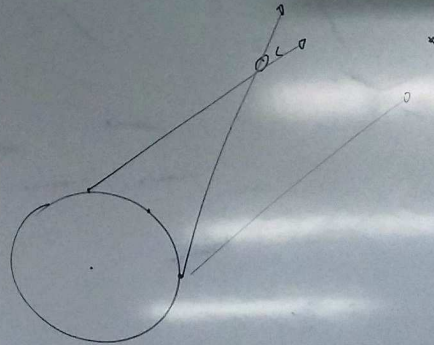


RELACION TOPOCÉNTRICAS - GECÉNTRICAS

PARALAJE DIURNA

ABERRACION DIURNA

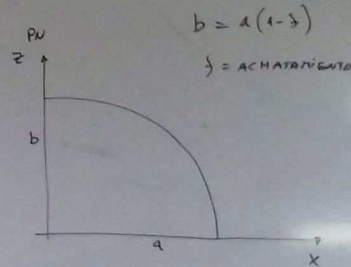
55



RELACION TOPOCÉNTRICAS - GEOFÉNICAS

PARALAJE DIURNA

ABERRACION DIURNA



$$b = a(1 - f)$$

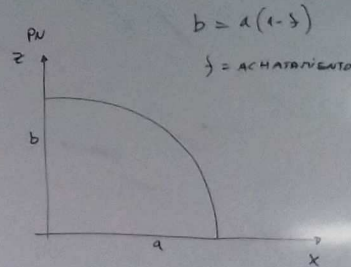
f = ACHATAMIENTO

GEOIDE = SUP. EQUIPOT.



RELACIÓN TOPOCÉNTRICA Y GEOFICÉNTRICAS

PARA
ABERRACIÓN



$$b = a(1 - \beta)$$

β = ACHATAMIENTO

DIFERENCIA
DE
METROS

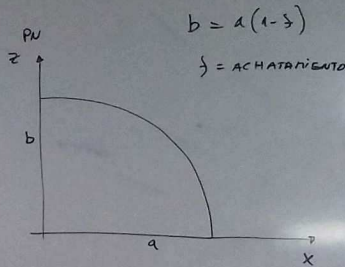
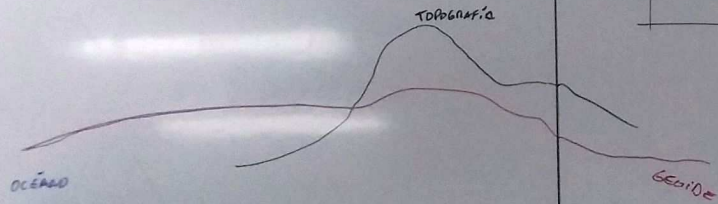
"GEOIDE" = SUP. EQUIPOTENCIAL

"ESFEROIDE ESTÁNDAR" = ELIPSOIDE
DE
REVOLUCIÓN

TRANSFORMACIONES TOPOCÉNTRICAS - GEODCÉNTRICAS

RAJE DIURNA

RAJON DIURNA



$$b = a(1 - f)$$

f = ACHATAMIENTO

DIFERENCIA
DE
METROS

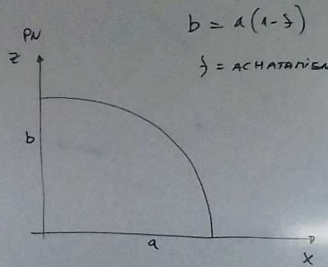
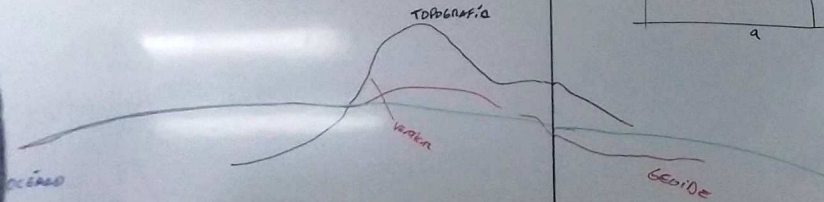
"GEODE" = SUP. EQUIPOTENCIAL

"ESFEROIDE ESTÁNDAR" = ELIPSOIDE
DE
REVOLUCIÓN

RELACIÓN TROPICAS - GEOCÉNTRICAS

PARALAJE DIURNO

ABERRACIÓN



DIFERENCIA DE METROS

"GEOIDE" = SUP. EQUIPOTENCIAL

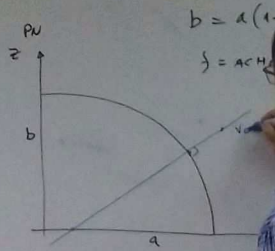
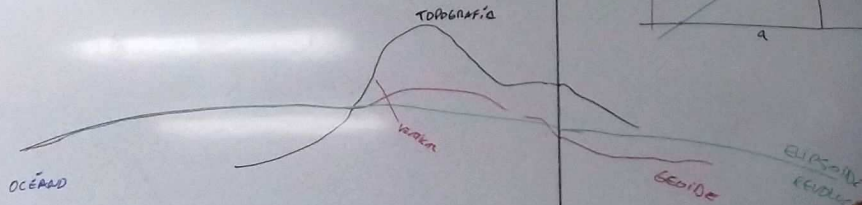
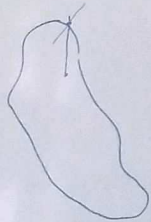
"ESFEROIDE ESTÁNDAR" = ELIPSOIDE DE REVOLUCIÓN

GRAVEDAD LOCAL \perp GEOIDE

RELACION TOPOCÉNTRICAS - GEODÉNTRICAS

PARALAJE DIURNA

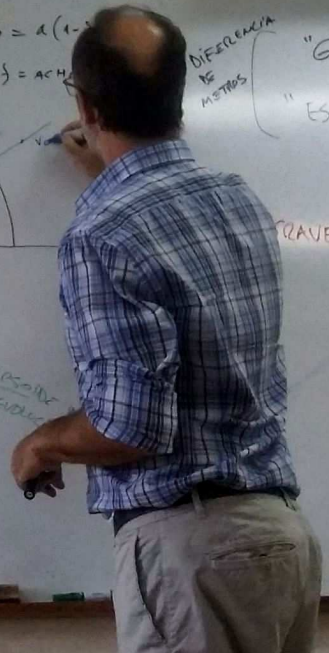
ABERRACION DIURNA



DIFERENCIA DE METROS

"GEODE" = SUP. EQUIPOTENCIAL
"ESFEROIDE ESTÁNDAR" = ELIPSOIDE DE REVOLUCIÓN

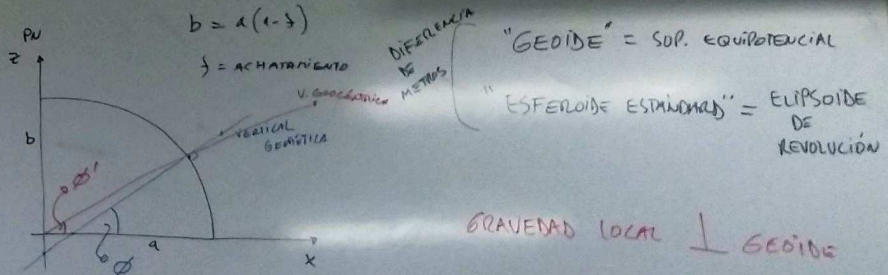
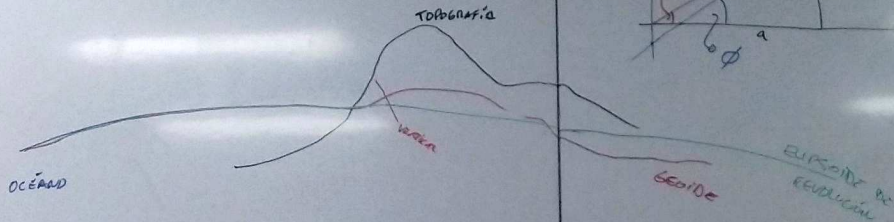
TRAVERSA LOCAL \perp GEODE



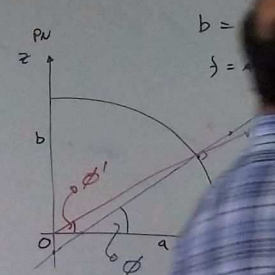
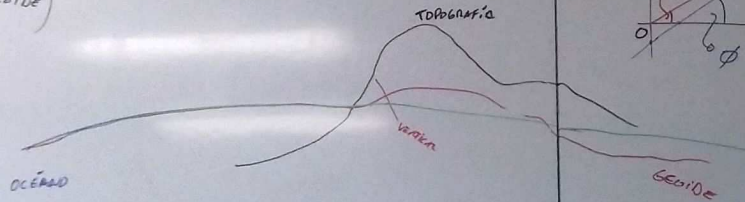
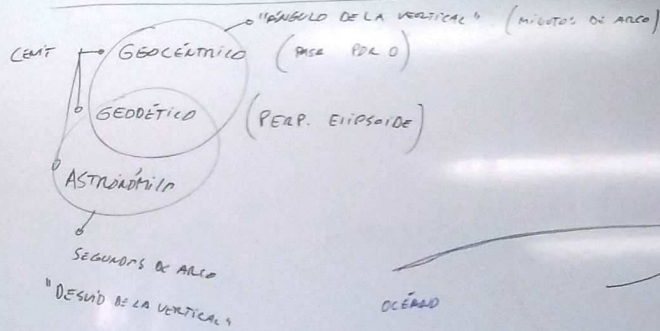
RELACION TOPOCÉNTRICAS - GEODÉNTRICAS

PARALAJE DIURNO

ABERRACION DIURNA



RELACION TOPOCÉNTRICAS - GEODÉNTRICAS

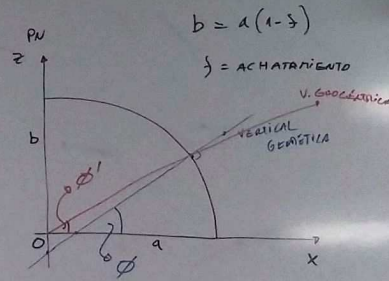
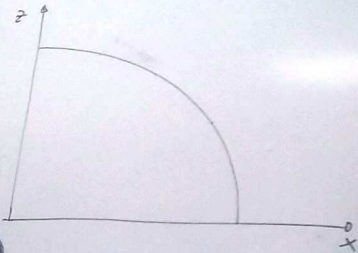


DIFERENCIA DE METROS

"GEOIDE" = SDP. EQUIPOTENCIAL

"ESFEROIDE ESTANDAR" = ELIPSOIDE DE REVOLUCIÓN

GRAVEDAD LOCAL \perp GEOIDE



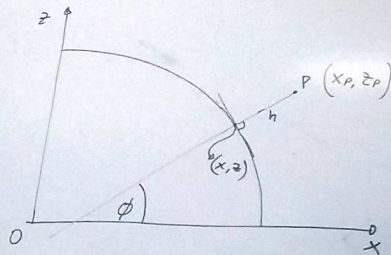
"GEOIDE" = SDP. EQUIPOTENCIAL

"ESFEROIDE ESTÁNDAR" = ELIPSOIDE DE REVOLUCIÓN

GRAVEDAD LOCAL \perp GEOIDE

$$a = 6378140 \text{ m}$$

$$f = 0.00355291$$

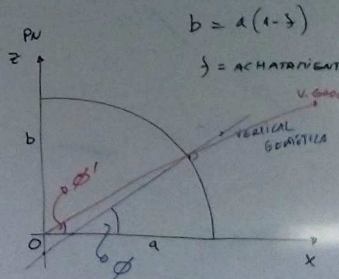


$$x_p = x + h \cdot \cos \phi$$

$$z_p = z + h \cdot \sin \phi$$

ELIPSE

$h =$ ALTURA SOBRE EL MAR



$$b = a(1-f)$$

$f =$ ACHATAMIENTO

DIFERENCIA DE METROS

"GEOIDE" = SUP. EQUIPOTENCIAL

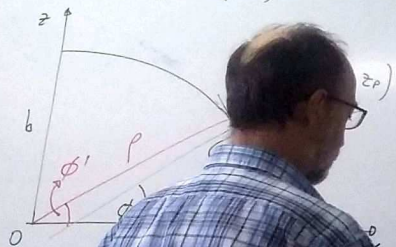
"ESFEROIDE ESTIMADO" = ELIPSOIDE DE REVOLUCION

GRAVEDAD LOCAL \perp GEOIDE

$$a = 6378140 \text{ m}$$

$$f = 0.00355291$$

$$b = a(1-f)$$



$$x_p = x + h \cdot \cos \phi = p \cdot \cos \phi'$$

$$z_p = z + h \cdot \sin \phi = p \cdot \sin \phi'$$

↓
EIPSE

BUSCAMOS $(h, \phi) \longleftrightarrow (p, \phi')$

$$\frac{x^2}{a^2} + \frac{z^2}{\underbrace{b^2}_{a^2(1-f)^2}} = 1$$

$h = \text{ALTURA}$

"GEOIDE" = SUP. EQUIPOTENCIAL

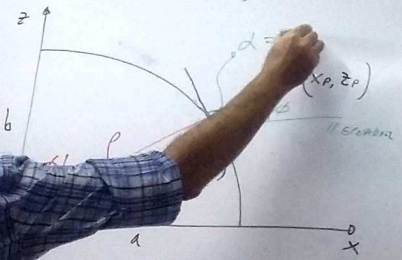
"ESFEROIDE ESTÁNDAR" = ELIPSOIDE DE REVOLUCIÓN

GRAVEDAD LOCAL \perp GEOIDE

$$a = 6378140 \text{ m}$$

$$f = 0.00355291$$

$$b = a(1-f)$$



$$x_p = x + h \cdot \cos \phi = p \cdot \cos \phi'$$

$$z_p = z + h \cdot \sin \phi = p \cdot \sin \phi'$$

EIPSE

BUSCAMOS $(h, \phi) \longleftrightarrow (p, \phi')$

$$\frac{x^2}{a^2} + \frac{z^2}{\underbrace{b^2}_{a^2(1-f)^2}} = 1$$

$$\frac{z \cdot x \, dx}{a^2} + \frac{z \, dz}{a^2(1-f)^2} = 0 \Rightarrow \boxed{\frac{dx}{dz} = -\frac{z}{x(1-f)^2}}$$

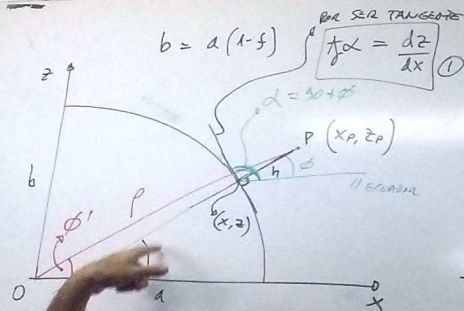
"GEOIDE" = SUP. EQUIPOTENCIAL

"ESFEROIDE ESTIMADO" = ELIPSOIDE DE REVOLUCIÓN

GRAVEDAD LOCAL \perp GEOIDE

$$a = 6378140 \text{ m}$$

$$f = 0.00355291$$



$$b = a(1-f)$$

PARA SER TANGENTE
 $f \alpha = \frac{dz}{dx}$ ①

$$x_p = x + h \cos \phi = p \cos \phi'$$

$$z_p = z + h \sin \phi = p \sin \phi'$$

EURSE

BUSCAMOS $(h, \phi) \leftrightarrow (p, \phi')$

$$\frac{x^2}{a^2} + \frac{z^2}{a^2(1-f)^2} = 1$$

$$\frac{2x dx}{a^2} + \frac{2z dz}{a^2(1-f)^2} = 0 \Rightarrow \frac{dx}{dz} = -\frac{z}{x(1-f)^2}$$
 ②

$$\text{DE ①: } f \alpha = f(90 + \phi) = -\frac{1}{f \phi} = \frac{dz}{dx}$$

$$\Rightarrow -\frac{1}{f \phi} = -\frac{z}{x(1-f)^2}$$

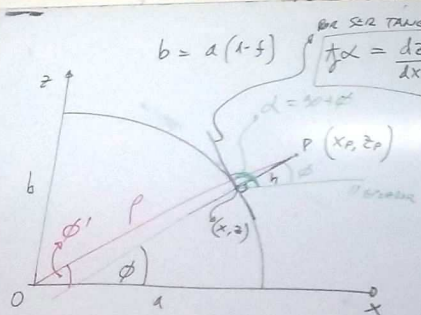
"GEOIDE" = SUP. EQUIPOTENCIAL

"ESFEROIDE ESTIMADO" = ELIPSOIDE DE REVOLUCIÓN

GRAVEDAD LOCAL \perp GEOIDE

$$a = 6378140 \text{ m}$$

$$f = 0.00355291$$



$b = a(1-f)$

DE SER TANGENTE

$f \alpha = \frac{dz}{dx}$ ①

$x_p = x + h \cos \phi = p \cos \phi'$

$z_p = z + h \sin \phi = p \sin \phi'$

BUSCAMOS $(h, \phi) \leftrightarrow (p, \phi')$

$$\frac{x^2}{a^2} + \frac{z^2}{b^2} = 1$$

$a^2(1-f)^2$

$$\frac{z x dx}{a^2} + \frac{z z dz}{a^2(1-f)^2} = 0$$

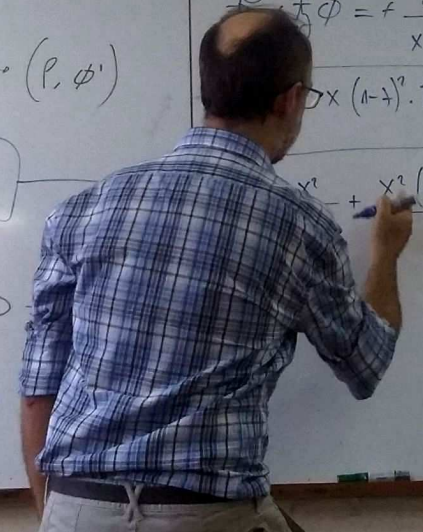
$h =$ ALTURA SOBRE EL MAR

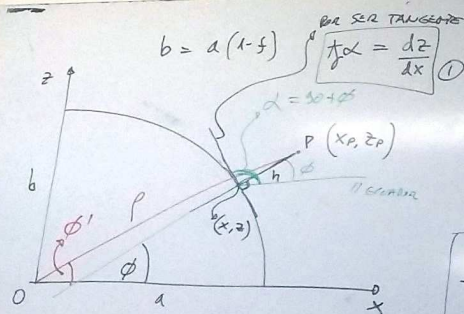
DE ①: $f \alpha = \frac{dz}{dx} = -\frac{1}{f \phi} = \frac{dz}{dx}$

② $f \phi = f \frac{z}{x(1-f)^2}$

$x(1-f)^2 \cdot f \phi$

$$x^2 + x^2(1-f)^2 f \phi = 1$$





$$b = a(1-f)$$

DE SER TANGENTE
 $f \alpha = \frac{dz}{dx}$ ①

$$\begin{aligned} x_p &= x + h \cdot \cos \phi = p \cdot \cos \phi' \\ z_p &= z + h \cdot \sin \phi = p \cdot \sin \phi' \end{aligned}$$

ECLIPSE

BUSCAMOS $(h, \phi) \leftrightarrow (p, \phi')$

$$\frac{x^2}{a^2} + \frac{z^2}{a^2(1-f)^2} = 1$$

$$\frac{z x dx}{a^2} + \frac{z dz}{a^2(1-f)^2} = 0 \Rightarrow \frac{dx}{dz} = -\frac{z}{x(1-f)^2}$$

h = ALTURA SOBRE EL MAR

$$\text{DE ①: } f \alpha = f(90 + \phi) = -\frac{1}{f \phi} = \frac{dz}{dx}$$

$$\Rightarrow f + f \phi = f \frac{z}{x(1-f)^2}$$

$$z = x(1-f)^2 \cdot f \phi \quad \text{③}$$

$$\frac{x^2}{a^2} + \frac{x^2(1-f)^2 f^2 \phi^2}{a^2} = 1$$

$$x^2 \left(1 + (1-f)^2 f^2 \phi^2 \right) = a^2$$

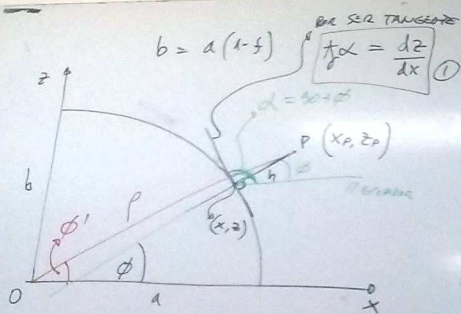
$$x^2 = \frac{a^2}{\cos^2 \phi + (1-f)^2 \sin^2 \phi}$$

$$x = a \cdot \left[\cos^2 \phi + (1-f)^2 \sin^2 \phi \right]^{-1/2} \cdot \cos \phi$$

$$z = \dots$$

$$x = a \cdot C \cdot \cos \phi$$

$$z =$$



$b = a(1-f)$
 por ser tangente
 $f \alpha = \frac{dz}{dx}$ ①

$x_p = x + h \cdot \cos \phi = p \cdot \cos \phi'$
 $z_p = z + h \cdot \sin \phi = p \cdot \sin \phi'$

EIPSE

$a \cdot C \cdot \cos \phi + h \cdot \cos \phi = p \cdot \cos \phi'$
 $a \cdot S \cdot \sin \phi + h \cdot \sin \phi = p \cdot \sin \phi'$

$a \cdot \cos \phi \cdot (C + h/a) = p \cdot \cos \phi'$
 $a \cdot \sin \phi \cdot (S + h/a) = p \cdot \sin \phi'$

funciones de phi

h = ALTURA SOBRE EL MAR

DE ①: $f \alpha = f(\phi + \phi') = -\frac{1}{f \phi} = \frac{dz}{dx}$

② $f + f \phi = f \frac{z}{x(1-f)^2}$

$z = x(1-f)^2 \cdot f \phi$ ③

$\frac{x^2}{a^2} + \frac{x^2(1-f)^2 f^2 \phi^2}{a^2} = 1$

$x^2 \left(1 + (1-f)^2 f^2 \phi^2 \right) = a^2$

$x^2 = \frac{a^2 \cdot \cos^2 \phi}{\cos^2 \phi + (1-f)^2 \sin^2 \phi}$

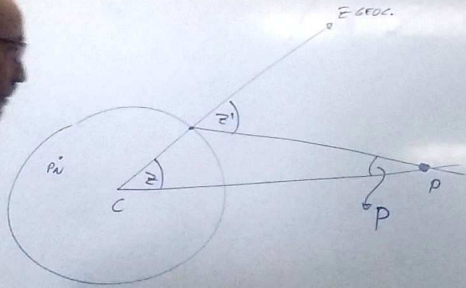
$x = a \cdot \left[\cos^2 \phi + (1-f)^2 \sin^2 \phi \right]^{-1/2} \cdot \cos \phi$

$z = \dots$

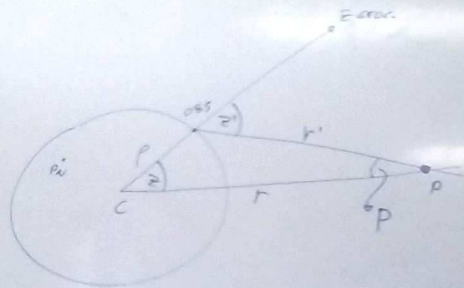
$x = a \cdot C \cdot \cos \phi$
 $z = a \cdot S \cdot \sin \phi$

$C \cdot (1-f)^2$

PARALAJE GEOCÉNTRICA (ó DIURNA)



PARALAJE GEOCÉNTRICA (ó SURTA)

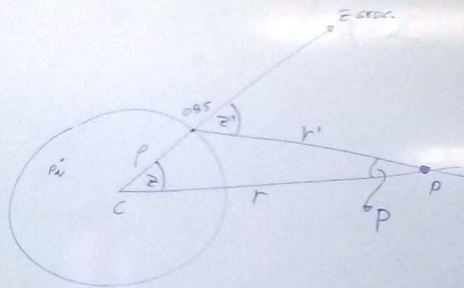


$$\frac{\sin p}{r} = \frac{\sin z}{r'} = \frac{\sin(180 - z')}{r} \Rightarrow \sin p = \frac{r}{r'} \cdot \sin z'$$

$$z' = z + p$$

$$\Rightarrow \boxed{z = z' - p}$$

PARALAJE GEOCÉNTRICA (ó DIURNA)



$$\frac{\sin P}{\rho} = \frac{\sin z}{r'} = \frac{\sin(180-z')}{r}$$

$$z' = z + P$$

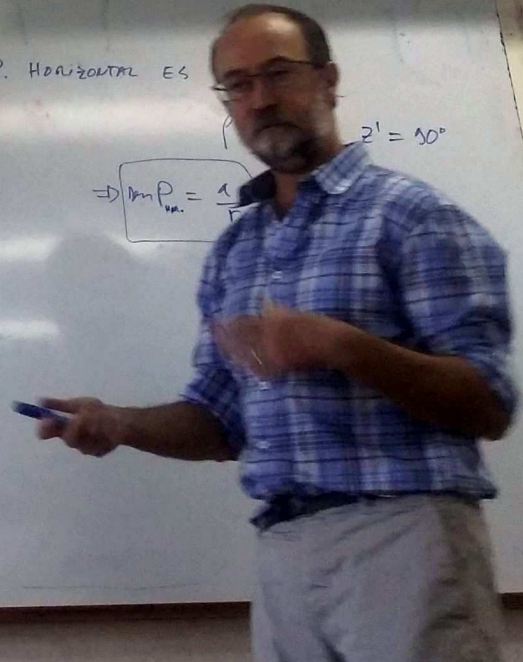
$$\Rightarrow \sin P = \frac{\rho}{r} \cdot \sin z'$$

$$\Rightarrow z = z' - P$$

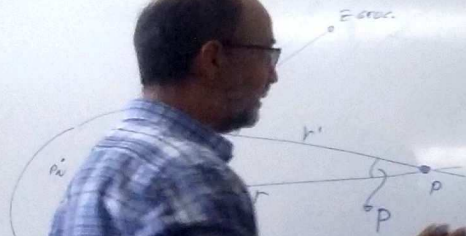
P. HORIZONTAL ES

$z' = 30^\circ$

$$\Rightarrow \sin P_{\text{hor.}} = \frac{\rho}{r}$$



PARALAJE GEOCÉNTRICA (ó DIURNA)



$$\frac{\sin p}{\rho} = \frac{\sin z}{r'} = \frac{\sin(180 - z')}{r}$$

$$\Rightarrow \sin p = \frac{\rho}{r} \cdot \sin z'$$

$$z' = z + p$$

$$\Rightarrow z = z' - p$$

P. HORIZONTAL ES P TAL QUE

$$p = a \quad \text{y} \quad z' = 90^\circ$$

$$\Rightarrow \sin p_{\max} = \frac{1}{r} \cdot 1$$

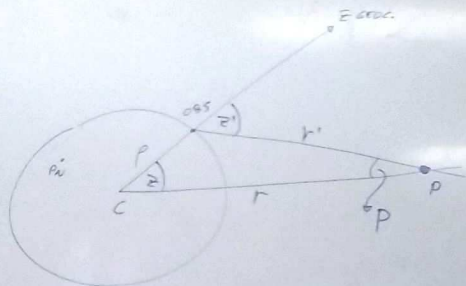
→ LUNA $p_{\max} \approx 57'$

→ SOL

$$\sin p_{\max} \approx \frac{6400 \text{ km}}{150.000.000 \text{ km}}$$

$$8,8$$

PARALAJE GEOCÉNTRICO (ó DIURNO)



$$\frac{\sin P}{p} = \frac{\sin z}{r'} = \frac{\sin(180-z')}{r}$$

$$\Rightarrow \sin P = \frac{p}{r} \cdot \sin z'$$

$$z' = z + p$$

$$\Rightarrow z = z' - p$$

$$\Delta \alpha, \Delta \delta$$

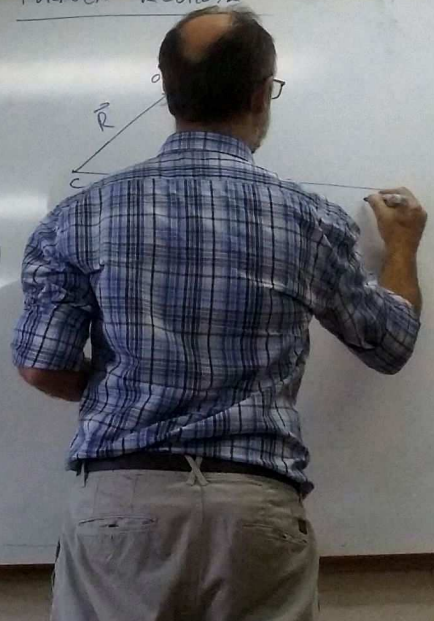
ANÁLOGO A REFRACCIÓN

(DESCONCIAMOS $\Delta \alpha$)

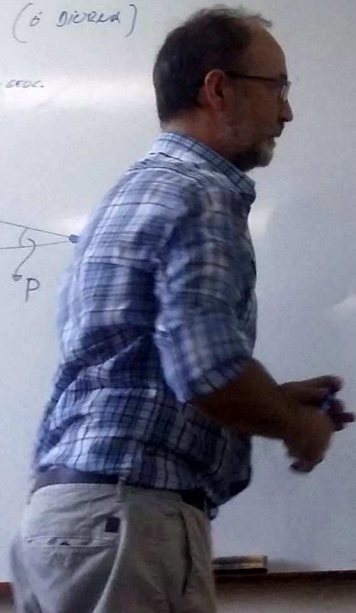
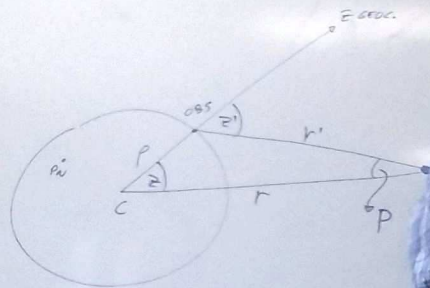
FÓRMULA RICUNOSA



$$\Delta z = k \cdot \frac{1}{R} z$$



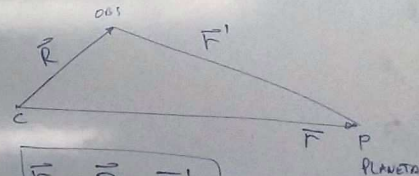
PARALAJE GEOCÉNTRICA (ó DIURNA)



DADO $\vec{r} = (d, \delta, r)$

$$\begin{cases} x = \cos \delta \cdot \sin d \cdot r \\ y = \cos \delta \cdot \cos d \cdot r \\ z = \sin \delta \cdot r \end{cases}$$

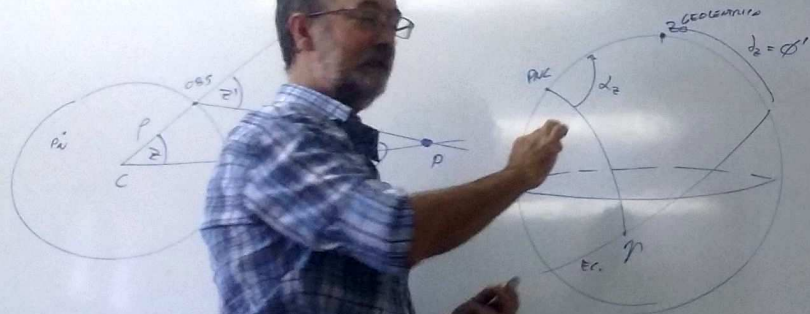
FÓRMULA RIORDANA



$$\vec{F} = \vec{R} + \vec{F}'$$

PARALAJE GEOCÉNTRICO (ó DIÓTRIA)

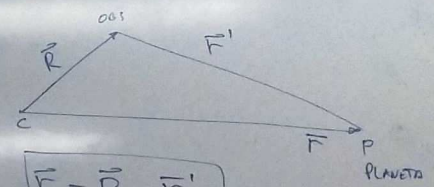
COORD. ECUI. CELESTES DEL OBS.



DADO $\vec{r} (\alpha, \delta, r)$

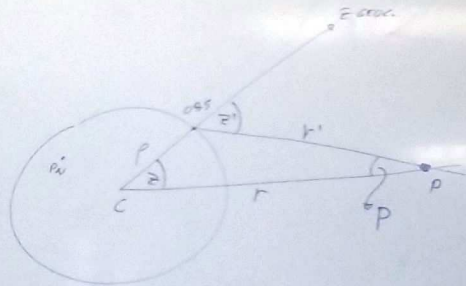
$$\begin{cases} x = \cos \delta \cdot \sin \alpha \cdot r \\ y = \cos \delta \cdot \cos \alpha \cdot r \\ z = \sin \delta \cdot r \end{cases}$$

FÓRMULA RICORDOSA

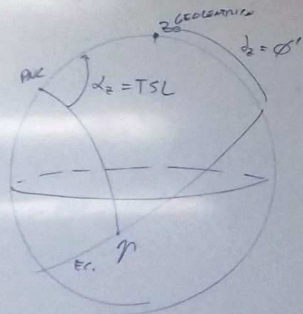


$\vec{r} = \vec{R} + \vec{r}'$

PARALAJE GEOCÉNTRICA (ó DIURNA)



(COORD. ECUI. CELESTES DEL OBS.)



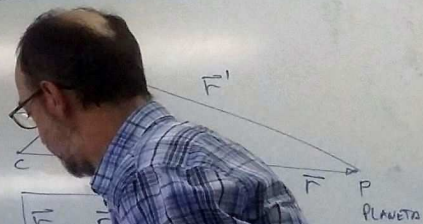
DADO $\vec{r} (\alpha, \delta, r)$

$$\begin{cases} x = \cos \delta \cdot \sin \alpha \cdot r \\ y = \cos \delta \cdot \cos \alpha \cdot r \\ z = \sin \delta \cdot r \end{cases} \quad \text{PLA}$$

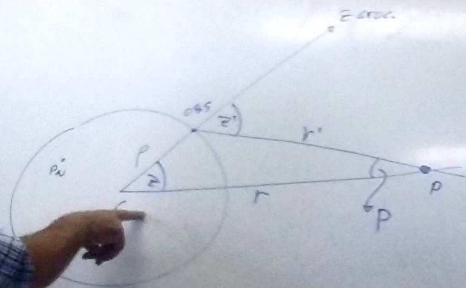
$$\vec{R} = \begin{cases} x = P \cdot \cos TSL \cdot \cos \phi' \\ y = P \cdot \sin TSL \cdot \cos \phi' \\ z = P \cdot \sin \phi' \end{cases} \quad \text{OBS}$$

$$\Rightarrow \vec{r}' = \vec{r} - \vec{R} \Rightarrow x'$$

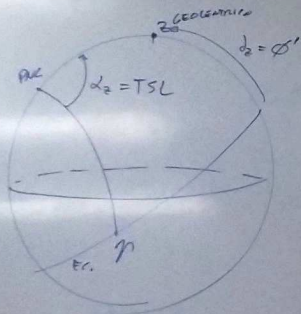
FÓRMULA RECURRENTE



PARALAJE GEOLÉNTRICA (ó DIURNA)



(COORD. ECUI. CELESTES DEL OBS.)



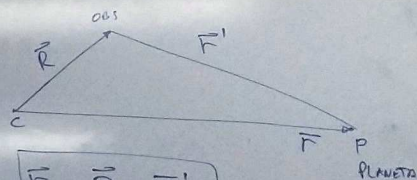
DADO $\bar{r} (\alpha, \delta, r)$

$$\begin{cases} x = \cos \delta \cdot \sin \alpha \cdot r \\ y = \cos \delta \cdot \cos \alpha \cdot r \\ z = r \sin \delta \end{cases} \quad \text{PLA}$$

$$\bar{R} = \begin{cases} x = P \cdot \cos TSL \cdot \cos \phi' \\ y = P \cdot \sin TSL \cdot \cos \phi' \\ z = P \cdot \sin \phi' \end{cases} \quad \text{OBS}$$

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FÓRMULA RIGUROSA



$$\bar{F} = \bar{R} + \bar{r}'$$

$$\Rightarrow \bar{r}' = \bar{F} - \bar{R} \Rightarrow (x', y', z') \Rightarrow \left. \begin{aligned} x' &= r' \cdot \cos \delta' \cdot \cos \alpha' \\ y' &= r' \cdot \cos \delta' \cdot \sin \alpha' \\ z' &= r' \cdot \sin \delta' \end{aligned} \right\} \Rightarrow \alpha', \delta'$$