Avalanche Simulation Data – Handover Notes

This document describes the avalanche simulation data prepared for the **pilot Brenner dataset**, focusing on the `/11_avaDirectory` directory and the scenario-specific exports in `/12_avaScenMaps`.

`/11_avaDirectory/`

This folder contains the **full avalanche inventory** (~26k features = ~13k avalanches + ~13k release areas).

- **Result rasters**
  - ~6 raster products per avalanche run (e.g. `zDelta`, `travelLengthMax`, `travelAngleMax`, …).
  - Stored in `com4_*` subfolders.
- **avaDirectory.csv**
  - Attributes only (no geometry).
  - Lightweight table (~26k rows) → best for filtering scenarios quickly.
- **avaDirectory.geojson**
  - Geometry + attributes for all avalanches.
  - Heavy (~73 MB), WebGIS-ready.
- **avaDirectory.parquet**
  - Geometry + attributes in Parquet format.
  - Much smaller and loads 10–50× faster in Python/QGIS.
  - Recommended for backend filtering and processing pipelines.

`/12_avaScenMaps/`

This folder contains **scenario-specific exports**, generated after applying filters (area IDs, sector, flow type, elevation bands, etc.):

- **avaScen_LWD-*.csv**
  Filtered Avalanches - list for each area (attributes only).
- **avaScenFilePaths_LWD-*.csv**
  - Filtered Avalanches - list with resolved raster file paths.
- **avaScen_LWD-*.geojson**
  - iltered Avalanches polygons + attributes + relative raster paths (relative to `/11_avaDirectory/`).
  - This is the recommended input for WebGIS.

Preprocessing Pipeline

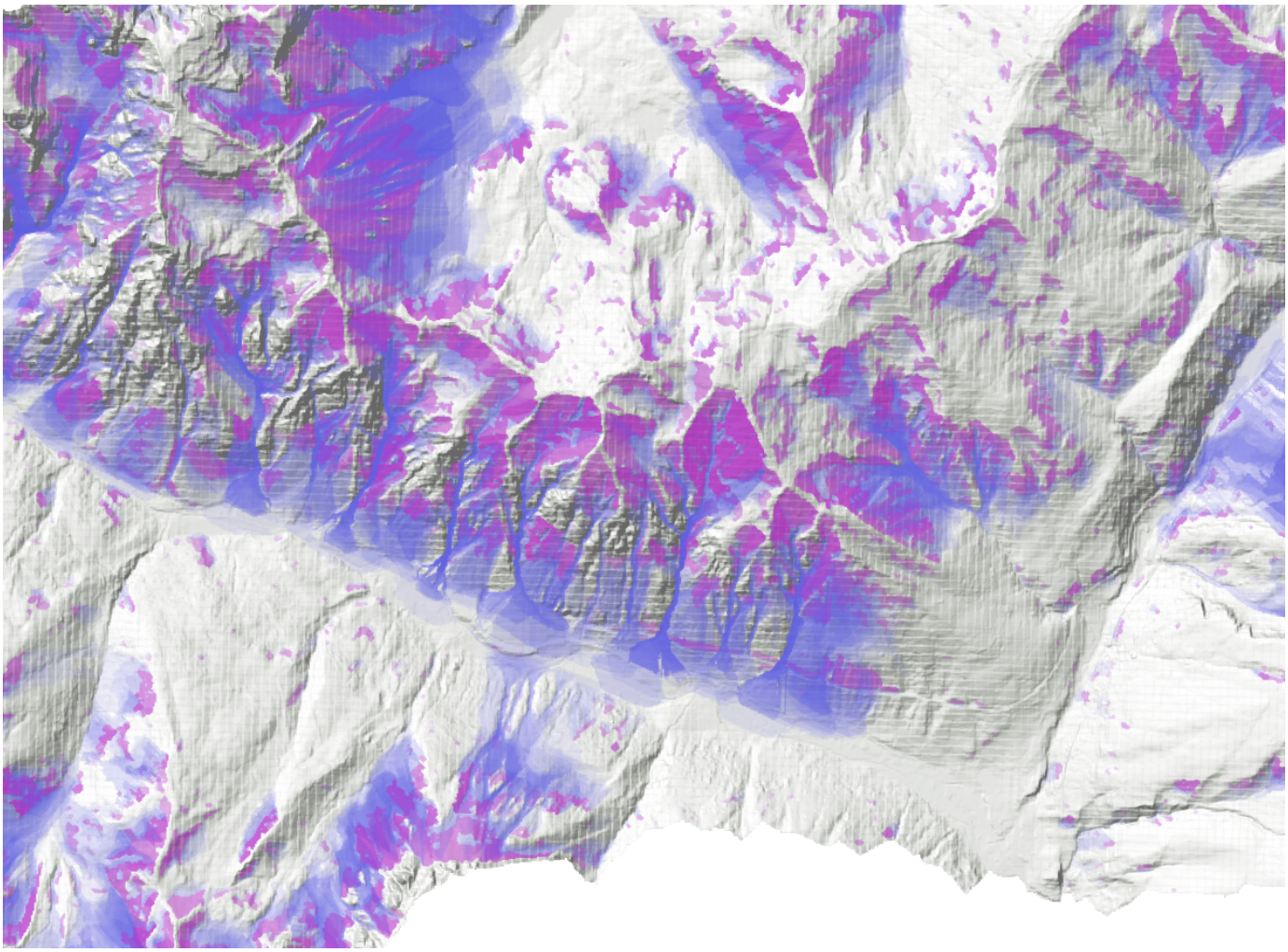
```
avaDirectory.csv
       |
       ▼
  Set Scenario Filter
       |
       ▼
    Filtered Avalanches (attributes only)
       |
       ▼
    avaDirectory.parquet (geometry + attributes)
       |
       ▼
```

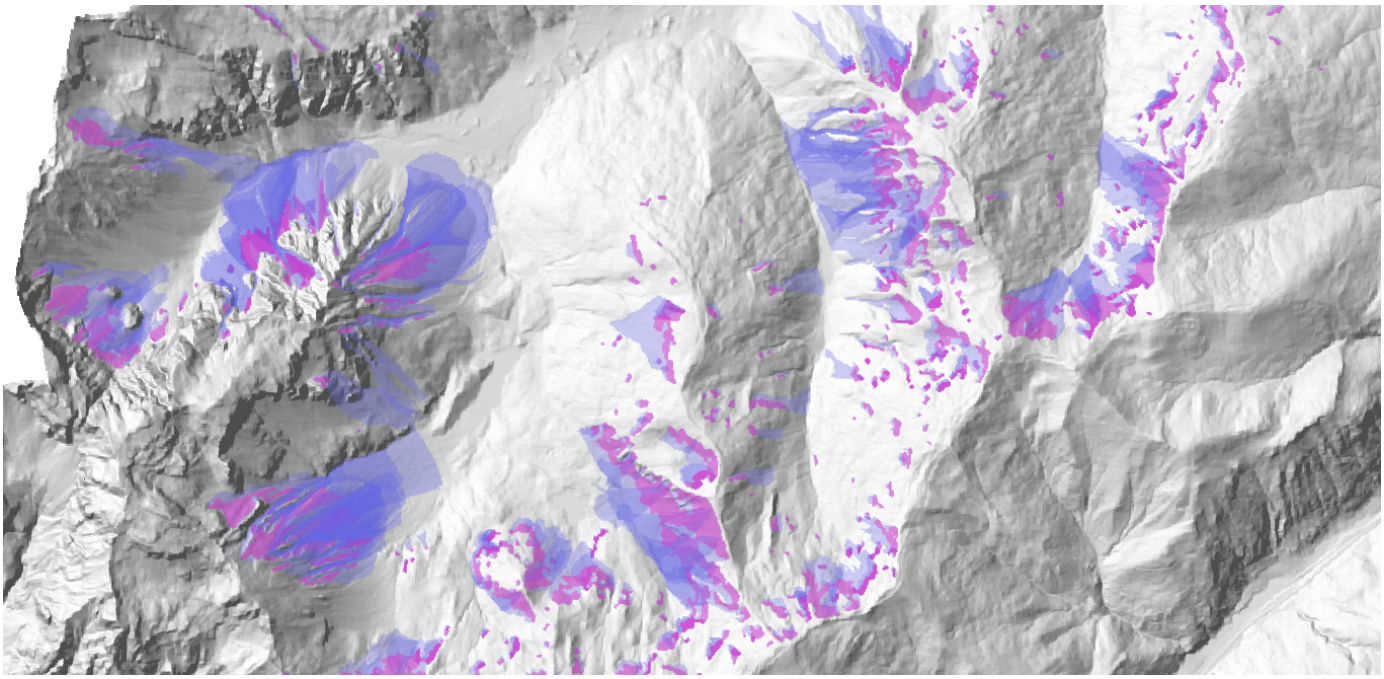
```
    merge filtered Avalanches + geometry
       │
       ▼
    append raster file paths from indexAvaFiles.pkl
       │
       ▼
avaScen_LWD-*.geojson  (final scenario outputs, WebGIS-ready)
```

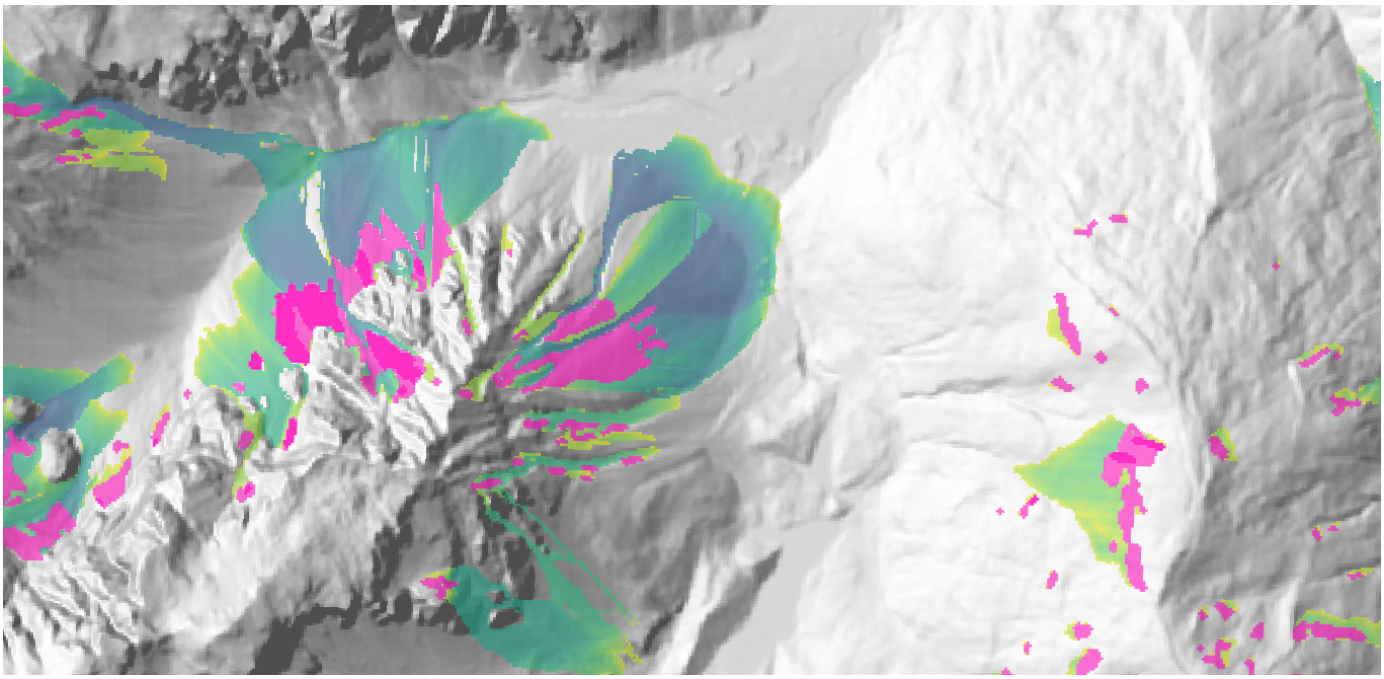
Suggested WebGIS Workflow

1. **Filtering pipeline**
   - Apply scenario filters first on **avaDirectory.csv** (fast).
   - Once filtered avalanches are selected, merge back with **avaDirectory.parquet** to attach geometry.
   - Add raster paths from the raster index (`indexAvaFiles.pkl`).
   - Export a **final GeoJSON** with geometry + relative raster paths
     → already prepared in `/12_avaScenMaps/`.

2. **Display concept**
   - **Zoomed out** → show only **polygons**
     - avalanche outlines [blue], release areas [pink], see 1&2 screenshot below.
   - **Zoomed in** (after a threshold) → load the linked **TIFF rasters on demand**
     from the `path_*` fields in the scenario GeoJSON.
     - avalanche raster [intensity], release areas [pink], see 3 screenshot below.
   - This keeps the map lightweight while enabling rich raster detail when needed.







Applied filter for testing

```
# --- Filters for Scenario 1 for area 1 & 2 ---

    areaLwdIds=['IT-32-BZ-04-01', 'IT-32-BZ-05-01'],
    subCs=[500],
    sectors=["S", "E"],
    flows=["Dry"],
    elevMin=0000,
    elevMax=2000,
```

- Output for WebGIS:
  - AREA 1 | Scenario 1: `12_avaScenMaps/avaScen_LWD-IT-32-BZ-05-01.geojson` &
  - AREA 2 | Scenario 1: `12_avaScenMaps/avaScen_LWD-IT-32-BZ-04-01.geojson`

and

```
# --- Filters for Scenario 2 for area 3 & 4 ---

    areaLwdIds=['AT-07-22', 'AT-07-23-02'],
    subCs=[500],
    sectors=["N", "W"],
    flows=["Dry"],
    elevMin=1800,
    elevMax=2400,
```

- Output for WegbGIS:
  - AREA 3 | Scenario 2: `12_avaScenMaps/avaScen_LWD-AT-07-22.geojson`
  - AREA 4 | Scenario 2: `12_avaScenMaps/avaScen_LWD-AT-07-23-02.geojson`