Case studies

In this section is briefly illustrated the application of Open Plot project in two case studies. The procedures described in these examples can be followed in the relatives movies, provided in the supplementary materials, named Sibillini.mp4 and Pobla.mp4, respectively.

The first example is from the Sibillini anticline, Northern Apennines (Italy). The "structural" problem is that of evaluating the variability of pressure solution cleavage frequency in different structural positions of an anticline characterised by a variable axis orientation. The input dataset is from a spreadsheet including measurements collected in the field, like cleavage strike, dip, spacing and, as in this anticline the cleavage is stratabound, the thickness of the hosting layer. Scatterplot of cleavage spacing (S) vs host-layer thickness (H) shows that these parameters are related and, accordingly, H/S should be used to quantify the cleavage frequency (e.g. Tavani et al., 2006). The *.stv file is thus imported in a spreadsheet, a new column is added, named "./HvsS" (the "./" characters will indicate the software that this is a numeric field), and the number of columns is updated in the header. Now the entire file, including reserved fields (see user manual) and the header, is copied. Import from clipboard procedure will recognise the header, and will load data without passing through the "boring" import procedure. In the data selection window bedding surfaces and pressure solution cleavages are selected and then plotted in the 3D window. To evaluate the variability of cleavage HvsS across the fold strike, data have to be projected onto an across-strike panel. However, as the anticline is characterised by a slightly variable axial trend, data should be projected using the local axis orientation. To do this we manually select a region and send the data included in this region (both bedding and cleavage data) to the stereoplot. Here a tensorial analysis is performed only on bedding data. In the tensorial analysis results, we click "apply K3", this assigns to entire selected dataset (including cleavages) the orientation of the local best-fit cylindrical axis. The same operations are performed for another region. We end up with two regions with different cylindrical axes. Data now are projected onto the across-strike panel using "eigenvector" option, such that, data are projected using the local axis orientation. A new 2D scatterplot window will open up, including data that have been previously selected (i.e. bedding surfaces and cleavages). Two new attributes are added to each datum, namely the X and Z coordinates along the panel. In this scatterplot window we plot the “X-position along panel” versus “HvsS”, result shows that cleavage frequency varies along the panel (i.e. across the fold) and, in particular, it roughly decreases toward the central portion of the transect (i.e. in the crestal sector).

The second example is from La Pobla de Segur (Spanish Pyrenees). Here it is illustrated how Open Plot can be used to create dip-domains. Traces have previously digitalised onto a georeferenced orthophoto draped on a DEM. In the planar regression tab of the drawing options window we define the parameters for the trace analysis procedure. This is a recursive procedure that finds, for each selected polylines group, a set of best-fit dip-domains (see user manual). In this window we also activate the dip-domains evaluation option, which will allow us to evaluate the “quality” of the automatically extracted dip-domains. Once the dip-domains are extracted from polylines, axial surfaces can be created. This allows constructing portions of a given layer surface, which can be later exported as DXF 3D faces and then imported in CAD-like software.