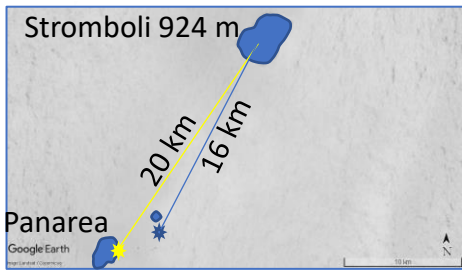


Supplementary Material S2 – Calculation of column height

G. Giordano, Università Roma Tre

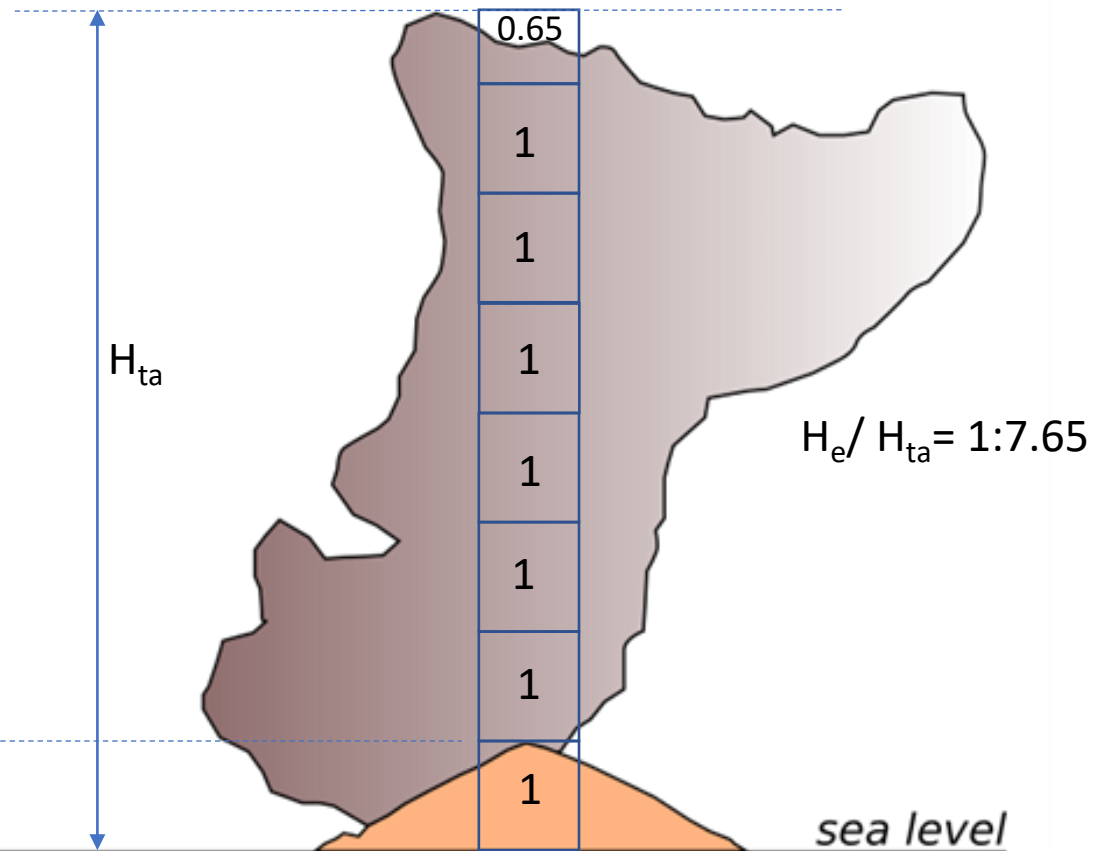
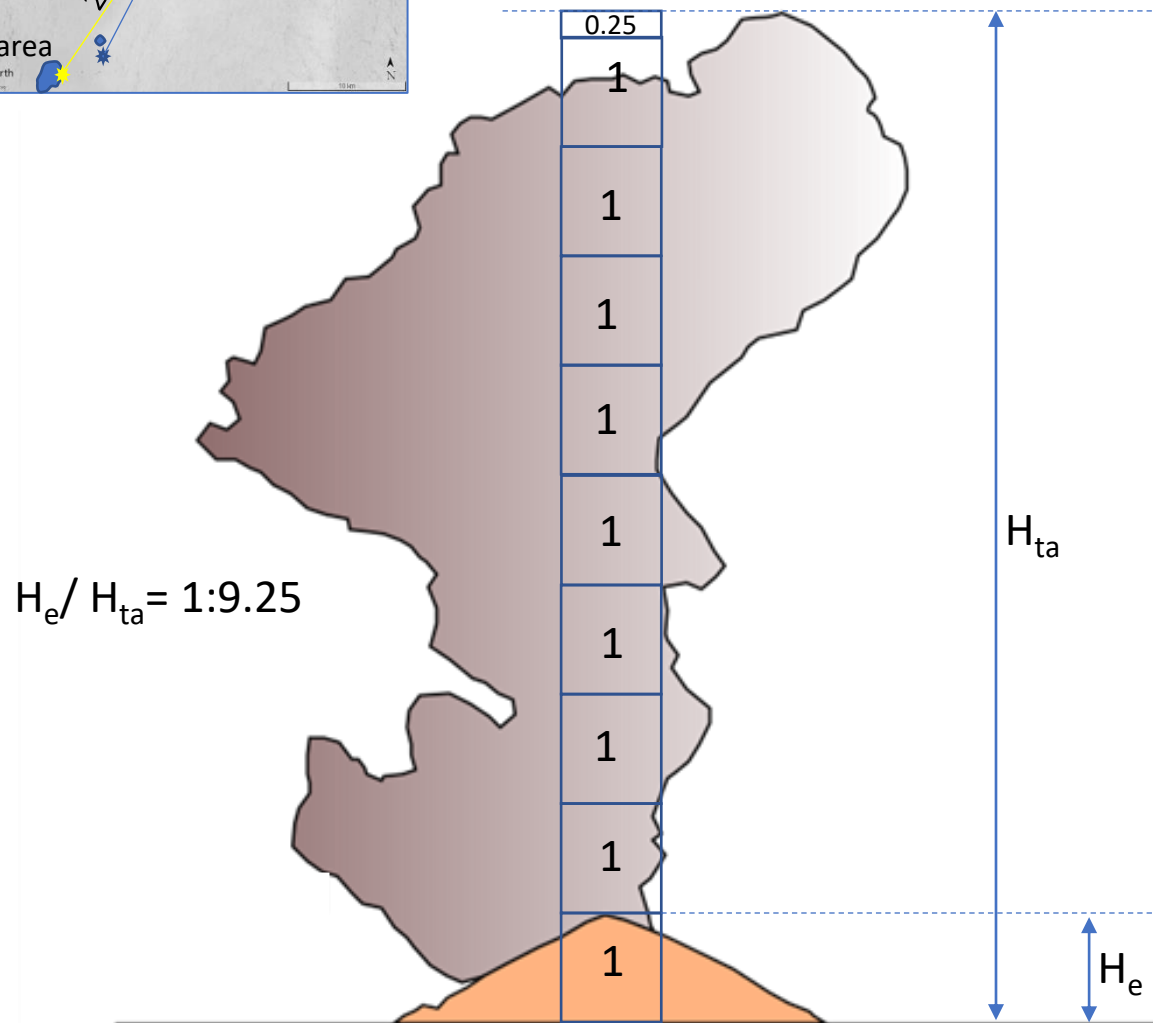
G. De Astis, INGV Roma

RATIO OF VOLCANO EDIFICE AND APPARENT COLUMN HEIGHTS FROM PANAREA VIEWPOINT



July 3

August 28



Redrawn from image taken from Panarea offshore 16 km away
Source: <https://gsud.cdn-immedia.net/2019/07/D-j4VU4W4AARNEw-379x505.jpg>



Redrawn from video frame taken from Panarea harbour 20 km away
Source: video courtesy of Natale Giunta

$$\alpha = \tan^{-1} (H_e/L)$$

$$\beta = \alpha (H_{ta}/ H_e)$$

$$H_{ts} = \tan (\beta) L$$

Note that errors may be due to expansion of the umbrella: if toward the view point may result in overestimation of the plume height

July 3, 2019

$$H_e = 0.9 \text{ km}$$

$$L = 16 \text{ km}$$

$$H_{ta}/ H_e = 9.25$$

$$\alpha = 3.21$$

$$\beta = 29.78$$

$$H_{ts} = 9.15 \text{ km}$$

$$H_t = 9.15 - 0.78 = \mathbf{8.37 \text{ km}}$$

Aug 28, 2019

$$H_e = 0.9 \text{ km}$$

$$L = 20 \text{ km}$$

$$H_{ta}/ H_e = 7.65$$

$$\alpha = 2.58$$

$$\beta = 19.71$$

$$H_{ts} = 7.16 \text{ km}$$

$$H_t = 7.16 - 0.78 = \mathbf{6.38 \text{ km}}$$

