Exercise 1: Step 8 - Slope correction

Radar backscatter: Ellipsoid-normalisation

Conventional Radar Backscatter

- Backscatter coefficients [dB/m²] are *ratio of scattered to incident power* per unit area:

$$\beta = k \cdot \frac{P_s}{P_i} \qquad \beta^0 = \frac{\beta}{A_\beta} \qquad \sigma_E^0 = \frac{\beta}{\underline{A}_\sigma} \qquad \gamma_E^0 = \frac{\beta}{\underline{A}_\gamma}$$

- Known: transmitted & received power P_t & P_r
- Derive: incident & scattered power P_i & P_s from P_t & P_r

$$\beta^0 = k \cdot \frac{f_2(P_r)}{f_1(P_t)} \cdot \frac{1}{A_\beta} \qquad \sigma_E^0 = k \cdot \frac{f_2(P_r)}{f_1(P_t)} \cdot \frac{1}{\underline{A}_\sigma} \qquad \gamma_E^0 = k \cdot \frac{f_2(P_r)}{f_1(P_t)} \cdot \frac{1}{\underline{A}_\gamma}$$

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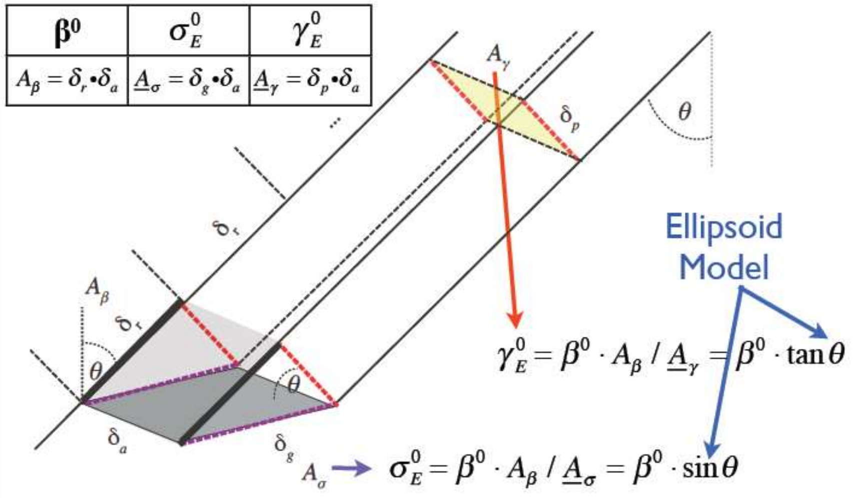
Ground Illuminated Area



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Ellipsoid-normalisation

ASAR: Calibrated sigma nought for detected products can be derived as:

$$\sigma_{i,j}^0 = \frac{DN_{i,j}^2}{K} \sin\left(\alpha_{i,j}\right)$$

$\frac{DN_{i,j}^2}{K} \rightarrow \beta^0$

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Exercise 1: Step 8 - Slope correction

Radar backscatter: slope-normalisation

Normalisation for local variation of scattering area:

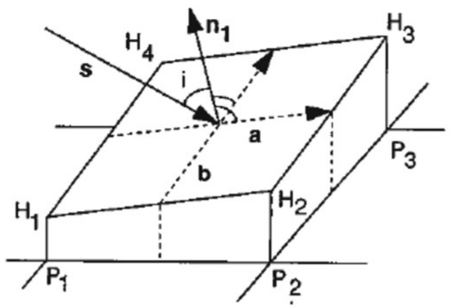
$$\sigma^0_{Norm} = \sigma^0_{Ellipsoid} * \frac{\sin \theta_{DEM}}{\sin \theta_{Ell.}}$$

Kellndorfer et al., TGRS, Sept. 1998.

θ_{DEM}

Local incidence angle projected into the range plane

Local incidence angle



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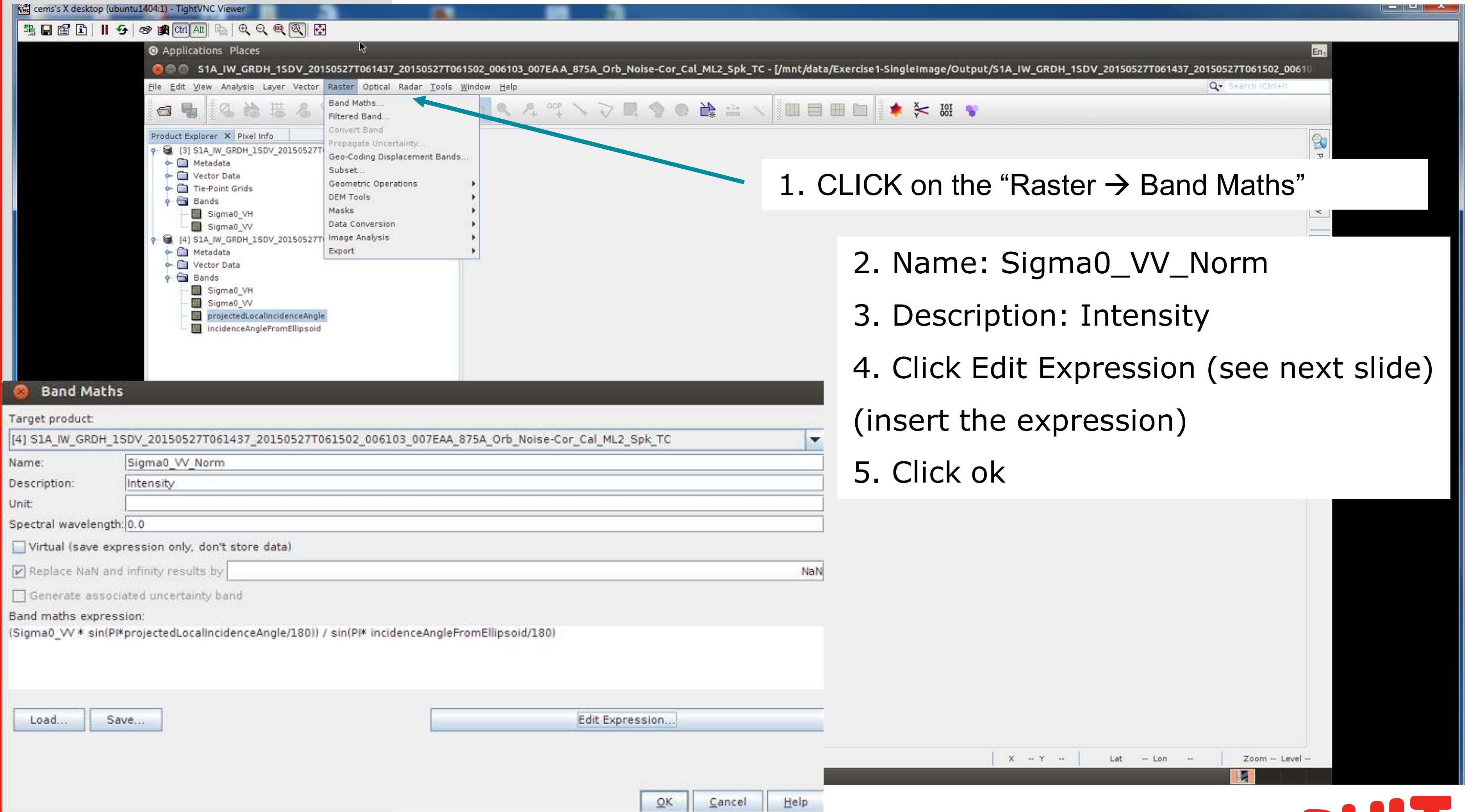
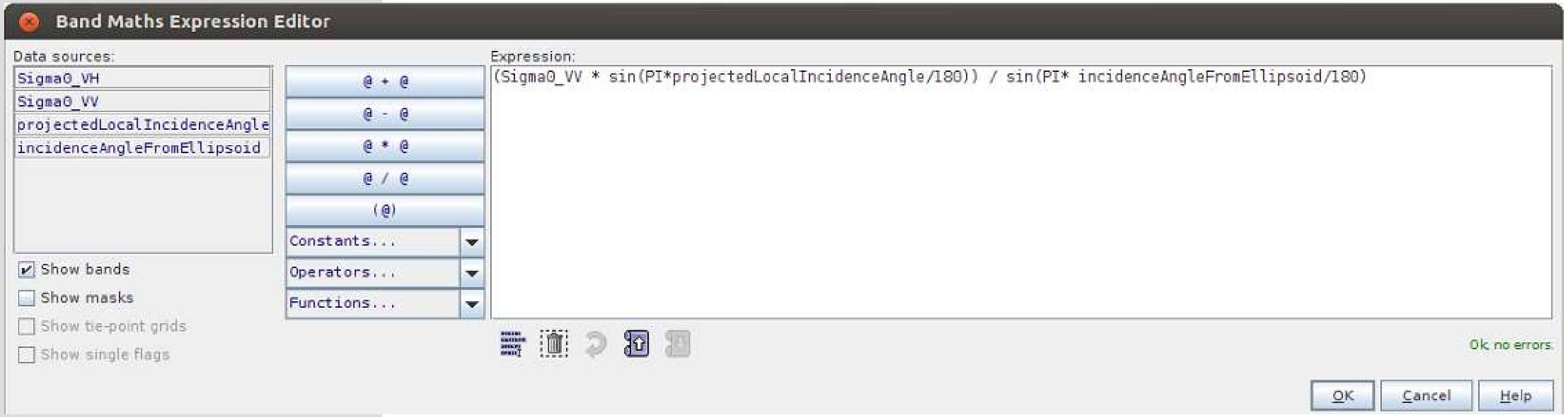
Exercise 1: Step 8 - Slope correction (Kellndorfer) - VV



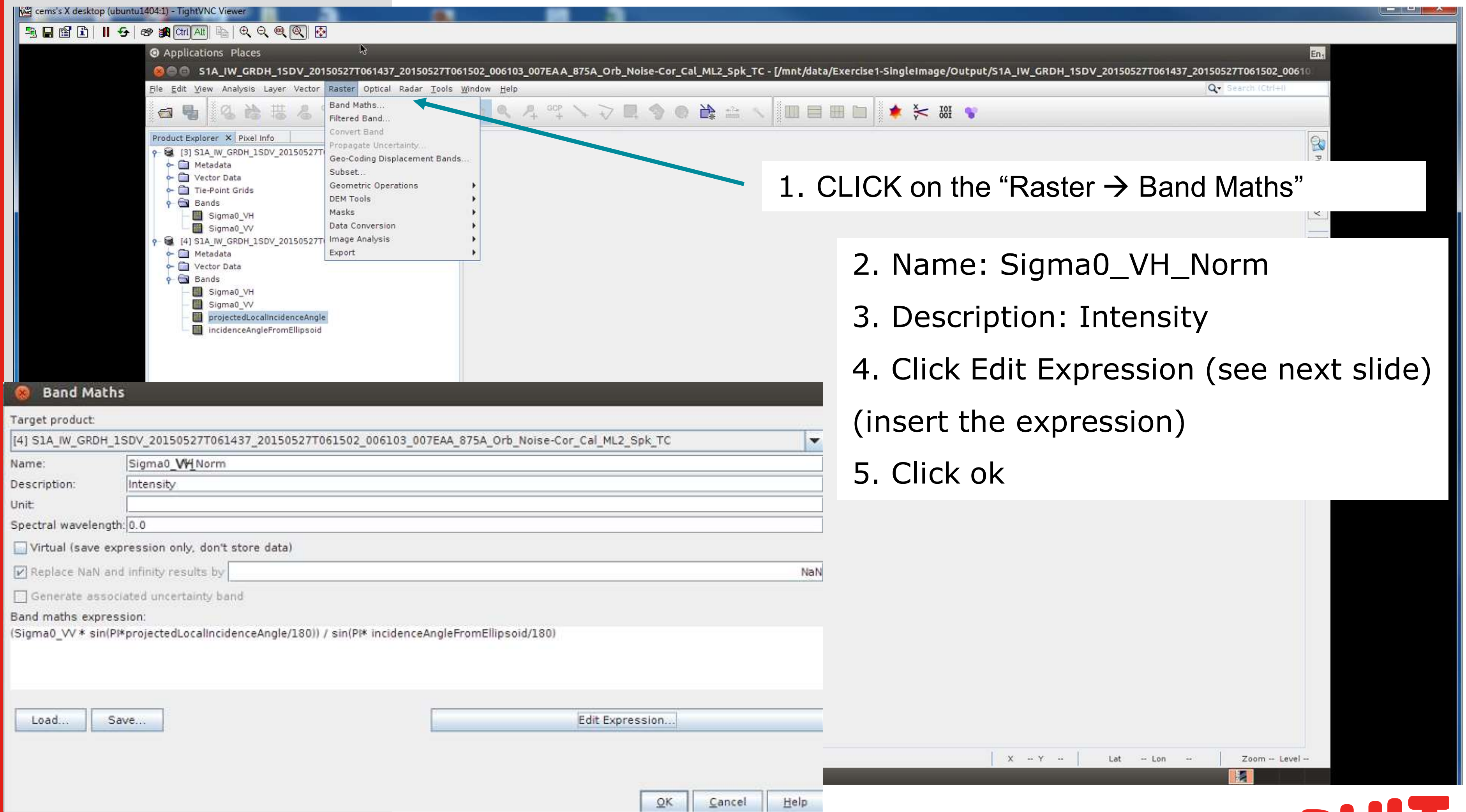
1. CLICK on the "Raster → Band Maths"

2. Name: Sigma0_VV_Norm
3. Description: Intensity
4. Click Edit Expression (see next slide) (insert the expression)
5. Click ok

Exercise 1: Step 8 - Slope correction (Kellndorfer) - VV



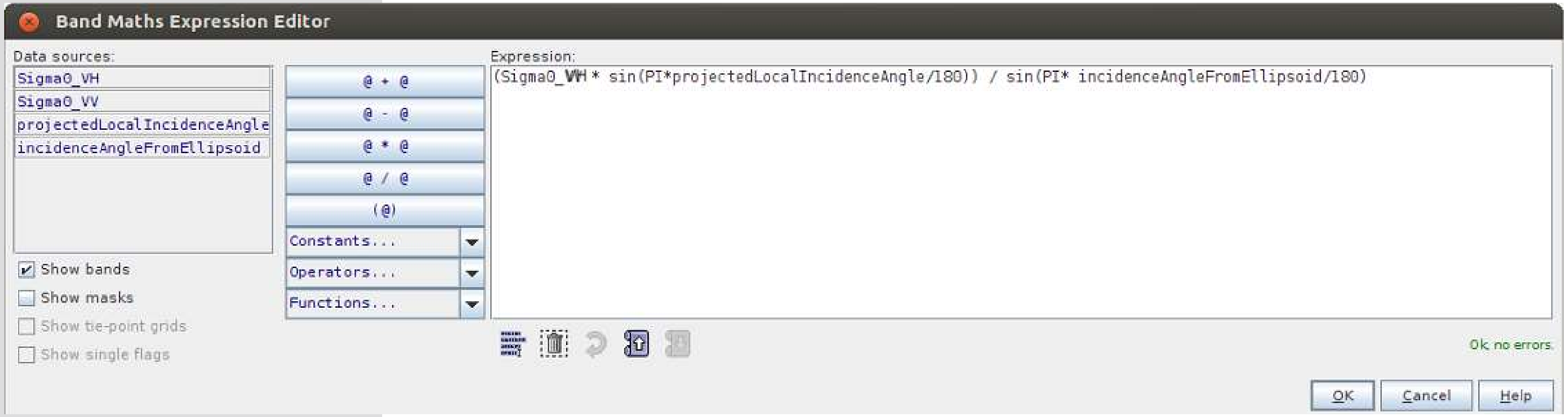
Exercise 1: Step 8 - Slope correction (Kellndorfer) - VH



1. CLICK on the “Raster → Band Maths”

2. Name: Sigma0_VH_Norm
3. Description: Intensity
4. Click Edit Expression (see next slide) (insert the expression)
5. Click ok

Exercise 1: Step 8 - Slope correction (Kellndorfer) - VH



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