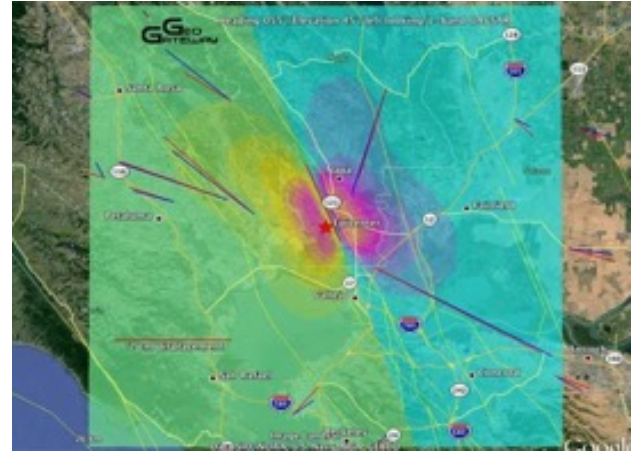## Dislocation (Disloc)

Elastic dislocation models generated by Disloc can be used to geodetically measure deformation, strain, and tilt, due to slip from active faults.

When running *Disloc*, several parameters are needed to characterize each fault.

Disloc Input Format

Use this form to upload one or more faults that are already in Disloc input file format. The following example shows formatting:

- Line 1: 32.904255 -115.526449 1 (this is the lat, lon of the origin; and "1" signifies use of a grid).
- Line 2: -75 1 151 -40 1 41 (the grid: x0, x_delta, x_number, y0, y_delta, y_number).
- Line 3: 20.489759271 -80.624111128 355.0 (first fault patch: x, y (km) from origin and strike (degrees).
- Line 4: 0 1.21 45.0 1.0 1.0 -0.0 -0.0 0.0 3.0 3.0 (fault_type 0 for point dislocation, depth, dip (degrees), lambda, mu,u1,u2,u3, length, width).
- Repeat the formats for Lines 3 and 4 for each additional fault.

close

The ***location*** of the fault is defined as the surface projection of the lower-left corner of the fault plane (shown as the origin in the diagram). The ***depth*** is the z-coordinate of the fault's bottom edge. The ***dip*** angle is measured from horizontal (as shown).
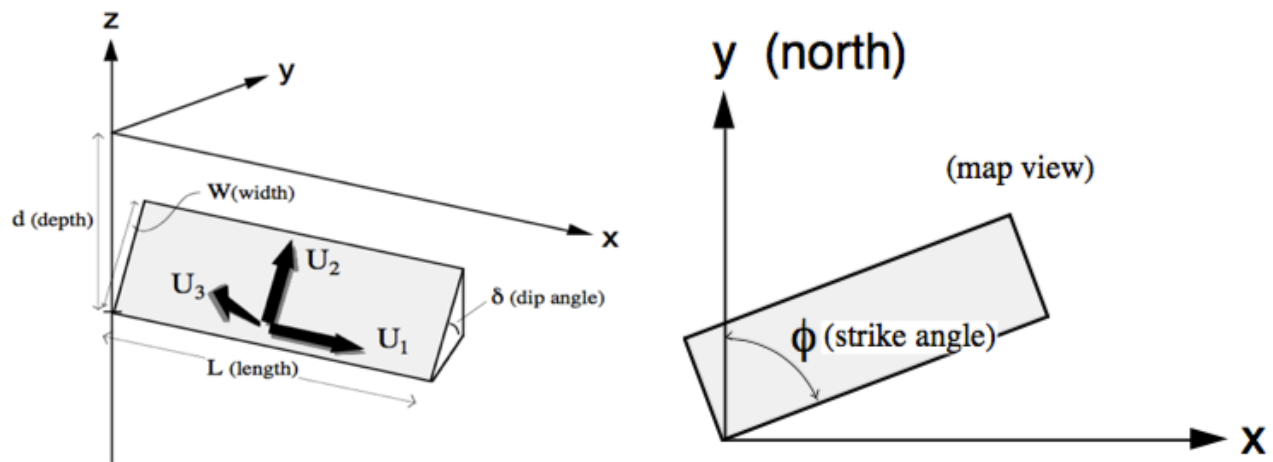
Figure adapted from (Donnellan, A., et al., 2014).

The **strike** angle is the orientation (measured clockwise from north) of the surface projection of the fault's horizontal edges. The **length** and **width** are the dimensions of the rectangular fault.

U_1 is the strike slip component of fault slip (positive for left-lateral).

U_2 is the dip slip component of fault slip (positive for thrust).

U_3 is the tensile component of fault slip (positive for opening).

For Disloc source code follow these steps below
Start by opening a text file.

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- Repeat the formats for Lines 3 and 4 for each additional fault.

close

Line 1:

You will first be asked to supply the "latitude" and "longitude" of the origin. These actually do nothing, and should be set to zero.

Next enter the generation parameter. This tells how you will specify the points at which you want calculated displacements. If it is 0, this means you will be giving it a list of arbitrary x,y points (good for irregularly distributed sites). If it is 1, this means you are asking for output at regularly spaced points on a rectangular grid (good for uniform coverage of an area if you want to later plot).

Line 2:

Next is either the list of x, y points, or a description of how to generate the rectangular grid. In the latter case, this consists of: starting x-coordinate, increment in x direction, number of steps in x direction, starting y-coordinate, increment in y direction, number of steps in y direction.

Line 3:

You will next be asked to supply the x coordinate and y coordinate of the first fault. You should enter the location of the fault's reference corner (see illustration) measured in units of distance (e.g. kilometers, not degrees). Next is the strike angle of the fault, measured clockwise from north as viewed from above (see diagram).

Line 4:

Next you give the vertical depth to the *bottom* of the fault, followed by the dip angle in degrees (zero for horizontal; 90° for vertical). Next are λ and μ, the Lamé elastic parameters.

Their absolute values are not important, only their ratio. $\lambda=\mu$ is the most common assumption for typical rocks.
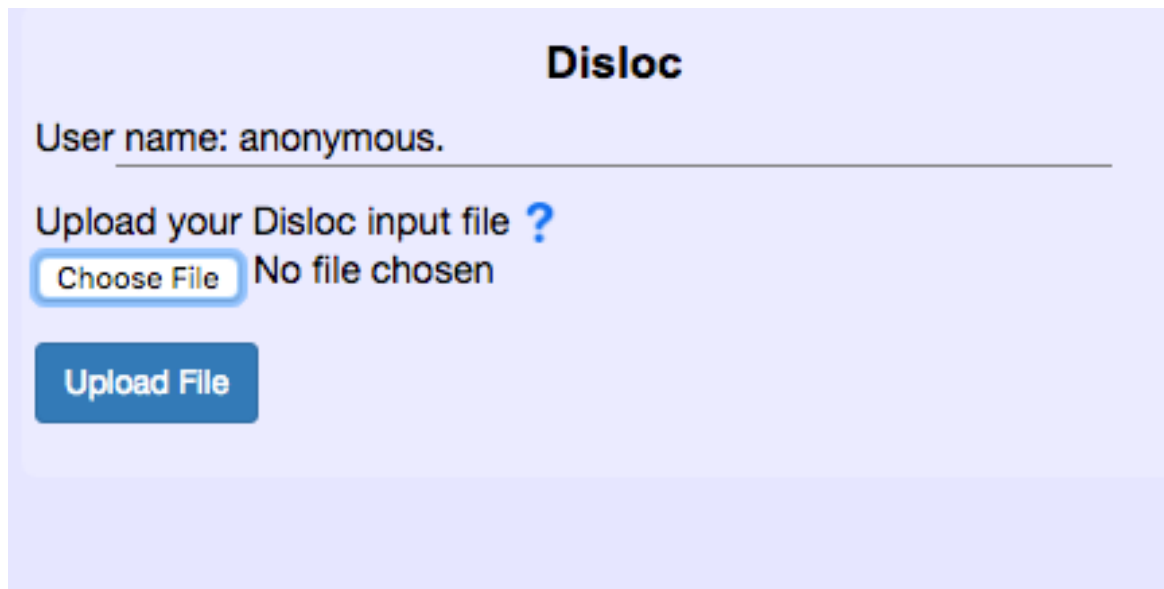
U_1, U_2, and U_3 are the amounts of relative slip to apply to the fault surface in the strike slip, dip slip and tensile directions, respectively.

Positive U_1 corresponds to *left-lateral motion* (opposite in sense to the San Andreas fault for example).

Positive U_2 corresponds to *thrusting motion* with the hanging wall riding up over the foot wall (like the San Gabriel mountains for example).

U_3 will not normally be used, since ordinary earthquake faults involve motion only tangential to the fault plane.

Finally the length and width of the rectangular fault surface (as illustrated) are entered. If you wish to model the effects of more than one fault, or build up a complex compound fault from rectangular "tiles", the input is simply repeated, starting with the next fault's x coordinate and y coordinate. When done entering faults, you signal the end to *setupdis* by typing <control-D>.

Disloc

User name: anonymous.

Upload your Disloc input file ?
Choose File | No file chosen

Upload File

Lastly upload the file on the "disloc" tab.