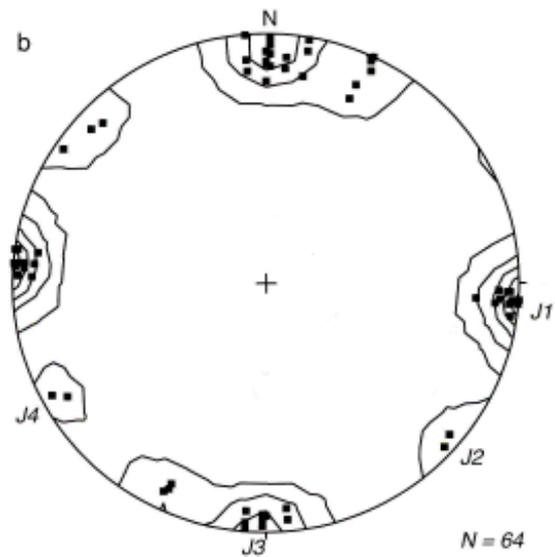
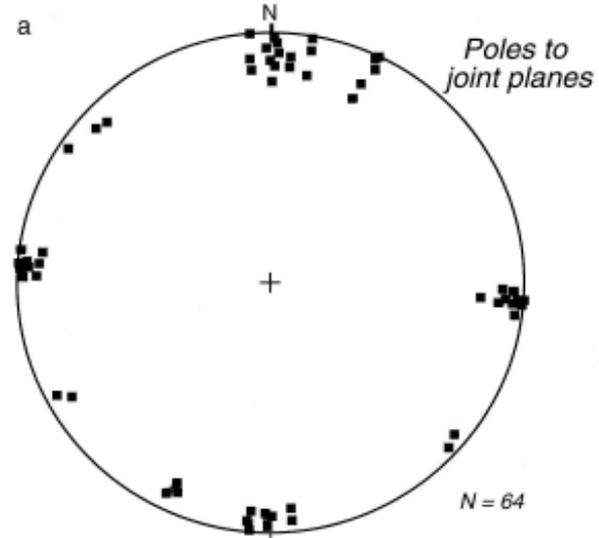


Representação em Estereogramas

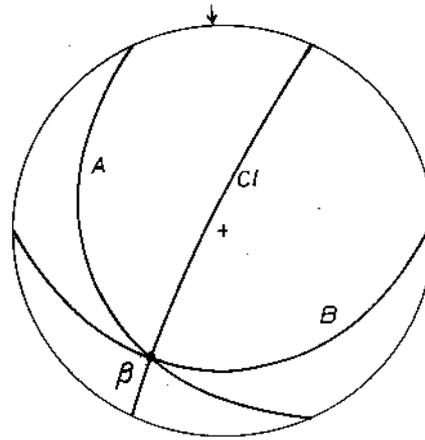
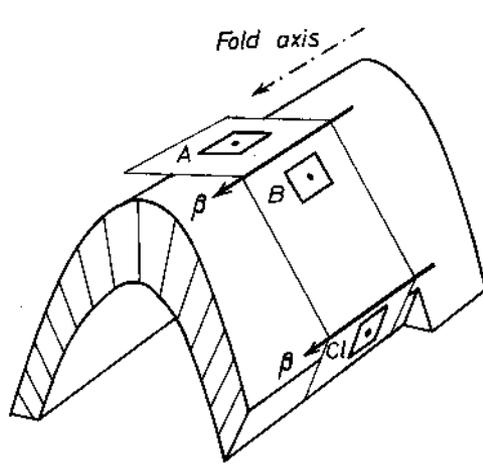
Ginaldo Campanha

1. Aplicações

Identificação de famílias de fraturas

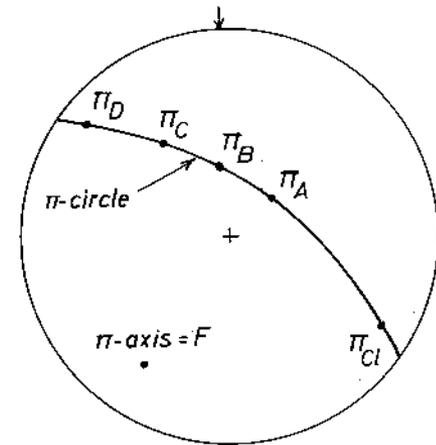
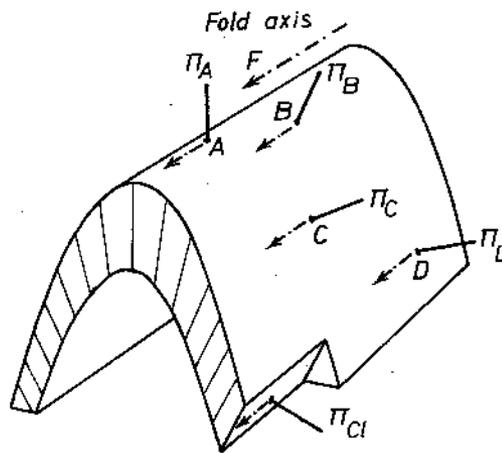


Análise de Dobramento

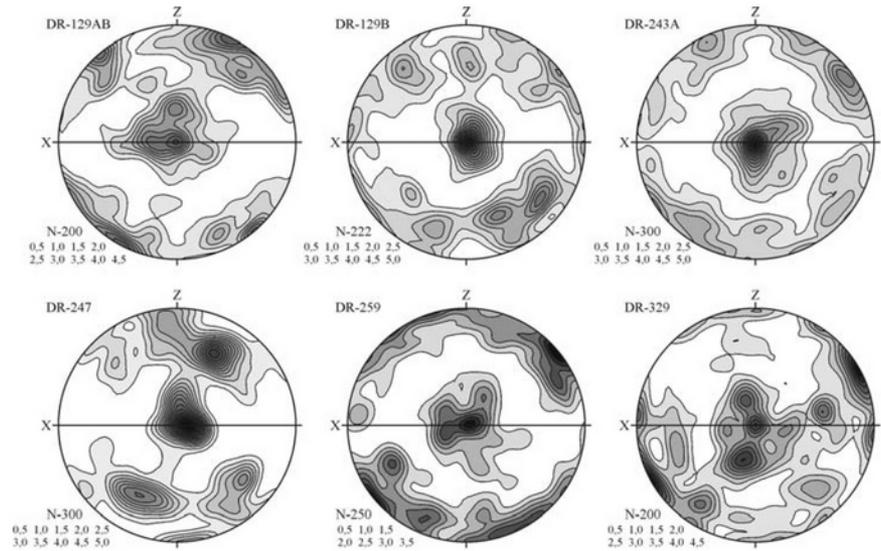
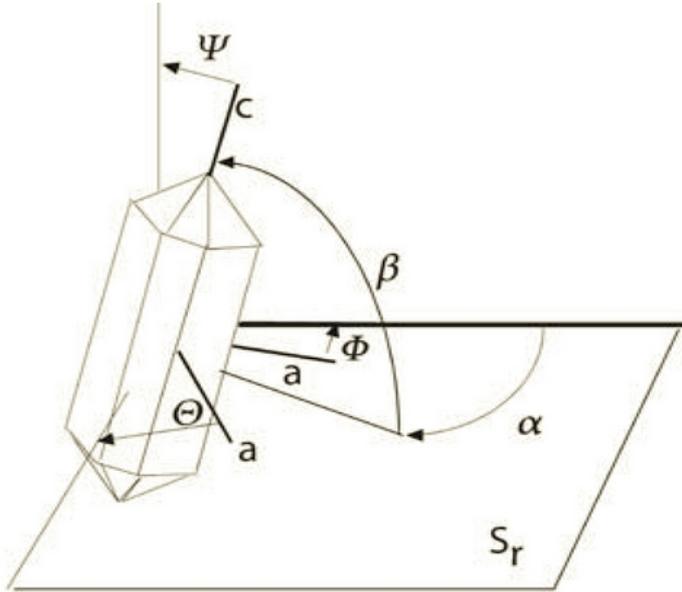


Eixo Beta

Eixo Pi



Padrões de eixos cristalográficos

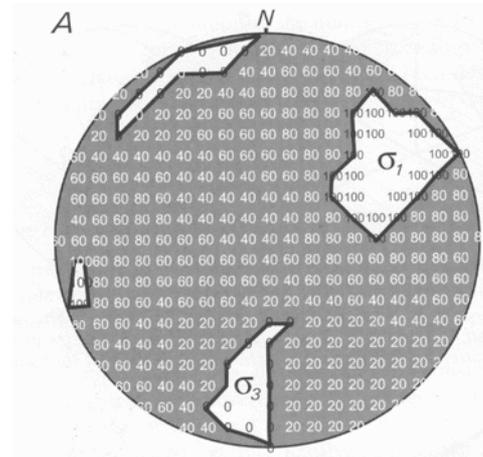
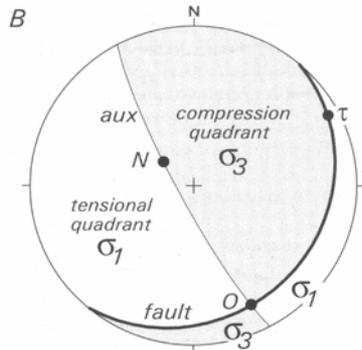
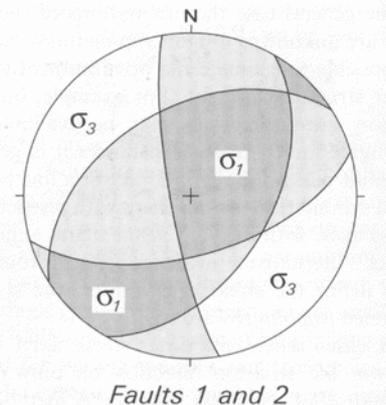
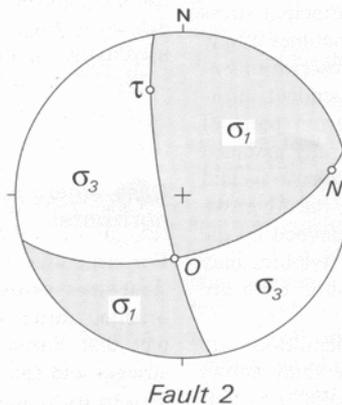
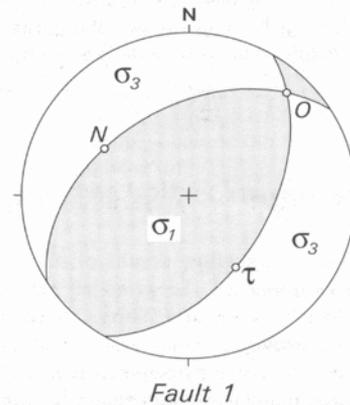
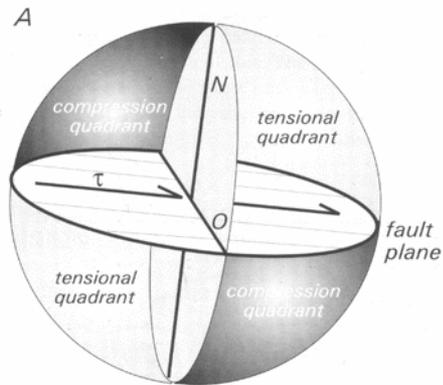


Passchier e Trouw, 2005

Faleiros, 2008

Determinação de esforços

Angelier ou diedros retos - Mecanismo Focal de Sismos



Análise da estabilidade de taludes

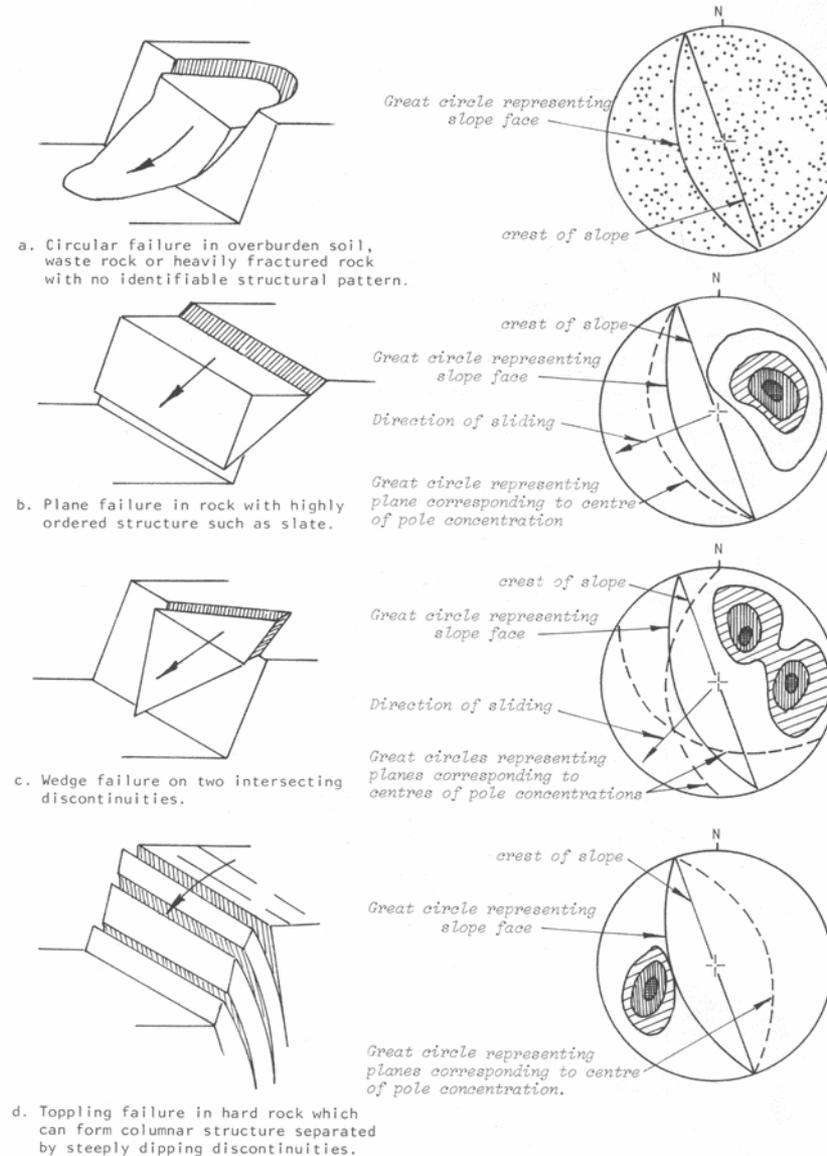
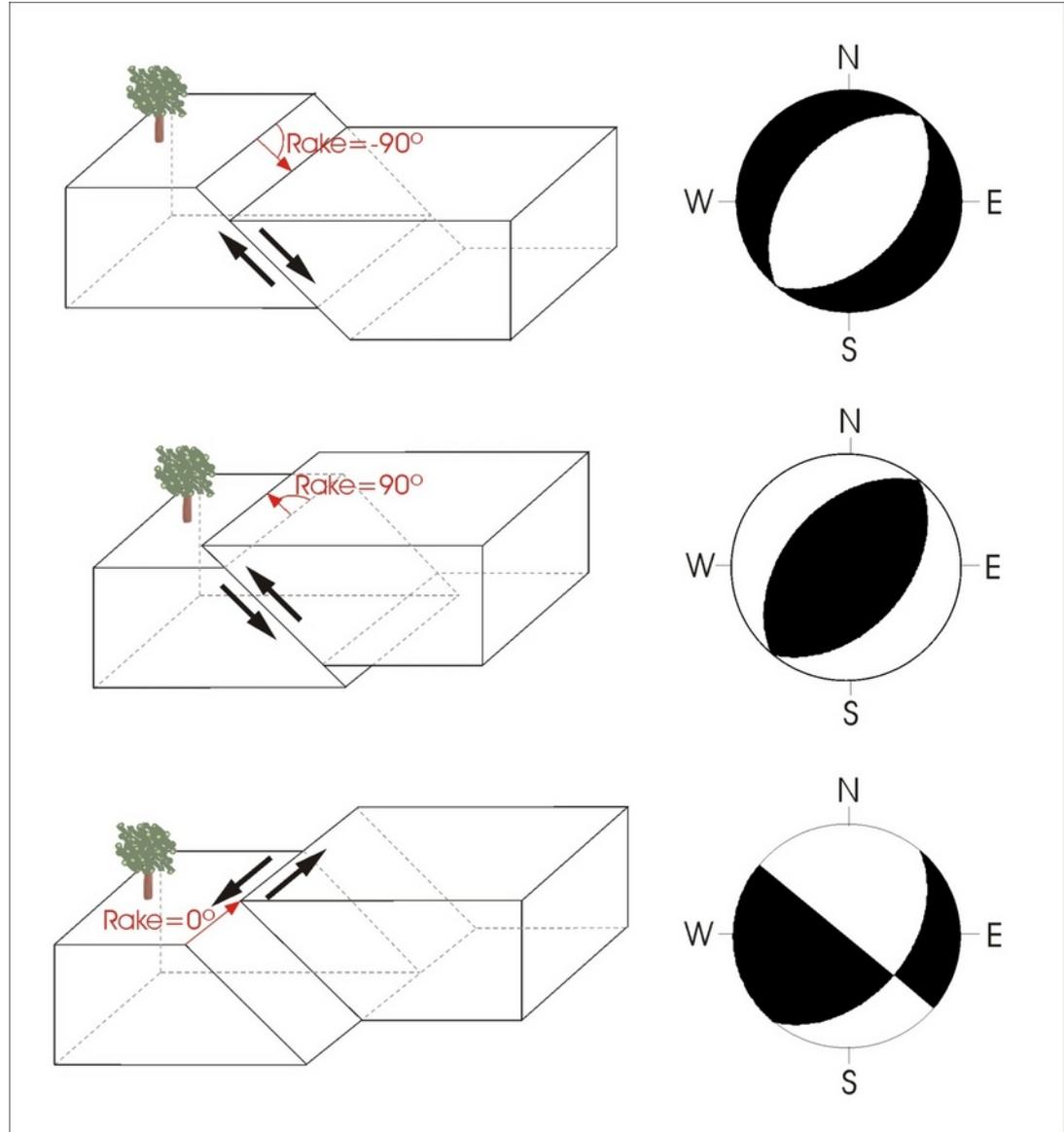


Figure 19 : Main types of slope failure and stereoplots of structural conditions likely to give rise to these failures.

Mecanismo focal de sismos



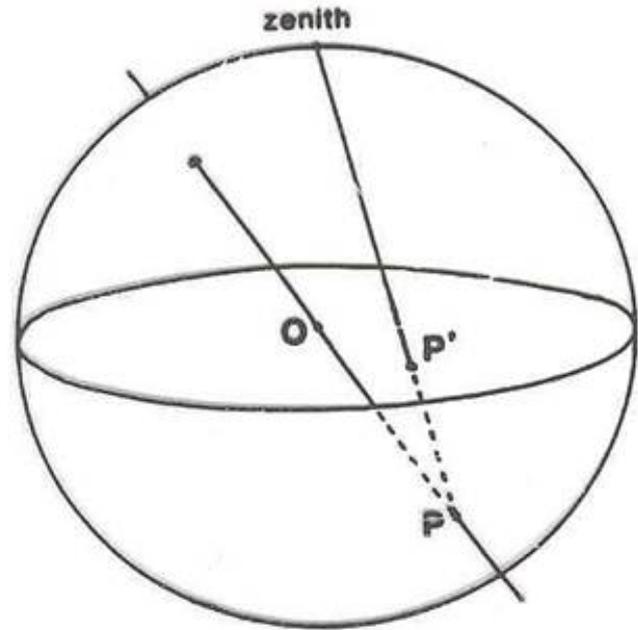
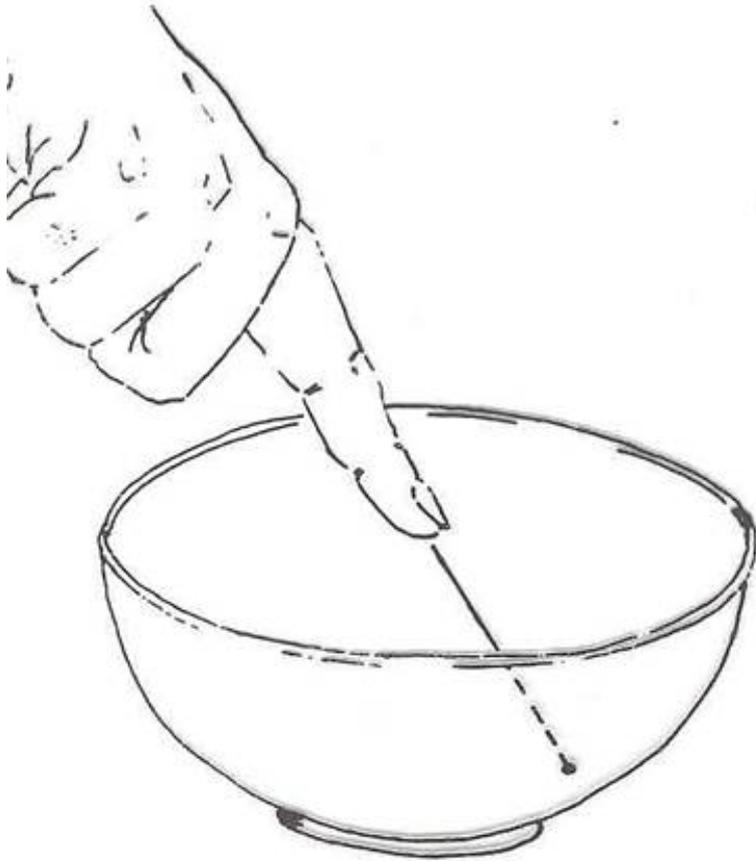
2. Representação em Estereogramas

Plotagem de planos e linhas

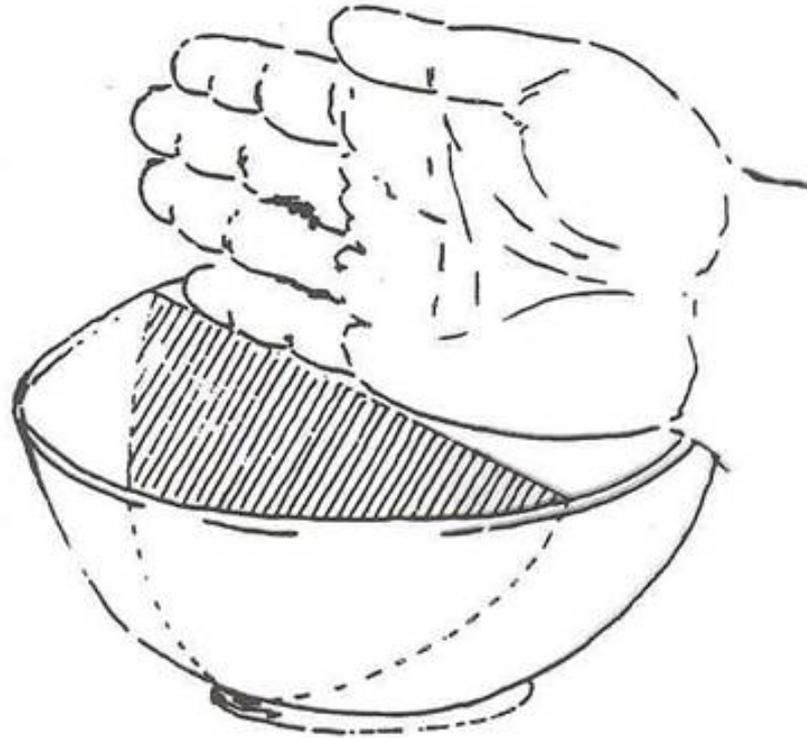
Tipos de projeções

Contagem e linhas de densidade

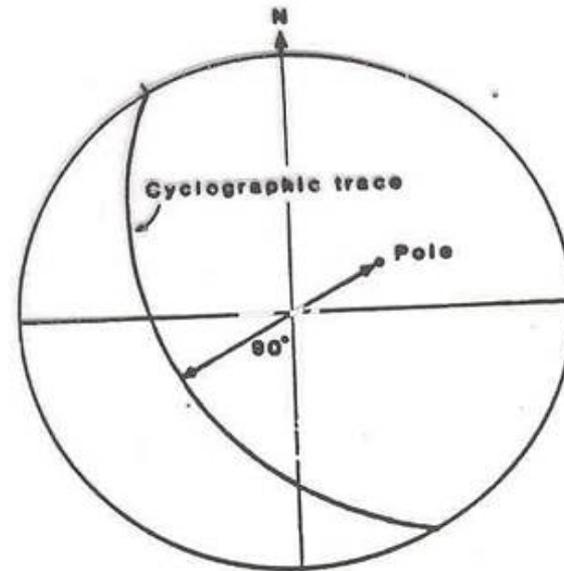
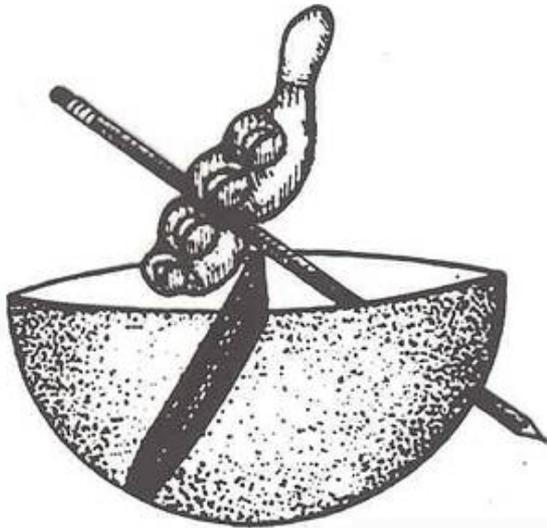
Princípio da projeção de uma linha



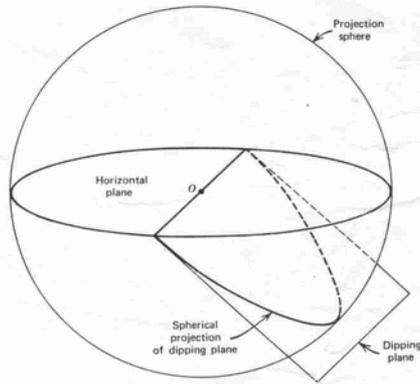
Princípio da projeção de um plano



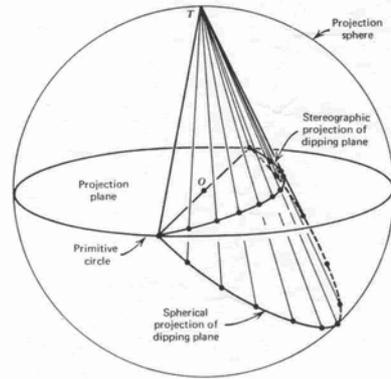
Projeção ciclográfica e polar de um plano



Projeção ciclográfica e polar de plano

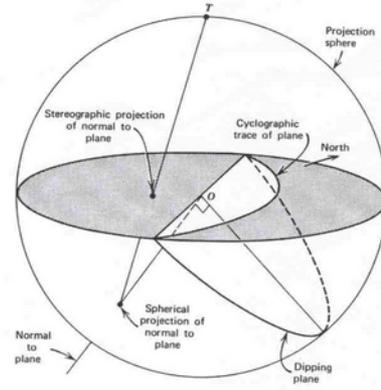


(a)

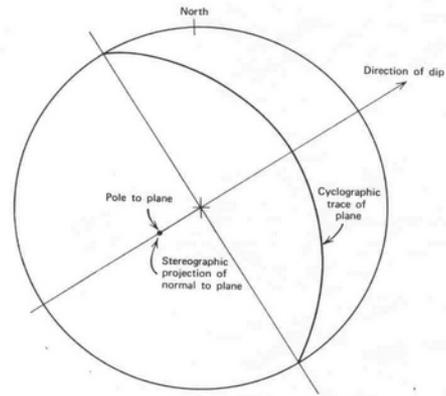


(b)

FIGURE A1 (a), (b) Principle of the stereographic projection.



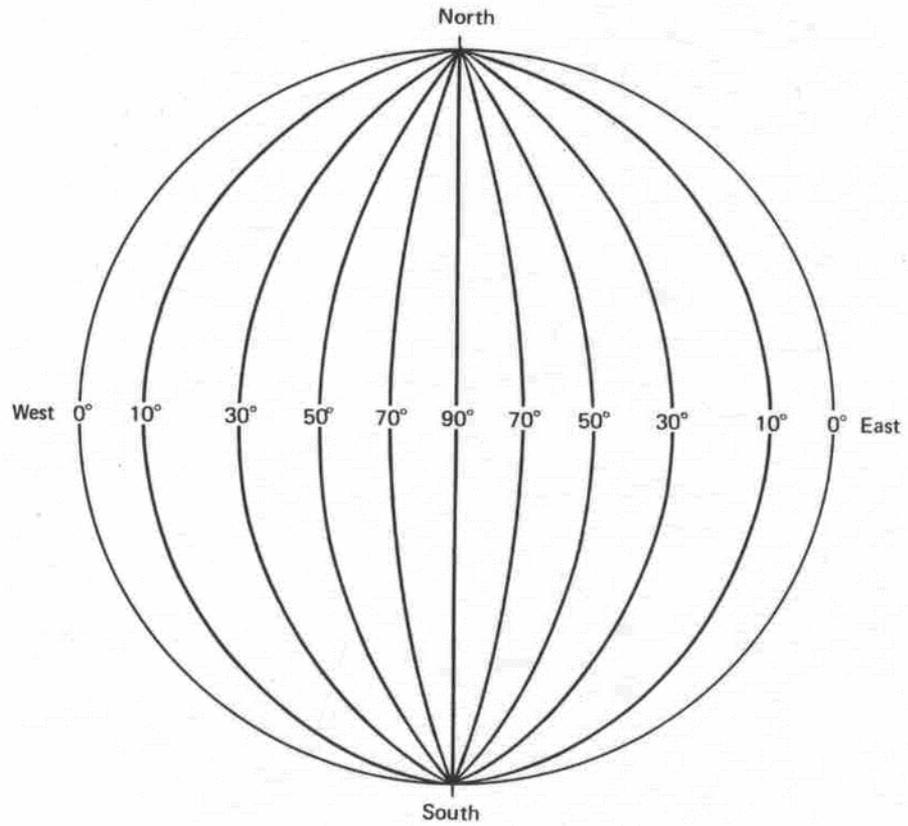
(a)



(b)

FIGURE A6 (a), (b) The stereographic projection of a plane and of the normal to that plane.

Círculos máximos



Círculos mínimos

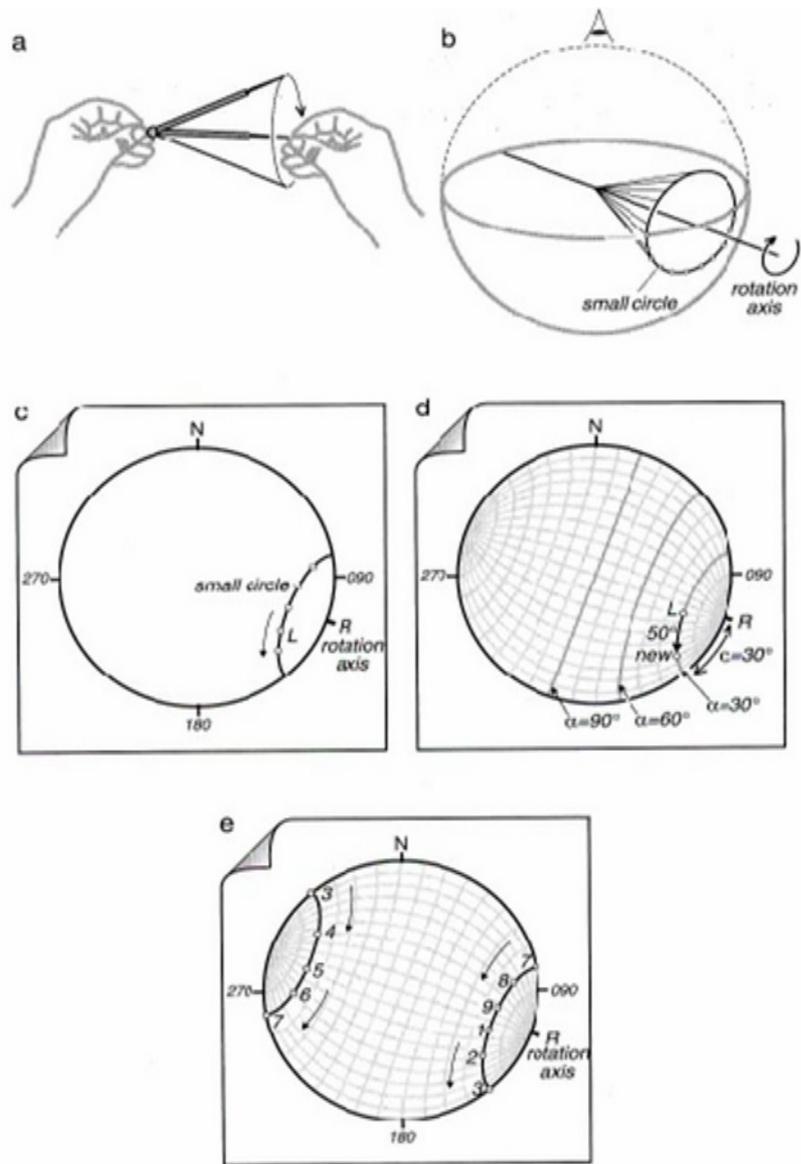
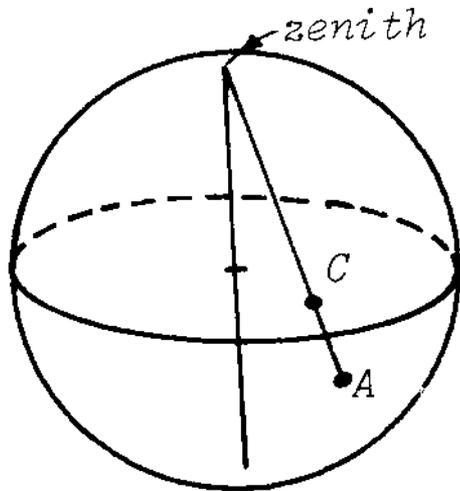


Fig. 32.

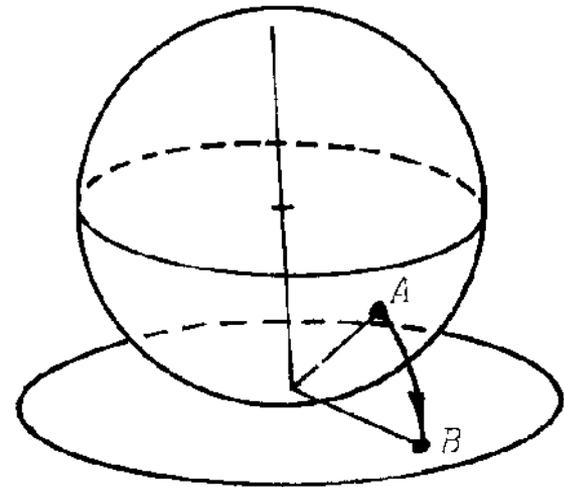
Tipos de projeção

Projeção de igual-ângulo



Equal angle projection

Projeção de igual-área



Equal area projection

Tipos de projeção

Projeção de igual-ângulo

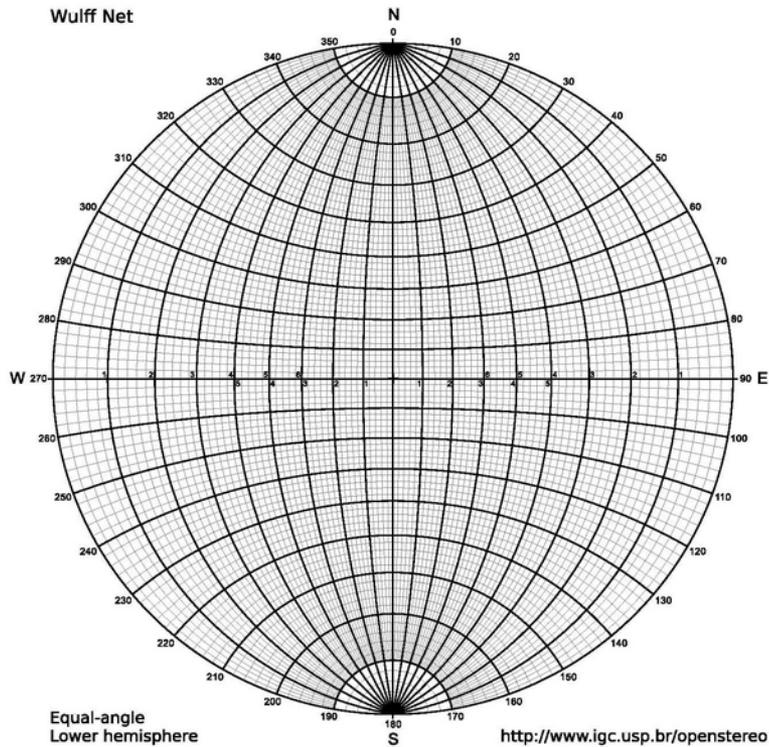


Diagrama de Wulff

Projeção de igual-área

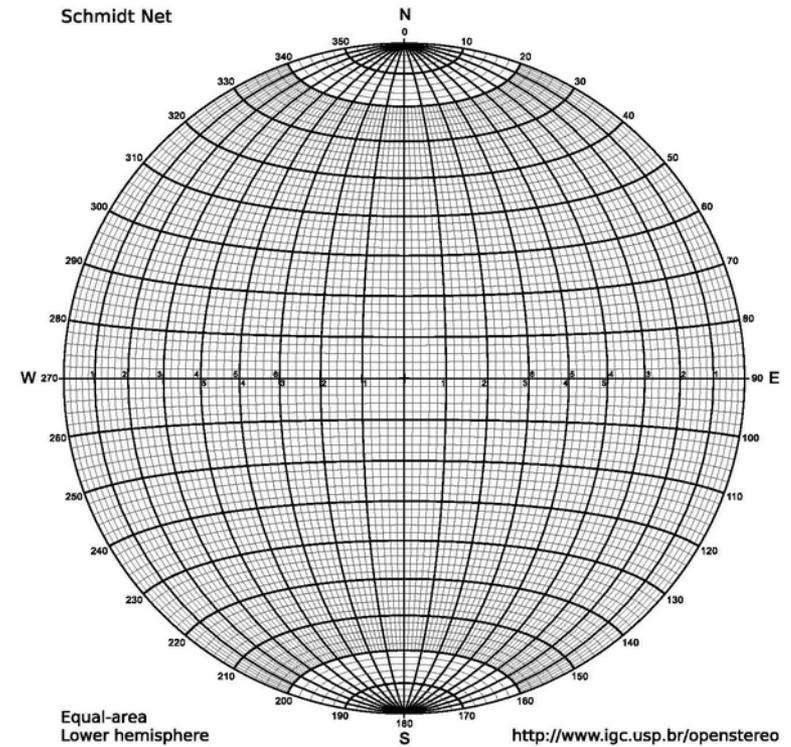
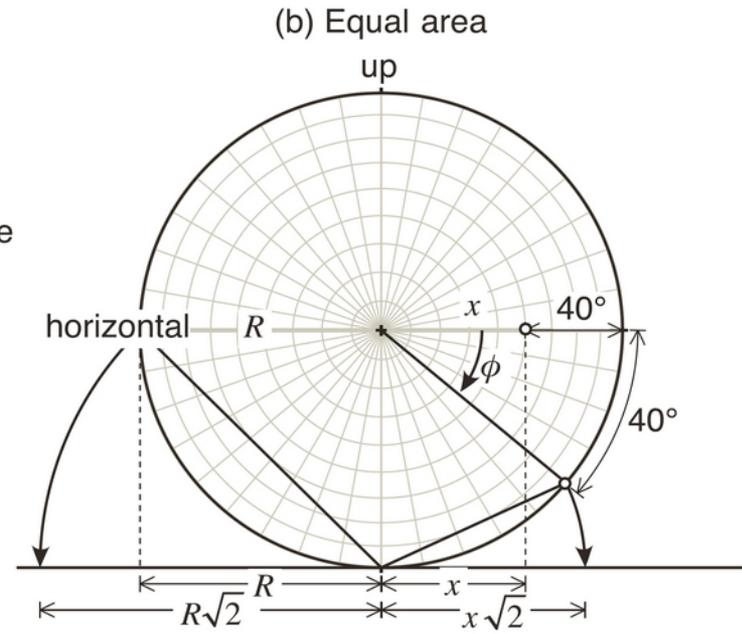
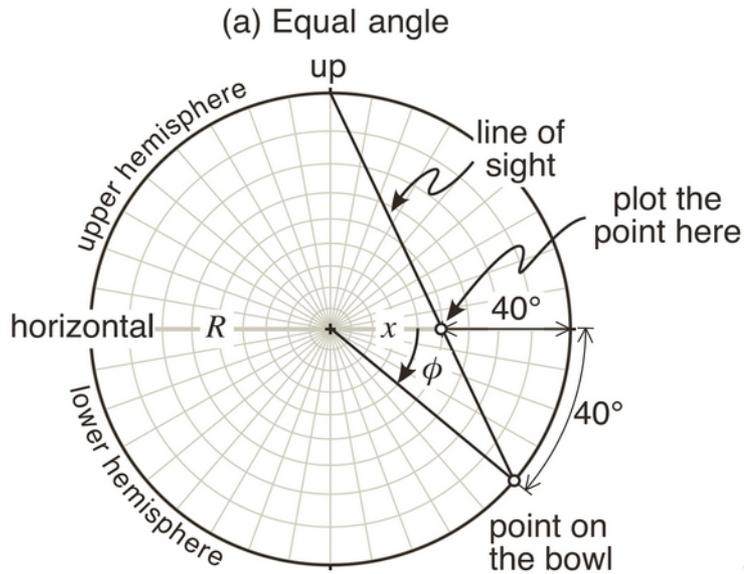


Diagrama de Shmidt-Lambert



$$x = R \tan\left(45 - \frac{\phi}{2}\right)$$

$$x = R \sqrt{2} \sin\left(45 - \frac{\phi}{2}\right)$$

Contagem e contorno de frequências

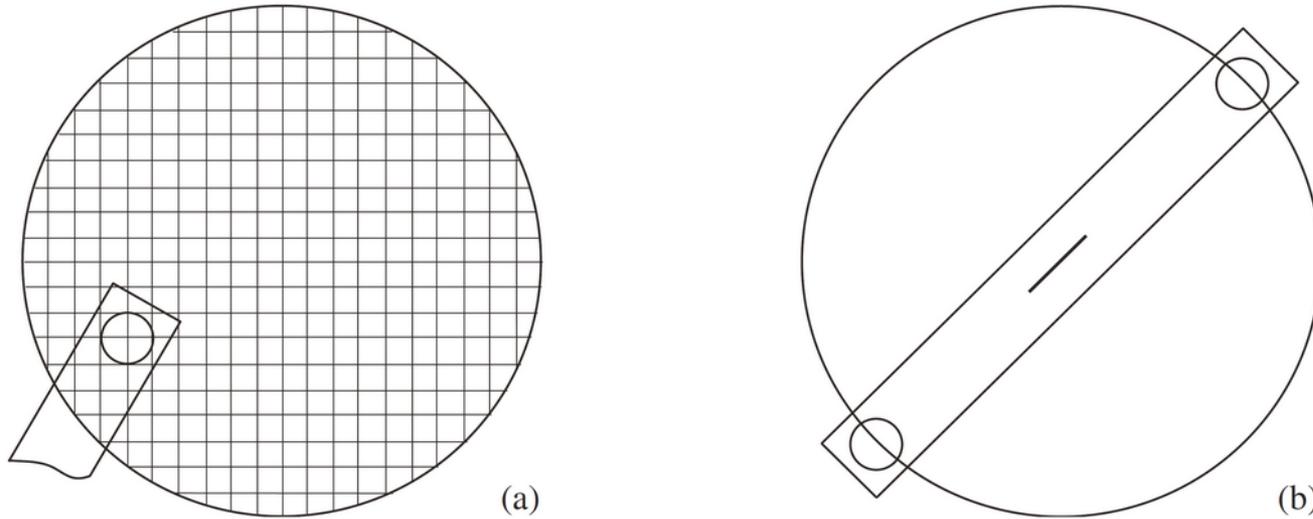


Figure 18.8 Schmidt method: (a) counting grid; (b) Schmidegg counter.

Contagem e contorno de frequências

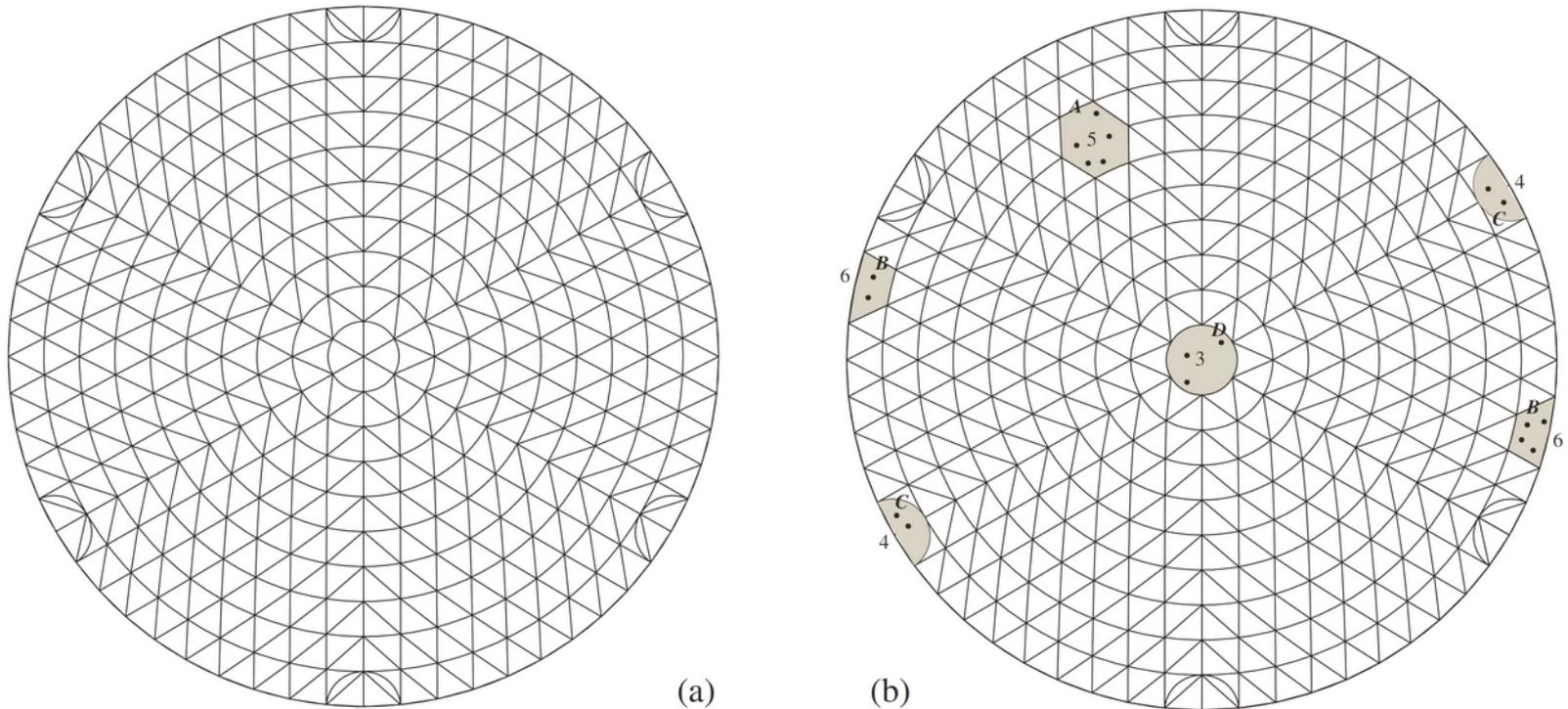


Figure 18.9 Counting: (a) Kalsbeek net; (b) density determinations.

Contagem e contorno de frequências

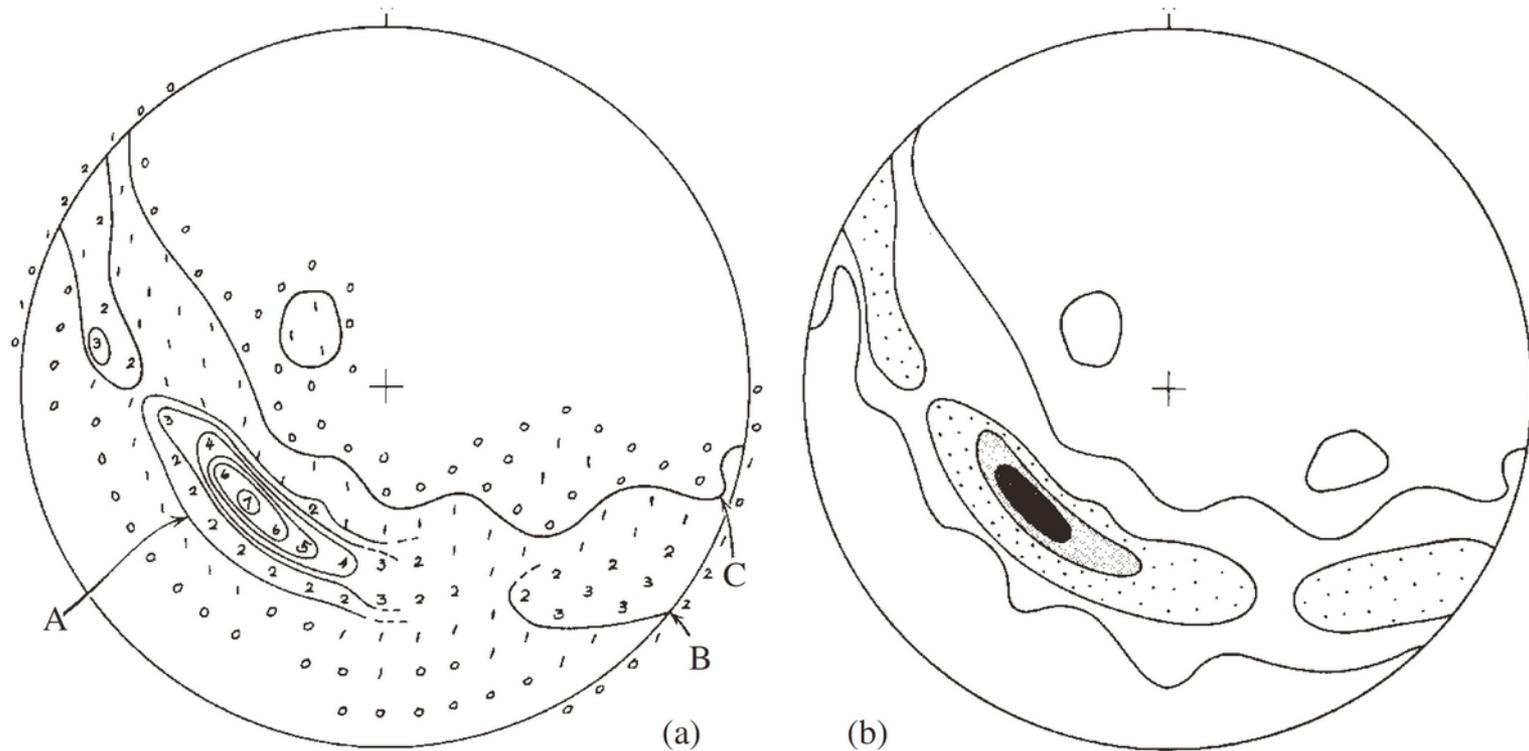
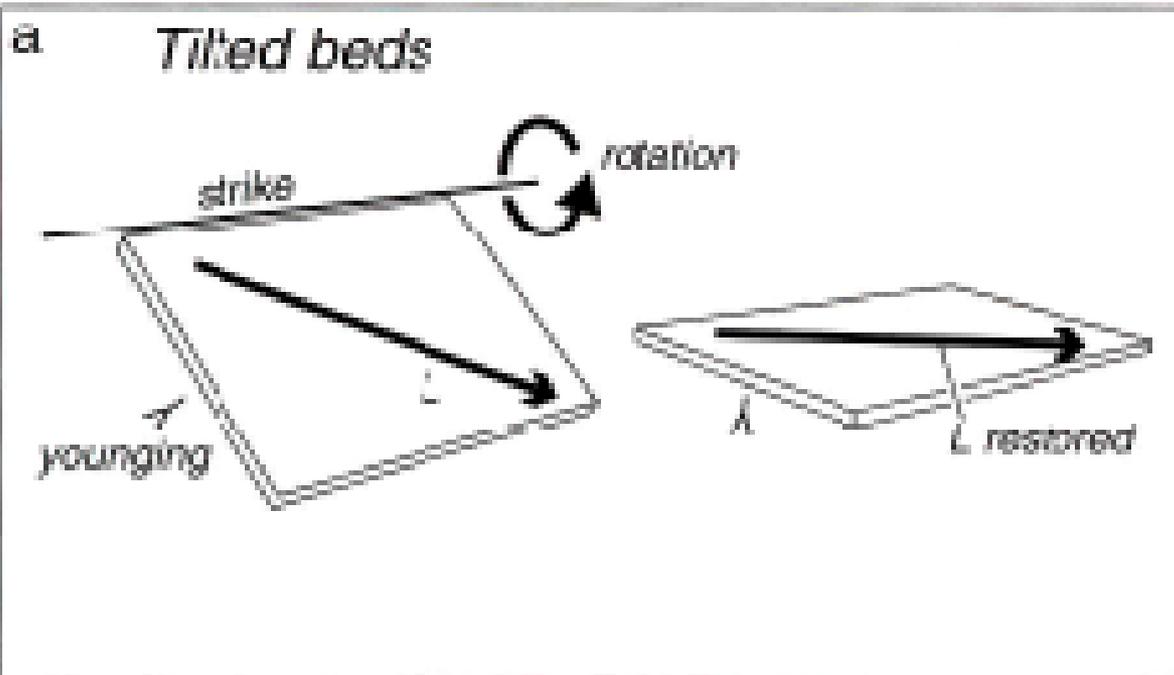
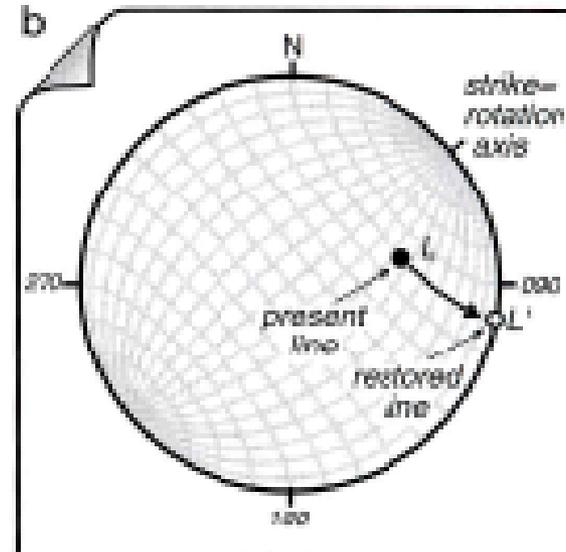
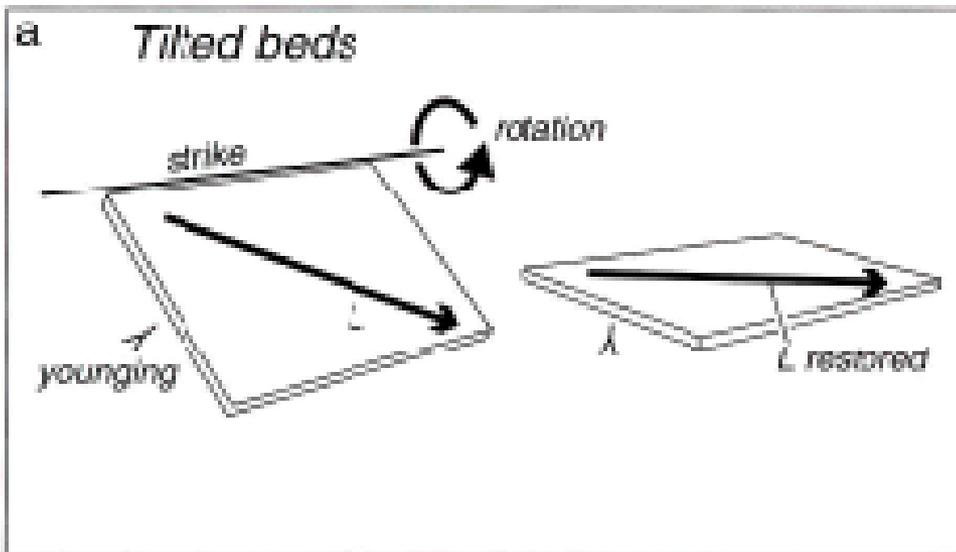


Figure 18.10 Contouring by hand: (a) counted densities and preliminary contours; (b) completed diagram; contours 2–4–8–12% per 1% area, maximum 14%.

6. Rotações





Rotações podem ser expressas por multiplicação de matrizes

$$\begin{bmatrix} r_1 \\ r_2 \\ r_3 \end{bmatrix} = \begin{bmatrix} \cos\omega & -\text{sen}\omega & 0 \\ \text{sen}\omega & \cos\omega & 0 \\ 0 & 0 & 1 \end{bmatrix} \cdot \begin{bmatrix} v_1 \\ v_2 \\ v_3 \end{bmatrix}$$

(em torno do eixo 3)

7. Softwares para Geologia Estrutural.

GIS e Cad

Modelagem 3D

GoCad e 3DMove

Análise de Orientação

Análise de Stress

Modelagem mecânica

Para análise de orientação (estereogramas)

DOS

QuickPlot (QP)

David van Everdingen

Trade (IPT)

Yamamoto e Pereira Jr

Para análise de orientação (estereogramas)

Windows

"Acadêmicos"

OpenStereo
Carlos Grohmann e Ginaldo Campanha

Stereonet
Richard Allmendinger

StereoNet for Windows
Per Ivar Steinsund

Stereo32
Klaus Röller, Claudia A. Trepmann

StereoNett
Johannes Duyster

Orient
Frederick W. Vollmer

"Comerciais"

Rockworks

Dips (Rocscience)

Para análise de stress

Trade

FaultKin

Ramsay & Lisle

TectonicsFP

Michael

etc. etc.

Referências

- Campanha, G. A. C., e Quintanilha, J. A.. 1996. Análise Estatística de Dados Estruturais; Estatística de Dados Direcionais Tridimensionais. In: *Projeção estereográfica para análise de estruturas*, edited by Carneiro, Celso Dal R. São Paulo: UNICAMP/CPRM/IPT.
- Cheeny, R. F. 1983 *Statistical methods in geology*. George Allen & Unwin, London. 169 p
- Fossen, H. 2010. *Structural Geology*. Cambridge University Press
- Fossen, H. 2012 *Geologia Estrutural Oficina de Textos*.
- Grohmann, C.H. and Campanha, G.A.C., 2010. OpenStereo: open source, cross-platform software for structural geology analysis. Presented at the AGU 2010 Fall Meeting, San Francisco, CA.
- Grohmann, C.H., Campanha, G.A.C. and Soares Junior, A.V., 2011. OpenStereo: um programa Livre e multiplataforma para análise de dados estruturais. In: XIII Simpósio Nacional de Estudos Tectônicos.
- Lisle, R.J. 2004 *Stereographic projection techniques for geologists and civil engineers*. Cambridge University Press.
- Mardia, K.V., 1972. *Statistics of Directional Data*. Academic Press.
- Marshak, S. 1998 *Basic methods of structural geology*. Prentice Hall, 446 p.
- Ragan, D. M. 2009. *Structural Geology: an introduction to geometrical techniques*. John Wiley & Sons, 207 p.
- Ramsay, J.G. & Huber, M.I. 1987. *The techniques of modern structural geology*. Volume 2: *Folds and Fractures*. Academic Press 700 p.
- Woodcock, N.H. 1977 Specification of fabric shapes using an eigenvalue method. *Geological Society of America Bulletin*, v. 88, p. 1231 - 1216