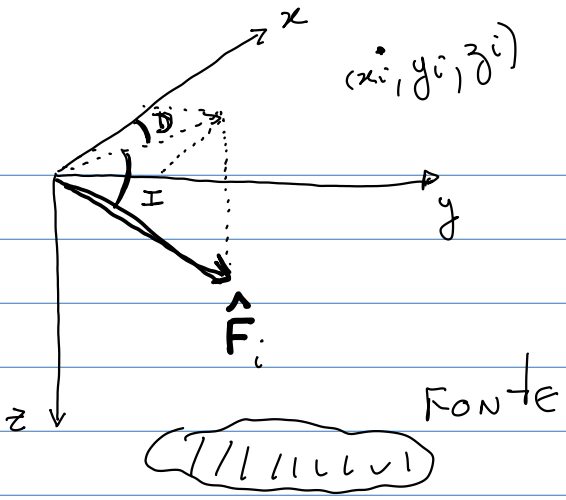
Anomalia de campo total



$\sim 23.000\ nT$

$$\mathbf{F}_i = \|\mathbf{F}_i\| \hat{\mathbf{F}}_i \qquad (\text{ex.: IGRF})$$

$$\hat{\mathbf{F}}_i = \begin{bmatrix} \cos I_i \cos D_i \\ \cos I_i \sin D_i \\ \sin I_i \end{bmatrix}$$

$$\|\hat{\mathbf{F}}_i\| = \left[(\cos I_i \cos D_i)^2 + (\cos I_i \sin D_i)^2 + (\sin I_i)^2 \right]^{1/2}$$

$$= \left[\cos^2 I \cos^2 D + \cos^2 I \sin^2 D + \sin^2 I \right]^{1/2}$$

$$= \left[\cos^2 I + \sin^2 I \right]^{1/2} = 1$$

$$\mathbf{B}_i = \|\mathbf{B}_i\| \hat{\mathbf{B}}_i \qquad \mathbf{T}_i = \mathbf{F}_i + \mathbf{B}_i$$

$$\Delta T_i = \|\mathbf{T}_i\| - \|\mathbf{F}_i\|$$

$$= \left[(F_{x_i} + B_{x_i})^2 + (F_{y_i} + B_{y_i})^2 + (F_{z_i} + B_{z_i})^2 \right]^{1/2}$$

$$- \left[F_{x_i}^2 + F_{y_i}^2 + F_{z_i}^2 \right]^{1/2}$$

$$\|\mathbf{F}_0\| >> \|\mathbf{B}_i\|, \quad \mathbf{F}_i = \mathbf{F}_0 \Rightarrow \hat{\mathbf{F}}_i = \hat{\mathbf{F}}_0$$

$$\tilde{\Delta T}_i = \hat{\mathbf{F}}_0^T \mathbf{B}_i$$

$$\tilde{\Delta T}_i \approx \Delta T_i$$

$$= \hat{F}_{x_0} B_{x_i} + \hat{F}_{y_0} B_{y_i} + \hat{F}_{z_0} B_{z_i}$$

$$u = \begin{bmatrix} x \\ y \\ z \end{bmatrix}$$

$$\|u\| = \left[x^2 + y^2 + z^2\right]^{1/2}$$

$f(x,y,z)$

$$f(x+\Delta x, y+\Delta y, z+\Delta z) \approx$$

$$\approx f(x,y,z) + \partial_x f\,\Delta x + \partial_y f\,\Delta y + \partial_z f\,\Delta z$$

$\nabla f \leftarrow$

$$\approx f(x,y,z) + \begin{bmatrix} \partial_x f \\ \partial_y f \\ \partial_z f \end{bmatrix}^T \begin{bmatrix} \Delta x \\ \Delta y \\ \Delta z \end{bmatrix}$$

$$\partial_x f = \frac{1}{2} \frac{1}{[\dots]^{1/2}} \not{2} x = \frac{x}{\|u\|}$$

$$\nabla f = \frac{1}{\|u\|} \begin{bmatrix} x \\ y \\ z \end{bmatrix} = \frac{u}{\|u\|} = \hat{u}$$

$$\|u+\delta u\| \approx \|u\| + \hat{u}^T \delta u$$

$$\|T_i\| \simeq \|F_0\| + \hat{F}_0^T B_i$$

$$\Delta T_i \approx \cancel{\|F_0\|} + \hat{F}_0^T B_i - \cancel{\|F_0\|}$$

$$\approx \hat{F}_0^T B_i = \tilde{\Delta T_i}$$

Como definir, analizando apenas o campo total medido, se a aproximação para a anomalia de campo total é boa?