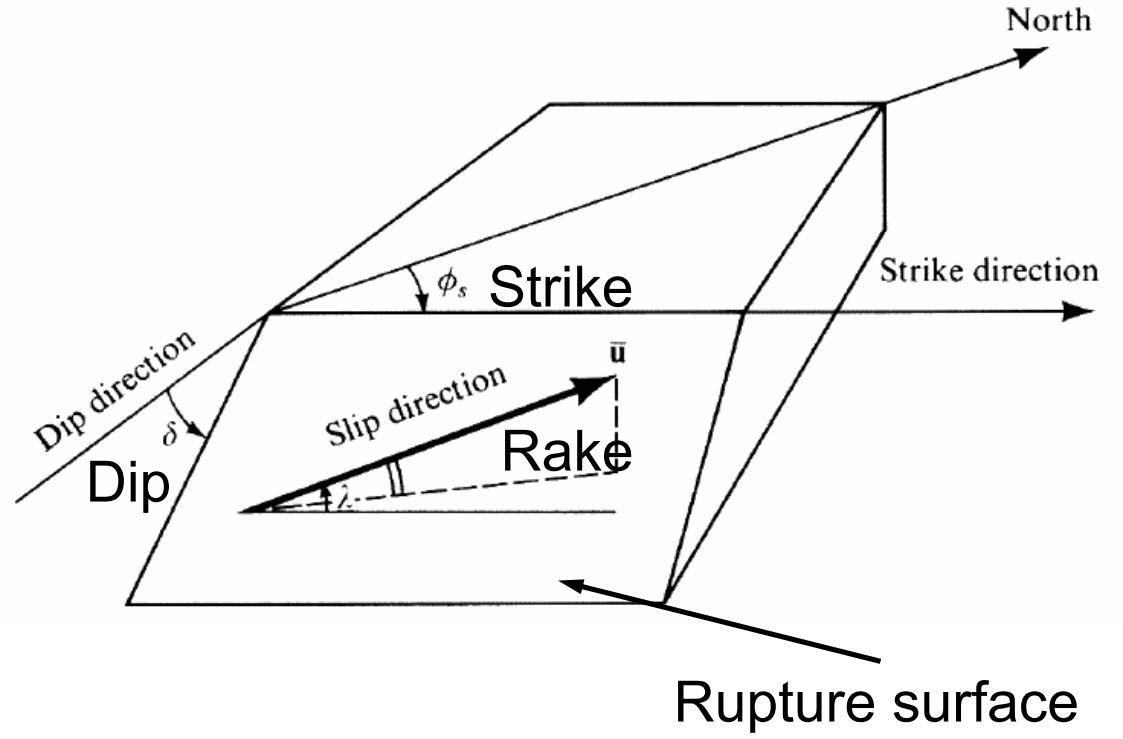
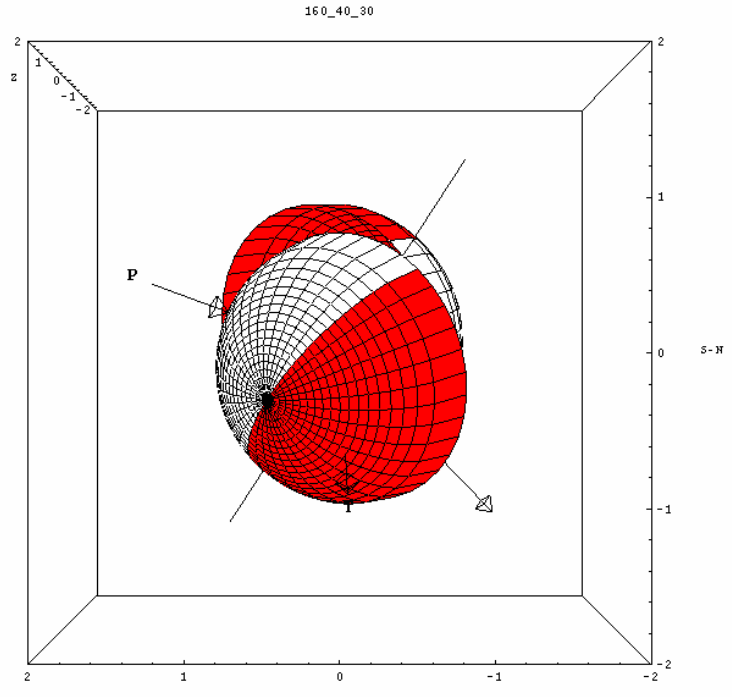
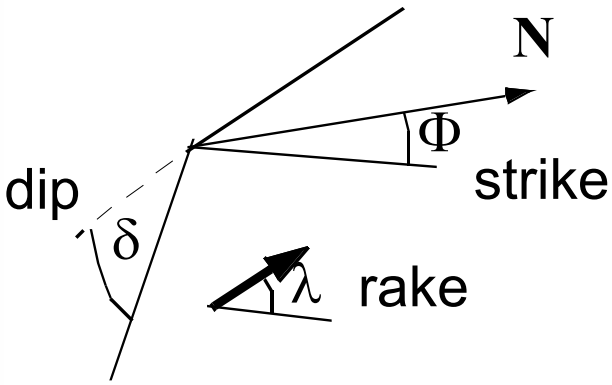
Point source - shear dislocation
Definition of strike, dip, slip
(Streichen, Fallen, Neigung)



Determination of fault plane solutions

Earthquake at a fault strike/dip/rake=160/40/30, oblique reverse fault



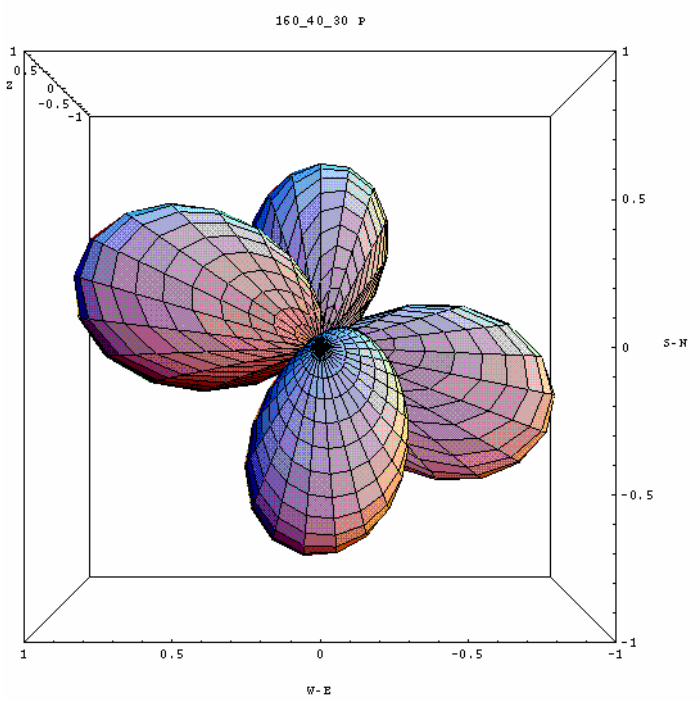


$$0 \le \Phi < 360°$$

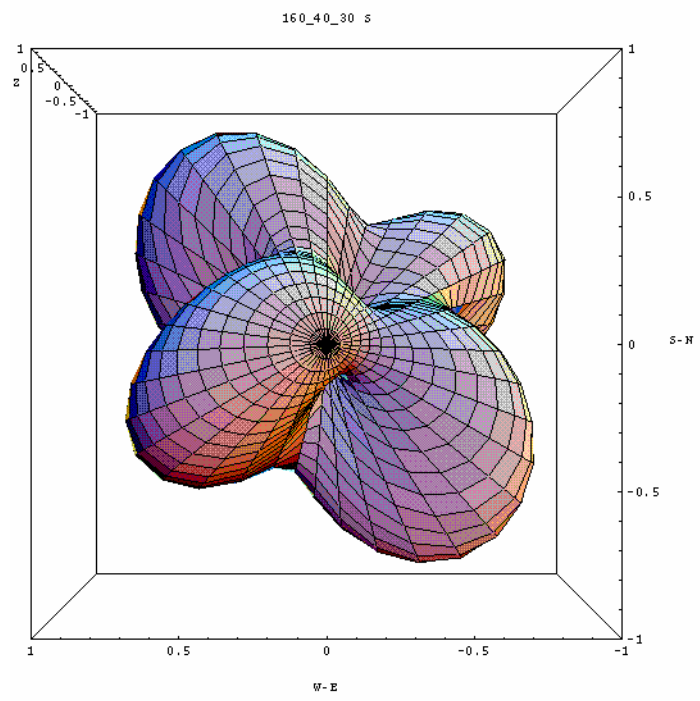
$$0 \le \delta \le 90°$$

$$-180° < \lambda \le 180°$$

Corresponding 3D radiation patterns

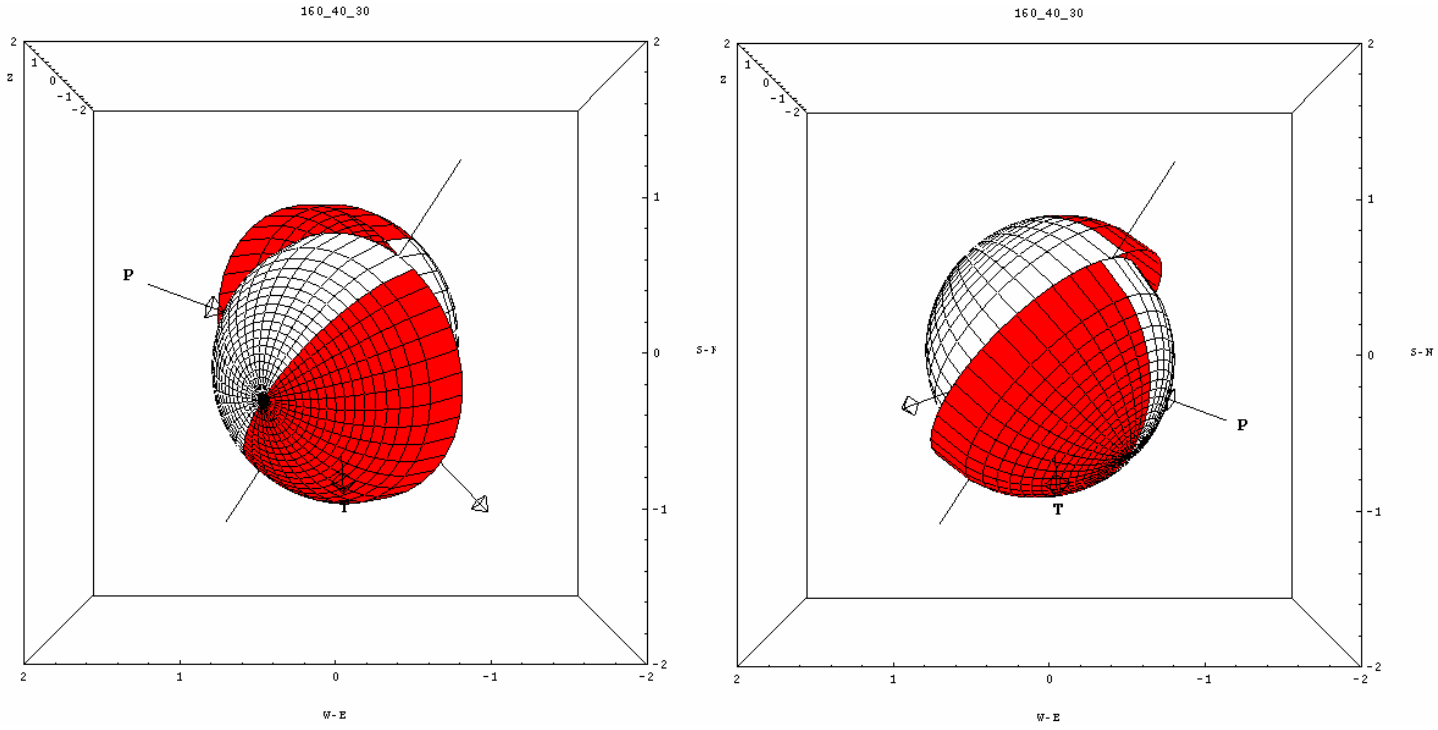


P-wave

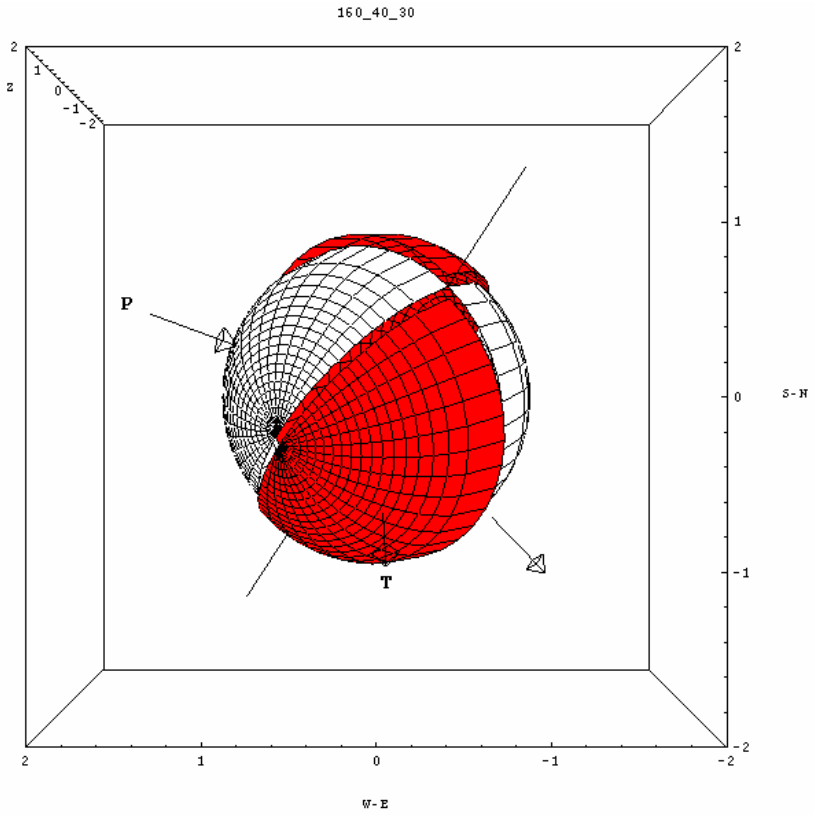


S-wave

2 fault mechanisms
with same radiation patterns

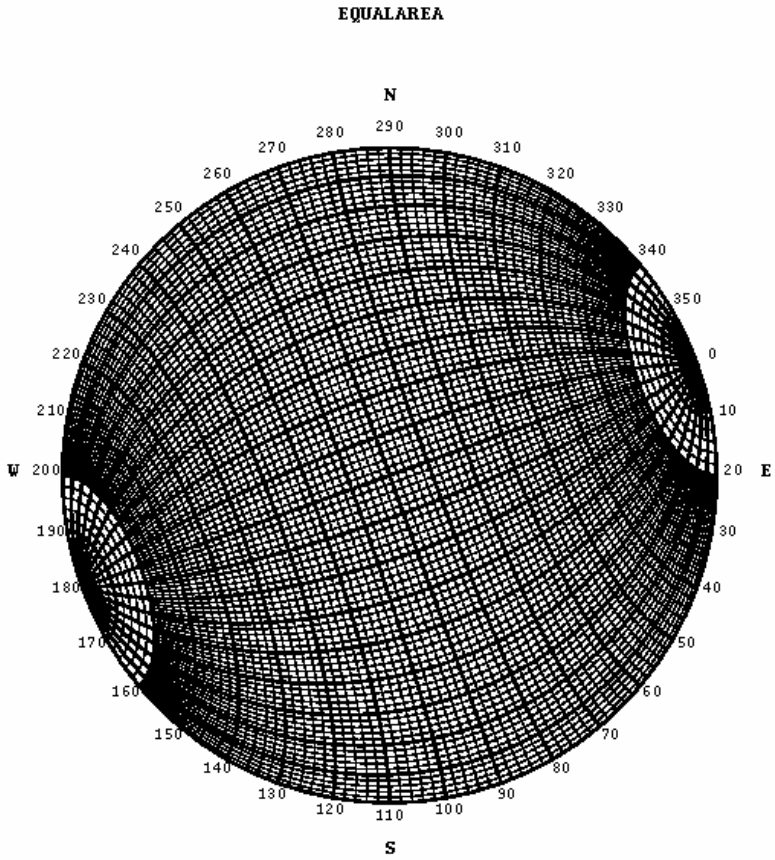


4 quadrants of different deformation

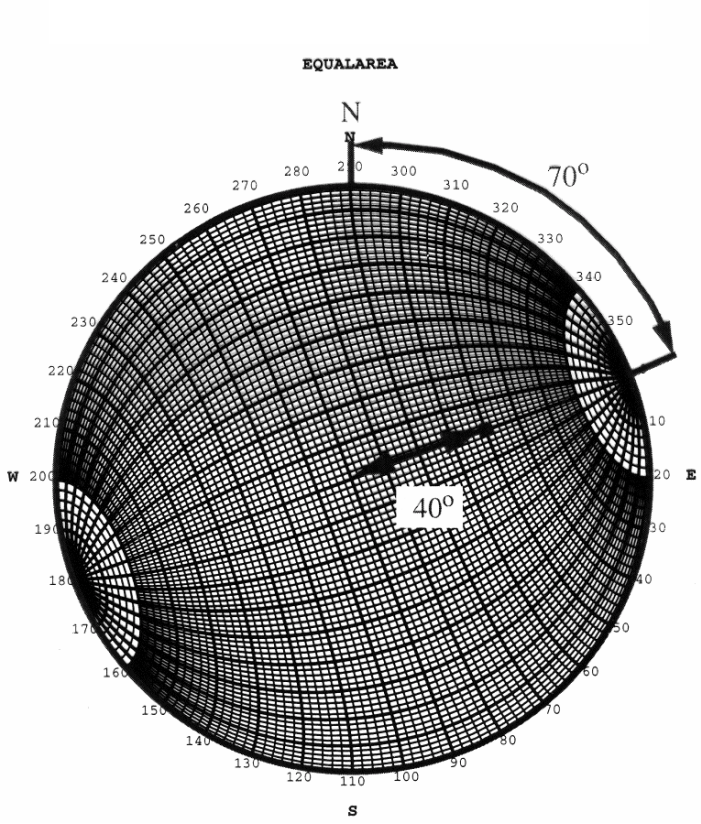


Observable by first motion polarity of P waves

Fault plane solution using Schmidt´s net



1. step:



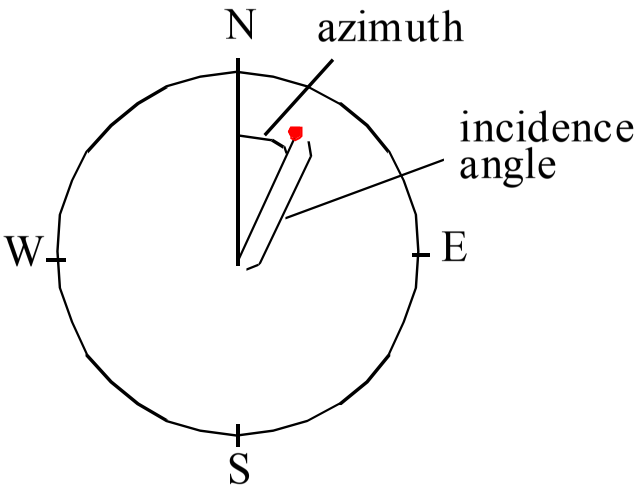
Plot intersection points of all rays through focal sphere in projection

e.g. F = 70°, a = 40°

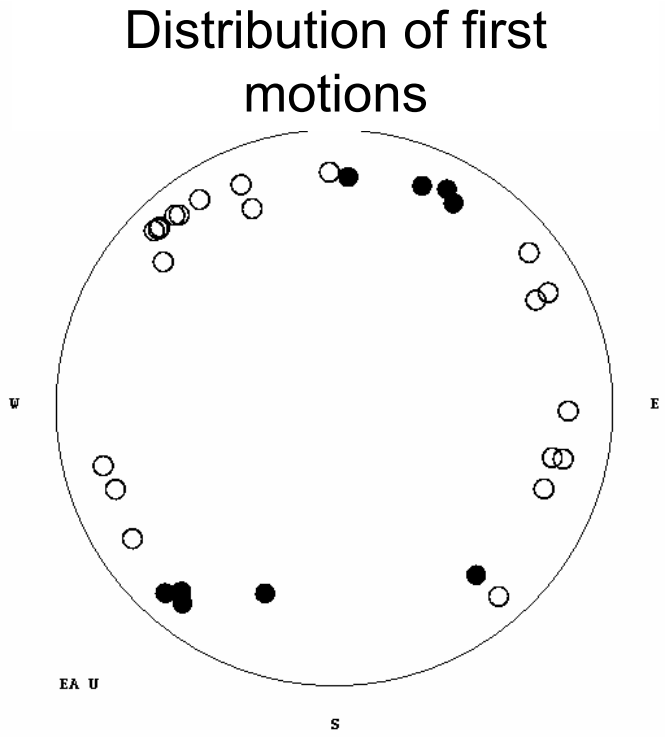
How to do it:

- Pin transparent paper on projection net
- Rotate projection net by azimuth
- Mark incidence angle from projection center
- Put first motion sign

Result:

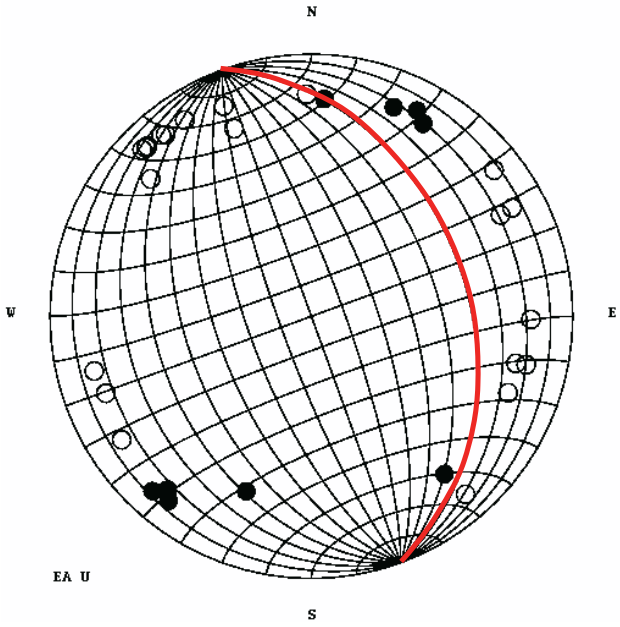


30 stations:



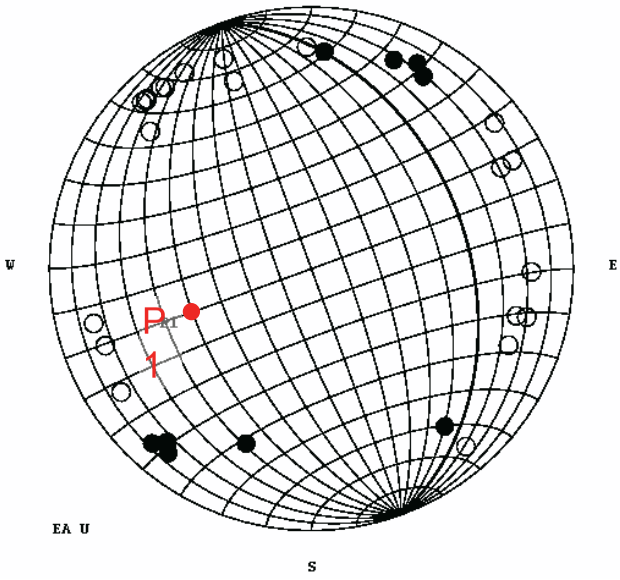
2. step:

Find first nodal plane (great circle)



3. step:

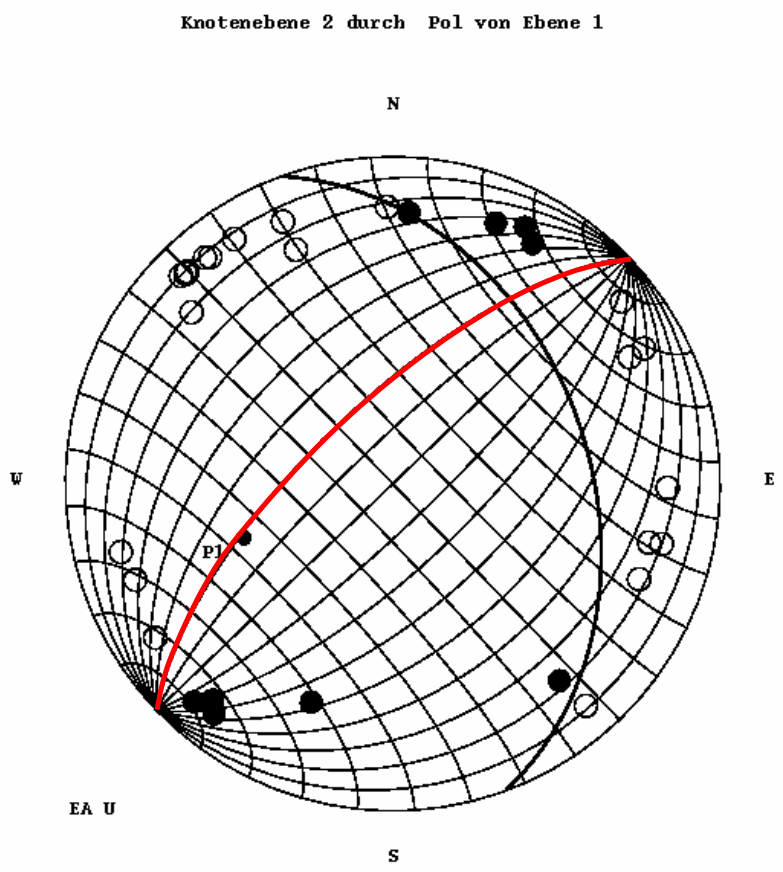
Construct corresponding pole P1



4. step:

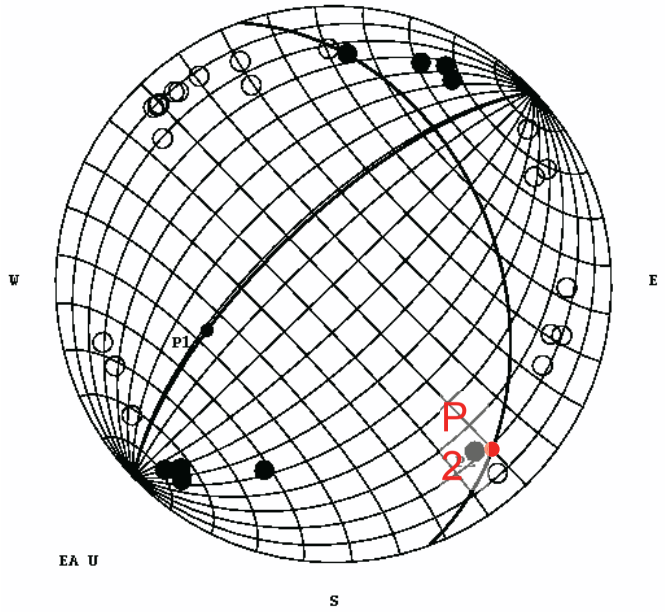
Construct second nodal plane:

- Through first pole
- Has to separate quadrants of different polarity



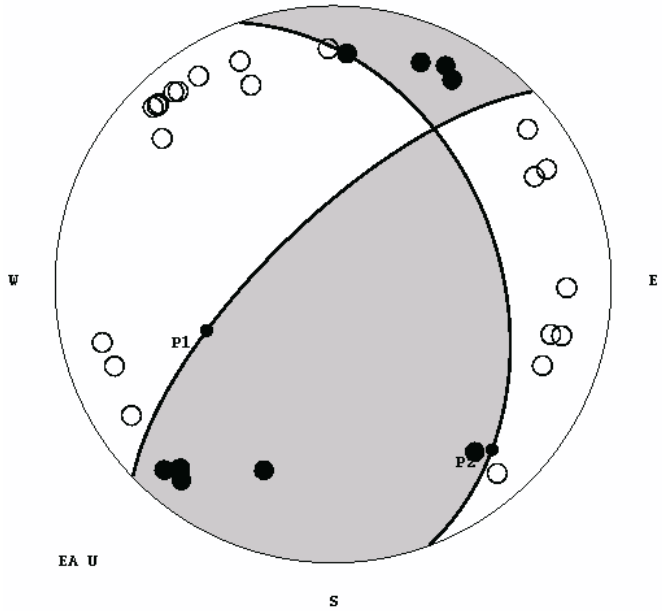
5. step:

Construct corresponding pole P2



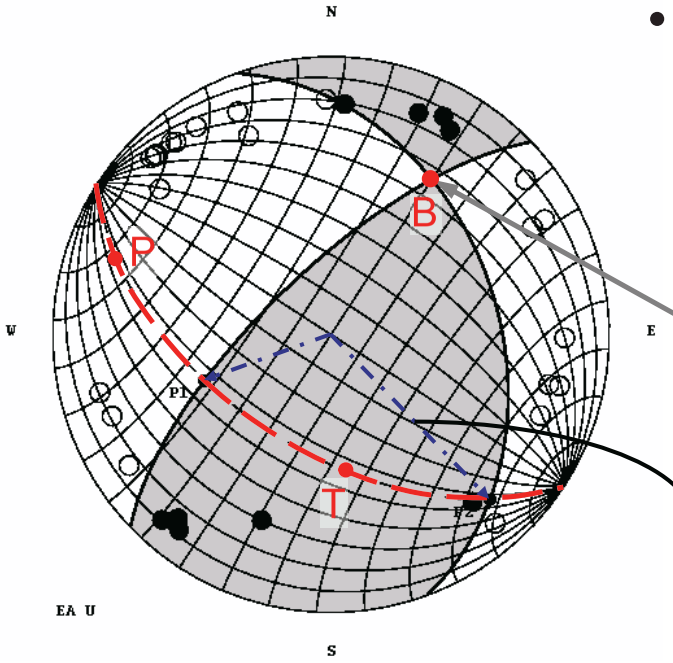
6. step:

Mark quadrants of compression and dilatation



7. step:

Connect poles by a great circle

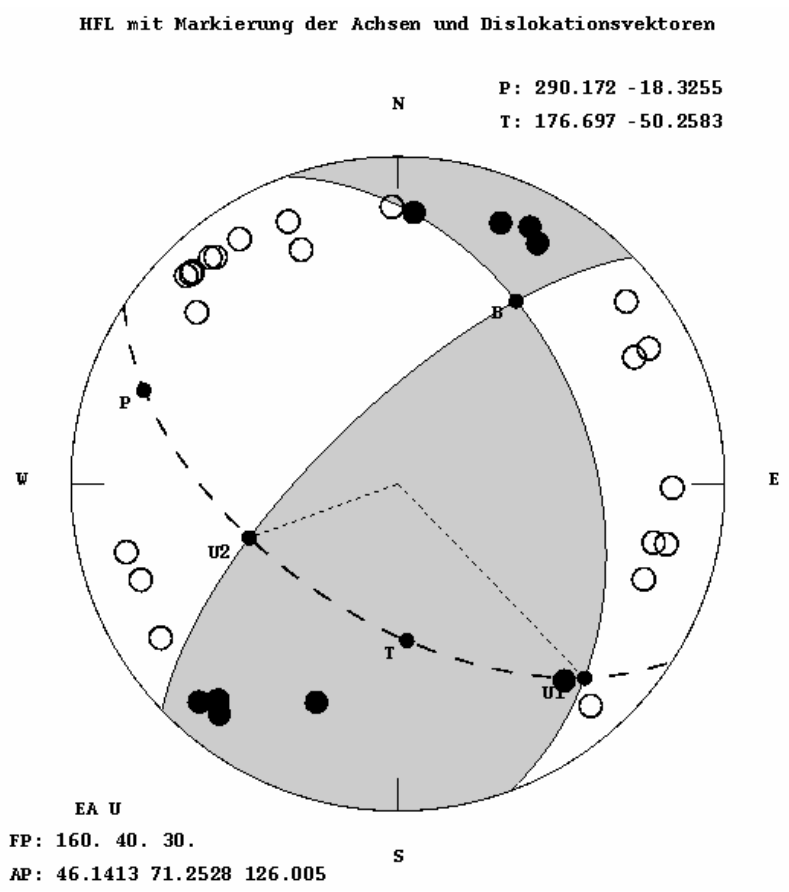


- P- (max. pressure in source) and T-axes (max. tension) on bisector between focal planes

B-axis (intermediate pressure/tension)

Dislocation vectors

Result – Fault-Plane solutions:



P- and T-axes

= directions of maximal compression/extension in radiation pattern

Generally P, T **NOT** equal tectonic stress axes, only under 45° - hypothesis

e.g. San-Andreas fault: max. principal stress ⊥ fault