Point cloud analysis and segmentation procedures in the PZero software

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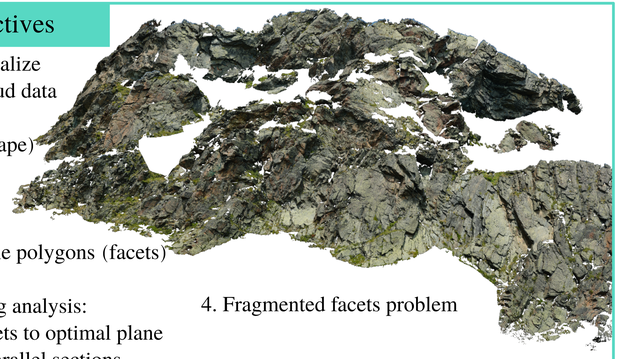
1. Main objectives



1. Import and visualize dense point cloud data sets (e.g. from Agisoft Metahsape)
2. Segment point cloud and extract plane polygons (facets)
3. Fracture spacing analysis:
   (a). Project facets to optimal plane
   (b). Multiple parallel sections
   (c). Calculate spacing
4. Fragmented facets problem

2. Case studies

Two main brittle deformation events present:

D1: Oligocene NW-SE extension

D2: Miocene NE-SW extension

Lago Verde dataset

Gressoney valley (Monte Rosa) Aosta, IT

- Folded and fractured metabasalts
- Schistosity planes with higher dipping angles
- On field data

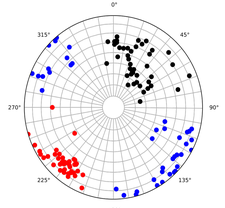


Fig 1: *Stereoplot representation of the planes measured one the field*

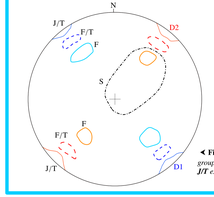


Fig 2: *Qualitative poles distribution for the Lago Verde dataset. Circled areas group poles of the different fracture sets present in the* ***D1*** *and* ***D2*** *events.* ***J/T*** *extensional joints,* ***F*** *shear fractures,* ***F/T*** *hybrid planes,* ***S*** *schistosity planes*

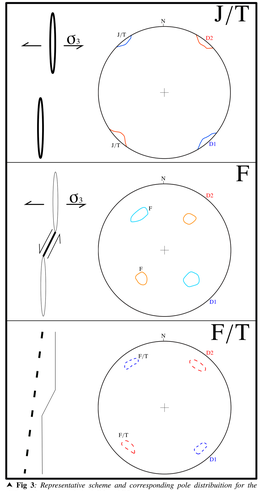
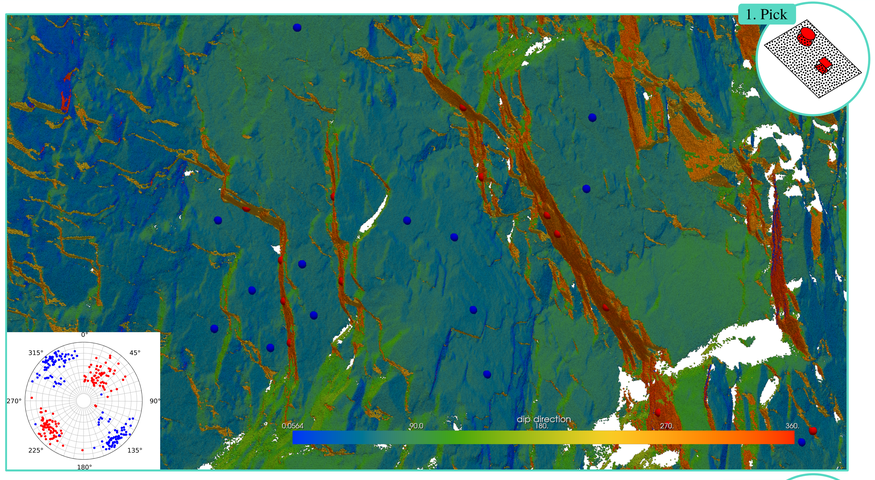
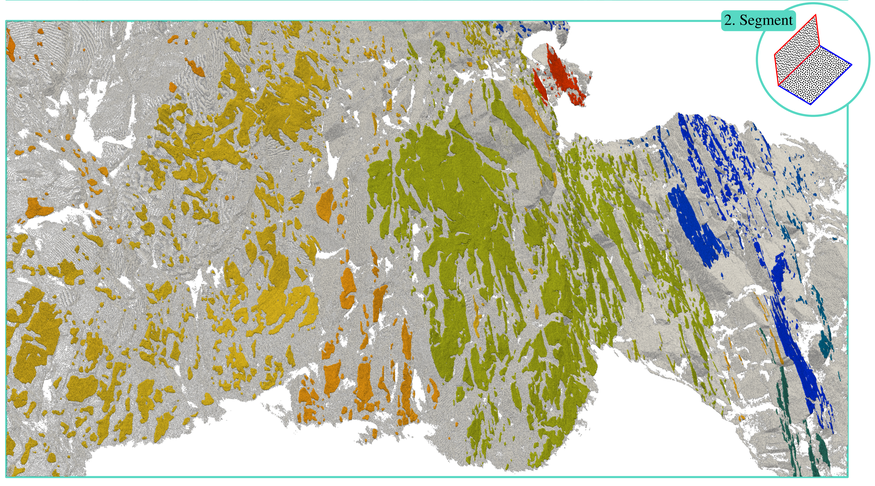
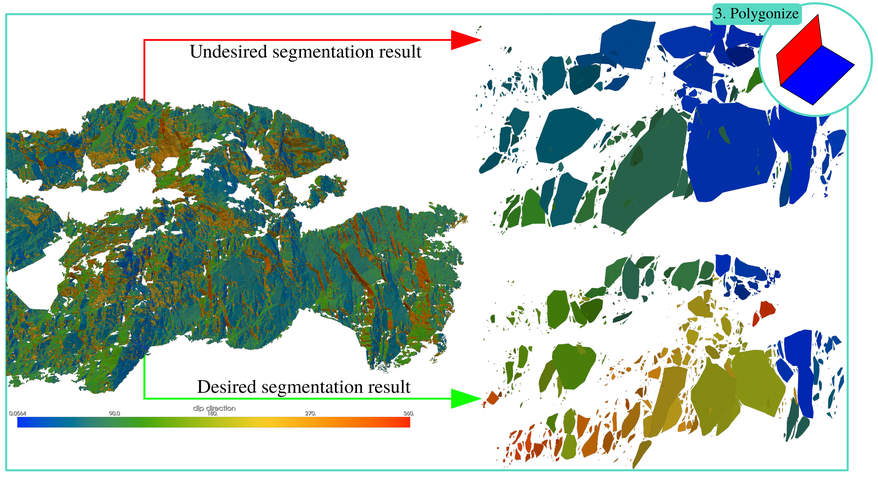


Fig 3: *Representative scheme and corresponding pole distribution for the different fracture sets in both* ***D1*** *and* ***D2***







3. Conclusions

Results:

- Precise attitude measurements comparable with the on field counterpart
- Satisfactory point cloud segmentation results
- Region polygonization and fracture facets export

Todo:

- Dataset calibration
- Better point cloud filtering functions
- Facets merging algorithms

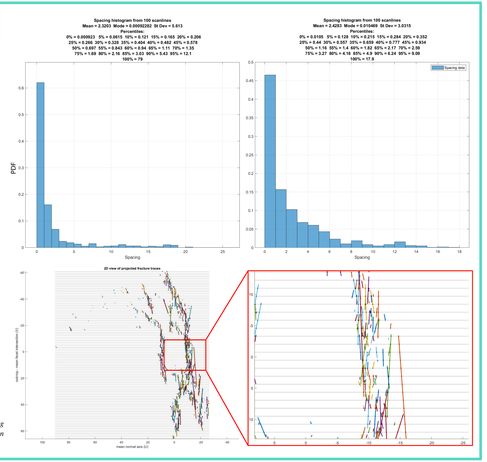


Fig 4: ***Top left****: Fracture spacing for 100 scanlines intersecting facet traces.* ***Top right****: Fracture spacing distribution for 100 scanlines intersecting digitized fracture traces.* ***Bottom****: Effect of the facets fragmentation on spacing distribution.*