Reconstruction of EAS core in the Horizontal System and Pixel System

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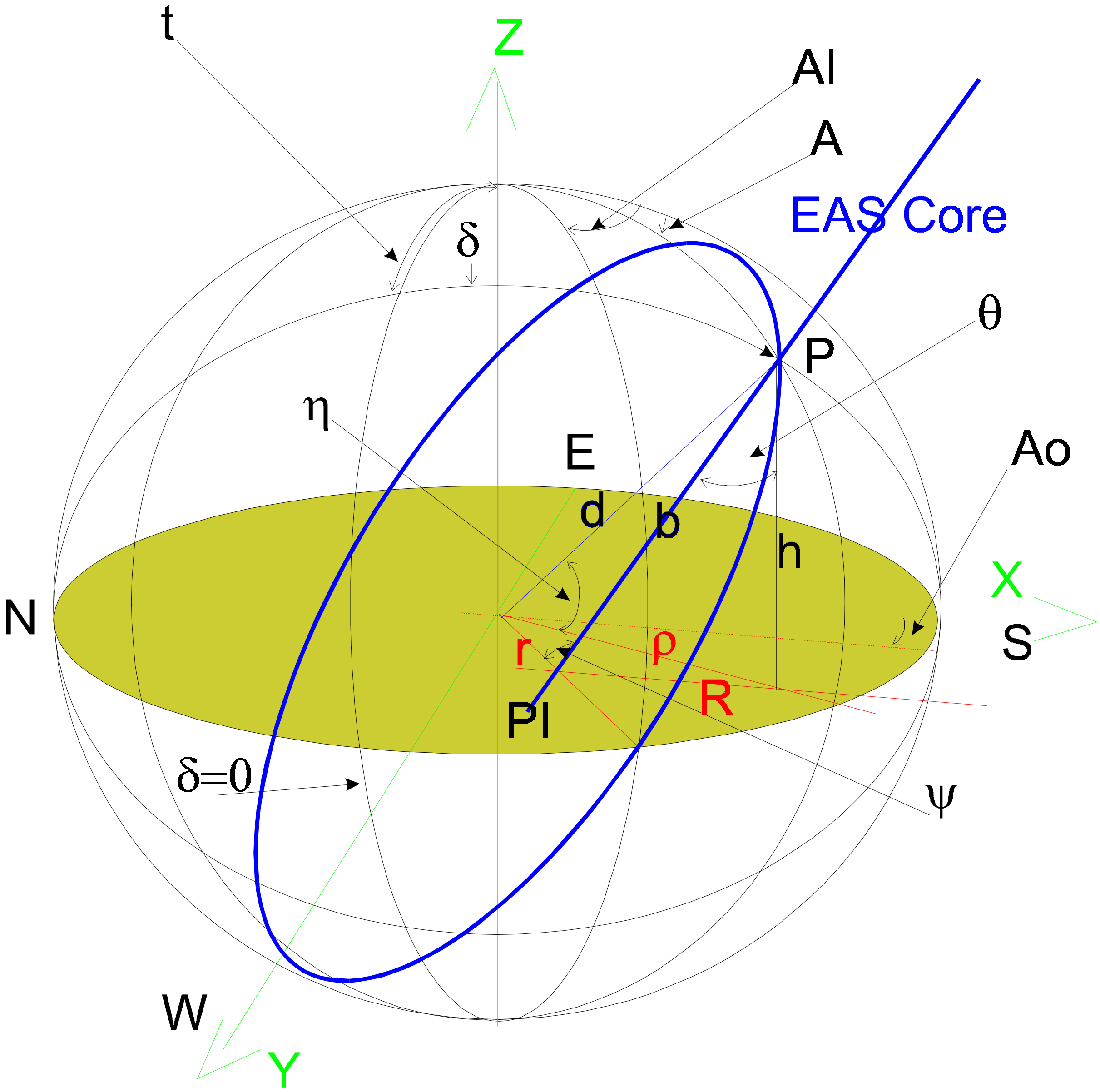
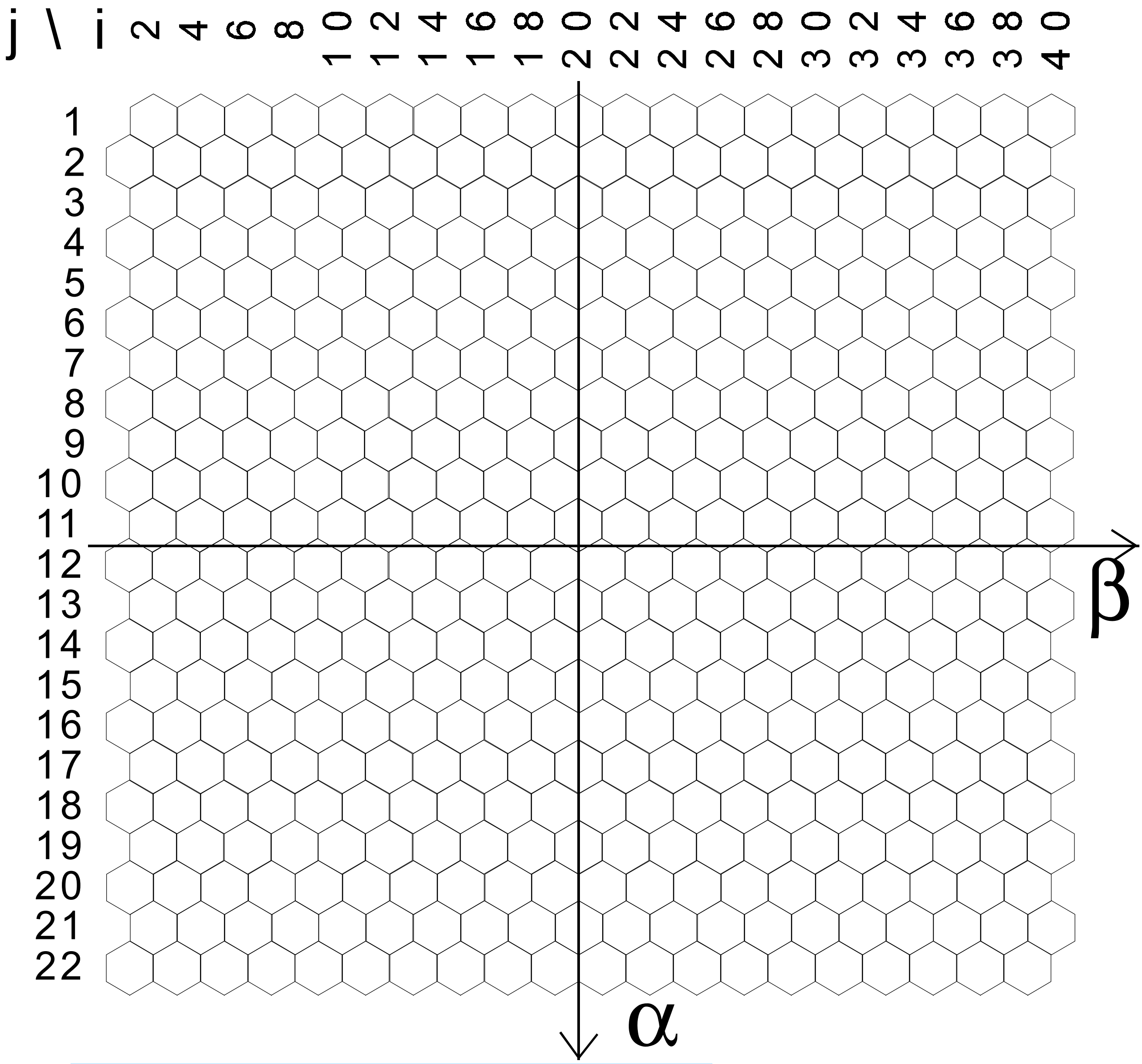
Input data:

- Position of EAS core on ground level i. e. A- azimuth, r- distance from mirror centre,
- Orientation of EAS core A_0-azimuth ; θ-zenith angle,
- Position on the EAS core -b


t
Z
Al
A
EAS Core
δ
θ
P
η
E
Ao
d
b
h
X
N
S
r
ρ
R
Pl
δ=0
ψ
W
Y



$$\alpha_j = (j - 11.5) \cdot 1.5^0 \cdot \frac{\sqrt{3}}{2}$$

$$\beta_i = (i - 20) \cdot 0.75^0$$

Two indexes notation

One index notation - Ron Shellard

$$n = 22 \cdot int\left(\tfrac{i}{2} - 0.1\right) + j$$

$$\frac{R}{\sin(AI - A)} = \frac{\rho}{\sin(AI - A_0)}$$

$$\rho = \frac{R\sin(AI - A_0)}{\sin(AI - A)}$$

$$h = \frac{R}{tan(\theta)}$$

In Horizontal System

$$\text{tg}(\eta) = \frac{h}{\rho} \quad \Rightarrow \quad \frac{\sin(AI - A)}{tan(\theta)\cdot\sin(AI - A_0)}; \ (10)$$

If $AI=A_0$ then $A=AI=A_0$ for all η

If $\theta=0$ then $A=AI$ for all η

In Pixel System

$$\cos(\delta)\cos(t) = \sin(\eta)$$
$$\cos(\delta)\sin(t) = \cos(\eta)\sin(A)$$
$$\sin(\delta) = -\cos(\eta)\cos(A)$$

$$tan(\delta) = \frac{\sin(AI)\cdot\sin(t)}{\cos(AI)} - \frac{tan(\theta)\cdot ctan(t)\cdot\sin(AI - A_0)}{\cos(AI)};\ (20)$$

$$ctan(\delta) = -ctan(AI)\cdot\sin(t)\quad for\ \ \theta = 0;\ (20a)$$

In EAS Core Plane

$$\cos(180-\psi) = \cos(AI)\cdot\sin(\theta)\cdot\cos(360-A_0) - \sin(AI)\cdot\sin(\theta)\cdot\sin(360-A_0)$$

$$b_{\min} = r\cos(\psi)$$

$$R_p = d_{\min} = r\sin(\psi)$$

$$h = b_{\min}\cos(\theta)$$

$$\sin(\eta_{\min}) = ctan(\psi)\cos(\theta)$$

$$A_{\min} = from\ eq(10)$$

$$d^2 = b^2 + r^2 - 2br\cos(\psi)$$

$$h = b\cos(\theta)$$

$$\sin(\eta) = \frac{b\cos(\theta)}{\sqrt{b^2 + r^2 - 2br\cos(\psi)}}$$

From time sequences we can have b, so from equation (10) is possible to find A for each point of EAS core.