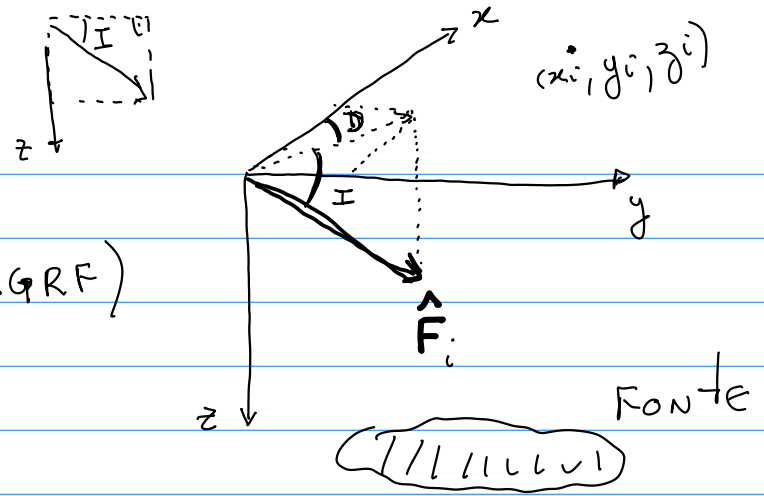


Anomalia de campo total

$\sim 23.000 \text{ nT}$

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

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



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

$$\mathbf{B}_i = \|\mathbf{B}_i\| \hat{\mathbf{B}}_i$$

$$\mathbf{T}_i = \mathbf{F}_i + \mathbf{B}_i$$

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

$$\begin{aligned} &= \left[(F_{xi} + B_{xi})^2 + (F_{yi} + B_{yi})^2 + (F_{zi} + B_{zi})^2 \right]^{1/2} \\ &\quad - \left[F_{xi}^2 + F_{yi}^2 + F_{zi}^2 \right]^{1/2} \end{aligned}$$

$$\|\mathbf{F}_0\| \gg \|\mathbf{B}_i\|, \quad \mathbf{F}_i = \mathbf{F}_0 \rightarrow \hat{\mathbf{F}}_i = \hat{\mathbf{F}}_0$$

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

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

$$= \hat{F}_{x0} B_{xi} + \hat{F}_{y0} B_{yi} + \hat{F}_{z0} B_{zi}$$

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

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

$$f(x, y, z) \Rightarrow$$

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

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

$$\nabla f \leftarrow \quad + \partial_z f \Delta z$$

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

$$\partial_x f = \frac{1}{\cancel{[\dots]^{1/2}}} \frac{1}{\cancel{x}} = \frac{x}{\|u\|}$$

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

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

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

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

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