAR_(1,47)D_010221	01-Feb-21	1	261.61	20.68	47988	41334	4.464	0.195	10.1	0.489	448	36.1	0.588	0.306	40	4.702	18-12-2019	01-02-2021

Fig.S11- NCF-SAR data is prepared for input in MATLAB.

(2) For executing NCF-SAR MATLAB program and testing the example data

(2.1) Downloaded folder named as NCF_SAR contains MATLAB program with example data.

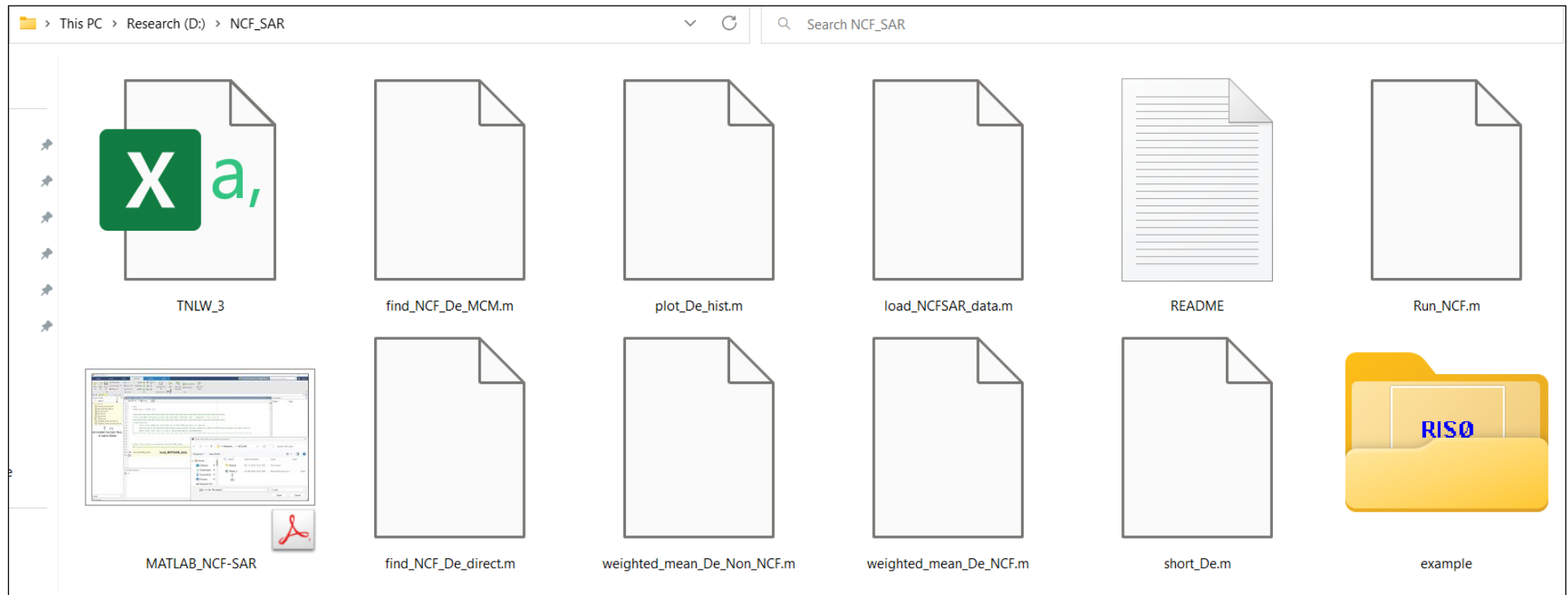


Fig. S12- NCF_SAR folder contains MATLAB program

(2.2) Open MATLAB code named as Run_NCF.m or simply type in command window "load_NCF_SAR_data".

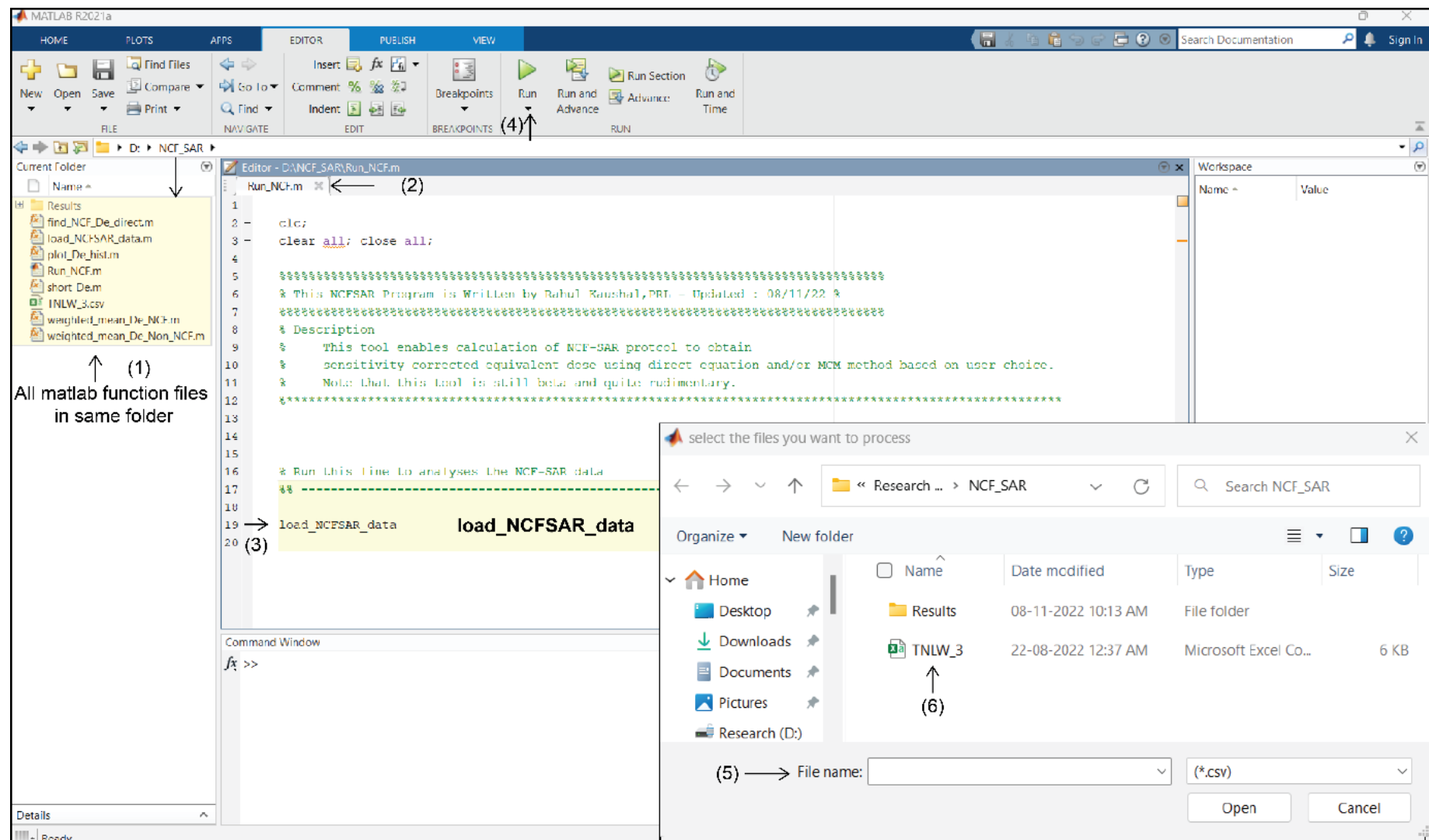
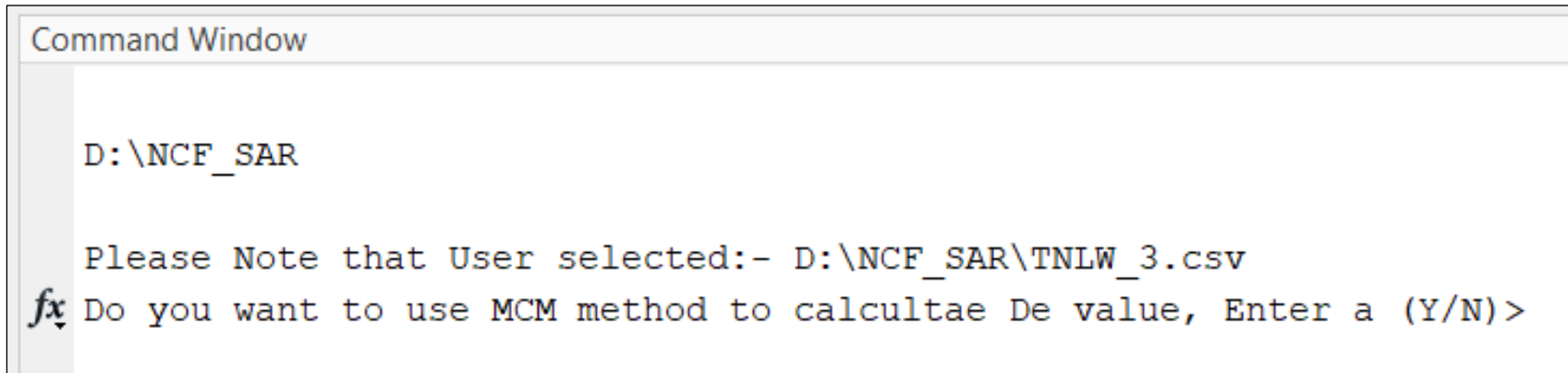


Fig. S13- A MATLAB interface to upload example file (TNLW_3.csv).

(2.3) Follow instructions appear on command window



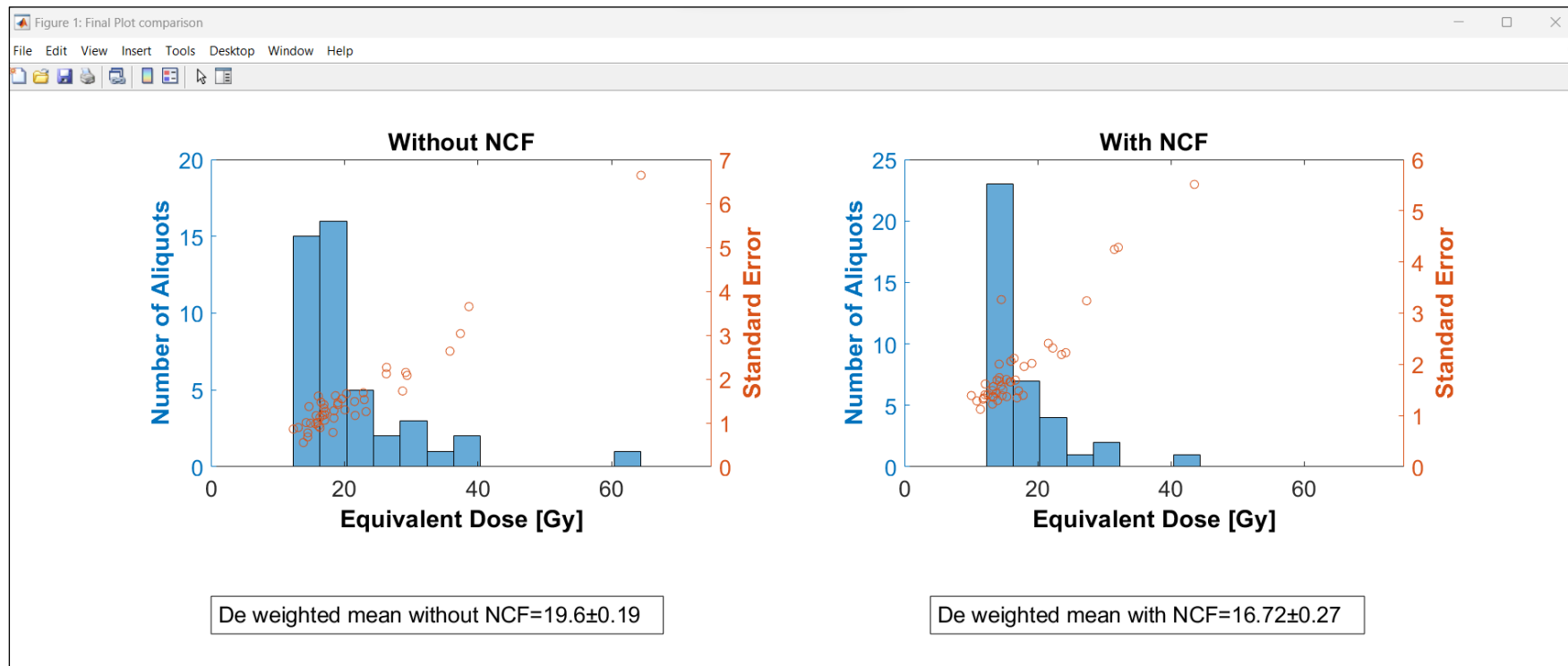
```
Command Window

D:\NCF_SAR

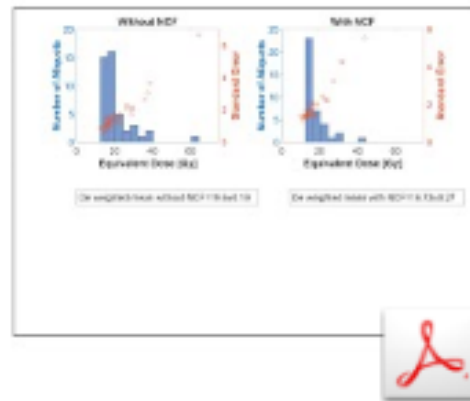
Please Note that User selected:- D:\NCF_SAR\TNLW_3.csv
fx Do you want to use MCM method to calculate De value, Enter a (Y/N)>
```

Fig.S14- select Y if user want to use MCM to calculate De value if not select N.

(2.4) Output will appear as histogram for without NCF and with NCF De value. And output will be saved in folder named as 'Results'.



This PC > Research (D:) > NCF_SAR > Results



TNLW_3_NCF_SAR



TNLW_3_result_NCF_SAR

Fig.S15- Result of NCF-SAR analysis.