

AFGROW European Workshop 2024

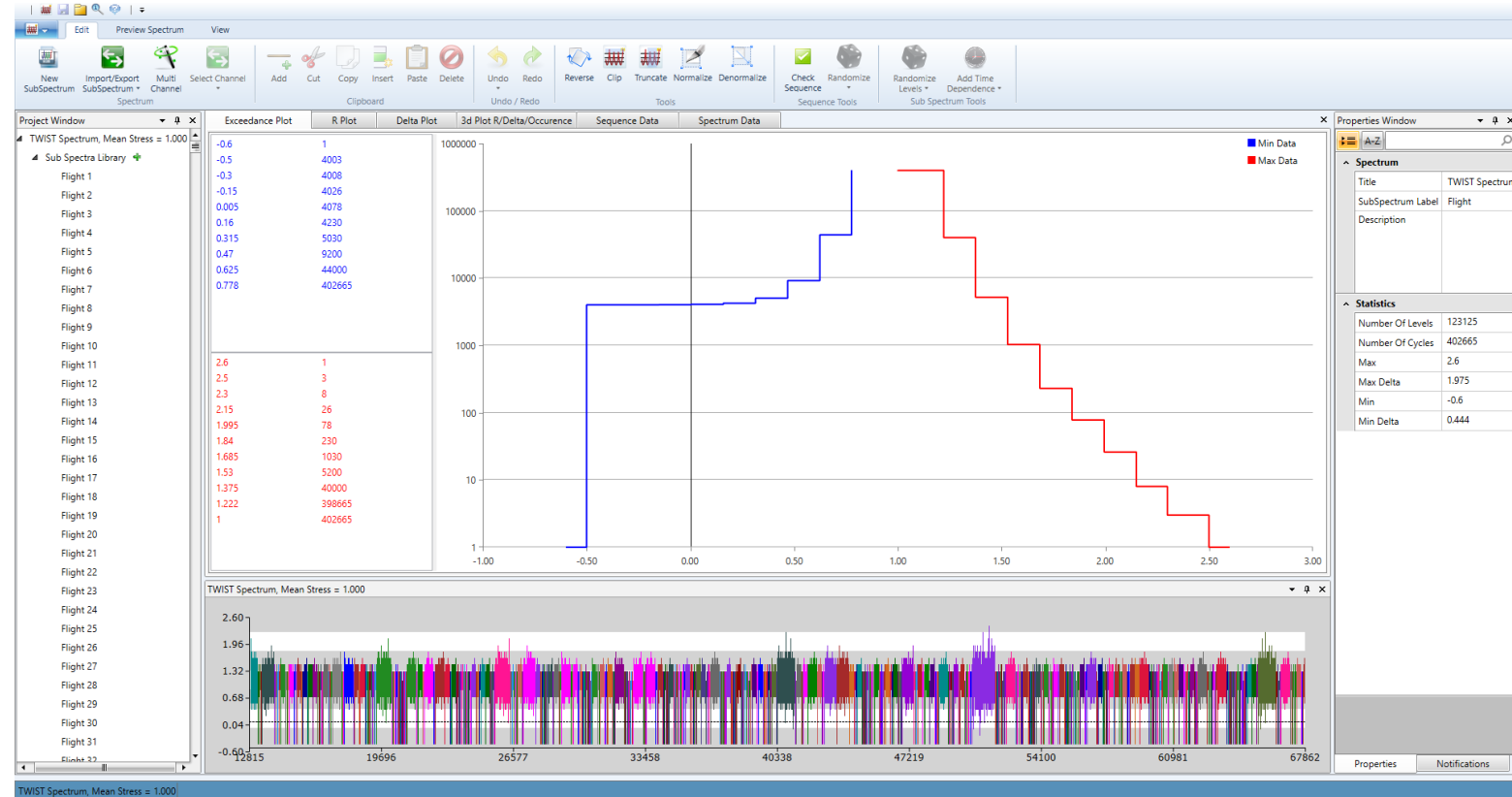
New Features in Spectrum Manager v 1.3

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LexTech What is Spectrum Manager



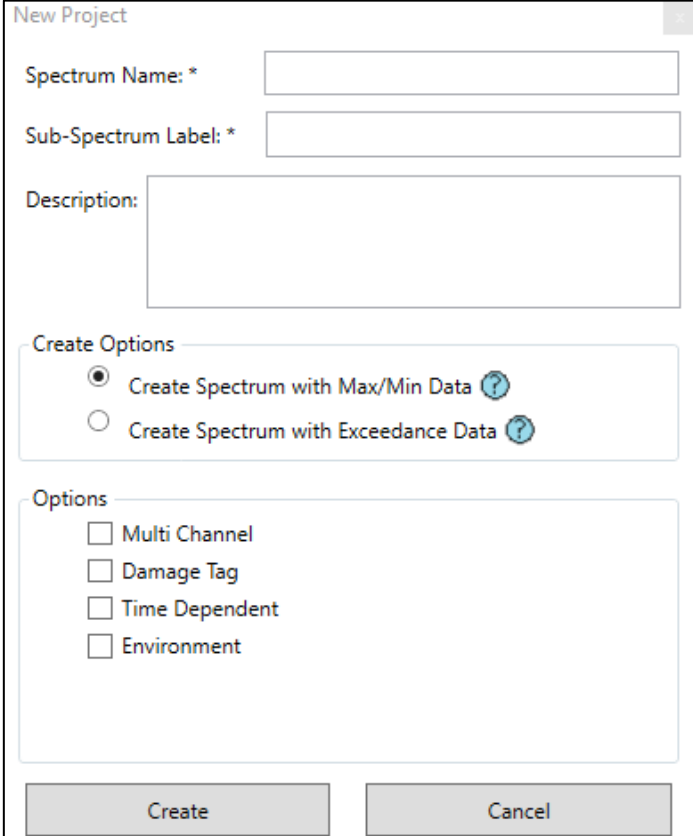
- Next evolution in AFGROW Spectrum generation using XML capabilities.
- Used to Generate Spectrum files for use in AFGROW.
- Create, Edit, and View Spectra Data through multiple detailed windows.
- Spectrum files must be cycle counted before being used in AFGROW



Creating a new Spectrum Project with Spectrum Manager

Spectrum Generation from Max/Min Data

- Select “New Project” in the Application Menu
- Enter a Spectrum Name and Sub-Spectrum Label, optional description
- Select the “Create Spectrum with Max/Min Data” option in the New project dialogue (default)
- Select any additional options to enable in the spectrum
- Click Create to begin adding data



New Project

Spectrum Name: *

Sub-Spectrum Label: *

Description:

Create Options

Create Spectrum with Max/Min Data ?

Create Spectrum with Exceedance Data ?

Options

Multi Channel

Damage Tag

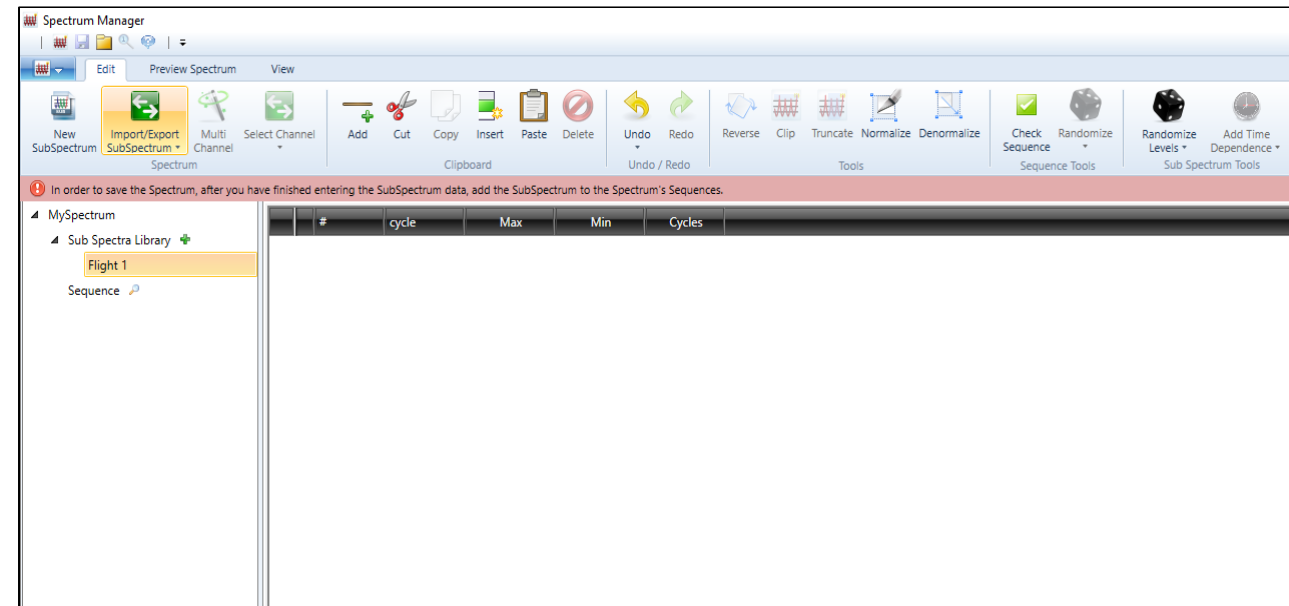
Time Dependent

Environment

Create Cancel

Spectrum Generation from Max/Min Data

- Start with an empty project
- Create new sub-spectra or import previously exported sub-spectra
- Formatted as cycle counted Max/Min/Cycles data
- Use the GUI to edit level data
- Create a sequence from project's sub-spectra library
- Once a valid sequence is created, saving the spectrum becomes available



Spectrum Manager Release 1.3

- Updated Spectrum Manager to a new Version of .NET
- Change the visual appearance to a modern Windows 11 theme
- Added option to filter Exceedance Plot by Damage Tags
- Incorporate AFGROW Cycle Counter into Spectrum Manager
- Added option to use ASTM E1049 rain flow and range pair spectrum cycle counting
- Option to output spectrum max-min data in a single column or line
- Ability to Concatenate Spectra
- Added an option to Auto Sequence the spectrum

New Spectrum Manager Views

- Updated application style to Windows 11 theme



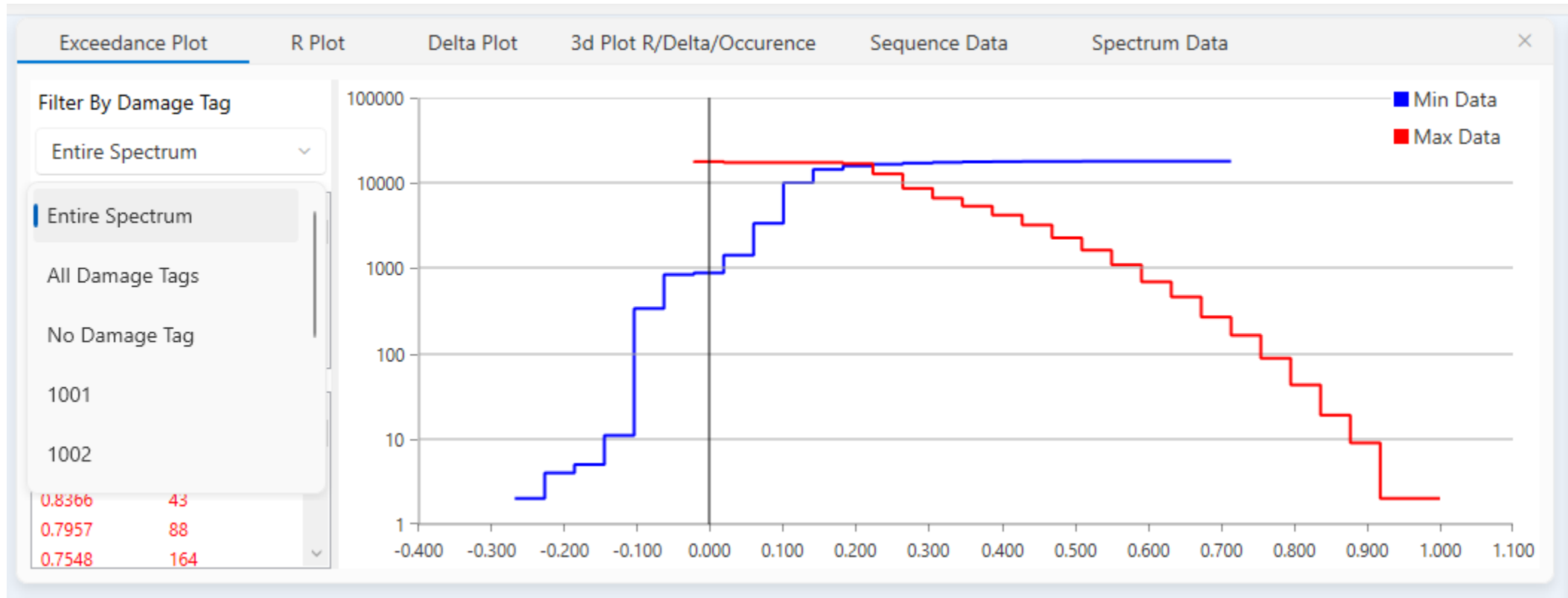
Old vs New Style



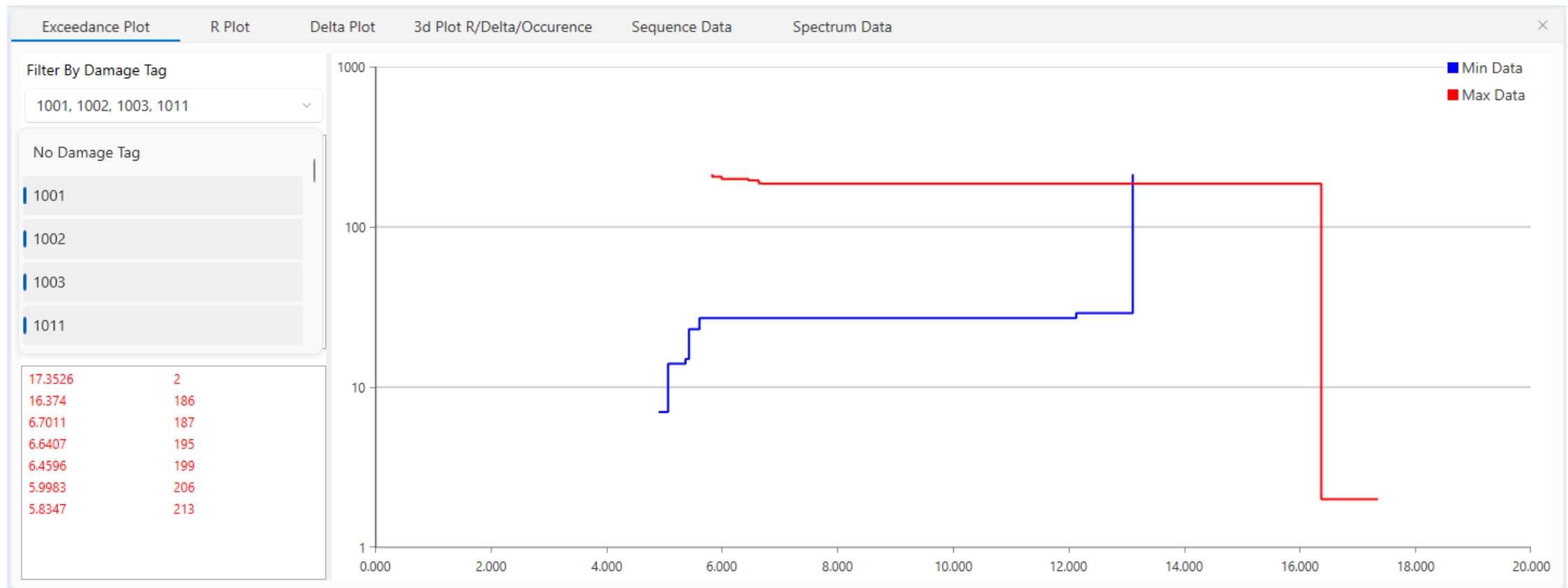
Damage Tag Filter on Exceedance Plot

- Filter the Exceedance Plot by damage tags in the Spectrum
- Can Filter by “Entire Spectrum (Default View), All Damage Tags (All levels with damage tags), No Damage Tag (only levels without any damage tag), and each individual damage tag
- Can also select multiple damage tags to view at once
- Only visible if you have Damage tags enabled in the Spectrum Options

Damage Tag Filter on Exceedance Plot



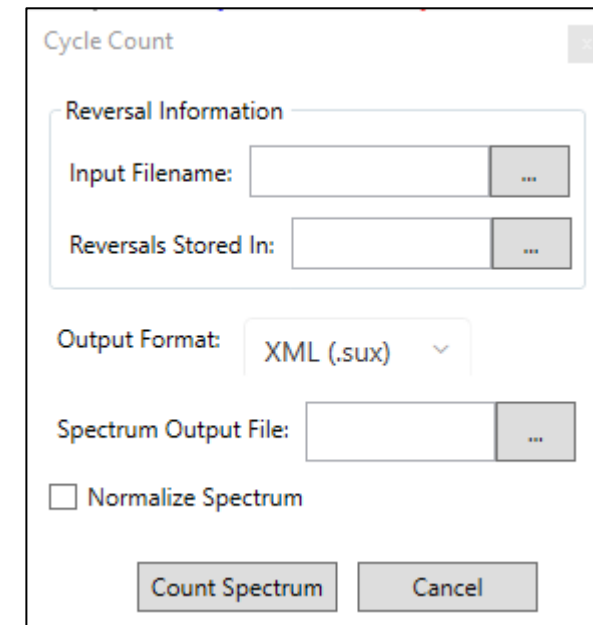
Damage Tag Filter on Exceedance Plot



New Spectrum Manager Options

Cycle Count

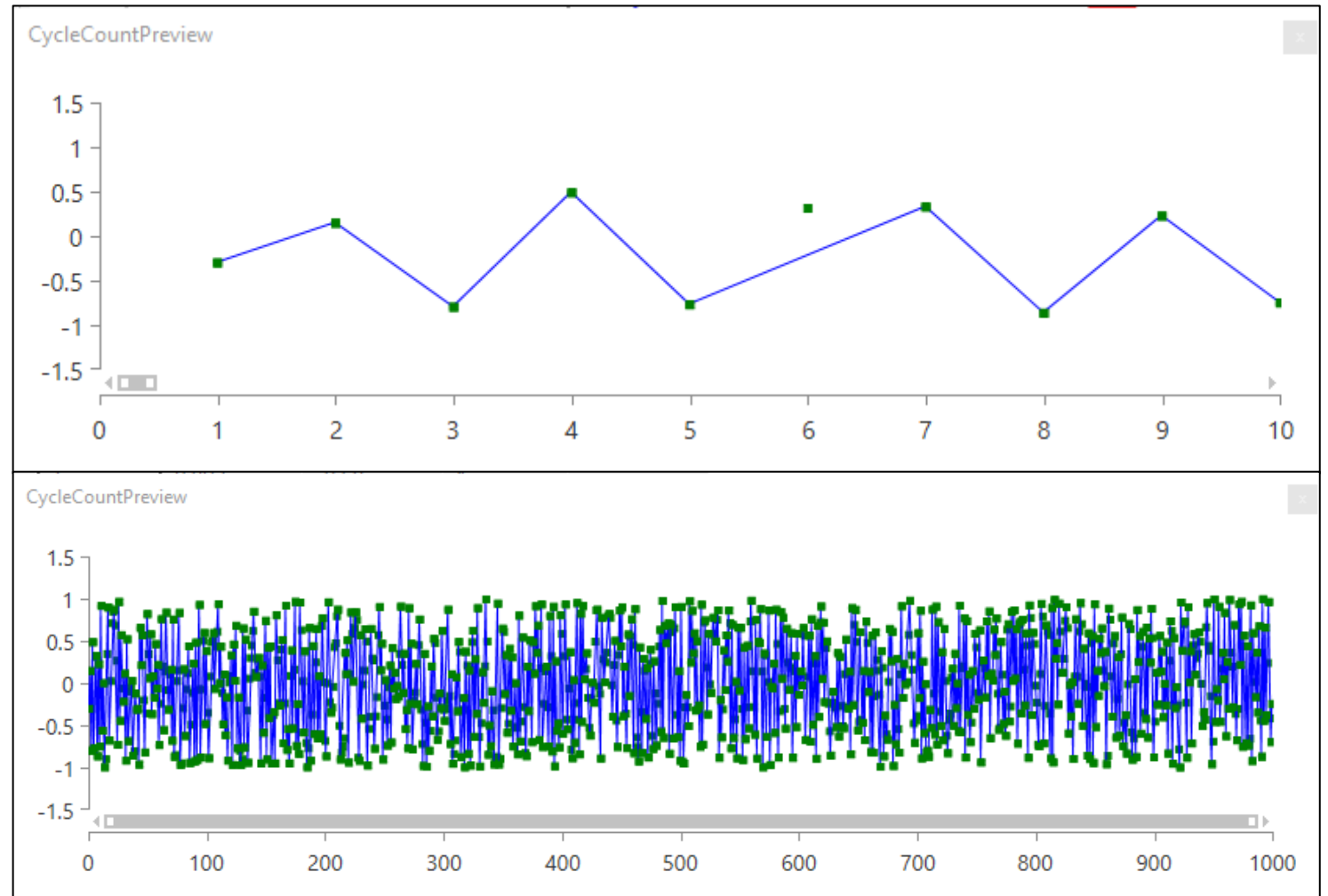
- Create a cycle counted sub-spectrum from time sampled or peak-valley uncounted input data
- Save data in a .inp file (values separated by spaces)
- Choose a file location to store reversal data
- Choose what format to output the sub-spectrum in (Older .sub format or XML)
- Select if you wish the resulting sub spectrum to be normalized



The screenshot shows a dialog box titled "Cycle Count". It contains the following fields and controls:

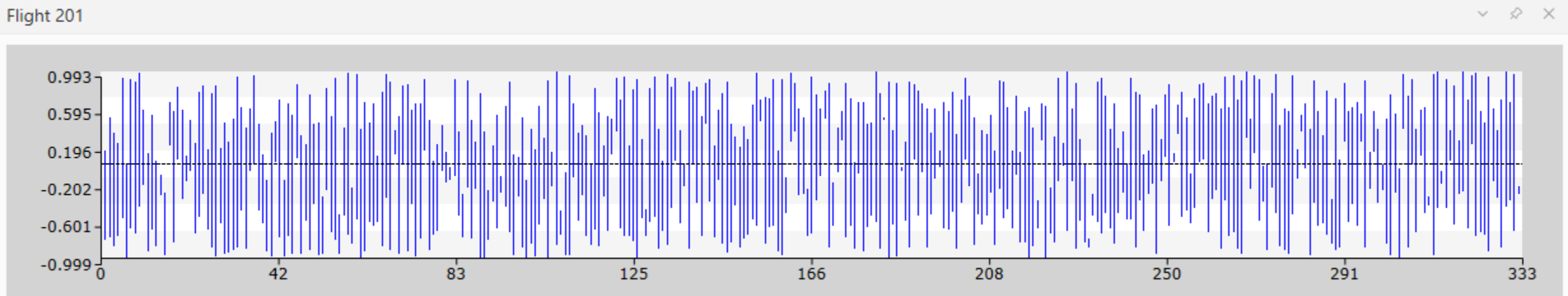
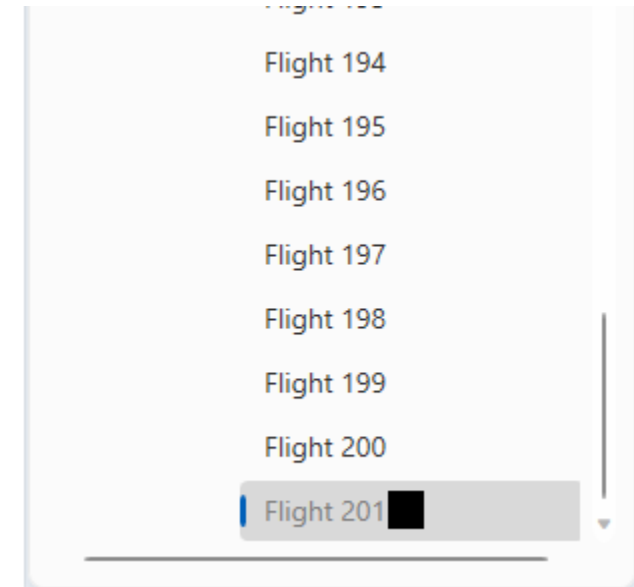
- Reversal Information** (grouped box):
 - Input Filename: [text box] [Browse button]
 - Reversals Stored In: [text box] [Browse button]
- Output Format: XML (.sux) [dropdown arrow]
- Spectrum Output File: [text box] [Browse button]
- Normalize Spectrum
- Count Spectrum [button]
- Cancel [button]

- A preview will be displayed of all points from input file, displayed as green squares
- Blue line connects the points used as reversals
- Graph is zoomable and scrollable for better visualization of data



Cycle Count

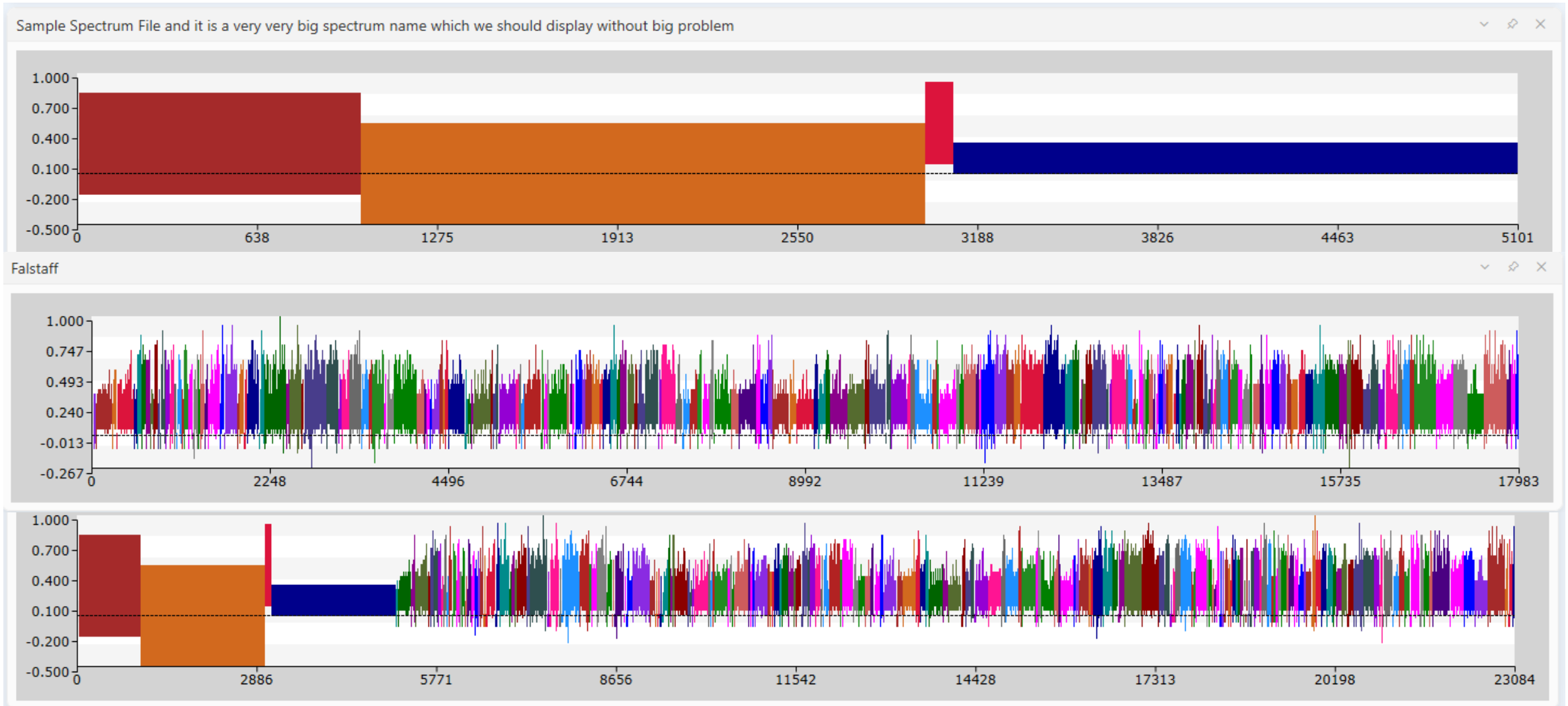
- New counted Sub Spectrum will be added to the end of the Sub Spectra Library
- Symbol will appear next to the name in library to indicate that the Sub Spectrum is from uncounted data



Concatenate Spectra

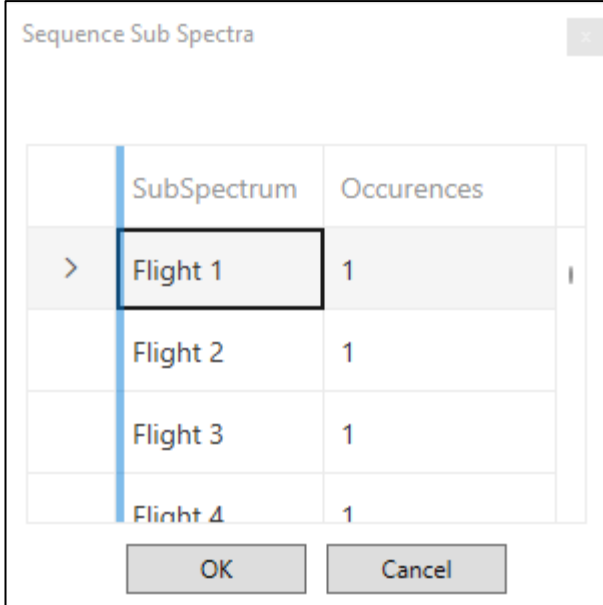
- Combine two spectra together
- Prompt will appear to use the current spectrum's Label to auto-generate names
- Damage Tag, Environment Tag, and Time Dependence data will be lost when concatenating the spectra

Concatenate Spectra



Auto Sequence

- Automatically add the Sub Spectra in the Sub Spectra Library to the Sequence
- Can modify the number of times a Sub Spectra appears in the sequence by changing the Occurrences value next to the Sub Spectrum name.
- These additional occurrences will be sequential.



	SubSpectrum	Occurrences
>	Flight 1	1
	Flight 2	1
	Flight 3	1
	Flight 4	1

OK Cancel



LexTech Using Spectrum In AFGROW



- Open the Spectrum Dialogue
- Select “Open spectrum file”
- Navigate to your saved spectrum file, select it and click “open”

The screenshot shows the 'Spectrum' dialog box with the following content:


Spectrum [Close]

Information: Spectrum Multiplication Factor [SMF] multiplies the stress or load levels found in spectrum files. This allows normalized spectra to be used. If actual stress levels are used in the spectrum files, SMF should be set to 1. Residual Strength Requirement [Pxx] is the value of stress (or load for models using load input) which must be carried at all crack sizes. It is used to determine the critical crack size - if a non-zero value is entered.

Preload [PL] is used to account for pre-existing stresses. This value is added to the max and min spectrum stresses after they have been multiplied by SMF.

Enter

Spectrum Multiplication Factor(SMF):

Residual Strength Requirement (Pxx): 

Preload (PL):

Select

Create new spectrum file

Open spectrum file

Constant amplitude loading



Questions/Comments?