# STRABOMICRO

## USER GUIDE

December 11, 2025

# Contents

# 1 Introduction

## 1.1 Overview of the StraboSpot Ecosystem?

The StraboSpot ecosystem is a suite of interconnected applications and software tools designed to support the collection, management, integration, and sharing of field and laboratory data in the geosciences. Its primary objective is to align data practices with the FAIR principles—Findable, Accessible, Interoperable, and Reusable—by providing a unified system for managing multidisciplinary geologic data.

Developed through ongoing community input, the StraboSpot ecosystem includes several specialized applications: **StraboField**, which supports workflows in structural geology, petrology, sedimentology, and tephra volcanology; **StraboMicro**, which facilitates microscopy-based geoscience research; and **StraboExperimental**, which serves the experimental deformation community. Each of these platforms utilizes controlled vocabularies developed by their respective scientific communities to promote standardized data collection and to improve the discoverability and interoperability of geologic data.

StraboSpot offers more than just a centralized data repository—it also includes tools for capturing and organizing field and laboratory observations, including images. The system is built around the concept of *spots*, which represent observations applied across defined spatial scales. This hierarchical structure allows users to nest observations from the regional to the microscopic scale and to organize data and images according to their specific workflow needs. This flexible framework enables users to capture and relate geologically complex information in a coherent and connected manner.

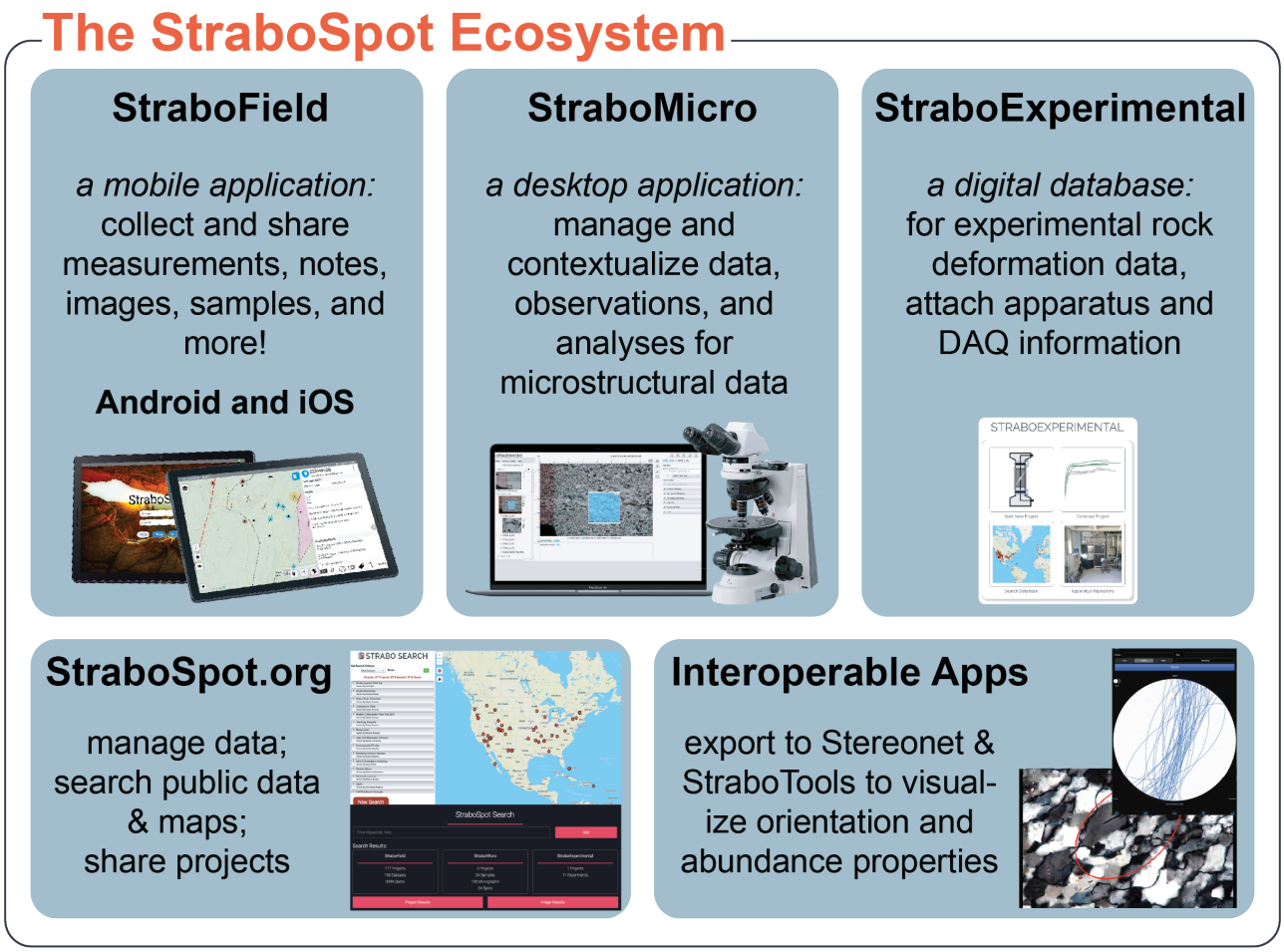



Figure 1: Overview of the StraboSpot ecosystem, three applications: StraboField, StraboMicro, and StraboExperimental all connected to the database at StraboSpot.org

## 1.2 StraboMicro: A Platform for Microscopy-Based Geoscience Research

**StraboMicro** is a desktop application specifically designed to support microscopy-based workflows in geoscience research. It provides a unique, image-centric organizational structure that enables users to efficiently manage and annotate micrographs while preserving spatial relationships and associated scientific metadata.

### Core Functionality

StraboMicro allows users to create and manage projects composed of geological samples. Each sample includes:

- **Reference Micrographs:** Typically low-resolution, full-sample scans or stitched images that provide contextual overviews.
- **Associated Micrographs:** Higher-resolution images of the same sample area, often collected using different imaging techniques (e.g., polarized light, SEM, CL) or instruments.

## Geoscience-Specific Metadata

A key feature of StraboMicro is its ability to link spatial image data with detailed geoscientific metadata. Users can annotate images with geologically meaningful information, such as:

- Project and dataset metadata
- Sample-specific metadata
- Micrograph-level metadata
- Mineralogy and lithology
- Grain and fabric characteristics
- Deformation structures (e.g., clastic deformation bands, faults, shear zones)
- Microstructural features (e.g., extinction patterns, grain boundaries)
- Veins, pseudotachylytes, folds, and fractures
- User notes, associated files, and external links

## Spatial Annotation with Spots

Users can add spatial annotations called *spots* directly onto images. Spots may be defined as points, lines, or polygons, each capable of storing customized observational data. This feature supports rigorous documentation of spatially-resolved geological features.

## Project Management and Data Sharing

StraboMicro is designed to facilitate the lifecycle of a research project:

- As new samples and observations are added, projects evolve in an organized and traceable manner.
- Projects can be shared publicly online, allowing others to view and search the data.
- A Digital Object Identifier (DOI) can be generated for each project, ensuring proper citation and long-term accessibility for publication and archiving purposes.

## Benefits

StraboMicro enhances research productivity by:

- Keeping all images and data visually organized and spatially linked
- Enabling detailed, metadata-rich annotations of geological observations
- Supporting transparent, reproducible science with long-term data preservation

StraboMicro represents a significant advancement in the integration of image-based data and geoscientific analysis, providing a robust platform for both research and education in the Earth sciences.

## 1.3 System Requirements

There are no specific hardware requirements for running the software. While higher-performance systems may offer improved speed and responsiveness, the software does not mandate any minimum system specifications.

## 1.4 Getting Help and Support

To get started with StraboMicro and to enhance your understanding of its features, we recommend the following resources:

- **YouTube Tutorials:** Watch the official StraboMicro tutorial videos available on our YouTube channel for step-by-step guidance.
- **User Manual:** Refer to this manual for detailed explanations of functions and features.
- **Weekly Office Hours:** Join our live support sessions held every Thursday from 1:00 PM to 3:00 PM CDT (UTC-5).
  *Register here:* `https://strabospot.org/help`
- **Email Support:** For additional help, contact us at StraboSpot@gmail.com.

# 2 Installation and Setup

## 2.1 Creating a StraboSpot Account

To use StraboMicro and access associated data services, you must first create a StraboSpot account. Follow the steps below to register:

1. Open your web browser and navigate to `https://www.StraboSpot.org`.
2. On the homepage, go to the `Account` menu in the top navigation bar and select `Register`.
3. Fill out the registration form with your full name and a valid email address. Please use a real and accessible email address, as it will be used to verify your account and for future communication.
4. After submitting the form, check your email inbox for a confirmation message from StraboSpot.
5. Open the email and click the confirmation link to activate your account.
6. Once confirmed, you may log in to the StraboSpot website using your new credentials.

**Note:** If you do not receive the confirmation email within a few minutes, check your spam or junk folder. If the issue persists, contact support at StraboSpot@gmail.com.

## 2.2 Downloading the Application

Follow the steps below to download the latest version of **StraboMicro**:

1. Open your web browser and navigate to `https://www.StraboSpot.org`.
2. Log in to your account:
   (a) On the homepage, click `Account > Log In`.
   (b) Enter your login credentials.
3. Navigate to the StraboMicro download page:
   (a) Select `Software > StraboMicro > Download StraboMicro`.
4. Download the most recent version of StraboMicro that is compatible with your operating system and processor type (e.g., Intel vs. Apple Silicon for macOS).

## 2.3 Installing on Windows/macOS/Linux

**Windows:**

- Double-click the downloaded `.exe` file.
- Follow the on-screen instructions in the installer.
- After installation, launch the application from your Start Menu or desktop shortcut.

**macOS:**

- Open the downloaded `.dmg` file.
- Drag the StraboMicro application into the `Applications` folder.
- Launch the app. If prompted, allow the app to run in System Preferences under `Security & Privacy`.

**Linux:**

- Extract the downloaded archive (e.g., `.tar.gz`).
- Navigate to the extracted folder in a terminal.
- Run the executable file using: `./StraboMicro`

## 2.4 First-Time Setup

When launching StraboMicro for the first time:

- You may be prompted to grant necessary system permissions.
- The application will create a default folder named `StraboMicroData` in your Documents directory. This folder stores project data and application cache.
- Ensure you are connected to the internet to enable automatic syncing with your StraboSpot account and access to vocabulary updates.

## 2.5 Updating the Software

If you are using a version of StraboMicro older than 1.2.9, automatic updates are not supported. You must manually update to the latest version. After this update, the application will automatically update going forward.

### 2.5.1 Checking Your StraboMicro Version

To verify your current version of the application:

1. Open the StraboMicro application.
2. Click the `Help` tab on the top navigation bar.
3. Select `About StraboMicro`.
4. Locate and confirm the application version number (e.g., 1.2.12).
    - If your application is version 1.2.12 or later, no further action is required.
    - If your version is older, follow the instructions below to update the application.

### 2.5.2 Manually Updating StraboMicro

1. **Save your current project:**
    (a) Go to `File > Save Project As…` and choose a location on your computer.
2. **(Optional) Upload your project to the StraboSpot server:**
    (a) Go to `File > Upload Project`.
    (b) This uploads your project data to your StraboSpot account online.
    (c) To verify the upload:
        i. Open your browser and go to `https://www.StraboSpot.org`.
        ii. Log in to your account (`Account > Log In`).
        iii. Navigate to `Account > My StraboMicro Data`.
        iv. Confirm that your project appears in the list with the correct upload date.
3. **Delete previously cached data:**
    (a) Open your file explorer and navigate to your `Documents` directory.
    (b) Locate the `StraboMicroData` folder.
    (c) Select and delete all folders inside `StraboMicroData`. This ensures compatibility with the new version.
4. **Reinstall the latest version:**
    (a) Repeat the steps in the **Downloading the Application** and **Installing** sections above.

## 2.6 StraboMicro Instrument Catalog

The **StraboMicro Instrument Catalog** enables laboratories and research groups to associate instrumentation with current and past research projects. It is designed to reduce redundancy in the data input process by storing instrument metadata, including:

- Instrument name
- Type and make
- Location
- Collection and post-processing software
- Detectors
- Additional notes

Once instrument information is entered into the catalog, any StraboMicro user can select that instrument during data entry. Relevant metadata will automatically populate, streamlining the workflow and ensuring consistency.

### 2.6.1 Becoming an Institution Principal Investigator (PI)

There are two ways to become a designated PI for an institution or laboratory:

1. During the 'Add New Sample' upload process within StraboMicro, a link to add a new institution to the catalog can be found in the 'Select Instrument' modal (Figure 2). Clicking the link generates an email request — see Section 5.1.3 for details.
2. Alternatively, you may directly email the development team to request PI access. See Section 1.4 for contact information.

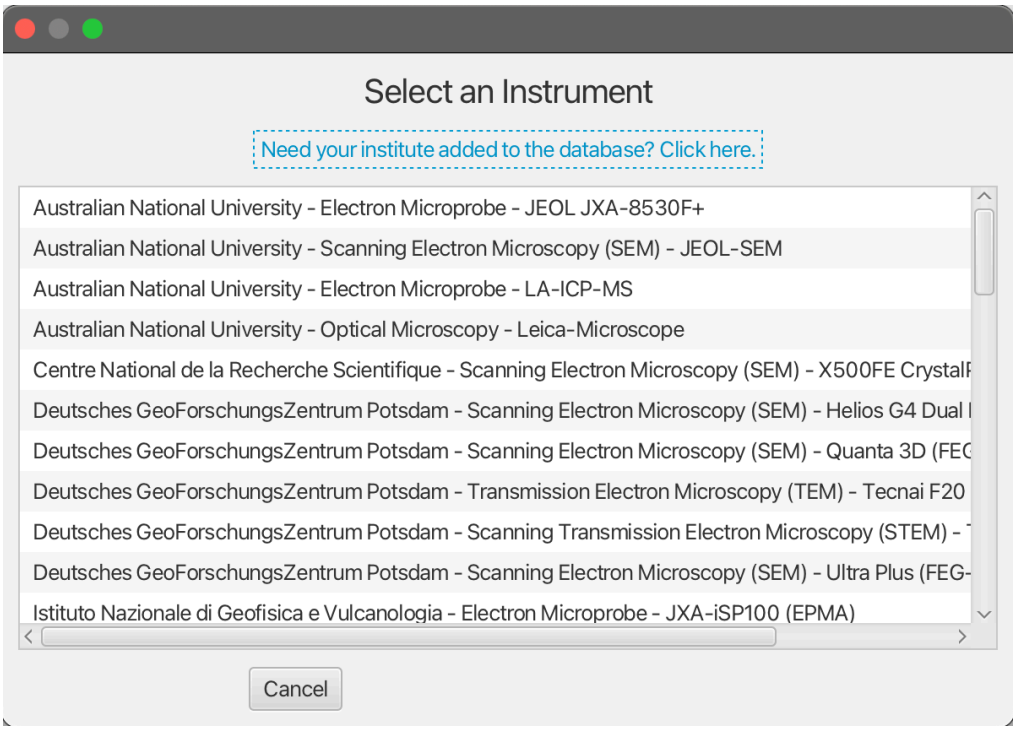



Figure 2: Screenshot of the **StraboMicro Select Instrument** modal with the PI request link.

### 2.6.2 Accessing and Updating the Instrument Repository

Once approved as a PI, you can manage instruments associated with your institution by visiting `www.strabospot.org`. After logging in:

1. Navigate to your account.
2. Select **My Instruments**.
3. Access the **StraboMicro Instrument Catalog**, where you can view existing institutions and instruments.
4. Use the provided links to add or edit instruments and institutional affiliations.

# 3 Manage StraboMicro Projects

StraboMicro projects differ slightly in structure from other StraboSpot applications. In StraboMicro, each **Project** contains one or more **Samples**, which store the data.

To create a new project, open the StraboMicro desktop application. For installation details, see Section 2: *Installation and Setup*.

From the **File** menu, choose either **New Project** or **New Project from Field Data**.

## 3.1 New Project

The **New Project** modal includes the following fields:

- **Project Name***
- Start Date
- End Date
- Purpose of Study
- Team Members
- Area of Interest
- GPS Datum (default: WGS84)
- Magnetic Declination
- Notes

**Required field.* After entering project details, you will be prompted to provide a **Dataset Name**.

Once complete, the interface automatically opens the **New Sample** modal—the same one used when selecting *Add / New Sample* or *Create New Sample* (see Section 3.2).

### 3.1.1 New Project from Field Data

**Navigation:** `File > New Project from Field Data`

This option creates a micrograph-based project using field data collected in StraboField.

#### Step 1: Select a Project

Opens the **Select a Project from Server** modal, listing all projects associated with your StraboSpot account.

- Select a project and click **Next**.

#### Step 2: Select a Dataset

Choose a dataset within the selected project.

- All available datasets will be listed.
- Click a dataset to view associated samples.

#### Step 3: Choose a Sample

A searchable list of samples appears.

- Select a sample to begin the **New Sample** workflow.
- The process starts at the **Load Reference Micrograph** step (see Section 5.1.2).

**Note:** You may return later to import additional samples from the same dataset.

#### Metadata Auto-Population

Field samples automatically import the following metadata:

- **Project and Dataset:**
  - Project Name, Start Date, GPS Datum, Magnetic Declination
  - Last Modified Timestamp, Location, Dataset Name
- **Sample:**
  - Sample ID/Name, Direct Link (StraboSpot.org), Location
  - Sampling Purpose, Description, Material Type, Inplaceness
  - Orientation Info, Size, Weathering, Notes

## 3.2 Open Existing Projects

StraboMicro allows you to open existing projects stored locally, in your StraboSpot account, or shared via code or DOI.

### 3.2.1 Open a Local Project

To open a local '.smz' file:

1. Launch the StraboMicro application.

2. Go to `File` → `Open Local Project`.
3. Navigate to the '.smz' file on your device.
4. Select the file and click `Open`.

### 3.2.2 Open a Remote Project

To open a project from your StraboSpot account:

1. Ensure you're logged into StraboMicro.
2. Confirm your login at the top of the window (`Logged in as [email]`).
3. Go to `File` → `Open a Remote Project`.
4. Select the project and click `Open`.

### 3.2.3 Open a Project with a Share Code

To access a shared project:

1. Launch StraboMicro.
2. Go to `File` → `Open a Project with a Share Code`.
3. Enter the provided code and click `Next`.

See Section 3.7.2 for instructions on generating share codes.

## 3.3 Save Projects

### 3.3.1 Save to Local Device

To save the currently open project:

1. Go to `File` → `Save Project`, or use `Ctrl+S` (Windows/Linux) or `Cmd+S` (macOS).
2. Choose a destination folder.
3. Enter a file name with the `.smz` extension.
4. Click `Save`.

### 3.3.2 Upload to StraboSpot Server

To back up or share your project online:

1. Go to `File` → `Upload Project`.
2. Read the upload prompt:

   *Uploading your project backs up your data and makes it accessible via StraboSpot.org.*

3. If the project already exists, check `Project Already Exists. Overwrite?` to proceed.

**Note:** StraboSpot.org retains version history. Frequent uploads are recommended to prevent data loss and preserve project history.

## 3.4 Download Projects

### 3.4.1 Download `.smz` File

**Method 1: From StraboSpot.org**

1. Go to `https://strabospot.org` or access it via the StraboMicro app (`File > Go to My Data`).
2. Log in and navigate to `Account > My StraboMicro Data`.
3. Click `Options` next to a project and select `Download`.

**Method 2: From the Online Viewer**

1. Go to `https://strabospot.org`, log in, and open the desired project via `My StraboMicro Data > View`.
2. Click `Download .SMZ` in the top-right corner of the viewer.

### 3.4.2 Download Project as PDF

**Method 1: From the Desktop App**

1. Open your project in StraboMicro.
2. Go to `File > Export Project as PDF`.
3. Choose a destination folder.

**Method 2: From the Online Viewer**

1. Log in to `https://strabospot.org`.
2. Navigate to `Account > My StraboMicro Data`.
3. Open the project via `Options > View`.
4. Click `Download PDF` in the viewer.

*Note:* Projects must be uploaded to the server before they can be viewed or exported online.

### 3.4.3 Download JSON File

1. In StraboMicro, go to `File > Export Project as JSON`.
2. Select the destination folder.
3. The project will be saved as a JSON file.

## 3.5 Download Project Images

**Method 1: Export All Images**

1. Go to `File > Export All Images`.
2. Select a destination folder.
3. The app will export a `.zip` containing all annotated micrographs.

*Note:* Images include all visible annotations at the time of export.

**Method 2: Export Individual Annotated Images**

1. Open a micrograph.
2. Click the **Download** button in the right panel.

*Tip:* To hide overlays in exports, use the **Show/Hide** icon before downloading.

## 3.6 Project Privacy

All projects are private by default in StraboMicro and StraboSpot. Users have full control over project visibility and can change privacy settings at any time.

To update a project's privacy, visit `www.strabospot.org` and log in. Navigate to your account, then select **My StraboMicro Data**. A list of your projects will be displayed, each with a toggle labeled **Public?** next to the project title.

If the toggle is switched to the right and appears green, the project is public and discoverable by other users through the StraboSpot search interface. If your project is public and you would like to make it private again, simply toggle the switch back to the left.

## 3.7 View and Share Projects

### 3.7.1 View in Online StraboMicro Viewer

1. Log in at `https://strabospot.org`.
2. Go to `Account > My StraboMicro Data`.
3. Click `Options > View` next to a project.

Ensure the latest version has been uploaded before viewing online.

### 3.7.2 Sharing Projects

The `Share` feature allows others to download your project using a short code—no login required. Shared projects are independent copies; changes made by others do not affect your original.

**Important:** Share codes always retrieve the most recent uploaded version, not a snapshot. To share a static version, use a `.smz` export.

### 3.7.3 Generate a Share Code

1. Log in at `https://strabospot.org`.
2. Go to `Account > My StraboMicro Data`.
3. Click `Options > Share` next to the desired project.
4. Follow on-screen instructions to generate and copy the share code.

*Note:* Shared projects are not collaborative; each copy is independent.

## 3.8 DOI Creation

You can generate a DOI (Digital Object Identifier) for a static, citable version of your project. Once created, the DOI links to a permanent snapshot, unaffected by future changes.

### 3.8.1 Generate a DOI

1. Log in at `https://strabospot.org`.
2. Go to `Account > My StraboMicro Data`.
3. Click `Options > Get DOI for Project`.
4. Follow the instructions to finalize DOI creation.

### 3.8.2 View a Project via DOI

1. Go to `https://strabospot.org`.
2. Navigate to `Search > Search All StraboSpot Data`.
3. Log in to your account.
4. Enter the DOI and click `Add`.
5. Select `View` next to the desired project.

# 4 User Interface Overview

StraboMicro features a user interface layout designed for intuitive navigation and efficient interaction with image data and metadata. The layout is organized into five main sections:

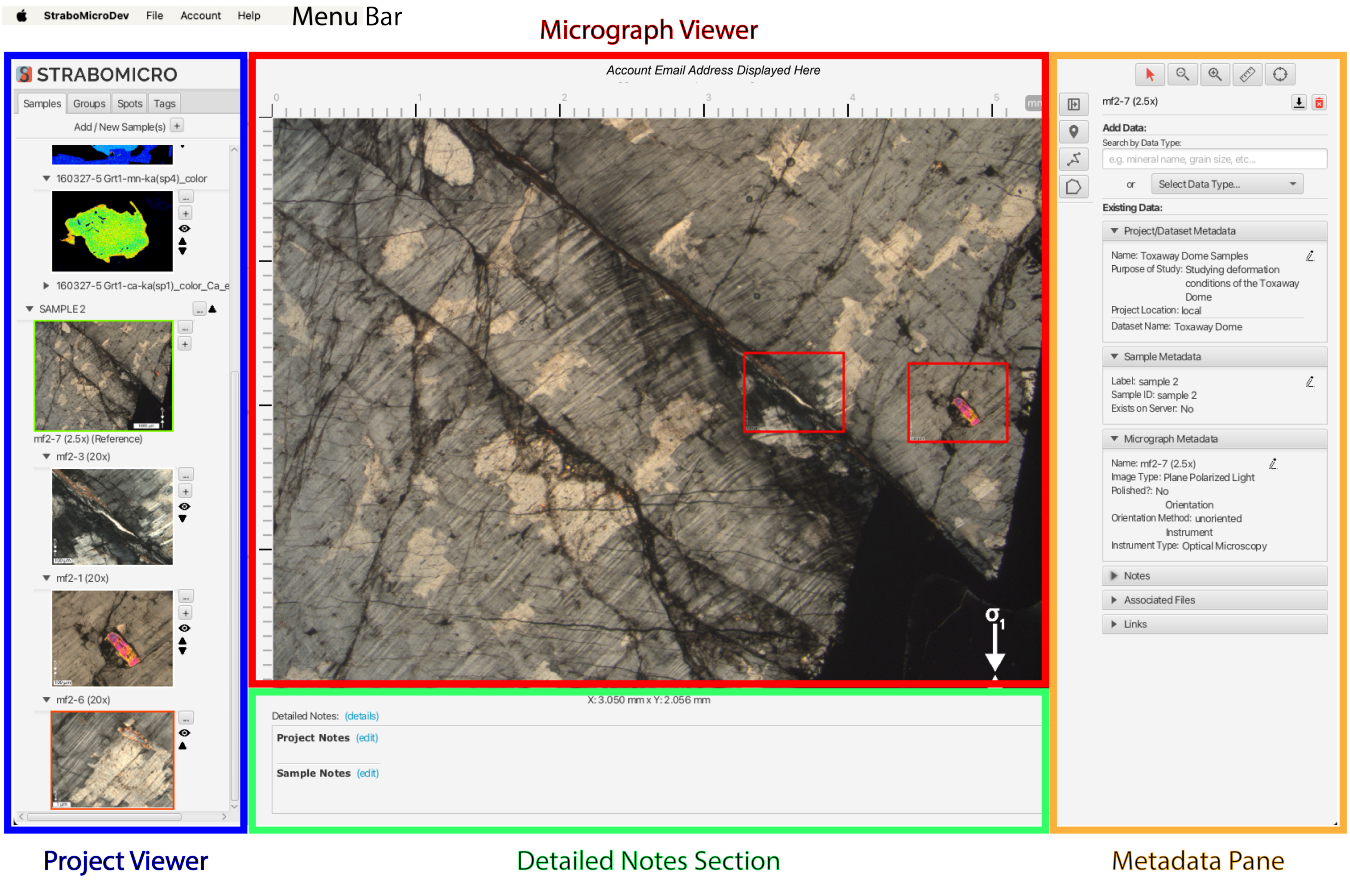



Figure 3: Overview of the StraboMicro desktop application, descriptions for each section are below.

- **Project Viewer:** Project navigation pane, where users can browse and select images within a project. At the top of this pane, navigation tabs allow users to organize and view images by **Sample**, **Groups**, **Spots**, or **Tags**. Selecting a different tab changes the organizational structure displayed in the left pane, enabling flexible image navigation based on the user's workflow or data structure.
- **Micrograph Viewer:** Displays the currently selected image for viewing, annotation, and analysis.
- **Metadata Pane:** Metadata and information pane, where users can enter and manage structured data associated with each image. Data fields may be expanded by toggling arrow icons to reveal additional information.
- **Detailed Notes Section:** A detailed notes section containing all notes from any of the fields available for the selected micrograph or spot. This section updates according to whether a micrograph or spot is selected.
- **Menu Bar:** Provides access to core application functions, including file management, tools, project settings, and help documentation.

This modular layout supports a streamlined and customizable workflow: navigate images on the left, analyze them in the center, view or enter detailed data on the right, and quickly review metadata below the main image. The tabbed navigation system in the project viewer pane enhances flexibility by allowing users to organize data according to their preferred context.

## 4.1 StraboMicro Terminology

Understanding key terms used in StraboMicro will help users organize and interpret their image data effectively. Two important concepts in the platform are **Reference Micrographs** and **Associated Micrographs**.

### Reference Micrograph

A **Reference Micrograph** is typically a low-resolution or stitched image—often a full thin section scan—that serves as a spatial framework for other, more detailed images. It provides context and scale for viewing and organizing high-resolution micrographs.

### Associated Micrograph

An **Associated Micrograph** is any image that is spatially linked to a Reference Micrograph. These images inherit the scale and spatial position defined by the reference image, allowing users to relate high-magnification data (e.g., specific features, grains, or deformation structures) back to the broader context of the thin section.

There is no limit to the number of nested Associated Micrographs. Users can create hierarchical relationships among images at increasing levels of magnification or focus. This nested structure supports the documentation of geologic features from the thin section scale down to the grain or subgrain level.

### Example Hierarchy

- **Reference:** Thin Section Scan
- **Associated:** Shear Zone Micrograph
- **Associated:** Specific Area within Shear Zone
- **Associated:** Image of Individual Grain
- **Associated:** EBSD Map of Grain

This hierarchical framework allows for the integration of multiple scales of observation, supporting detailed documentation and analysis within a consistent spatial context.

## 4.2 Project Viewer Pane: Project Navigation

The **Project Viewer Pane** in StraboMicro serves as the primary navigation area for organizing and accessing project content, including samples, micrographs, groups, spots, and tags. The pane is designed to support flexible workflows and customizable data organization.

### Navigation Tabs

At the top of the Project Viewer Pane are four navigation tabs that control how data is displayed:


- **Samples (Default):** Displays a hierarchical view of all samples, including reference and associated micrographs. Each sample is represented with a thumbnail image and can be expanded to reveal its related micrographs.
- **Groups:** Displays groups of micrographs organized by user-defined themes or characteristics. For example, users can group all micrographs showing chessboard extinction or those containing garnet. Selecting a group filters and displays only the relevant micrographs, streamlining analysis by feature or objective.
- **Spots:** Lists all labeled spots across the project. Each micrograph displays a hyperlink list of its corresponding spots. Clicking a spot will load the related micrograph in the main viewing window and show its metadata in the Metadata Pane.
- **Tags:** Displays all tags used in the project. Clicking a tag will show all associated spots, each linked to its corresponding micrograph. Selecting a spot from the list opens the related micrograph in the main window and displays the tagged spot's metadata in the Metadata Pane.

### Managing Samples and Micrographs

In the **Samples** tab, users can manage project data as follows:

- To **add a new sample**, click the + button next to `Add/New Sample` at the top of the Project Viewer Pane.
- Click the **sample name** or the toggle arrow to its left to expand or collapse its associated micrographs.
- Click the **three-dot menu** to the right of a sample name for the following options:
  - Add a new reference micrograph
  - Edit sample metadata
  - Delete sample
- For each **reference micrograph**, a separate three-dot menu provides:
  - Add to group(s)
  - Edit micrograph metadata
  - Delete micrograph
- Use the + button below the reference micrograph to add an **associated micrograph**. Associated micrographs inherit scale and spatial positioning from the reference and are displayed on top of it in the main viewer.
- The **eye icon** toggles visibility of the associated micrograph.

- The **up/down arrows** below the eye icon allow you to adjust the stacking order of associated micrographs, moving them up or down in the visibility layer stack.

The StraboMicro application layout supports efficient navigation and flexible organization of complex image datasets, enabling users to quickly locate, view, and manage micrographs and related data within their project.

## 4.3 Micrograph Viewer: Image Display

The **Micrograph Viewer** in StraboMicro displays the micrograph currently selected in the Project Viewer Pane. This is the primary workspace for viewing, analyzing, and annotating images.

#### Image Display and Scale

The displayed image includes a dynamic scale bar along the top and left edges. As the user zooms in, zooms out, or pans across the image, the scale bar adjusts in real time to reflect the current magnification level. This ensures accurate spatial interpretation at any zoom level.

At the bottom edge of the image window, the live coordinate readout displays the current position of the cursor as `X: [value] unit, Y: [value] unit`. These coordinates correspond to the location of the cursor on the image and are dynamically updated as the user moves the mouse. The units used are based on the spatial scale defined when the image was initially uploaded.

#### Detailed Notes Section

Beneath the main image display is the **Detailed Notes** section. This section shows image-specific metadata, notes, or other user-entered information related to the currently displayed micrograph. It provides an accessible overview of contextual or observational data without needing to expand individual metadata sections in the Metadata Pane.

This combination of responsive navigation, accurate spatial coordinates, and linked metadata supports a seamless and precise workflow for image-based geologic analysis.

## 4.4 Metadata Pane Overview

The **Metadata Pane** displays metadata associated with the micrograph. This includes both the information provided during the micrograph upload process and any additional metadata entered by the user later.

### 4.4.1 Spot Tools

Between the **center viewing window** and the metadata pane are four vertical buttons (from top to bottom):

**Show/Hide Metadata Pane**

**Add Spot** - Spots are useful for marking small, specific features such as unique observations, individual grains, or regions analyzed with other instruments.

**Add Line Spot** - Line Spots are used to annotate linear features or transects.

**Add Polygon Spot** - Polygon Spots allow users to define custom shapes representing larger spatial areas of the micrograph.

Users can customize the **color and transparency** of all spot types via:

`Spot Metadata > Edit > Spot Color > Custom Color > Edit Transparency`

### 4.4.2 Toolbar Functions

**Cursor Tool** – Pan and select objects.

**Zoom Out** – Decrease magnification.

**Zoom In** – Increase magnification.

**Measure Tool** – Measure distances on the micrograph.

**Re-Center** – Reset view to original position.

Below the toolbar, the **micrograph name and type** are displayed, followed by **Download** and **Delete** buttons.

### 4.4.3 Data Entry Section

The **data section** begins below the micrograph name. A label, ``Add Data:''`, appears above a search bar where users can search for a data input type. Alternatively, a dropdown menu provides a list of available data pages.

There are **18 specialized data entry pages** for geological metadata. These are described in detail in **Section 6: Data Entry**. The available pages include:

- Project/Dataset Metadata
- Sample Metadata
- Micrograph Metadata
- Mineralogy/Lithology
- Grain Information
- Fabric Information
- Clastic Deformation Bands
- Faults and Shear Zones
- Extinction Microstructures
- Grain Boundary/Contact Information
- Vein Information
- Pseudotachylyte Information
- Fold Information
- Notes
- Associated Files
- Links

## 4.5 Top Menu Overview

At the top-left banner of the **StraboMicro** window, you will find the main menu bar, similar to most desktop applications. The primary menu categories include:

- **StraboMicro**
- **File**
- **Account**
- **Help**

Each menu contains a set of tools and options designed to manage your project, access your account, or get help. The following is a summary of the options available in each menu.

**StraboMicro Menu**

- **Quit StraboMicro** – Exit the application.

**File Menu**

- **New Project:** Create a new local project. Local means the project will be saved to your device until manually uploaded to the server.
- **New Project From Field Data:** Create a new StraboMicro project from StraboField data.
- **Open Local Project:** Open a StraboMicro project saved on your device.
- **Open Remote Project:** Open a project on your StraboSpot account.
- **Open Shared Project:** "Due to the fact that StraboMicro project files can be quite large and difficult to share, this interface has been created to allow StraboMicro users to share project files using a small, simple code. To open a project shared by another user, simply enter the code into the box below and click Next. The project file will be downloaded and opened automatically. Please be aware that this system DOES NOT allow two users to work on the same project. The project file downloaded using this code is unique and not tied to the original file. To share your own project file with others, please visit the StraboSpot.org website and go to My Data to share your uploaded StraboMicro Projects."
- **Close Project:** Close the project, all changes are recorded locally.
- **Save Project:** Save the project locally to the users device.
- **Save Project As...:** Choose where to save a copy of the project
- **Upload Project:** Upload the StraboMicro project to your StraboSpot account online. Backing up the project online
- **Export Project as PDF:** Creates a PDF file of the StraboMicro project including the images, annotations, and metadata.
- **Export Project as JSON:** Create a JSON file of your StraboMicro project to be saved outside of the StraboMicro file structure.
- **Export All Images:** Export all images in the StraboMicro project.

- **Preferences:** Opens a new menu with image, view, and database options.
  - **Image Options:** User can choose or change they image quality of the micrographs added to the project in StraboMicro. If a user has a large number of micrographs, a lower pixel size will preserve the speed and responsiveness of StraboMicro. High pixel size will preserve higher image quality but may compromise the operating speed and responsiveness of StraboMicro.
    * *"The Micrograph Image Quality setting controls how large images are handled when adding them to a project.* Due to existing software constraints, large images are down-scaled to prevent memory constraints from being overwhelmed when loading and displaying images. The Image Quality setting controls what size the long edge of incoming images are scales down to. Below is a table of down-scaled values. These numbers represent the size (in pixels) of the long axis of the down-scaled image. **Please note:** that this setting only applies to newly added images. Images added prior to changing this setting will remain at their former resolution."
    * Micrograph Image Quality Options:
      - **Low**: 1000 Pixels
      - **Medium**: 2500 Pixels
      - **High**: 5000 Pixels
  - **View Options:** The user can choose to show or hide red outlines on associated micrographs nested within a reference micrograph. These outlines appear only when the reference micrograph is selected and displayed in the main window. They indicate the spatial position and size of each associated micrograph relative to the reference image.
  - **DB Options (Database Options):** User can define the Database Endpoint URL

**Account Menu**

- **Go to My Data at StraboSpot.org:** Automatically opens StraboSpot.org > Account > My StraboMicro Data, it will display all StraboMicro projects. The My Data page contains the Project Options:
  - View
  - Download
  - Share
  - Get DOI
  - Delete
- **Logout**: Log out of the StraboSpot account with the current project.

**Help Menu**

- **About StraboMicro:** Displays the StraboMicro Software Version downloaded on the current device and the MIT License.

- **Send Error Report:** Sends a record of recent actions in StraboMicro to our developers to help replicate the issues or errors users are experiencing.
- **Clear Preferences:** Resets all user preferences.
- **Check for Software Update:** Built in quick check for users to update the StraboMicro version.

# 5 Sample and Spot Management

## 5.1 Add / New Sample

To begin adding a new sample, click the **Add / New Sample** button:

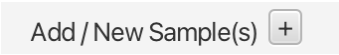



Figure 4: Add / New Sample button

The following sections outline each modal that appears during the new sample creation process.

### 5.1.1 Sample Info

The **Sample Info** modal collects descriptive metadata for your sample:

- **Sample ID/Name***
- **Location:** Latitude and Longitude
- **Main Sampling Purpose:**
  - Fabric / Microstructure
  - Petrology
  - Geochronology
  - Geochemistry
  - Active Eruption
  - Other
- **Description**
- **Material Type:**
  - Intact Rock
  - Fragmented Rock
  - Sediment
  - Tephra
  - Carbon or Animal

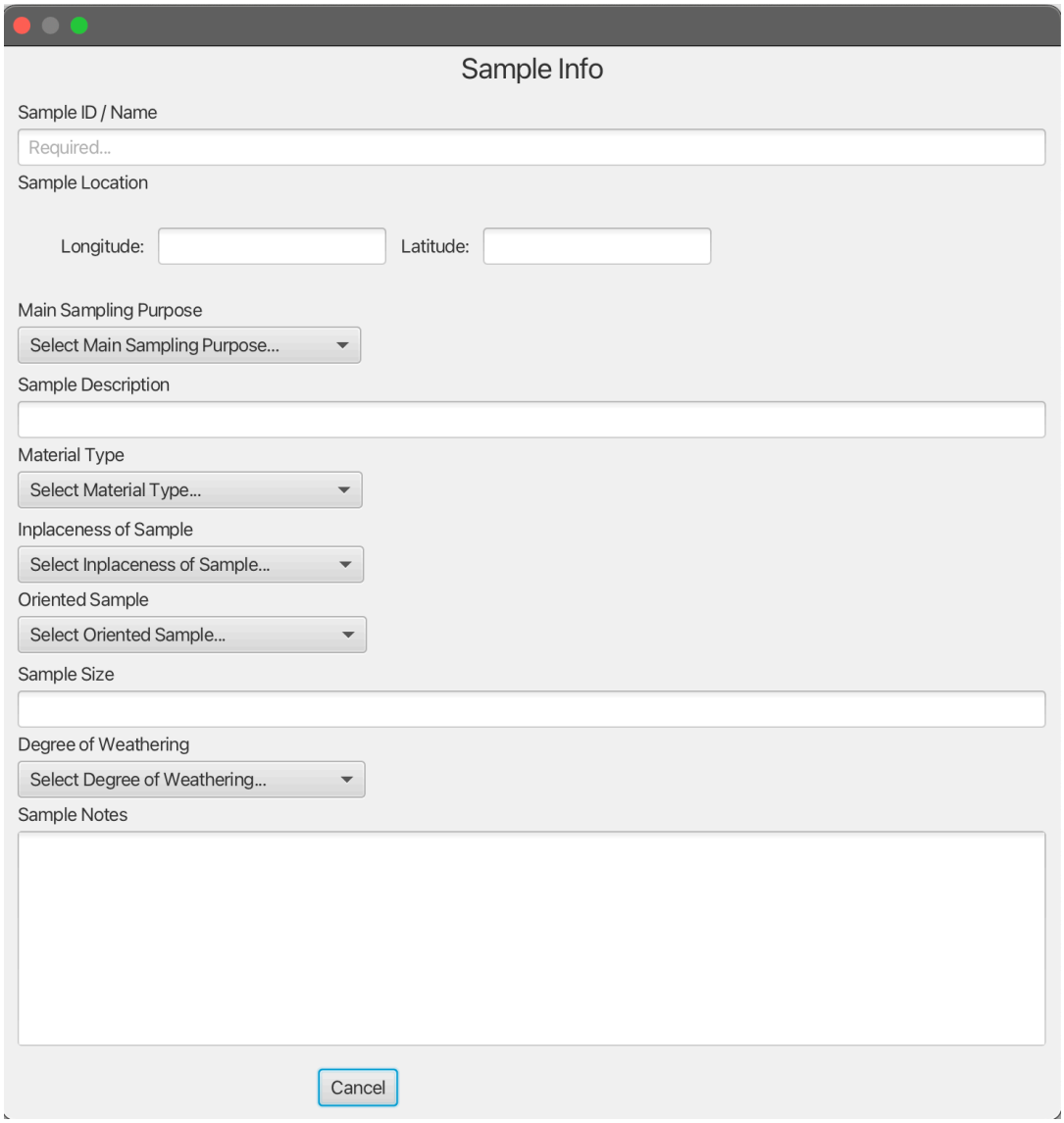



Figure 5: Sample Info modal in the StraboMicro Desktop App

  - Other

- **Inplaceness:** 1 = Float, 5 = Definitely in Place
- **Oriented Sample:** Yes / No
- **Sample Size**
- **Weathering Degree:** 1 = Highly Weathered, 5 = Fresh
- **Notes**

**Required field.* Click **Next** to continue.

### 5.1.2 Load Reference Micrograph

Supported image formats: `.jpeg`, `.png`, `.bmp`, `.tiff`

- In the **Load Reference Micrograph** modal, click **Browse** to select and upload an image file from your computer.
- **Important:** The image must include a clearly visible **scale bar**.

- A note in the modal states: "You can add additional reference micrographs to this sample later." This allows for uploading multiple images (e.g., lower magnification views) as needed.
- Click **Next** to proceed to the **Instrument and Image Info** section.

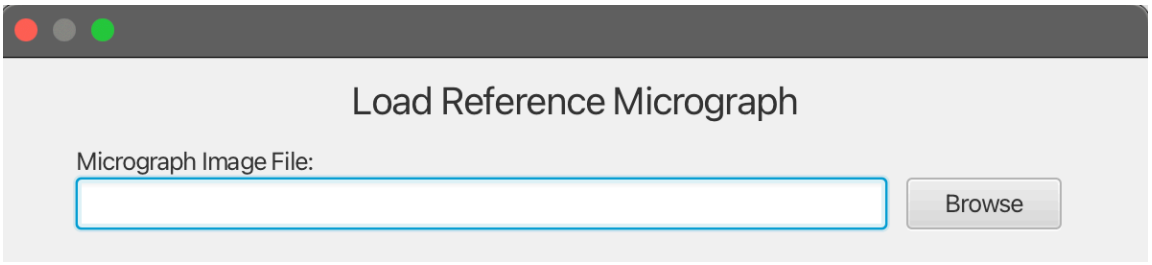



Figure 6: Load Reference Micrograph modal

### 5.1.3 Instrument and Image Info – Enter or Import Metadata

In the **Instrument and Image Info** modal, you can:

- Use the **Load Metadata from Previous Image** option to import metadata from a previously uploaded micrograph in the project.
- Use the **Select...** dropdown to choose an existing sample, which will auto-fill its Sample ID/Name.
- Choose the instrument manually, or click **Find Instrument in Database** to search the shared StraboMicro instrument repository.

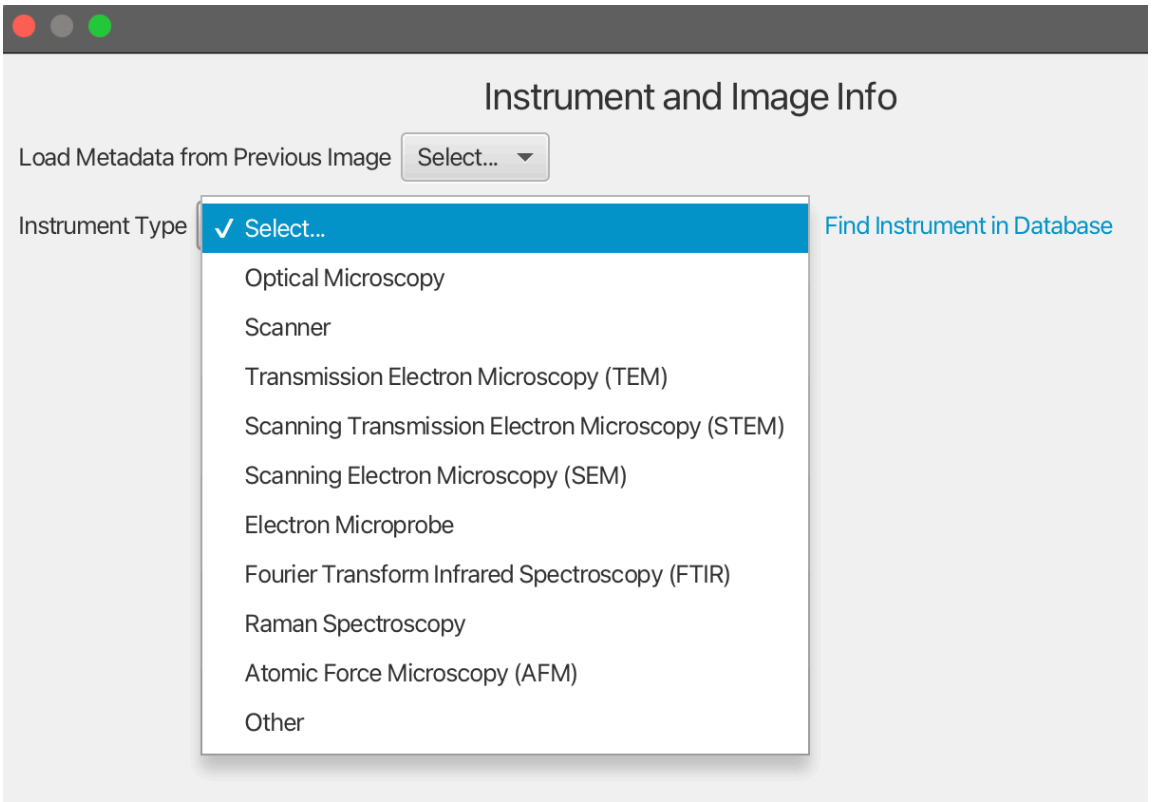



Figure 7: Instrument and Image Info modal

**About the Instrument Repository:**

- The StraboMicro Instrument Database allows institutional PIs to upload instrument metadata and operating parameters.
- Researchers can use these entries to auto-fill instrument fields and to identify equipment at other institutions for potential collaboration.
- For additional details, see **Section 2: The Instrument Repository**.

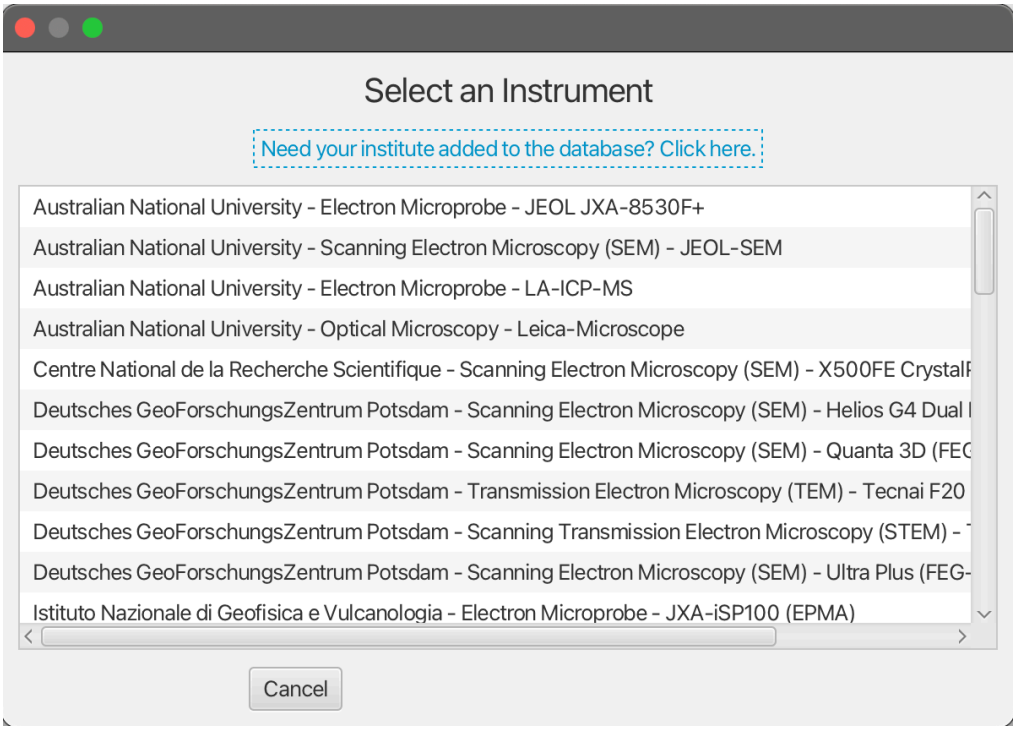



Figure 8: Instrument selection popup showing available instruments from the StraboMicro repository

**Requesting a New Institute Entry:**

- If your institution is not listed, click the blue link at the top of the modal: **"Need your institute added to the database? Click here."**
- This generates an email to `StraboSpot@gmail.com` with the following template:

```
Hello,

Please add the following institute to the StraboMicro Apparatus Repository:

Lab or Facility Name:
Institute Name:

StraboSpot Account: *your account email address*

Thanks,

*your account name*
```

- Complete the Lab/Facility and Institute fields before sending.

**Metadata Input by Instrument Type**

- If selecting a new instrument manually, choose from the following **Instrument Types**:
  - Optical Microscopy
  - Scanner
  - Transmission Electron Microscopy (TEM)
  - Scanning Transmission Electron Microscopy (STEM)
  - Scanning Electron Microscopy (SEM)
  - Electron Microprobe
  - Fourier Transform Infrared Spectroscopy (FTIR)
  - Raman Spectroscopy
  - Atomic Force Microscopy (AFM)
  - Other

**Supported Image/Data Types per Instrument:**

- **Optical Microscopy:** Plane Polarized Light, Cross Polarized Light, Reflected Light, 1/4 Lambda Plate, Cathodoluminescence, Gypsum Plate.
- **Scanner:** No Polarizer, Plane Polarized, Cross Polarized, Other.
- **TEM:** Bright Field, Dark Field, Electron Diffraction (SAED, CBED, NBD, LACBED), EDS (with periodic table element selection), ACOM, EDS Tomography.
- **STEM:** Bright Field, Dark Field, ADF, HAADF, EDS (element selection), EELS, CL (Panchromatic, Wavelength-Filtered, Spectroscopy).
- **SEM:** SE, BSE, FSE, EBSD (Euler, IPF-X/Y/Z, Band Contrast, Phase Map, Grain Boundaries), TKD, ECCI, EDS/WDS (element selection), CL (Panchromatic, Wavelength-Filtered), FIB Imaging.
- **FTIR:** False Color Map, Intensity Map.
- **Raman Spectroscopy:** False Color Map, Intensity Map.
- **AFM** Topography Image.

**Metadata Entry Options**

- Enter metadata manually or load from the StraboMicro instrument database.
- When applicable (e.g., for EDS, WDS), use the interactive periodic table to select elements.
- Input data for specific analytical modes such as EBSD, CL, or EELS where prompted.

**Abbreviations (Alphabetical)**

- **ACOM** – Automated Crystal Orientation Mapping
- **ADF** – Annular Dark Field
- **AFM** – Atomic Force Microscopy

- **BSE** – Backscattered Electron
- **CBED** – Convergent Beam Electron Diffraction
- **CL** – Cathodoluminescence
- **ECCI** – Electron Channeling Contrast Imaging
- **EBSD** – Electron Backscatter Diffraction
- **EDS** – Energy Dispersive X-ray Spectroscopy
- **EELS** – Electron Energy Loss Spectroscopy
- **FIB** – Focused Ion Beam
- **FSE** – Forescattered Electron
- **FTIR** – Fourier Transform Infrared Spectroscopy
- **HAADF** – High-Angle Annular Dark Field
- **IPF** – Inverse Pole Figure (e.g., IPF-X, IPF-Y, IPF-Z)
- **LACBED** – Large Area Convergent Beam Electron Diffraction
- **NBD** – Nano Beam Diffraction
- **PI** – Principal Investigator
- **SAED** – Selected Area Electron Diffraction
- **SE** – Secondary Electron
- **SEM** – Scanning Electron Microscopy
- **STEM** – Scanning Transmission Electron Microscopy
- **TEM** – Transmission Electron Microscopy
- **TKD** – Transmission Kikuchi Diffraction
- **WDS** – Wavelength-Dispersive X-ray Spectroscopy

### 5.1.4 Instrument Data

Click **Next** to open the **Instrument Data** modal.

At the top of this modal, a message recommends uploading an instrument template via the StraboSpot website. This enables metadata fields to be auto-populated in future sessions. If possible, ask the instrument's Principal Investigator (PI) to submit a template at: `https://strabospot.org`

Below the message, the instrument type you previously selected will appear (e.g., *Instrument Type: Optical Microscopy*).

**Fields to Complete:**

- **Instrument Make:** Brand and model
- **Instrument Location:** Institution and lab name

- **Software (Data Collection):** Application name and version
- **Software (Post-Processing):** Application name and version
- **Notes:** Optional field for any additional information

For certain instrument types, an additional **Detectors** section may appear, including:

- **Type**
- **Make**
- **Model**

**Note:** If you selected a preloaded instrument from the StraboMicro repository, these fields will be auto-filled and do not require manual input.

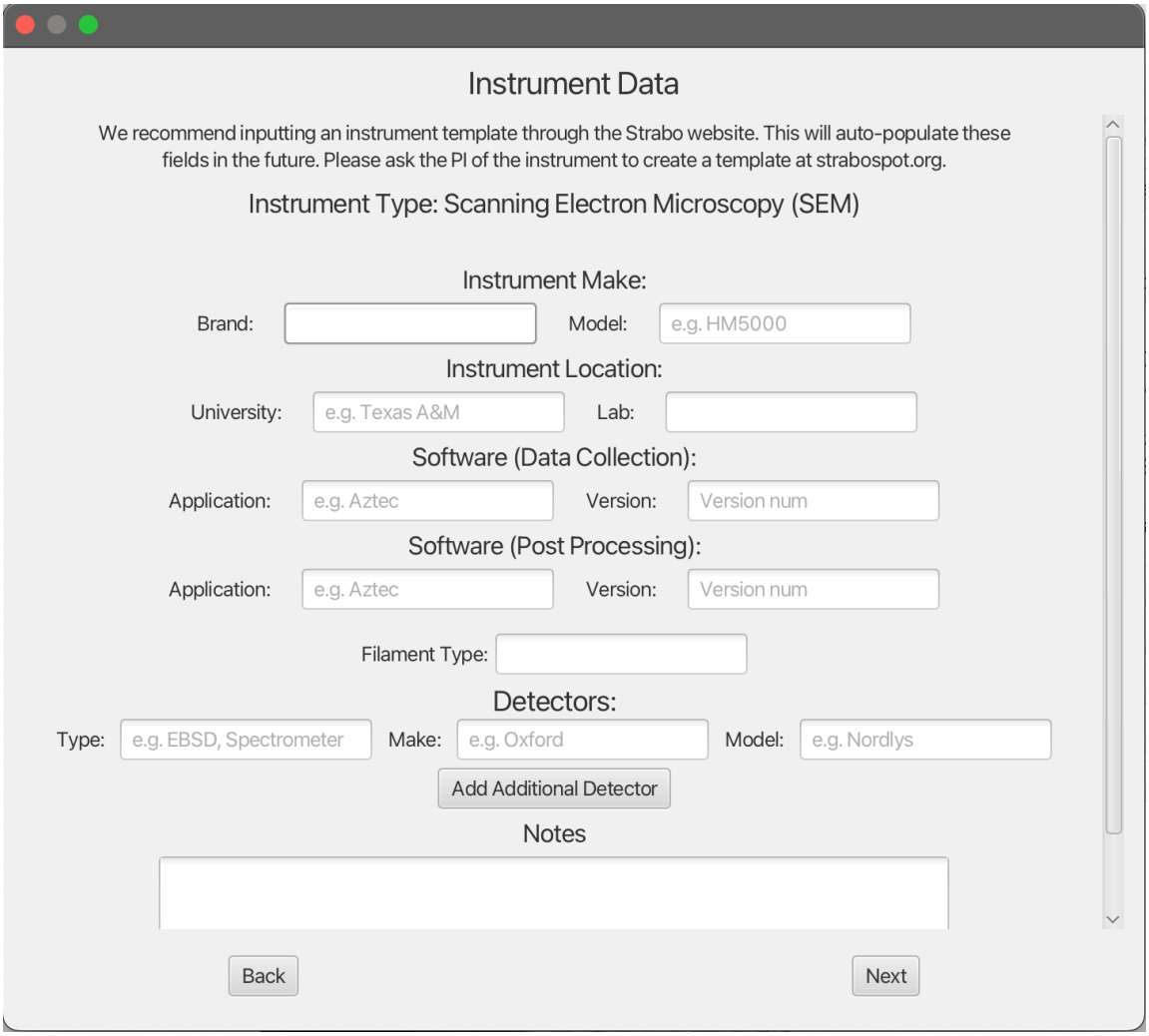



Figure 9: Instrument Data modal in StraboMicro

### 5.1.5 Instrument Settings

Click **Next** to continue the upload process. For certain instrument types, an additional **Instrument Settings** modal will appear. The fields shown in this modal are specific to the selected instrument.

**For Scanning Electron Microscopy (SEM) or Electron Microprobe:**

- Acceleration Voltage (kV)

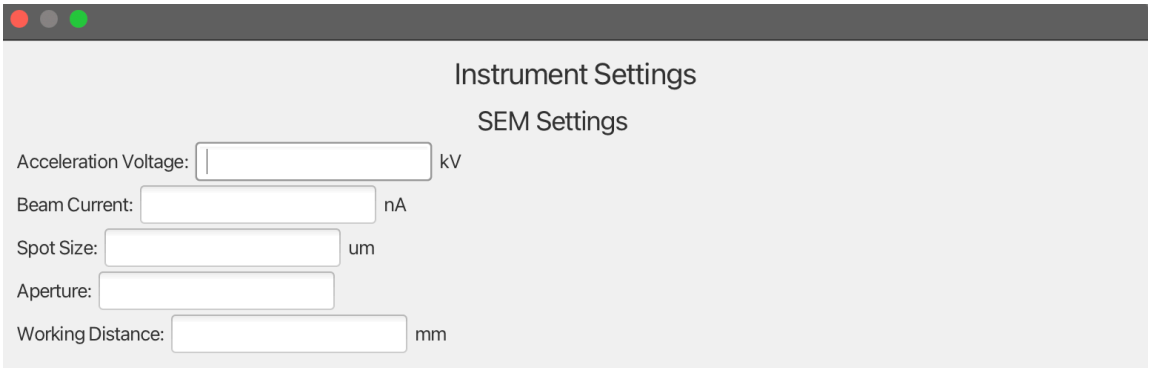



Figure 10: Instrument Settings modal example for Scanning Electron Microscopy (SEM). Fields shown vary by instrument type.

- Beam Current (nA)
- Spot Size ($\mu$m)
- Aperture
- Working Distance (mm) replaces Camera Length
- Other fields may vary depending on instrument configuration

**For Transmission Electron Microscopy (TEM):**

- Acceleration Voltage (kV)
- Beam Current (nA)
- Spot Size ($\mu$m)
- Aperture
- Camera Length (mm)

**For Scanning Transmission Electron Microscopy (STEM):** Includes all TEM fields, plus:

- Camera Binning
- Dwell Time (s)

**For Fourier Transform Infrared Spectroscopy (FTIR):**

- Instrument Purged (Yes/No)
- Environment Purged (Yes/No)
- Aperture ($\mu m^2$)
- Scan Time (s)
- Resolution (Hz)
- Spectral Resolution ($cm^{-1}$)
- Wavenumber Range
- Averaging
- Background Composition (KCl, NaCl, Other)

- Background Correction Frequency
- Notes

**For Raman Spectroscopy:**

- Excitation Wavelength ($\mu$m)
- Laser Power (mW)
- Spot Size ($\mu$m)
- Diffraction Grating (grooves/mm)
- Integration Time (s)
- Objective (magnification, e.g., 10x, 50x)
- Spatial Resolution ($\mu$m)
- Averaging
- Calibration

**For Atomic Force Microscopy (AFM):**

- Mode (Contact, Intermittent Contact [Tapping])
- Cantilever Stiffness (N/m)
- Tip Diameter ($\mu$m)
- Operating Frequency (kHz)
- Scan Dimensions (pixels)
- Scan Area ($\mu$m)
- Spatial Resolution ($\mu$m)
- Room Temperature (°C)
- Relative Humidity (%)
- Sample Temperature (°C)

**Note:** Only the fields relevant to the selected instrument type will be displayed. If metadata was preloaded via the instrument repository, these fields may already be filled in.

### 5.1.6 Micrograph Metadata

In this section, you will be prompted to enter the following metadata:

- **Name:** A text field to assign a unique name or identifier to the micrograph.
- **Polished:** A checkbox indicating whether the sample surface is polished.
  - If selected, an additional field will appear to describe the polishing method or details.
- **Notes:** An optional text field for any additional observations or comments.

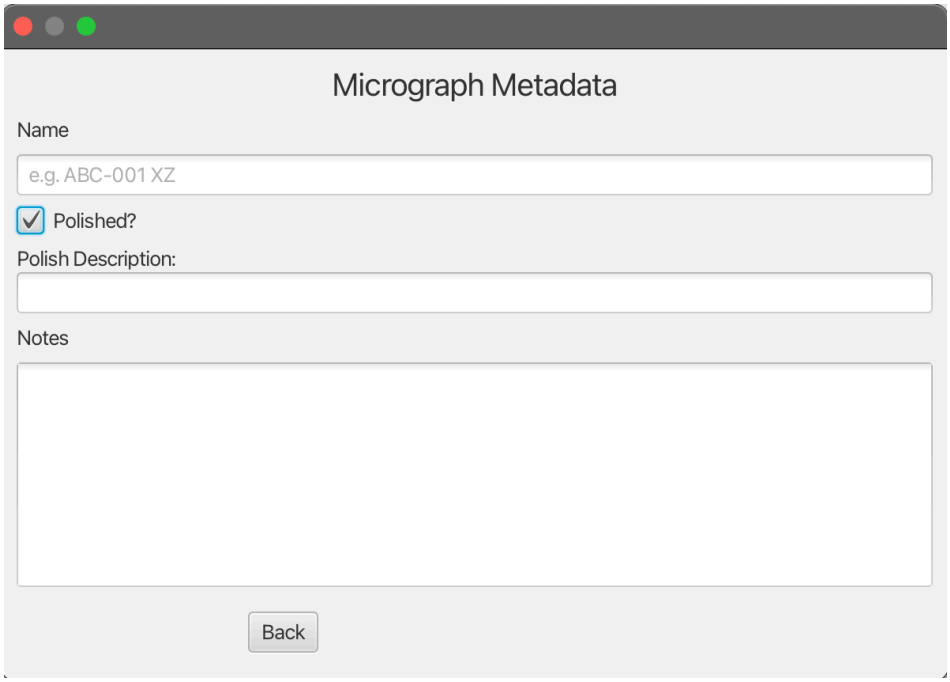



Figure 11: Micrograph Metadata modal displaying fields for Name, Polished checkbox, and Notes.

### 5.1.7 Orientation of Reference Micrograph

Define the orientation of the reference micrograph by selecting one of the following three options:

1. **Unoriented Thin Section**
   - No additional metadata is required.
2. **Trend and Plunge of Edges / Strike and Dip of Surface**
   - This option requires users to define the micrograph orientation using geologic measurements.
   - A message at the top of the modal instructs:

     "Provide **TWO of THREE**: Select the arrow on each edge that represents a lower hemisphere plunge, and enter the trend and plunge information and/or provide the strike and dip of the thin section."
   - Input fields include:
     - Trend and Plunge values for both horizontal and vertical axes
     - Corner selection to define orientation direction
     - Strike and Dip of the thin section surface

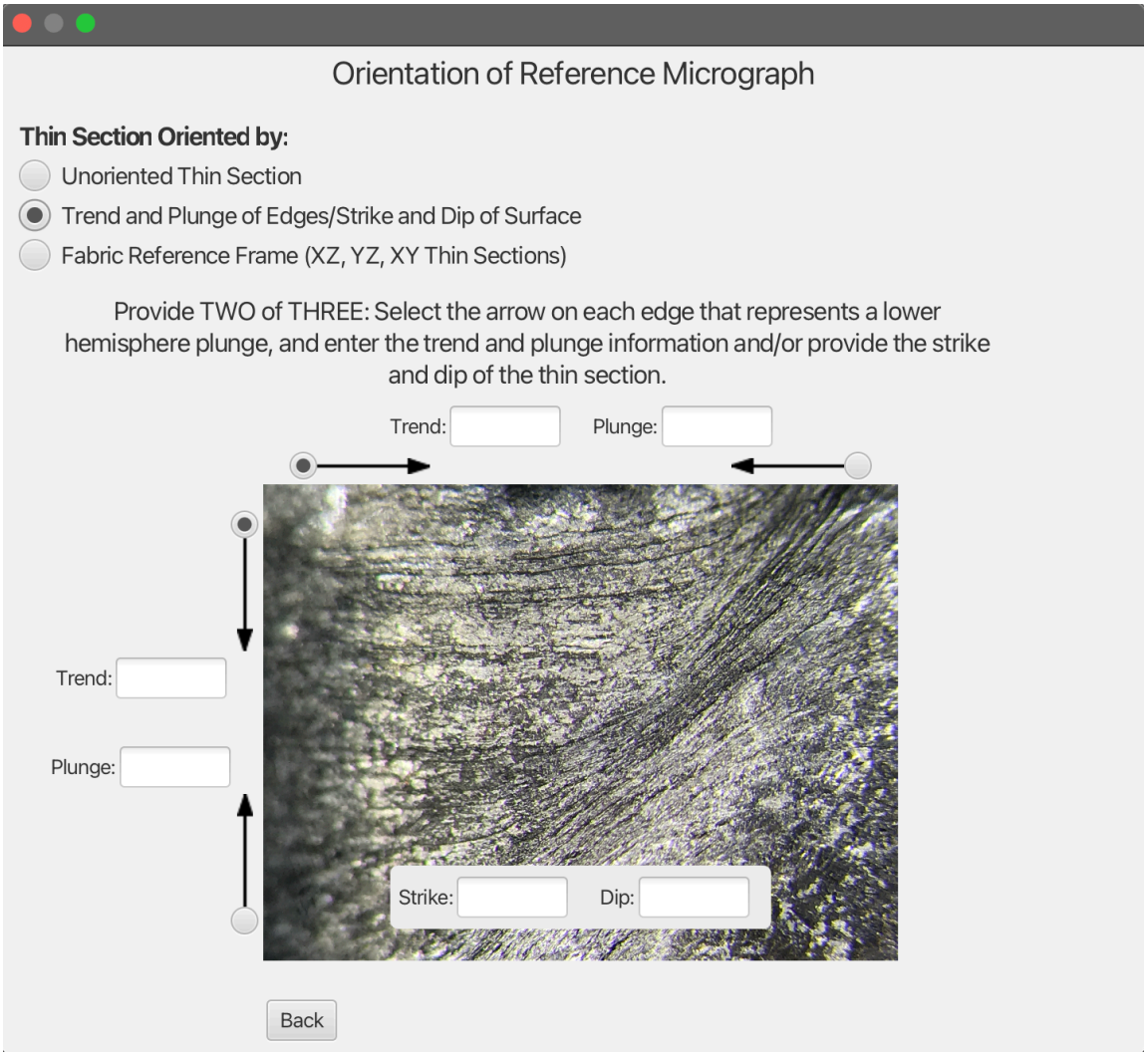



Figure 12: Example modal for entering Trend and Plunge or Strike and Dip orientation data.

3. **Fabric Reference Frame (XZ, YZ, XY Thin Sections)**
    - Select the orientation of the thin section based on the structural fabric:
        - **XZ** – Lineation (X) and foliation normal (Z)
        - **YZ** – Perpendicular to lineation (Y) and foliation normal (Z)
        - **XY** – Lineation (X) and perpendicular to lineation (Y) in the foliation plane
    - Required metadata:
        - **Foliation Orientation:** Strike and Dip (Geographic coordinates)
        - **Lineation Orientation:** Either
            - Trend and Plunge, or
            - Rake (Right-Hand Rule, 1–180°)
        - **Look Direction:** Specify whether the image was taken:
            - Looking down through the micrograph (toward the lower hemisphere), or
            - Looking up through the micrograph (toward the upper hemisphere)

- A note in the modal provides clarification:

  "When viewing the reference micrograph, are you looking toward the lower hemisphere or upper hemisphere in geographic coordinates?"

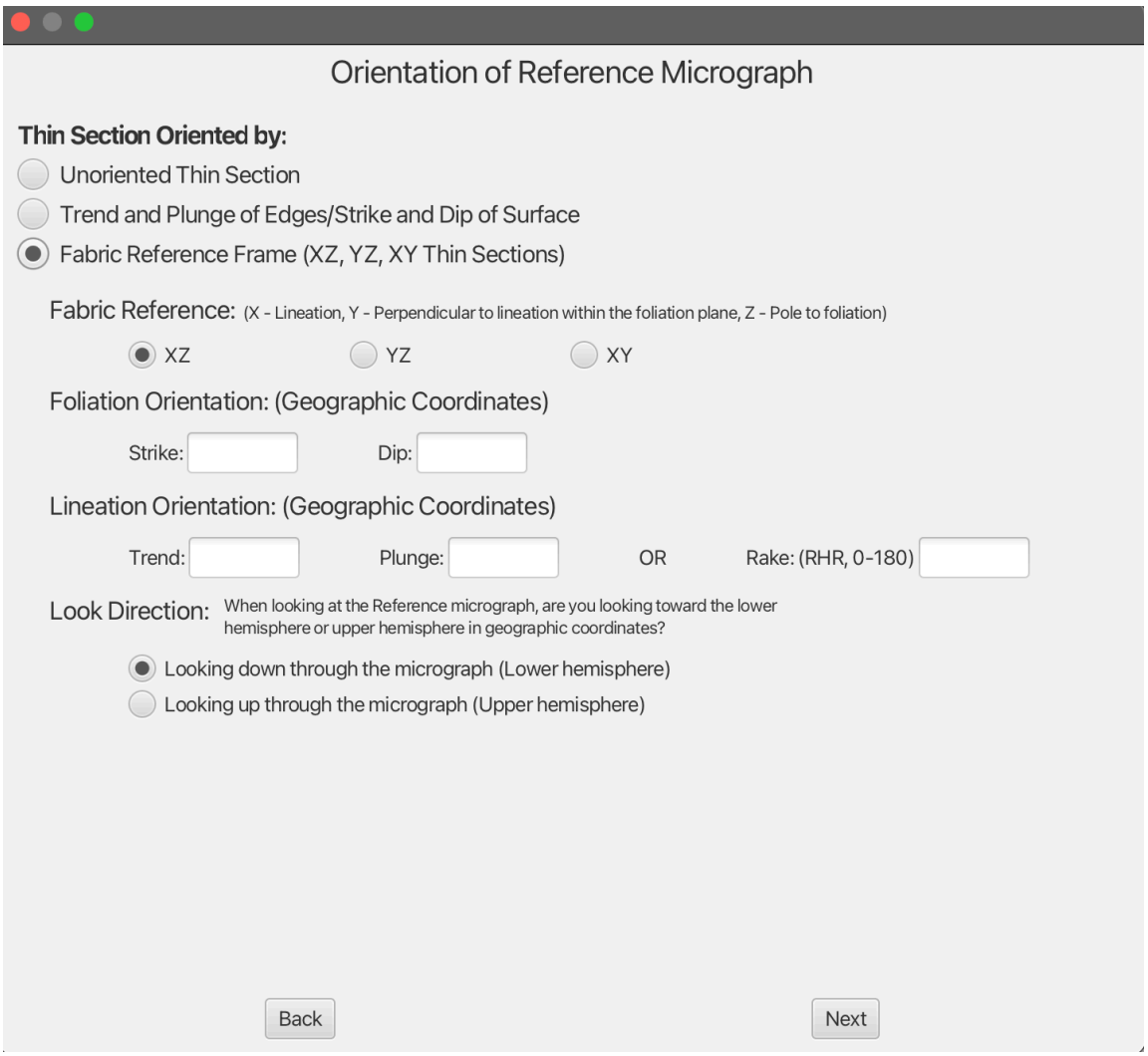



Figure 13: Fabric Reference Frame modal with XZ/YZ/XY options and orientation metadata fields.

### 5.1.8 Define Top Corner (Fabric Reference Frame Only)

If you selected the *Fabric Reference Frame* option, an additional modal will appear: **Define Top Corner**.

- The micrograph image is displayed with clickable buttons at each corner.
- Select the corner that is **highest in geographic coordinates** by clicking the corresponding button.

### 5.1.9 Set Micrograph Scale and Location

After defining the orientation, the next step is to set the scale and spatial information for the micrograph. This involves selecting one of the available scaling methods. Based on your selection, the system will guide you through a corresponding follow-up modal to complete the location and scale setup.

**Choose one of the following scale-setting methods:**

1. **Trace Scale Bar**
    - Use drawing tools to trace a line across the visible scale bar in the image.
    - Tools include:
        - **Pointer Tool:** Move or reposition the micrograph.
        - **Line Tool:** Click once to begin drawing a line, and click again to finish.
    - The pixel length is automatically calculated. Enter the corresponding real-world length and select the correct unit ($\mu$m, mm, cm).
    - Use mouse scroll to zoom in/out on the image.
    - Optionally, check **Flip Image** to mirror the micrograph across the vertical axis.

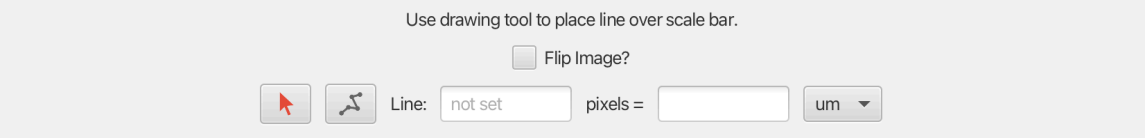



Figure 14: Example: Trace Scale Bar modal

2. **Pixel Conversion Factor**
    - Enter the pixel-to-distance conversion factor directly.
    - Input the number of pixels and its real-world equivalent (units: $\mu$m, mm, cm).
    - **Flip Image** option is also available.


Figure 15: Example: Pixel Conversion Factor modal

3. **Provide Width/Height of Image**
    - Enter the total width and height of the image manually.
    - Select the units from the dropdown.
    - The **Flip Image** checkbox is included.


Figure 16: Example: Provide Width/Height modal

4. **Copy Size from Existing Micrograph**

- Select a previously uploaded micrograph to copy its size.
- A dropdown menu lists all available micrographs.
- **Flip Image** option is also included.

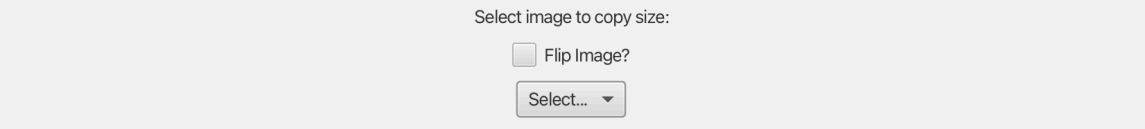



Figure 17: Example: Copy Size from Existing Micrograph modal

Once the selected method is completed, a corresponding modal will prompt you to finalize the micrograph's location and scale. The fields shown in this final step directly correspond to your earlier selection. After all required inputs are entered, click **Finish** to add the reference micrograph to the sample and save it to the project.

## 5.2 Spot Management

Spots are a central concept in StraboSpot, representing spatial observations at multiple scales. In StraboMicro, a spot might represent a grain, a mineral inclusion, or any localized feature within a thin section or micrograph. This multiscale framework enables users to document observations consistently, from the field to the microscope.

## 5.3 Adding a New Spot

Once a micrograph has been loaded, users can add new spots directly onto the image to annotate and analyze specific features. Each spot is associated with editable metadata, accessible via the **right panel**, which includes information entered during micrograph upload and any user-provided observations.

### 5.3.1 Spot Tools

To the right of the **central viewing window**, a vertical toolbar provides access to spot creation tools:

**Show/Hide Right Panel**

**Add Spot** – For marking discrete features such as mineral grains or points of interest.

**Add Line Spot** – For linear features such as foliations, transects, or crystal boundaries.

**Add Polygon Spot** – For selecting custom regions like mineral zones or deformation domains.

### 5.3.2 How to Add a Spot

Follow these steps to add a spot to a micrograph:

1. **Determine the appropriate spot type:** Choose whether you are marking a point, a line feature, or an area (polygon).
2. **Click the corresponding button** in the vertical toolbar to activate that spot mode. The selected tool will highlight in red.
3. **Navigate the micrograph:** Use click-and-drag to move the image, scroll to zoom, or use the zoom buttons in the top-right corner.
4. **Add the spot to the micrograph:**
    - **Point:** Click once to place the spot.
    - **Line:** Click to add vertices. Double-click the final point to complete the line.
    - **Polygon:** Click to define each corner. The shape appears as you add points. Double-click the last vertex to close the shape.
5. **Fill out spot information:** Once the spot is placed, a configuration modal appears (see Figure 18).
6. **Enter metadata:** Provide the spot name, label color, spot color, transparency, and optional notes.
7. **Save the spot:** After saving, the spot appears in the micrograph and is listed in the **Spot Metadata** panel on the right side (see Figure 23).
8. **Edit the spot:** Click the pencil icon (see Figure 21) in the metadata panel to make changes or add more details.

**Tip:** If you activate a spot tool but decide not to place a spot, click the **Cursor tool** (top-right) to exit spot mode and return to default navigation.

### 5.3.3 Spot Options

After selecting a spot type—**Point**, **Line**, or **Polygon**—a configuration modal appears (Figure 18) allowing you to define the following:

- **Spot Name:** Assign a unique label.
- **Label Color:** Defines the text color for the spot label on the micrograph.
- **Spot Color:** Controls the fill or line color of the spot.
- **Transparency:** Adjust the opacity using a slider.
- **Notes:** Optional free-text field for observations, interpretations, or measurements.

All spot types can be customized further by navigating to:

```
Spot Metadata > Edit > Spot Color > Custom Color > Edit Transparency
```

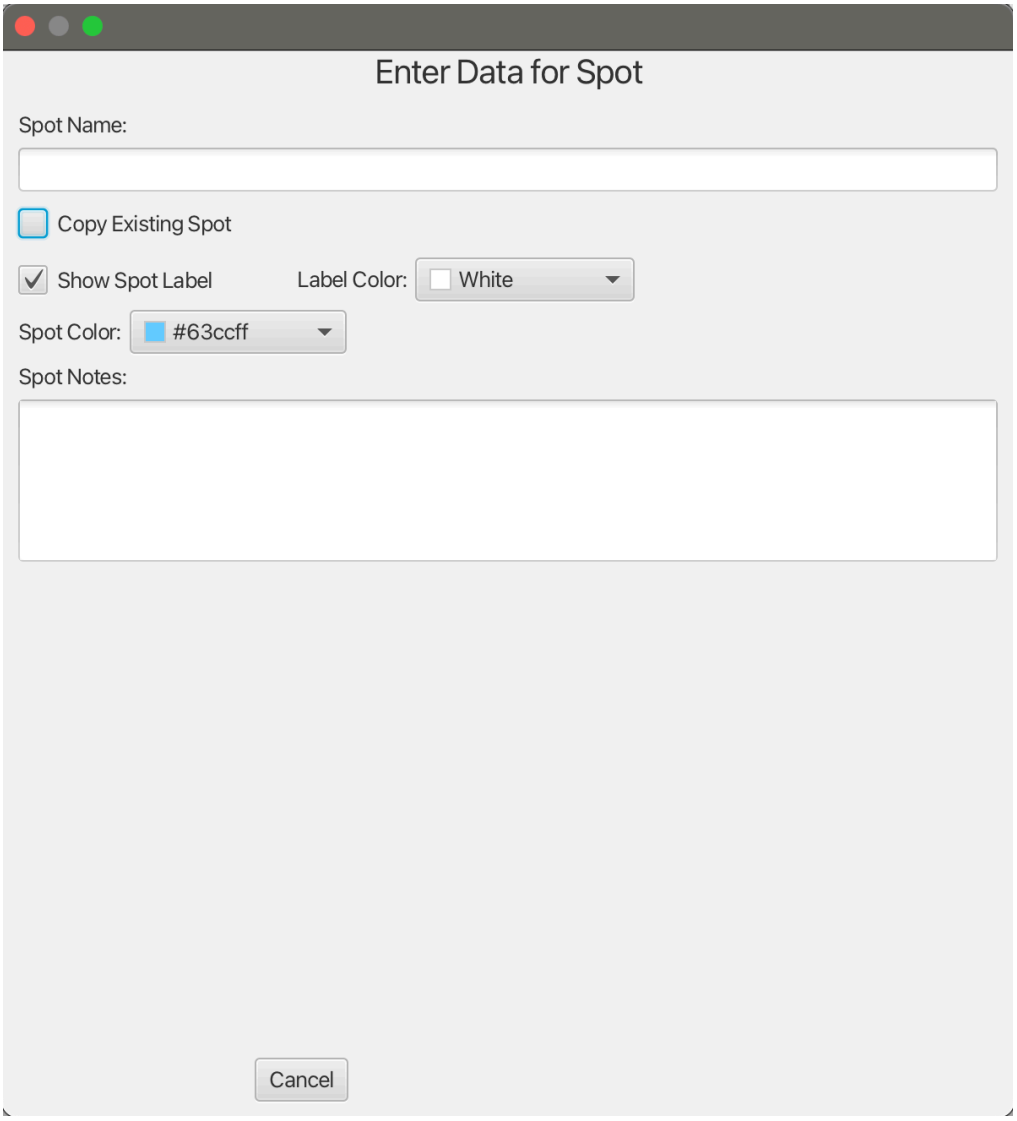



Figure 18: Add Spot configuration modal showing customization options for spot name, label color, spot color, transparency, and notes.

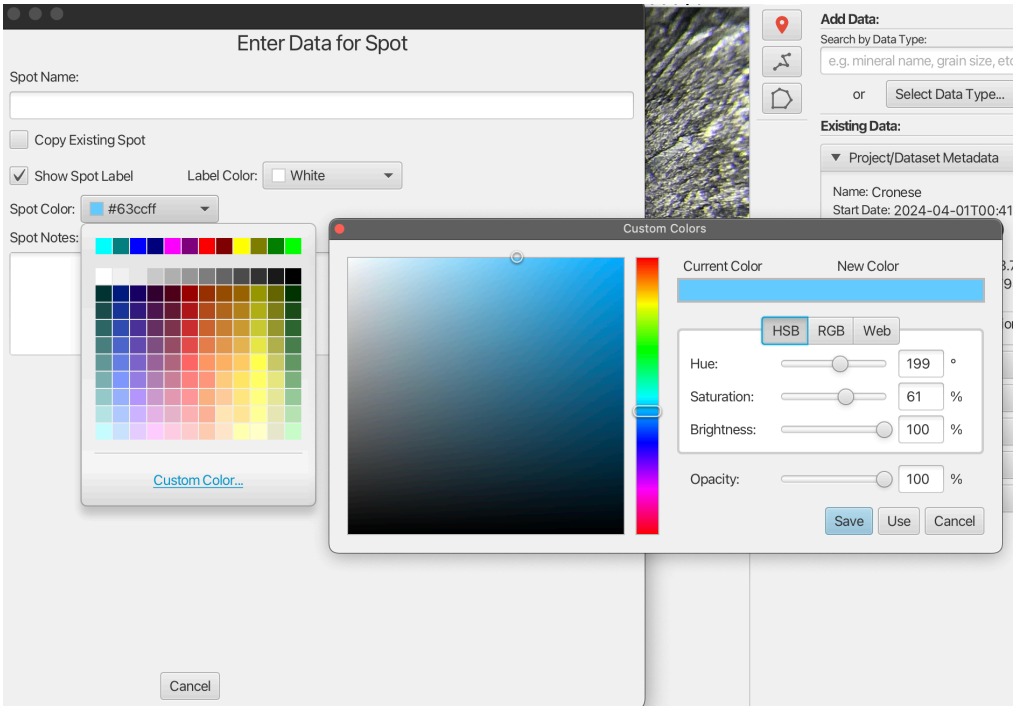



Figure 19: Color and transparency selection interface.

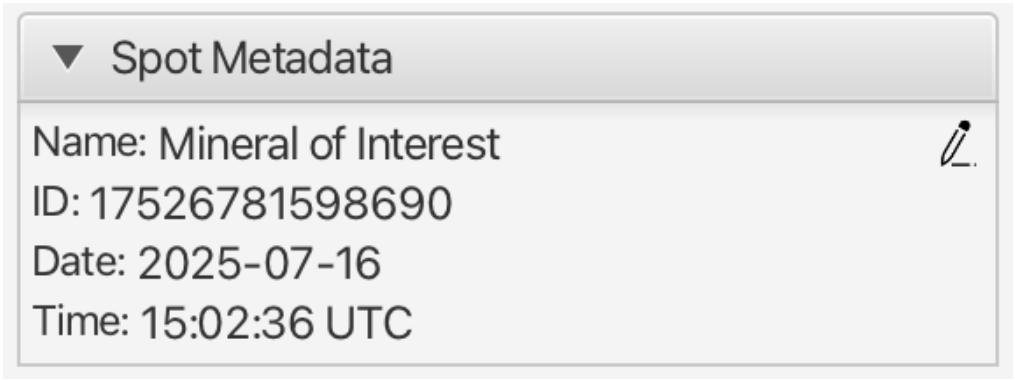



Figure 20: Spot Metadata panel showing saved spot entries and editable fields.

Figure 21: Pencil icon used to edit spot metadata.

## 5.4 Spot Navigation

The tabs at the top of the **left panel** allow users to choose how they navigate through the project. Once spots have been added to reference and associated micrographs, they will appear in a nested structure within the panel, organized by micrograph and spot name.

Each spot name functions as a clickable hyperlink. Clicking a spot name will:

- Load and display the corresponding micrograph in the **central viewing panel**.
- Highlight the selected spot on the micrograph with a red outline, indicating it is active.

- Open the **Spot Metadata** toggle panel on the right side, showing detailed metadata for the selected spot (see Figure 23).

This navigation structure enables efficient browsing between spots, micrographs, and related metadata, helping users quickly access and update their observations across the project.


Figure 22: Spot navigation panel showing nested structure and clickable spot names

# 6 Data Entry and Observation Tools

StraboMicro provides a flexible framework for entering detailed observational data across multiple spatial contexts. Users can choose to associate data with an entire **micrograph image**, a specific **point (spot)**, a **line** representing a transect or trace, or a **polygon** outlining an area of interest. This structure allows observations to be scaled and shaped according to the nature of the feature being studied—ranging from localized points and linear structures to broader areas or the full thin section.

In addition, features and observations can be explicitly linked to previously defined mineralogical or lithological classifications, supporting consistent interpretation and integrated analysis.

This section describes how to enter data at each spatial level and outlines the types of information that can be recorded within each context.

## 6.1 Adding Data

To begin entering data:

- **To add data to a micrograph:** Click anywhere on the micrograph (not on a spot) to ensure it is selected and active.
- **To add data to a spot:** Click the spot to select it. When active, the spot will be outlined in red and its metadata panel will appear on the right (see Figure 23).


Figure 23: Spot Metadata panel showing selected spot with editable data fields.

Once the correct layer is selected (either a micrograph or spot), use the dropdown menu in the **right-hand panel** to choose a data type. You may either scroll through the list or use the search bar to find a specific option. Click the desired data type and complete the corresponding form. Details for each data type are outlined in the sections below.

## 6.2 Types of Data

The following subsections provide descriptions and example screenshots for each type of data entry modal available in StraboMicro.

### 6.2.1 Mineralogy and Lithology

Use this panel to document mineral constituents and lithologic characteristics of the sample.

- **Mineralogy Tab:** Add observed minerals and include optional notes. (See Figure 24.)
- **Lithology Tab:** Describe lithology and add supporting notes. (See Figure 25.)


Figure 24: Mineralogy data modal for entering observed minerals.

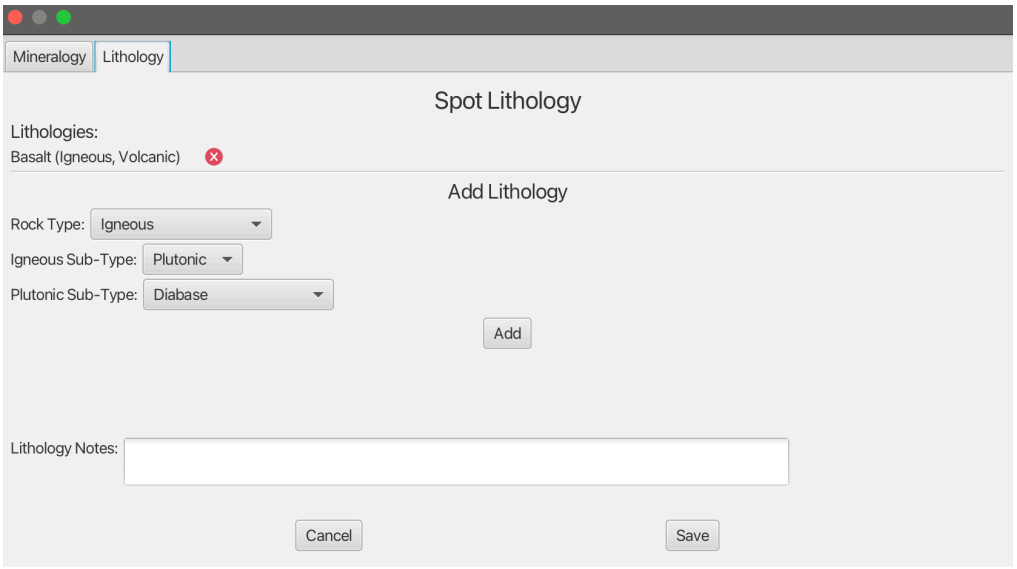



Figure 25: Lithology data modal with fields for rock type and additional notes.

### 6.2.2 Grain Size, Shape, and SPO

These options allow detailed documentation of grain characteristics after mineralogy has been entered.

- **Grain Size:** Enter modal or observed grain sizes. (See Figure 26.)
- **Grain Shape:** Record observed grain morphologies. (See Figure 27.)
- **Shape Preferred Orientation (SPO):** Add SPO information to describe directional alignments. (See Figure 28.)

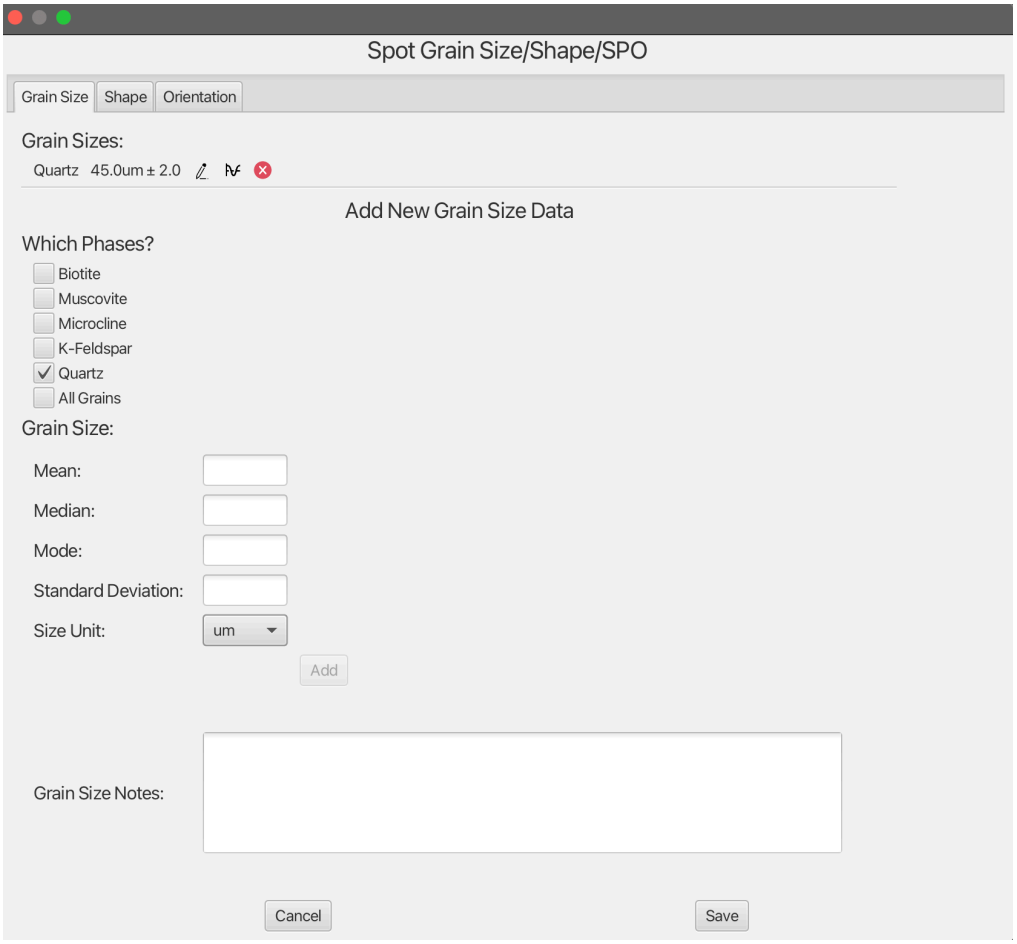



Figure 26: Grain Size data modal with fields for entering quantitative grain size information.

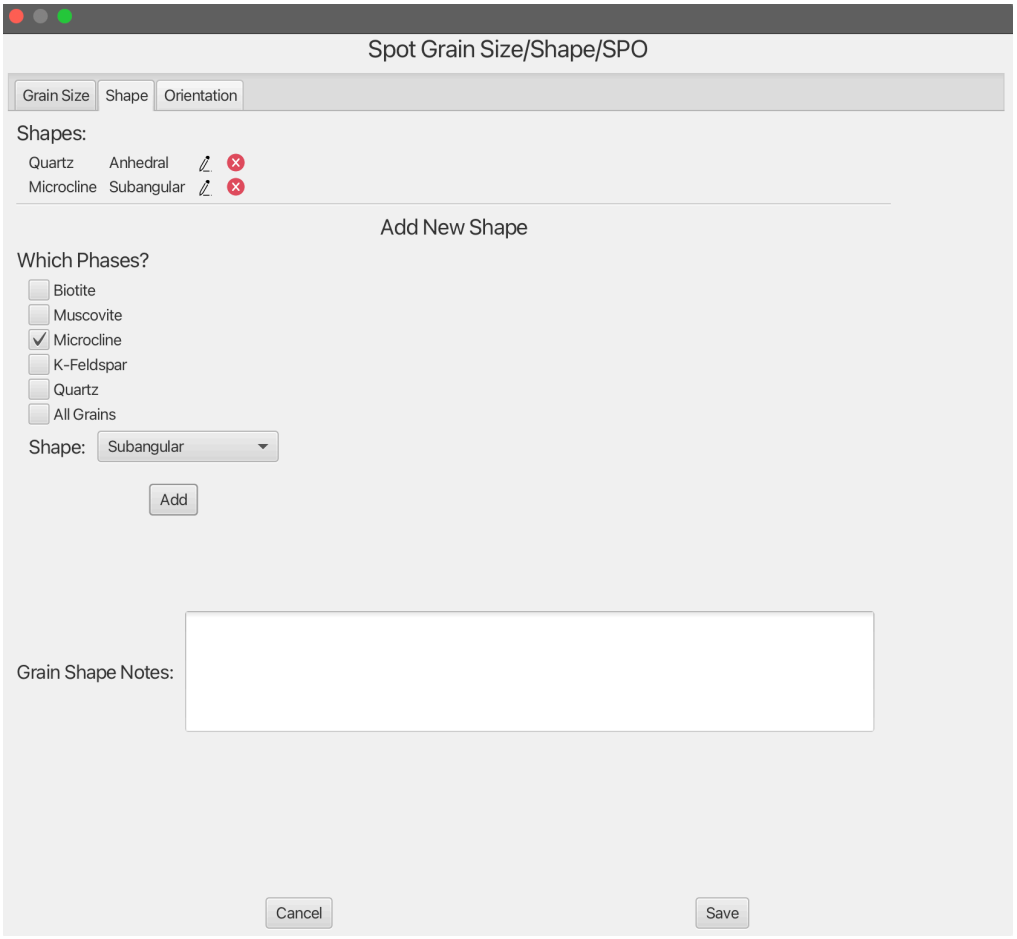



Figure 27: Grain Shape modal showing morphology options.

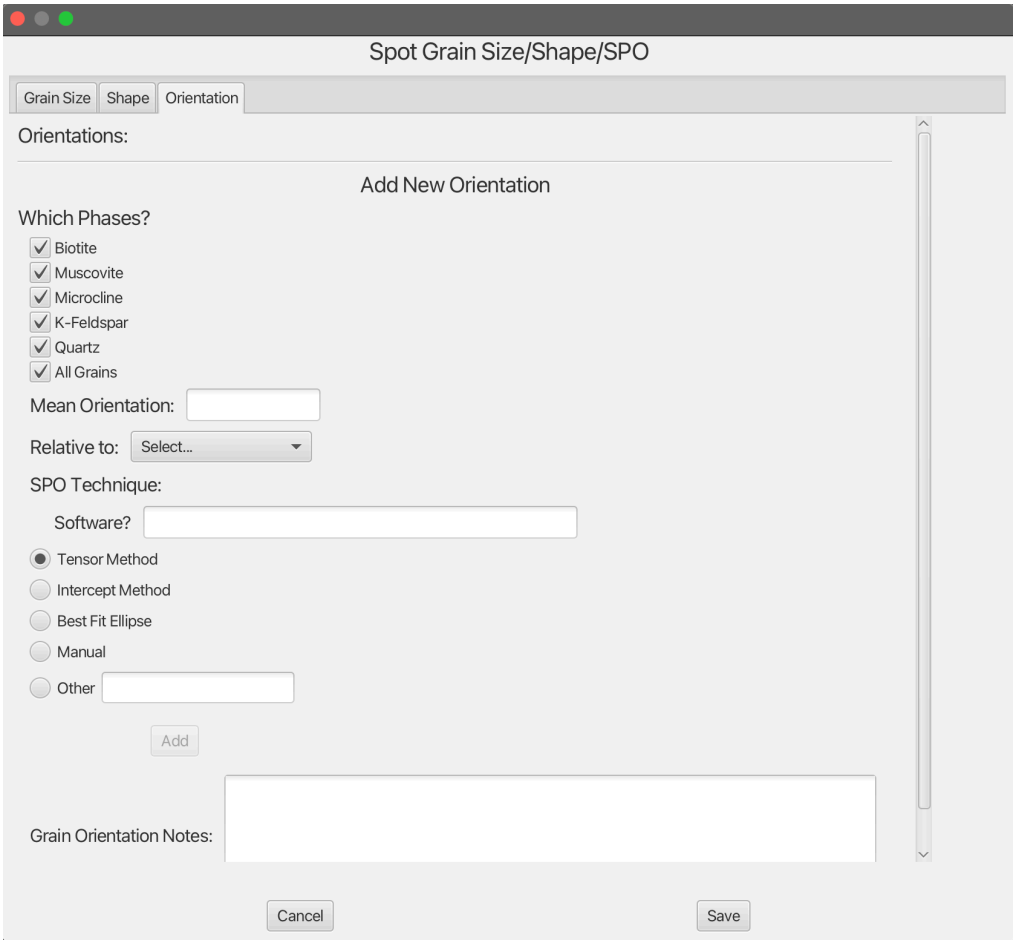



Figure 28: Shape Preferred Orientation (SPO) modal for documenting alignment of grains.

### 6.2.3 Fabrics

Fabrics can be classified as **foliation**, **lineation**, or **fabric trace**, and further characterized as either **primary** or **secondary**, and **penetrative** or **spaced**.

When adding a fabric, you must choose a **"Define By"** option. This selection determines which additional metadata fields are available. The four options are:

- **Composition**
- **Grain Size**
- **Grain Shape Orientation**
- **Cleavage (Solution Seam)**

Each option enables a different data entry form, as shown in the figures below.

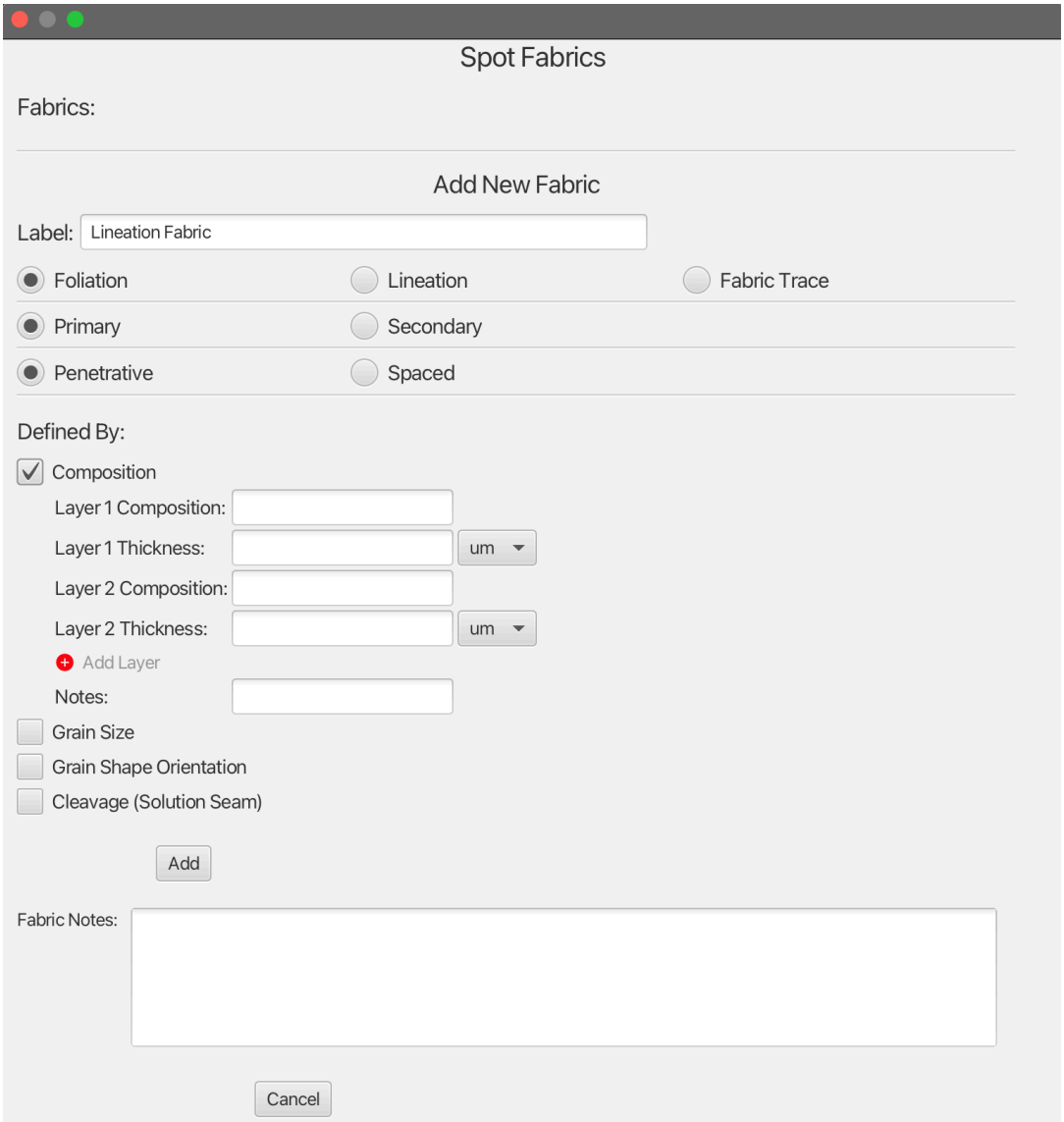



Figure 29: Fabric defined by composition

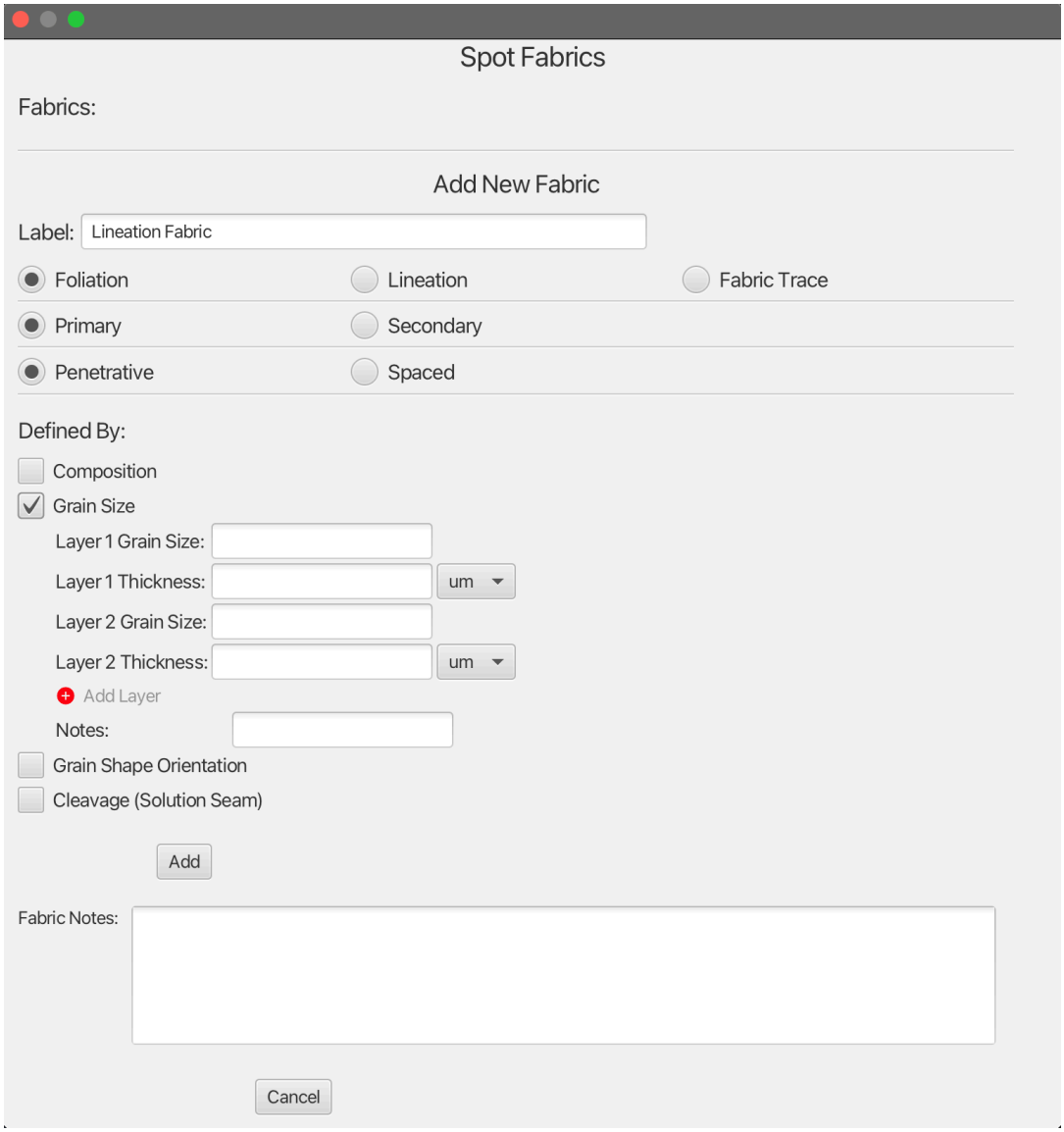



Figure 30: Fabric defined by grain size

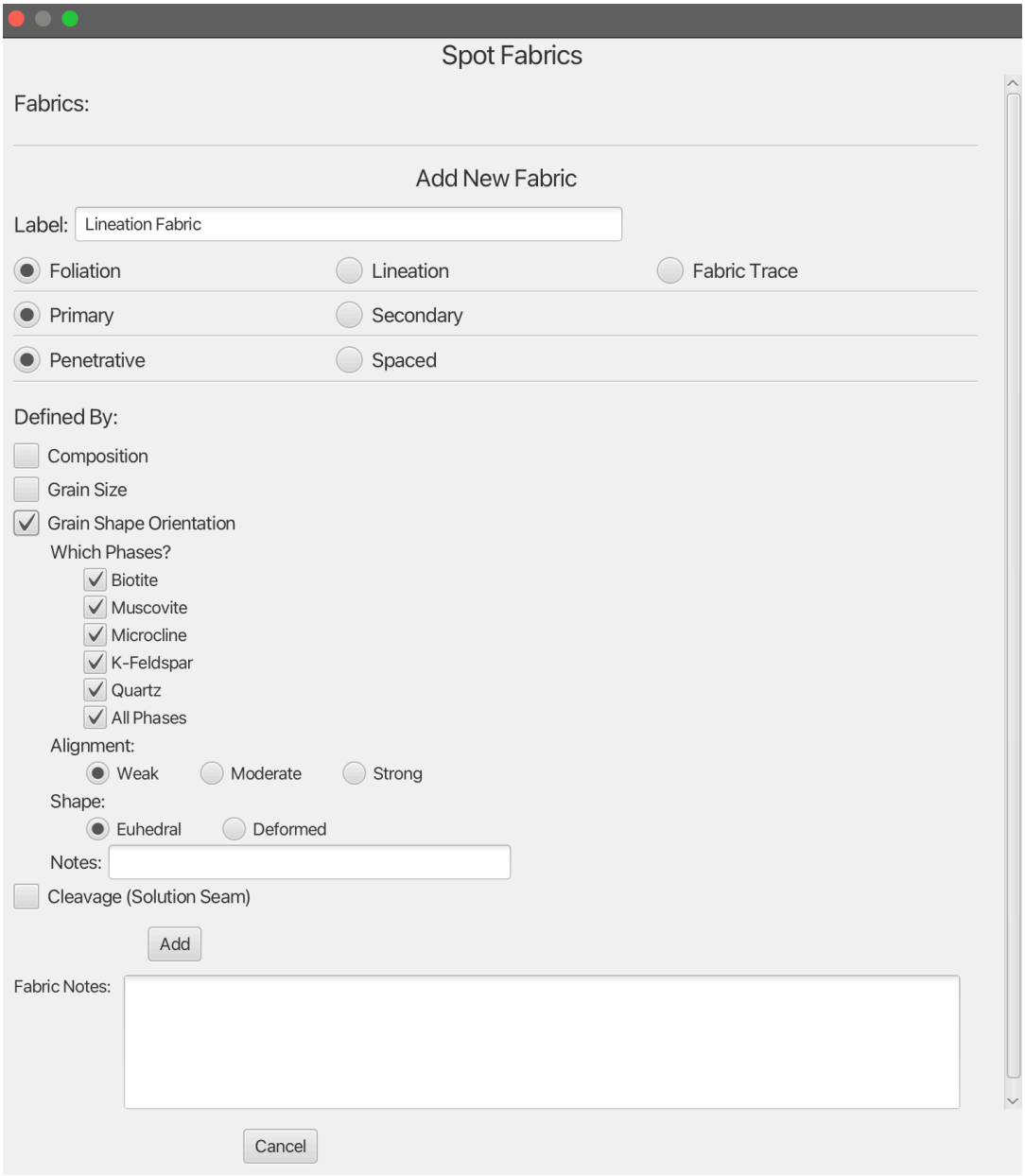



Figure 31: Fabric defined by grain shape orientation

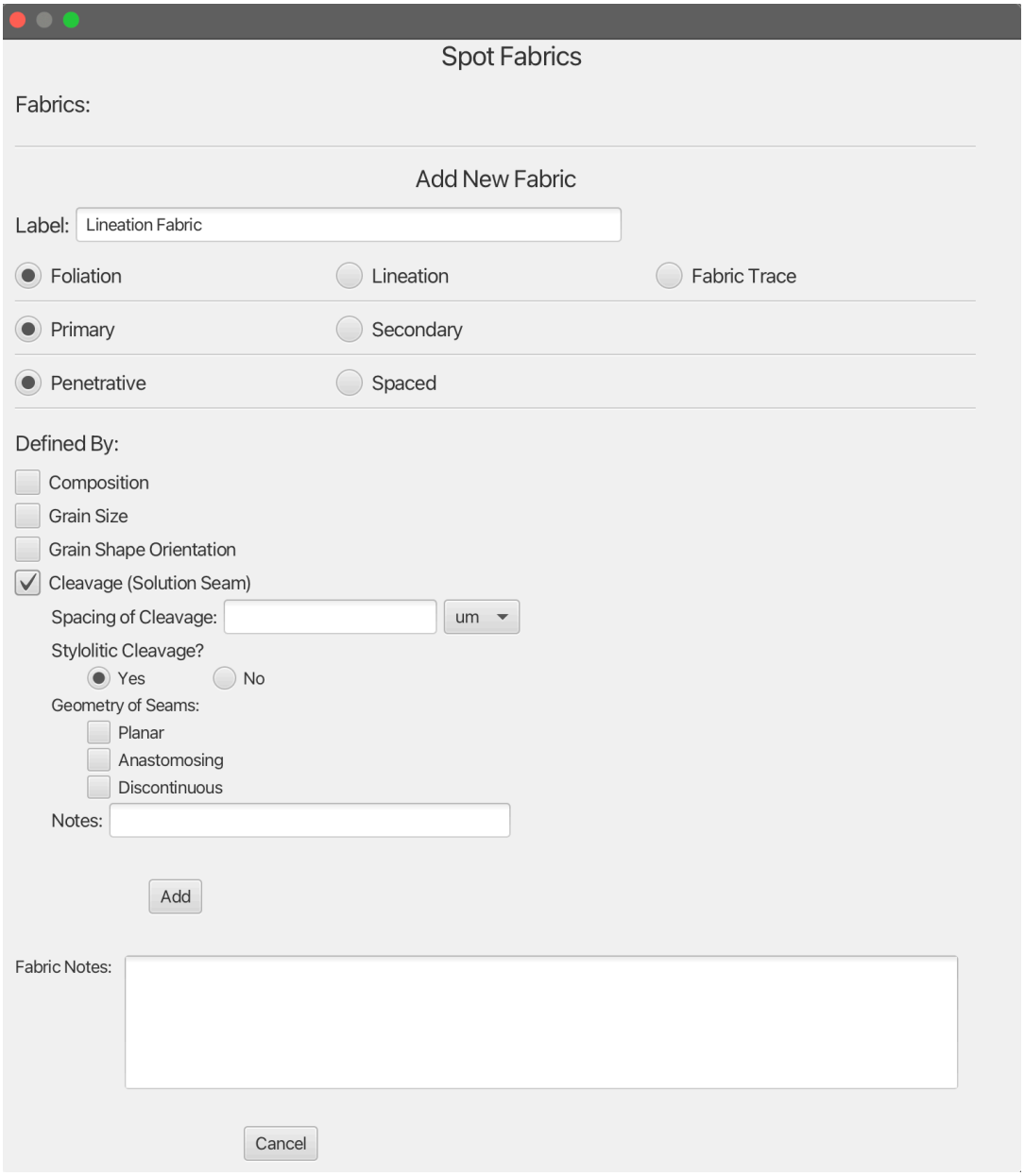



Figure 32: Fabric defined by cleavage (solution seam)

Multiple fabrics may be defined for a single spot or micrograph if needed.

### 6.2.4 Clastic Deformation Bands

Clastic deformation bands can be characterized by several properties:

- **Type:** Select one or more from the following—*cataclastic*, *dilation*, *shear*, or *compaction*.
- **Thickness:** Specify the thickness of the band.
- **Cement Type:** Optionally note the type(s) of cement present.

These input fields appear in the clastic deformation band data modal.

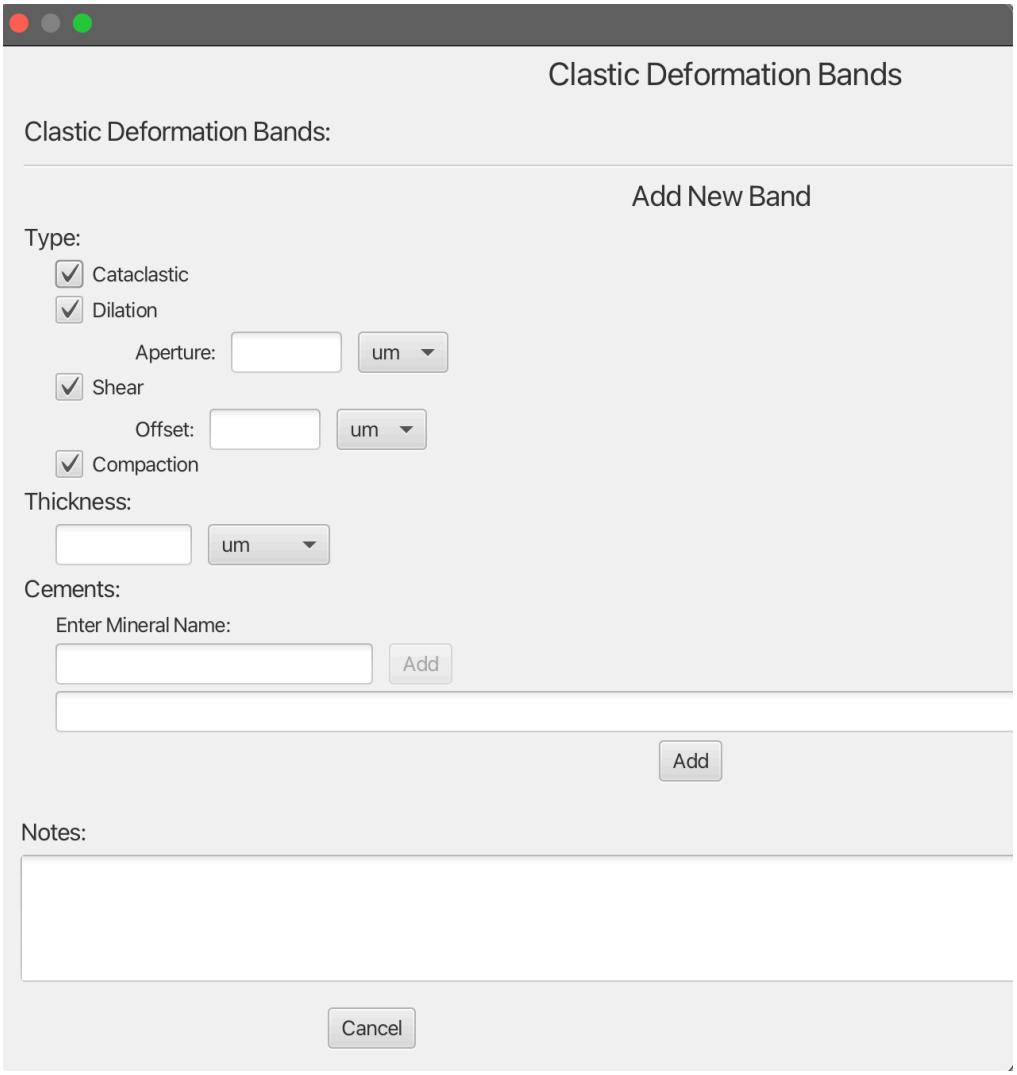



Figure 33: Data entry modal for clastic deformation bands

### 6.2.5 Grain Boundaries and Contacts

All grain boundary and grain contact observations can be linked to previously defined mineralogy or lithology for the selected image or spot, improving contextual understanding and interpretive accuracy. A variety of grain boundary morphologies may be selected using check boxes—multiple selections are allowed as applicable. Boundary descriptors can be further refined using additional criteria based on the initial selection.

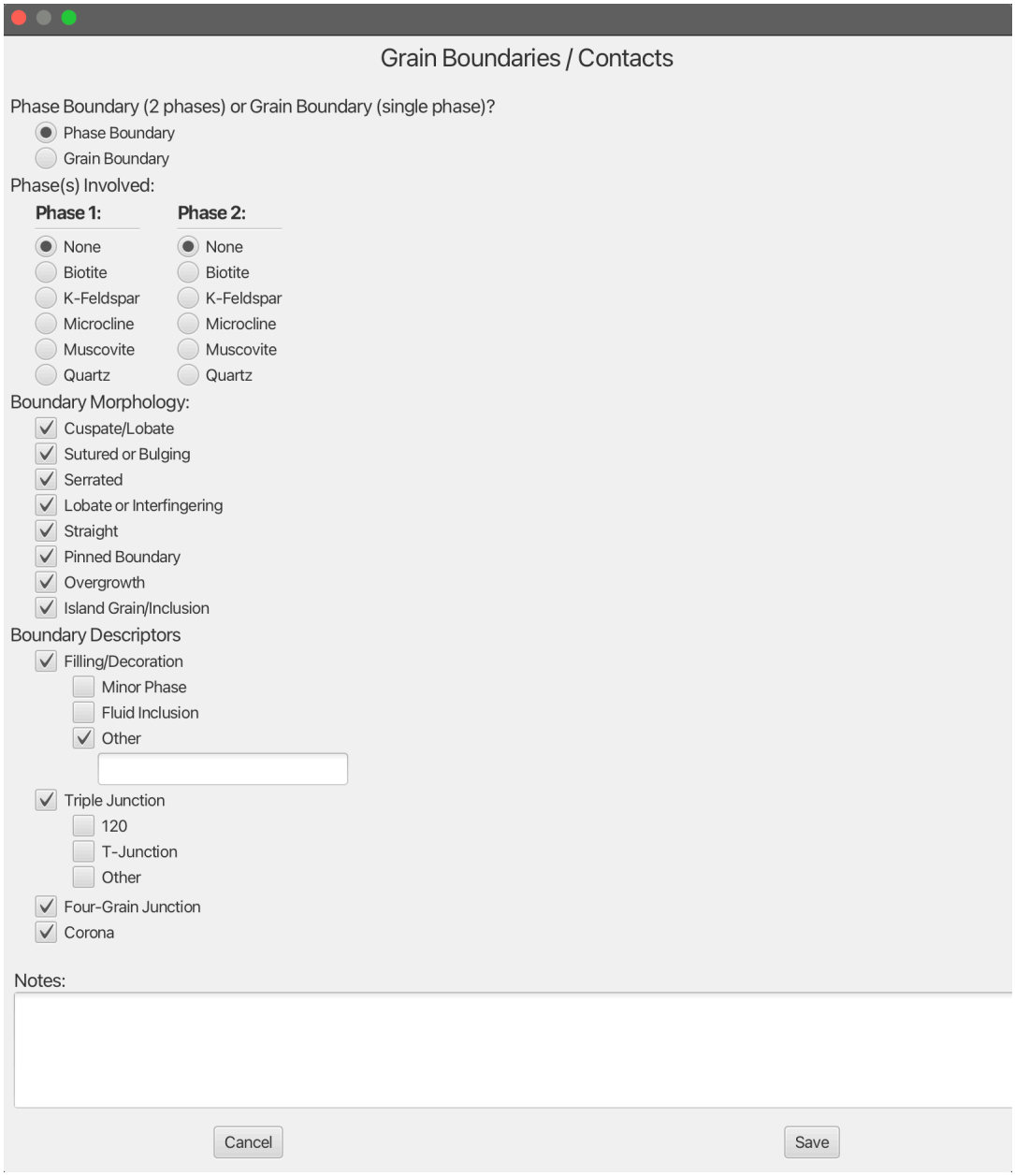



Figure 34: User interface options for grain boundary characterization, including point and line spot tools, mineralogical associations, and descriptor check boxes.

### 6.2.6 Intragranular Structures

Intragranular structures are features that occur within individual mineral grains. When documenting these structures, users can specify the associated mineral by selecting from the previously defined mineralogy or lithology list.


Figure 35: Interface for adding Intragranular structures, showing the option to associate each feature with a defined mineral.

### 6.2.7 Veins

Observational data related to veins within a thin section can be entered directly within this form. Unlike other features, vein mineralogy is defined here and does not need to be selected from the previously defined mineralogy or lithology list.

Users can document various characteristics of veins, including crystal shape, growth morphology, inclusion trails, kinematic indicators, and any additional relevant notes. This allows for detailed description of vein textures and formation processes.

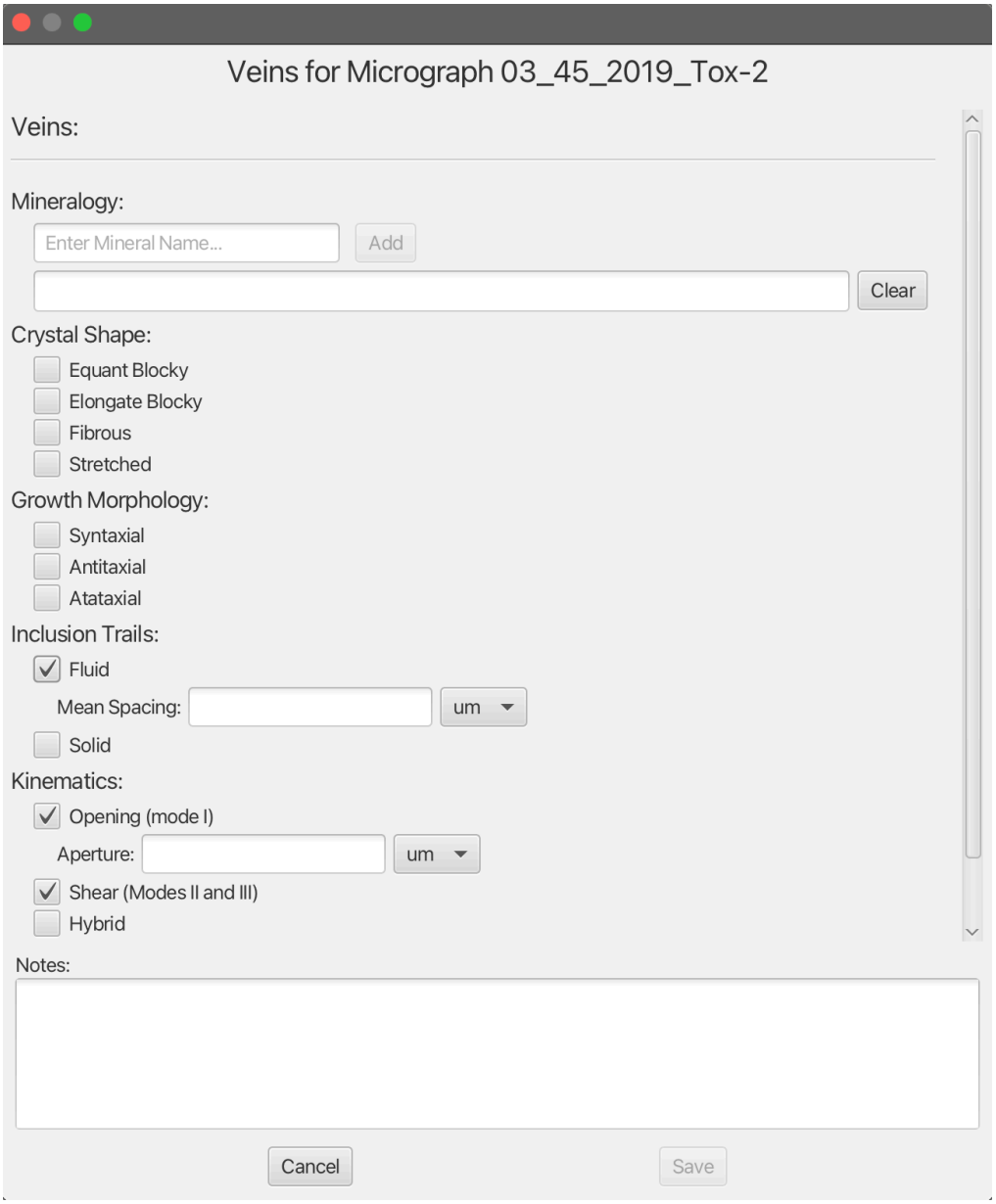



Figure 36: Interface for entering vein-related observations, including mineralogy, morphology, and kinematic features.

### 6.2.8 Pseudotachylyte

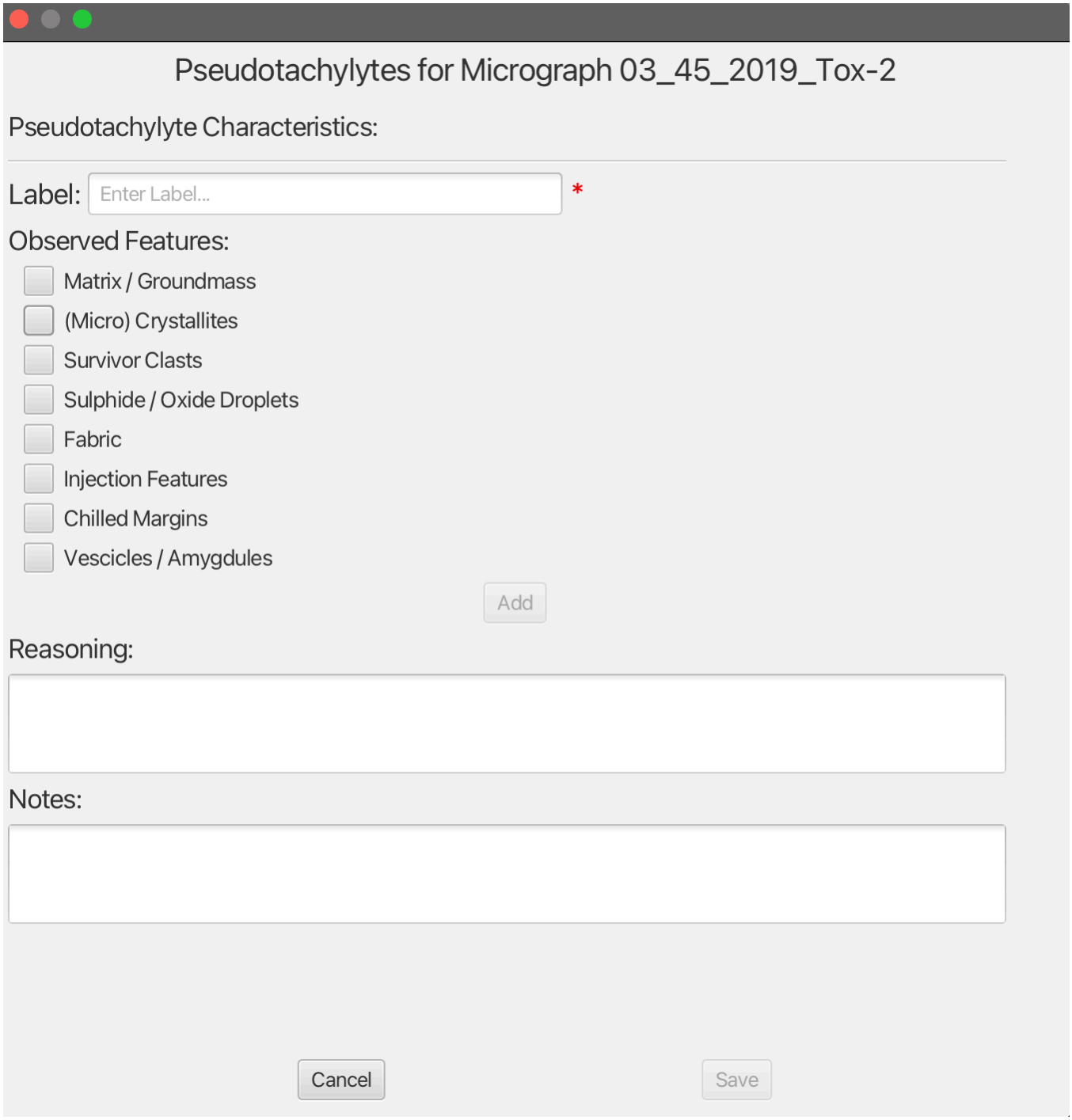
Pseudotachylyte data entry can be further refined by selecting from a set of observed features. These options allow for detailed characterization of textures and components associated with pseudotachylyte formation.

The figures below display all available metadata input options. The first figure shows the primary metadata modal, followed by individual conditional fields that appear based on the selected feature. Observed features include:

- Matrix / groundmass
- (Micro)crystallites
- Survivor clasts
- Sulphide / oxide droplets

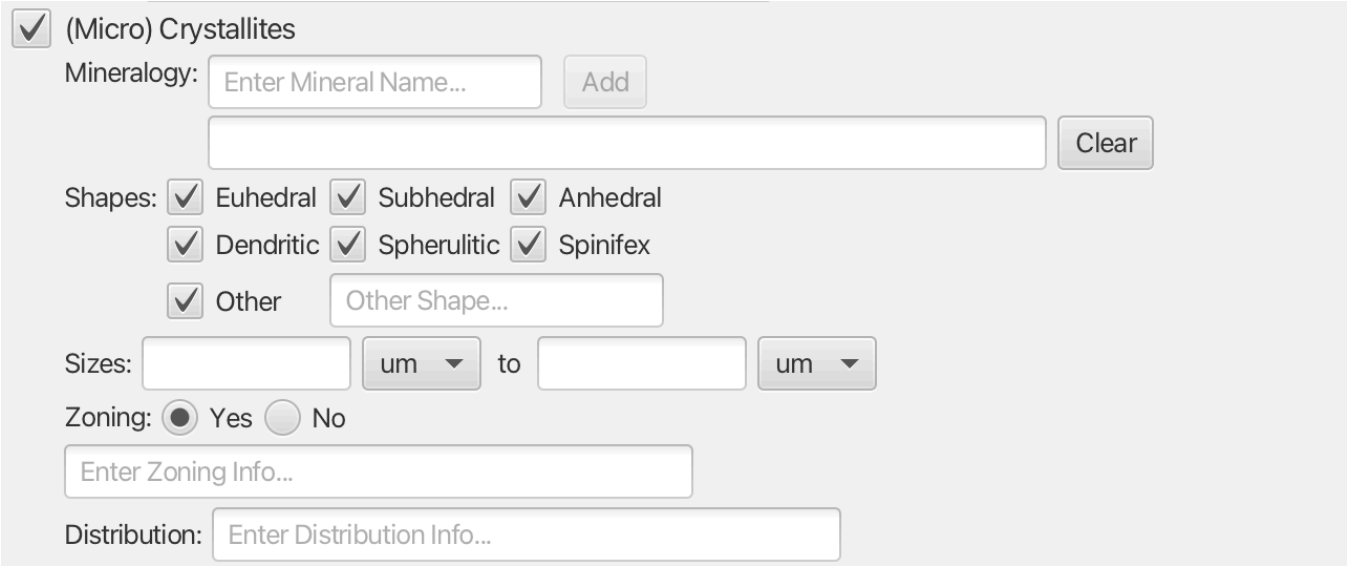
- Fabric
- Injection features
- Chilled margins
- Vesicles / amygdules

**Main Metadata Modal**

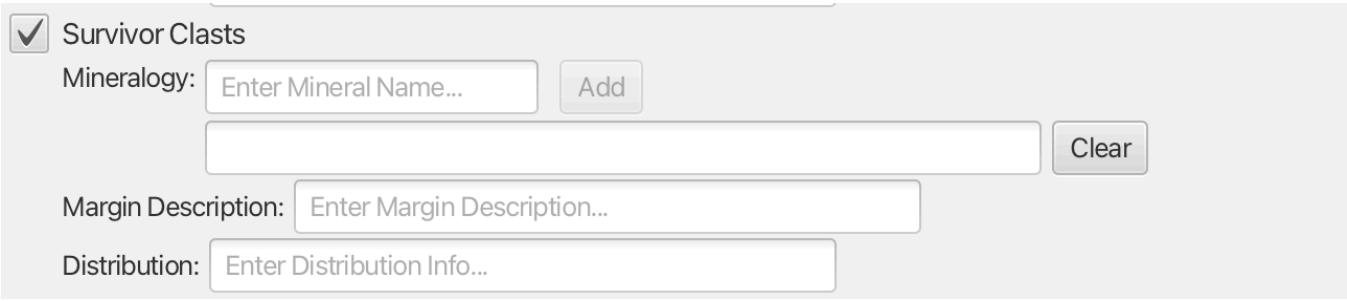



**Matrix / Groundmass**

### (Micro) Crystallites

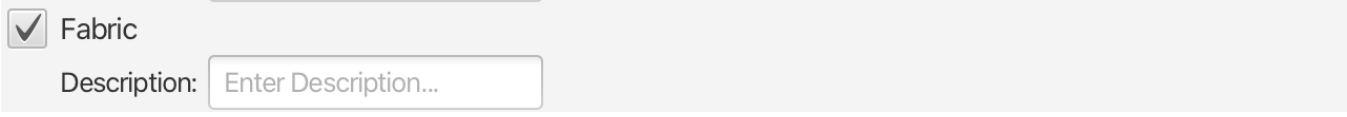



### Survivor Clasts

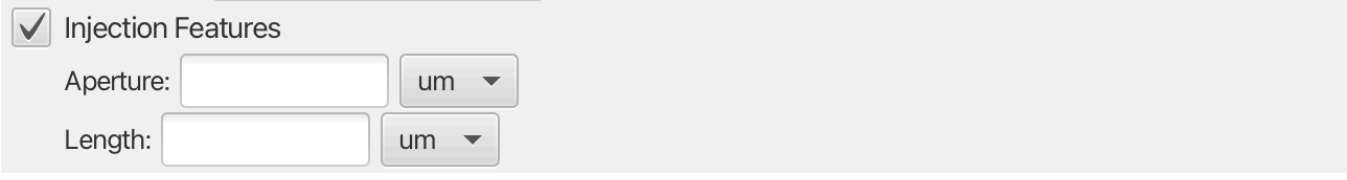



### Sulphide / Oxide Droplets

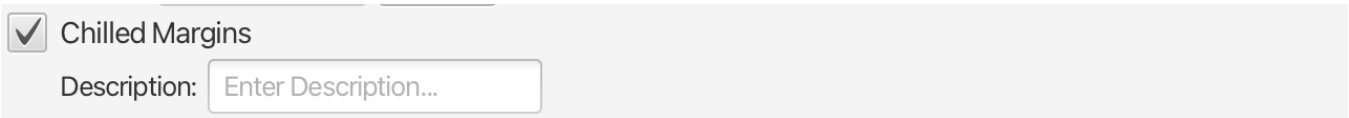

### Fabric




### Injection Features



**Chilled Margins**




**Vesicles / Amygdules**

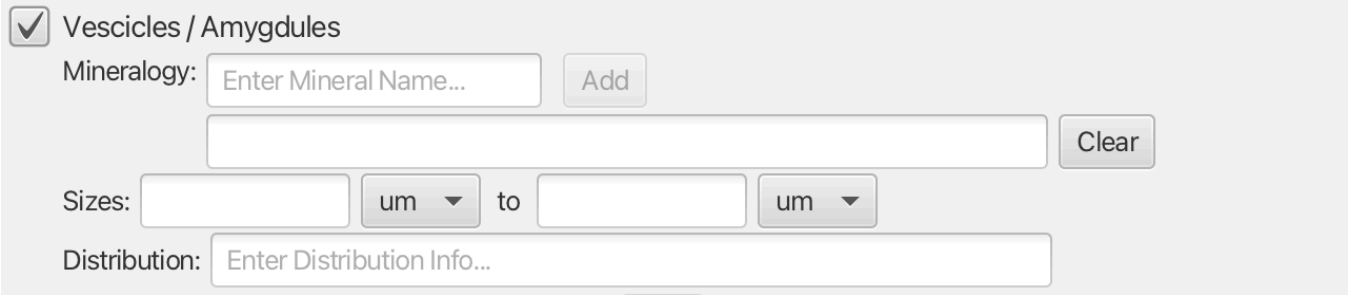



Figure 37: Pseudotachylyte metadata entry options. Each screenshot shows the available fields for a specific observed feature when selected in the form interface.

### 6.2.9 Folds

The **Folds Modal** provides a structured approach for describing key characteristics of folds. Users can specify attributes such as:

- Custom labels
- Interlimb angle geometry
- Closure geometry
- Axial trace orientation
- Symmetry
- Fold style
- Continuity
- Facing direction
- Additional notes

This allows for consistent and comprehensive documentation of fold structures at the micrograph or spot level.

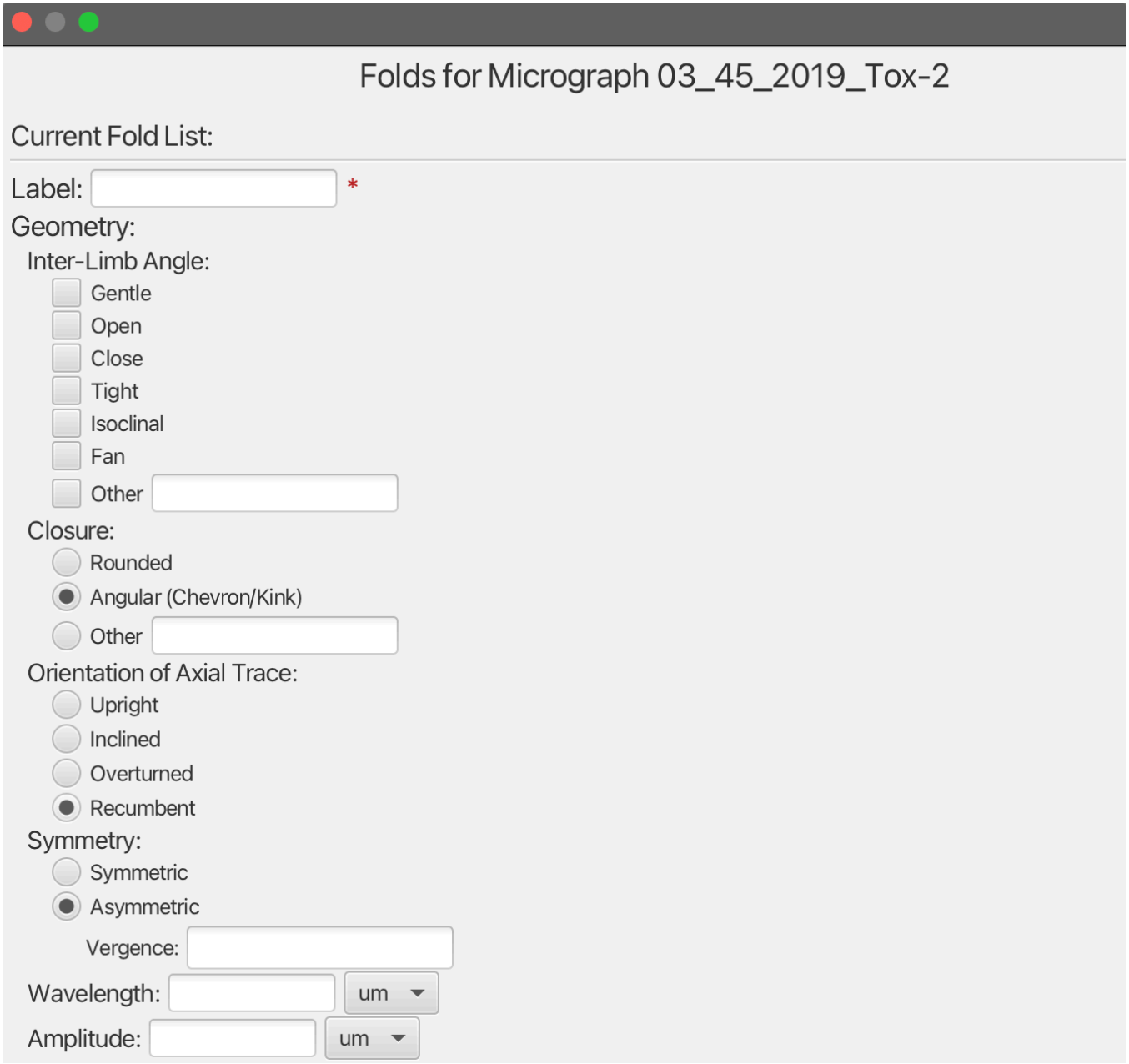



Figure 38: Fold Modal: Fold Geometry

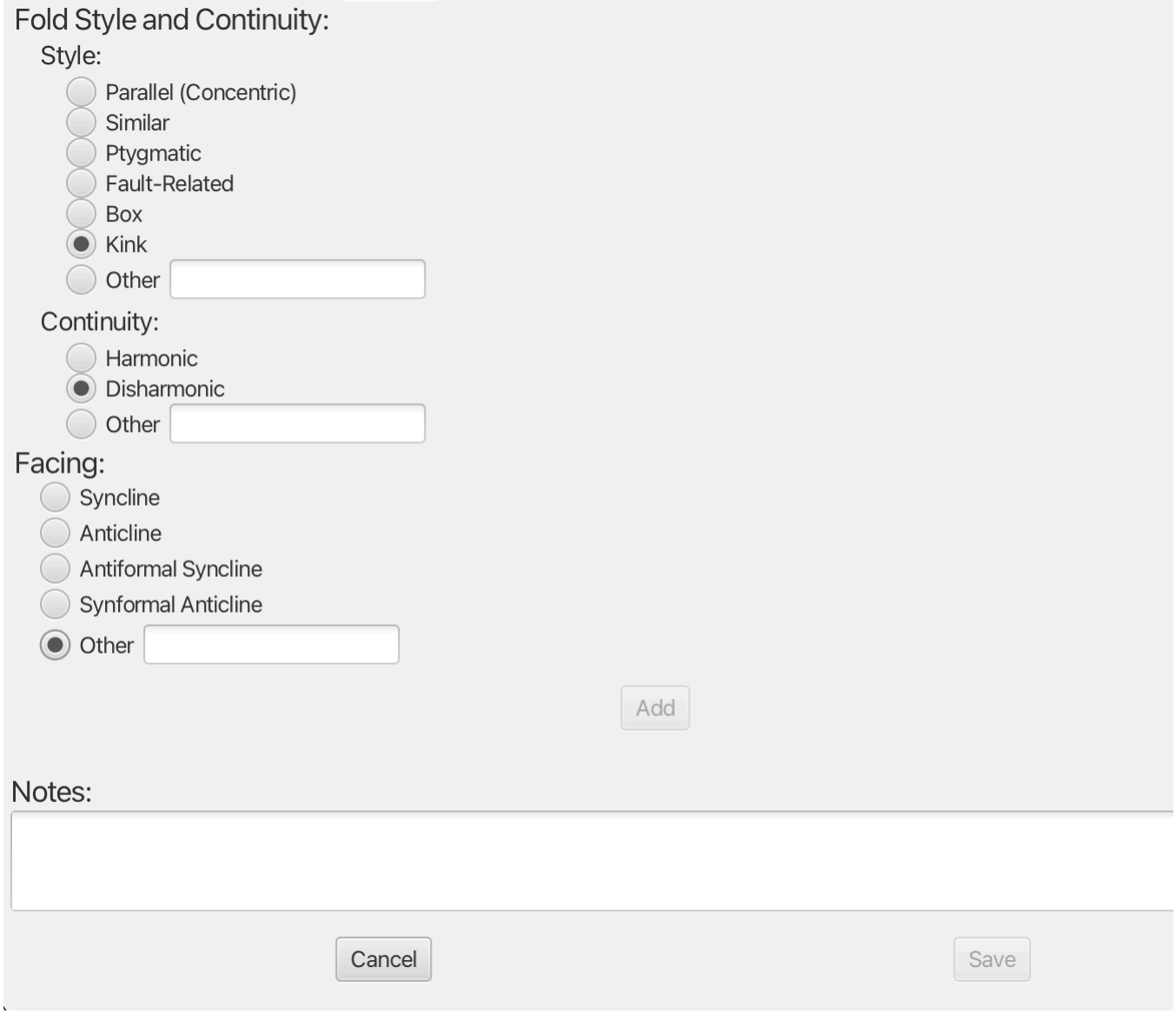



Figure 39: Fold Modal: Fold Style and Continuity

### 6.2.10 Faults and Shear Zones

The **Faults and Shear Zones** modal allows users to input structural data directly onto micrographs or spatial points (spots). Users can define shear sense and specify associated shear sense indicators. Additional metadata such as measured offsets and zone widths can be recorded, along with any relevant observations entered into the freeform notes field.

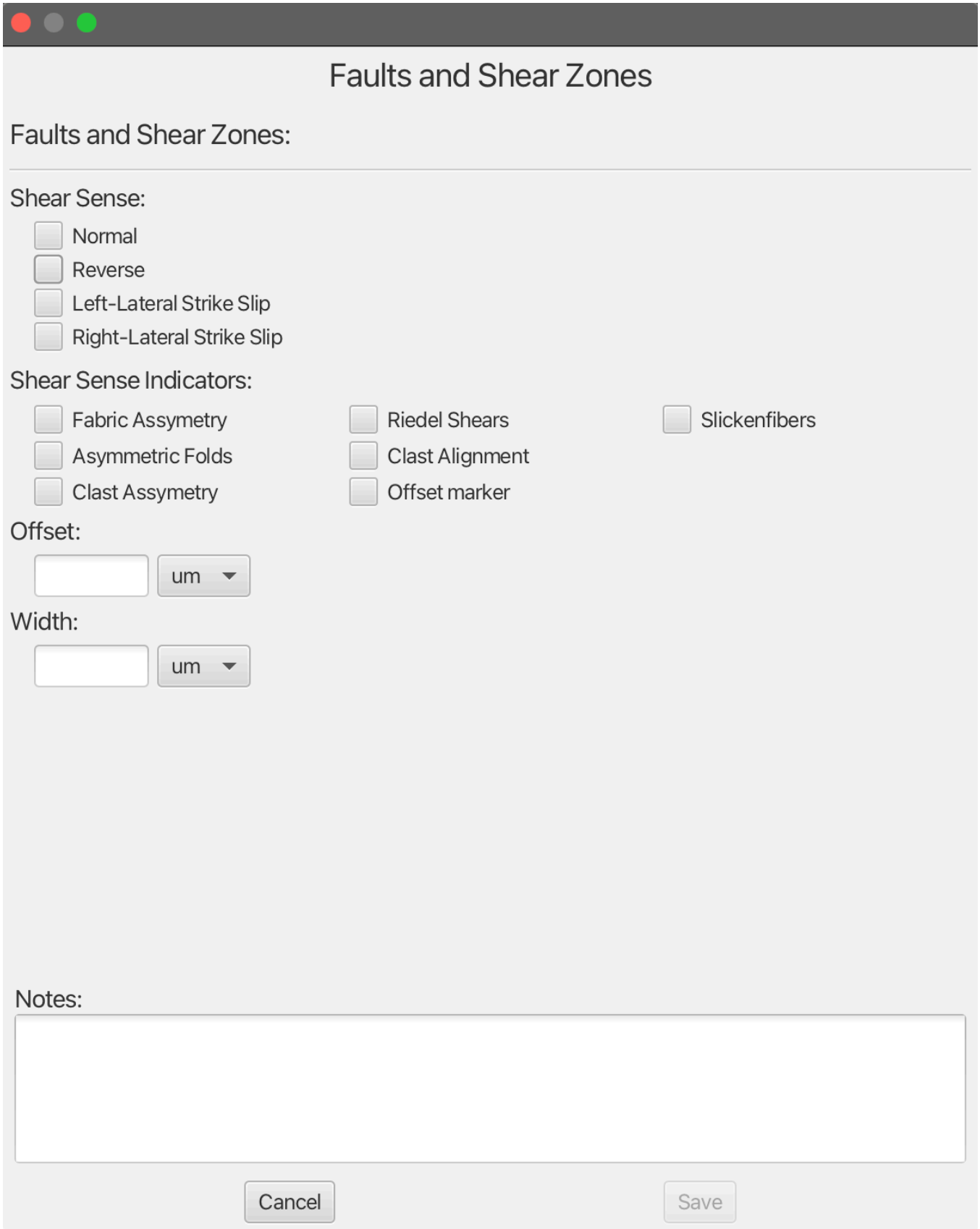



Figure 40: Screenshot of the *Faults and Shear Zones* data input modal.

### 6.2.11 Extinction Microstructures

Extinction microstructure metadata can be added to a micrograph or spot and includes attributes such as the mineral phase, type of heterogeneous extinction, presence of subgrain structures, extinction bands, and dislocations.

Multiple microstructures can be recorded in this section. For example, if a sample exhibits chessboard extinction in quartz and patchy, undulose extinction in feldspar, both structures can be documented as separate entries within the metadata.

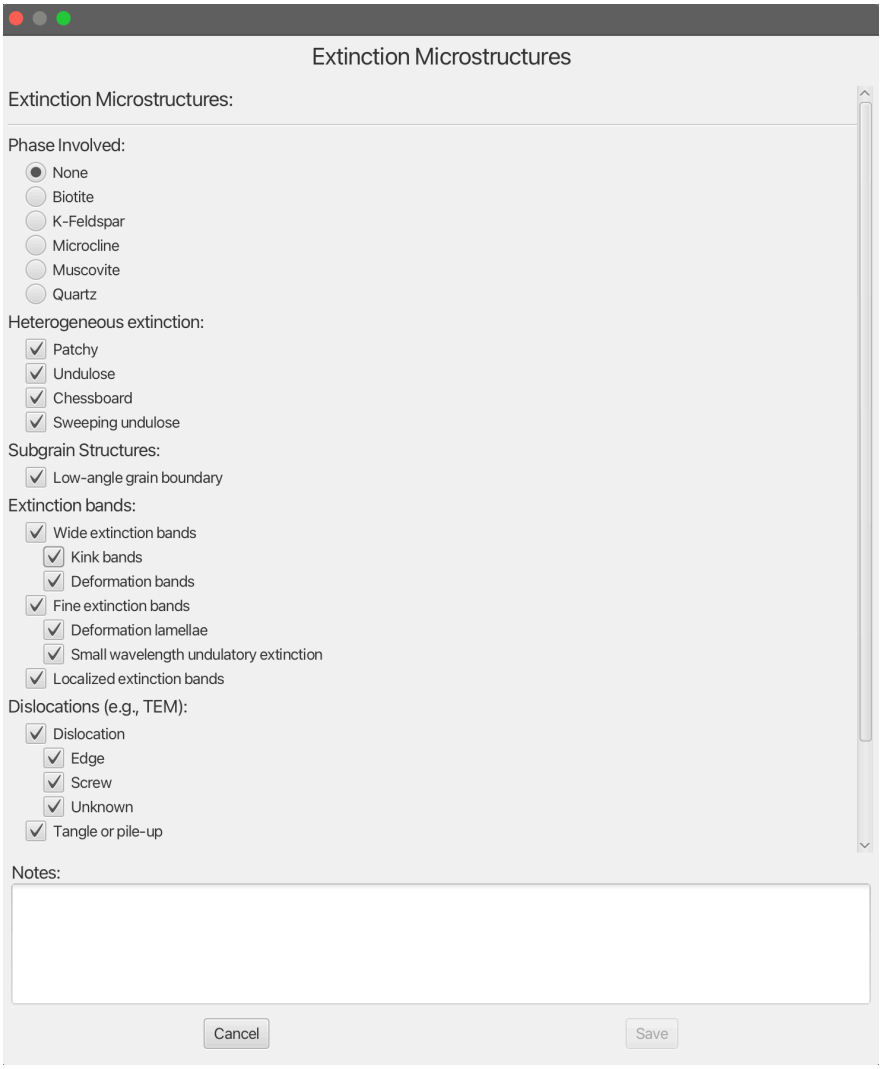



Figure 41: Screenshot of the *Extinction Microstructures* data input modal.

### 6.2.12 Fractures

Fractures can be recorded on a micrograph or spot using the **Fractures** modal. The mineralogy of fractured phases does not need to be predefined—relevant minerals can be specified within the modal itself. Users can also define the kinematic mode, input measured aperture or offset values (with units), and indicate whether the fracture is sealed or healed using a checkbox. A freeform notes field is available for additional observations.

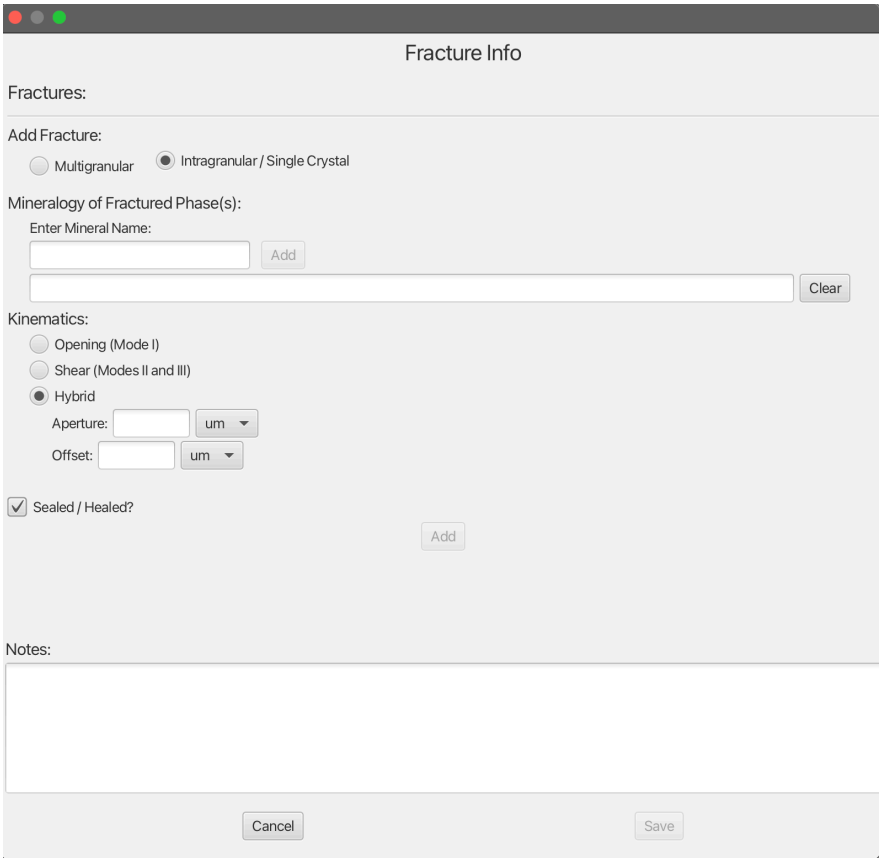



Figure 42: Screenshot of the *Fractures* data input modal.

### 6.2.13 Notes

The **Notes** field provides a freeform text area for entering and editing descriptive or contextual information. This section supports extended text and is ideal for capturing observations, interpretations, or any additional metadata that may not fit into predefined fields.

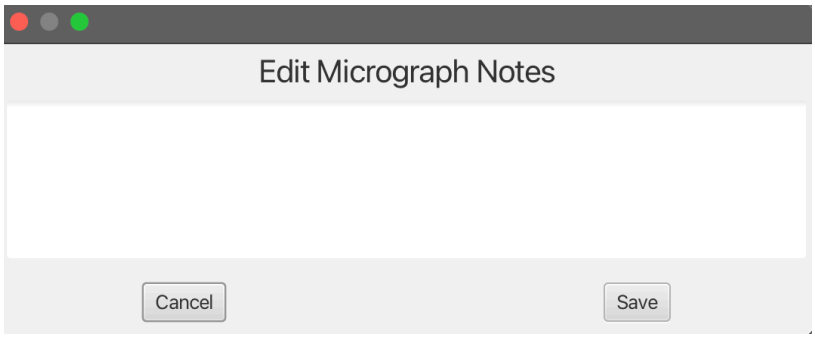



Figure 43: Screenshot of the *Notes* text entry field.

### 6.2.14 Associated Files

Users can attach external files to a micrograph or spot using the **Associated Files** modal. Files are added one at a time by selecting the appropriate file type from a dropdown menu (Figure 44), and an optional note can be attached to each file. Notes are linked to the currently selected file and will reset after each upload to ensure clear association.

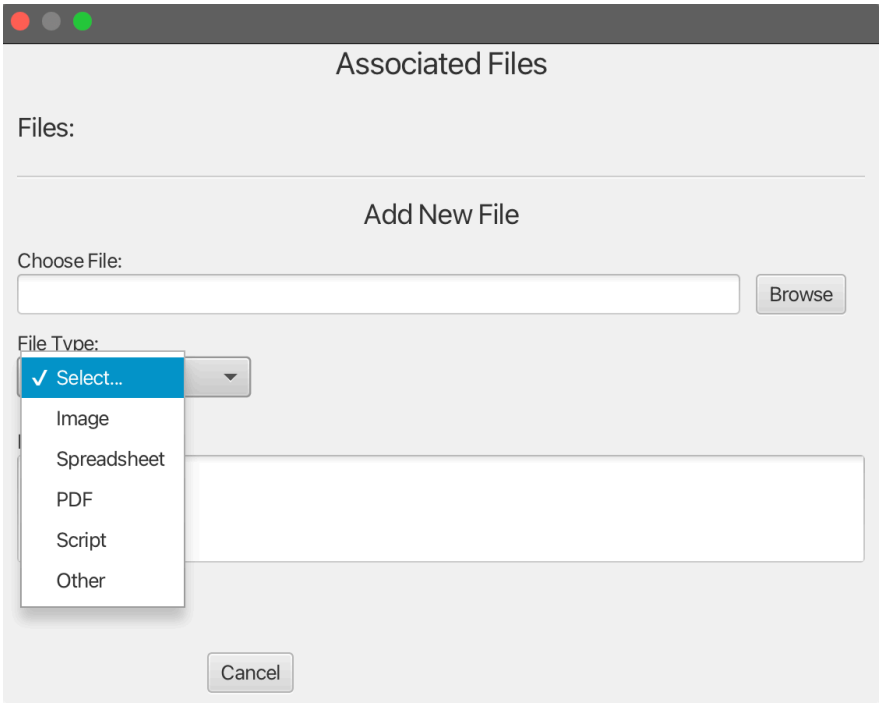



Figure 44: Screenshot of the *Associated Files* modal, showing file selection and type dropdown.

### 6.2.15 Links

The **Links** section allows users to add one or more external or internal references. Multiple links can be added as needed to connect relevant documents, datasets, or resources.

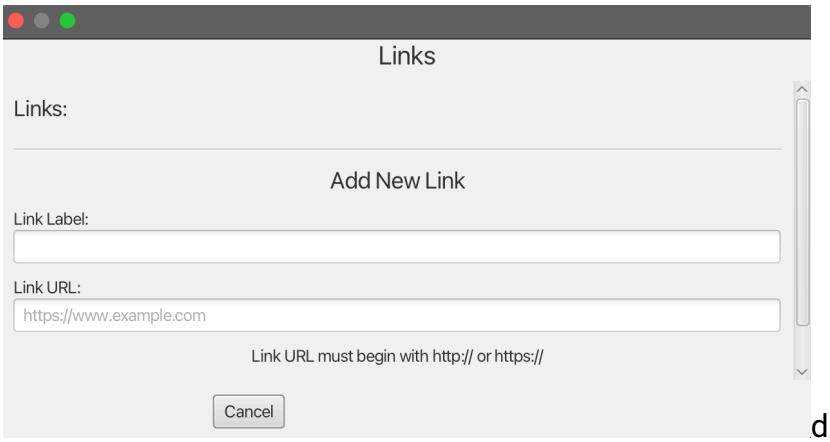



Figure 45: Screenshot of the *Links* data entry interface.

# 7 Troubleshooting and FAQs

If you experience any problems or issues with StraboMicro, please use the ”Send Error Report” option available in the Help menu, outlined in Section 4.5. This interface enables users to send issues directly to StraboMicro developers, including error logs which are essential for troubleshooting and debugging.

## 7.1 Common Issues and Fixes

1. **StraboMicro Crashes and Fails to Launch:** If StraboMicro crashes and subsequently fails to open, it is possible that the current project has become corrupted. In such cases, it may be necessary to delete the application's cached data.

   To remove cached data, navigate to the `StraboMicroData` folder located in your `Documents` directory, and delete all subfolders within it.

   **Important:** Before deleting any data, ensure you create a backup copy of the contents of the `StraboMicroData` folder to preserve any data that may be recoverable.

2. **StraboMicro will not update:** "Installation Failed. Failed to install shortcut." If you receive this error, try unchecking the 'Add Desktop Shortcut' checkbox. See Figure 46 for an example of the error.

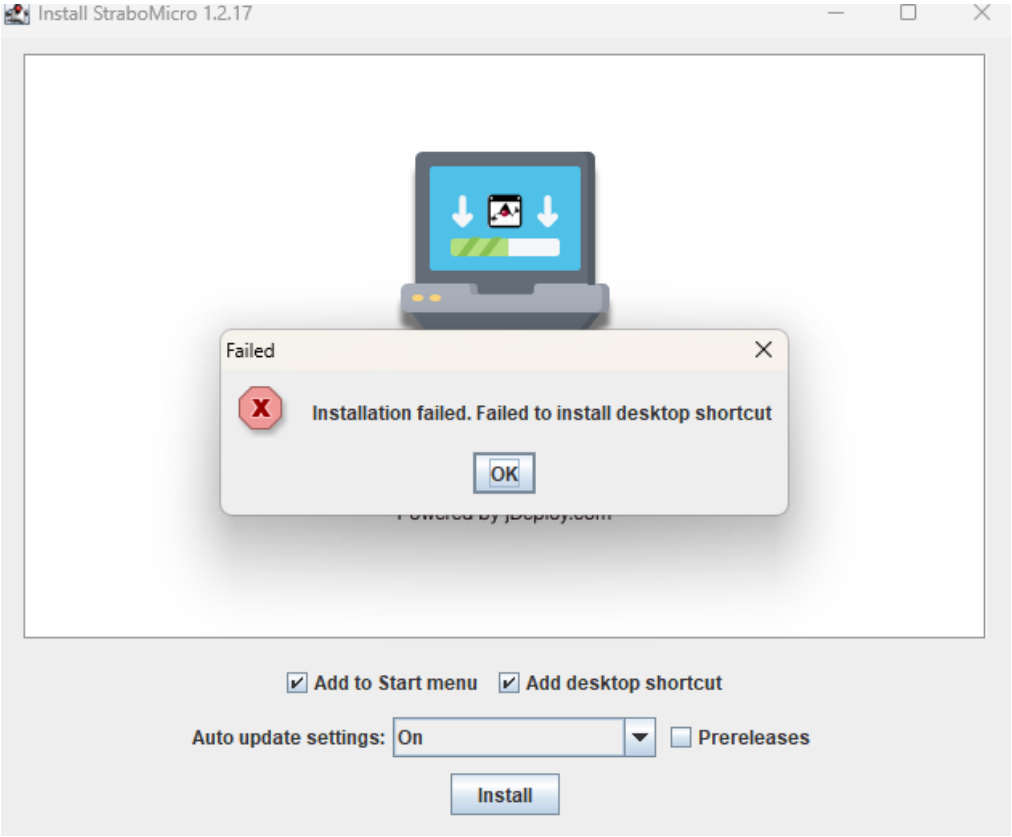



Figure 46: Add Desktop Shortcut Permissions Error: unable to add desktop shortcut due to computer permissions, therefore unable to update the StraboMicro application.

## 7.2 Frequently Asked Questions (FAQs)

### Do I have to manually update StraboMicro every time a new version is released?

No, if you are using version 1.2.9 or newer the StraboMicro desktop application will automatically update.

### Why should I update StraboMicro?

Updating software is a simple but powerful way to protect your system, enjoy new features, and ensure smooth operation. Ignoring updates can lead to security risks, performance issues, and compatibility problems over time.

# 8 Appendices

## 8.1 Glossary of Terms

### Abbreviations (Alphabetical)

- **ACOM** – Automated Crystal Orientation Mapping
- **ADF** – Annular Dark Field
- **AFM** – Atomic Force Microscopy
- **BSE** – Backscattered Electron
- **CBED** – Convergent Beam Electron Diffraction
- **CL** – Cathodoluminescence
- **ECCI** – Electron Channeling Contrast Imaging
- **EBSD** – Electron Backscatter Diffraction
- **EDS** – Energy Dispersive X-ray Spectroscopy
- **EELS** – Electron Energy Loss Spectroscopy
- **FIB** – Focused Ion Beam
- **FSE** – Forescattered Electron
- **FTIR** – Fourier Transform Infrared Spectroscopy
- **HAADF** – High-Angle Annular Dark Field
- **IPF** – Inverse Pole Figure (e.g., IPF-X, IPF-Y, IPF-Z)
- **LACBED** – Large Area Convergent Beam Electron Diffraction
- **NBD** – Nano Beam Diffraction
- **PI** – Principal Investigator
- **SAED** – Selected Area Electron Diffraction
- **SE** – Secondary Electron
- **SEM** – Scanning Electron Microscopy
- **STEM** – Scanning Transmission Electron Microscopy
- **TEM** – Transmission Electron Microscopy

- **TKD** – Transmission Kikuchi Diffraction
- **WDS** – Wavelength-Dispersive X-ray Spectroscopy

## 8.2 Keyboard Shortcuts

## 8.3 Data Schema Overview

## 8.4 Licensing and Attribution