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UNIVERSITY

FACULTY OF SCIENCES

DEPARTMENT OF BIOLOGY
RESEARCH GROUP PROTISTOLOGY AND AQUATIC ECOLOGY

Belgian
Earth Observation Day
2023

Remote sensing Adjacency Correction (RAdCor)

Earth Observation processing for high-contrast scenes

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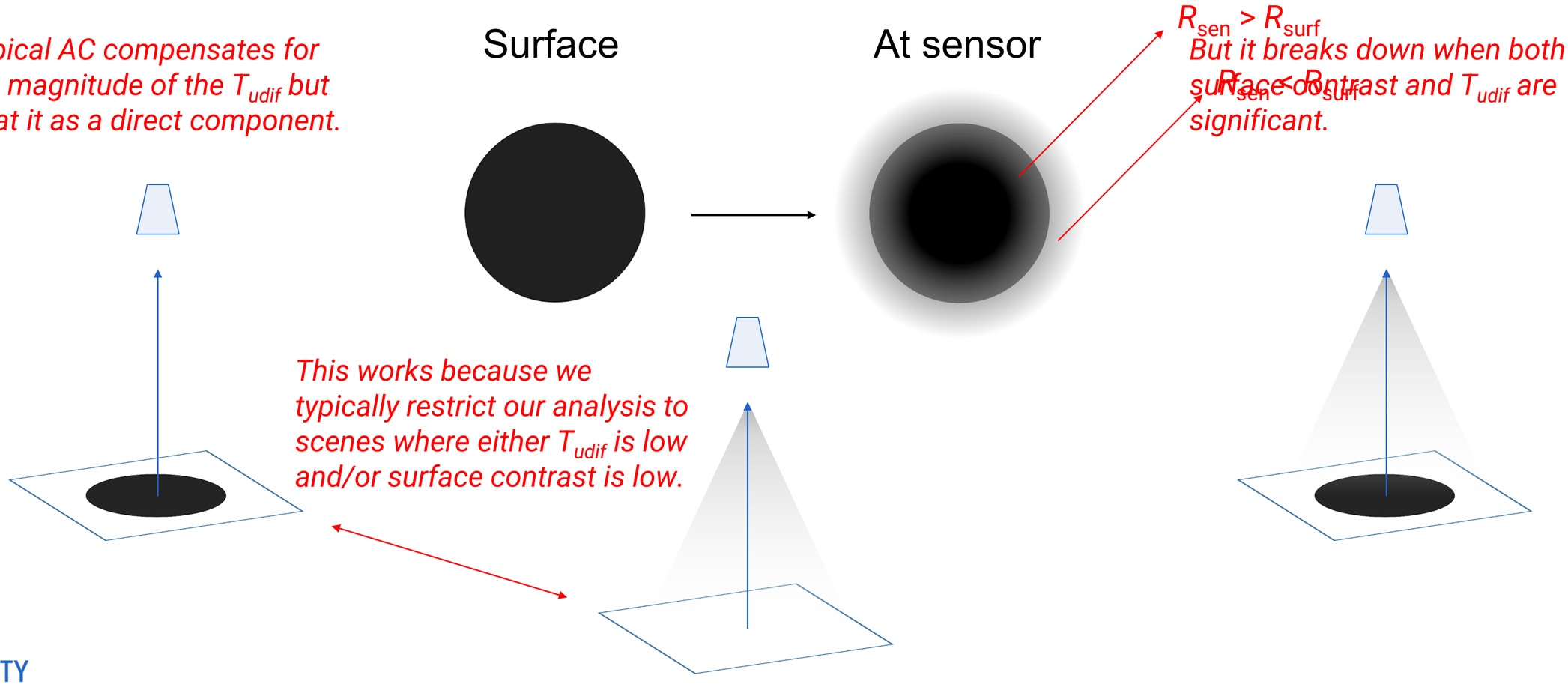
Koen Sabbe
Alexandre Castagna

museum

Quinten Vanhellemont
(**Coordinator**)

THE ADJACENCY PROBLEM

= *surface contrast + atmosphere diffuse transmittance*



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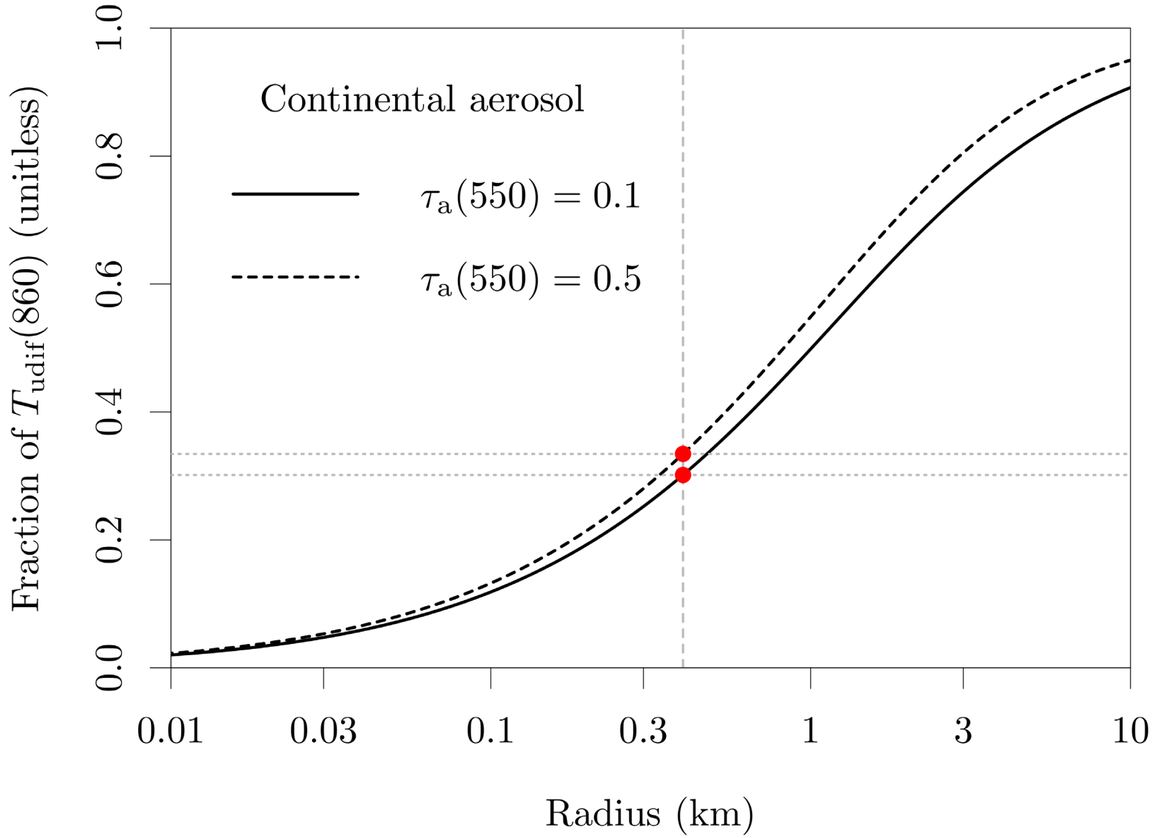
HIGH CONSTRAST SCENES

@PlanetScope, PS1067, 2019-08-26



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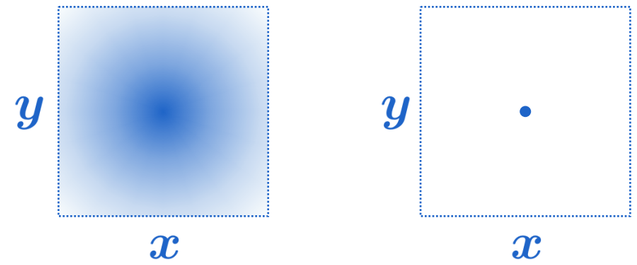
(APPROXIMATE) MEASUREMENT EQUATION

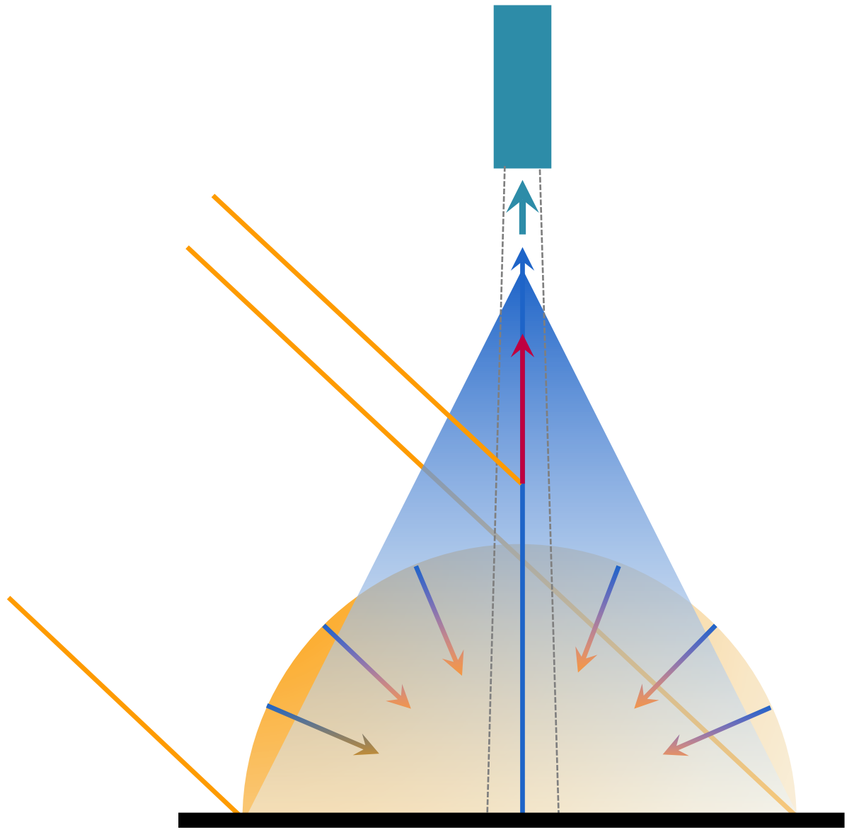
$$\rho_{\mathrm{t}}(x,y) = \left[\rho_{\mathrm{p}} + \rho_{\mathrm{s}}^{*}(x,y)\right] T_{\mathrm{g}}$$

$$\rho_{\mathrm{s}}^{*}(x,y) = \rho_{\mathrm{s}}(x,y) T_{\mathrm{utot}} \frac{T_{\mathrm{dtot}}}{1 - \rho_{\mathrm{s}}(x,y) S}$$

$$\rho_{\mathrm{s}}^{*}(x,y) = \left[\rho_{\mathrm{s}} \circledast \gamma_{\mathrm{utot}}\right](x,y) \frac{T_{\mathrm{dtot}}}{1 - \rho_{\mathrm{e}}(x,y) S}$$

$$\gamma_{\mathrm{utot}} = \gamma_{\mathrm{udif}} + \gamma_{\mathrm{udir}}$$





$$T_{\mathrm{utot}} = \iint dx\, dy \left[\gamma_{\mathrm{udif}} + \gamma_{\mathrm{udir}}\right](x,y)$$

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EFFICIENCY

$$\rho_t(x,y) = \left[\rho_p + \rho_s^*(x,y)\right] T_g$$

$$\rho_s^*(x,y) = [\rho_s \circledast \gamma_{utot}](x,y) \frac{T_{dtot}}{1 - \rho_e(x,y) S}$$

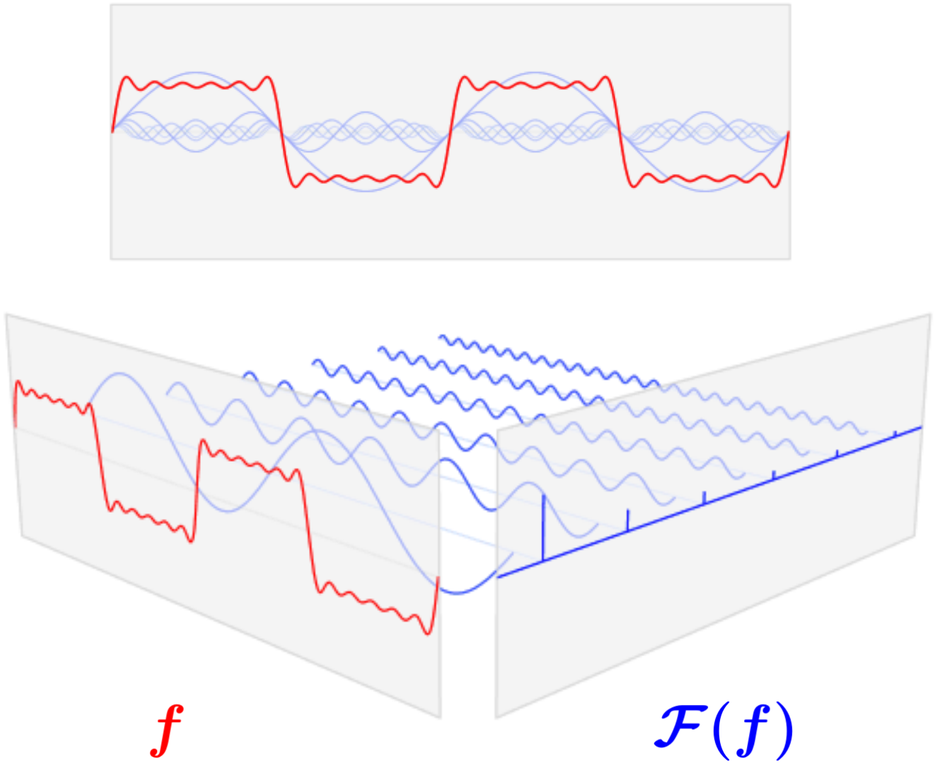
x

$$\rho_s^*(x,y) = [\rho_s \circledast \gamma_{tot}](x,y)$$

$$\mathcal{F}(\rho_s^*) = \mathcal{F}(\rho_s)\mathcal{F}(\gamma_{tot})$$

$$\therefore \rho_s(x,y) = \mathcal{F}^{-1}\left(\frac{\mathcal{F}(\rho_s^*)}{\mathcal{F}(\gamma_{tot})}\right)(x,y)$$

@Lucas V. Barbosa



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EFFICIENCY

$$\rho_{\mathrm{t}}(x,y) = \left[\rho_{\mathrm{p}} + \rho_{\mathrm{s}}^{*}(x,y)\right] T_{\mathrm{g}}$$

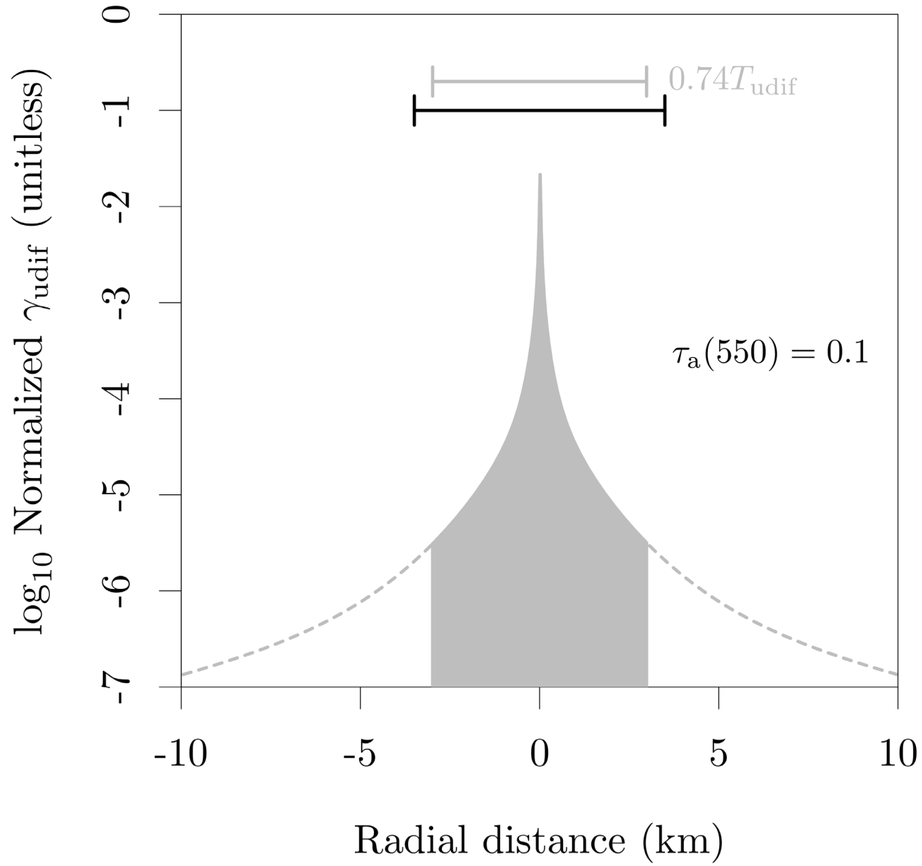
$$\rho_{\mathrm{s}}^{*}(x,y) = \left[\rho_{\mathrm{s}} \circledast \gamma_{\mathrm{utot}}\right](x,y) \frac{T_{\mathrm{dtot}}}{1 - \rho_{\mathrm{e}}(x,y) S}$$

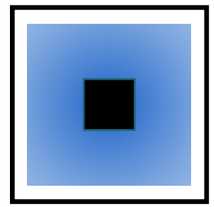
x

$$\rho_{\mathrm{s}}^{*}(x,y) = \left[\rho_{\mathrm{s}} \circledast \gamma_{\mathrm{tot}}\right](x,y)$$

$$\mathcal{F}(\rho_{\mathrm{s}}^{*}) = \mathcal{F}(\rho_{\mathrm{s}}) \mathcal{F}(\gamma_{\mathrm{tot}})$$

$$\therefore \rho_{\mathrm{s}}(x,y) = \mathcal{F}^{-1}\left(\frac{\mathcal{F}(\rho_{\mathrm{s}}^{*})}{\mathcal{F}(\gamma_{\mathrm{tot}})}\right)(x,y)$$





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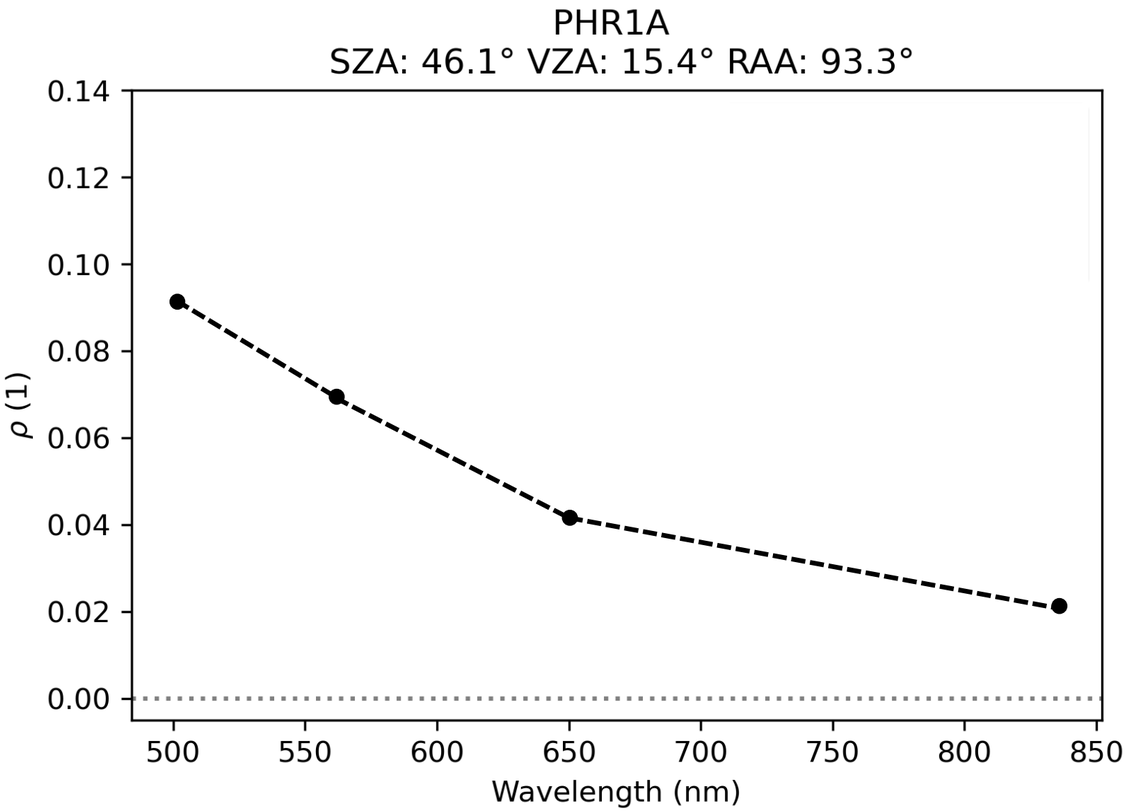
GENERALITY

PHR1A 2014-09-08 11:10:20
ρ_t RGB

Zeebrugge, Pléiades-1A 2014-09-08

~100 km^2
~8x12 km



Estimate $\tau_a(550)$ in each band, select lowest $\tau_a(550)$

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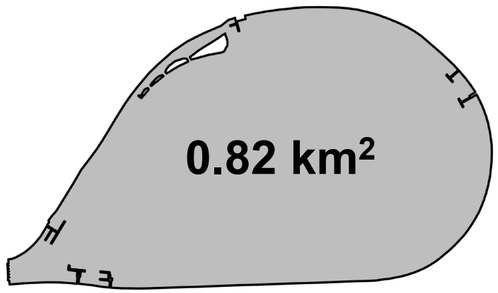
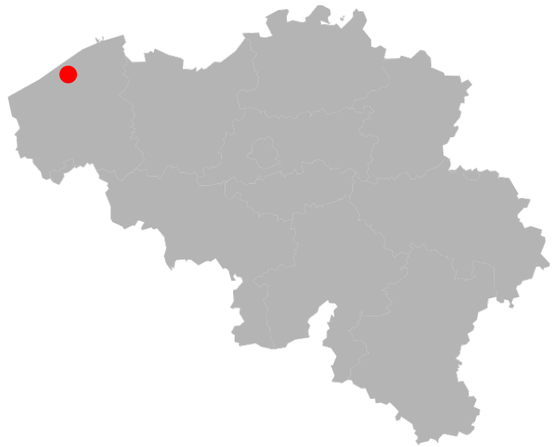
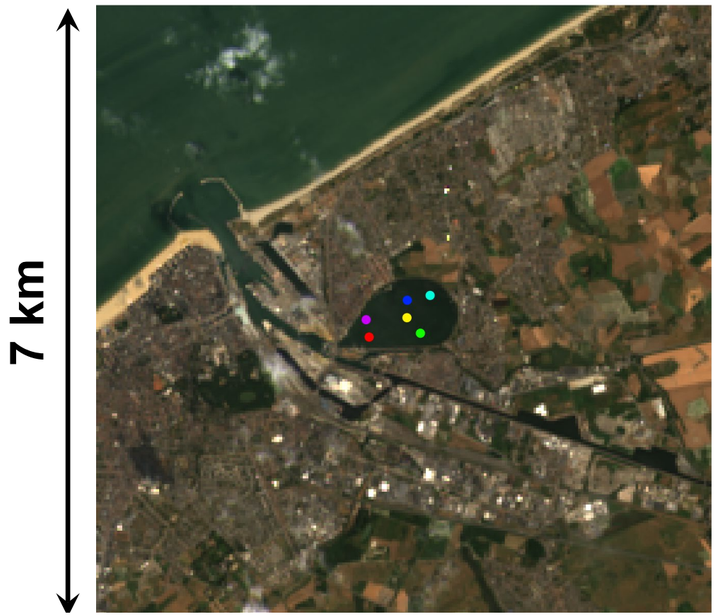
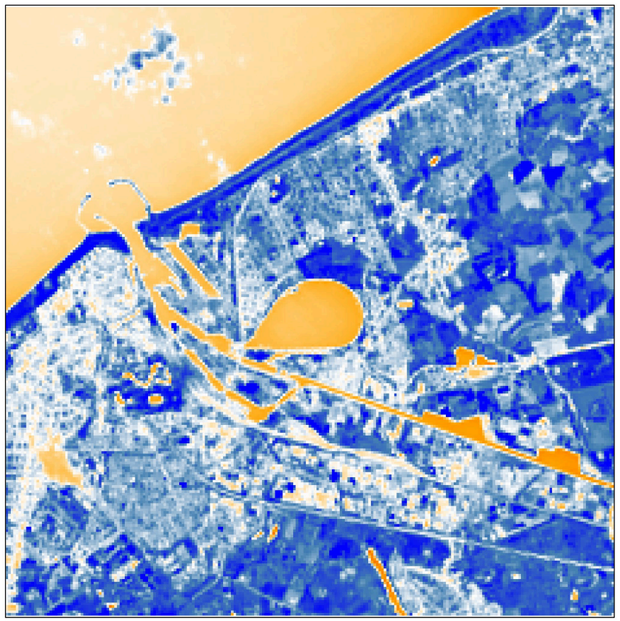
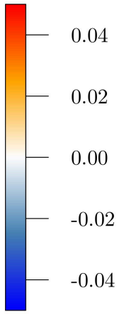
SPUIKOM: OLI/LANDSAT 8 (2018-07-24)

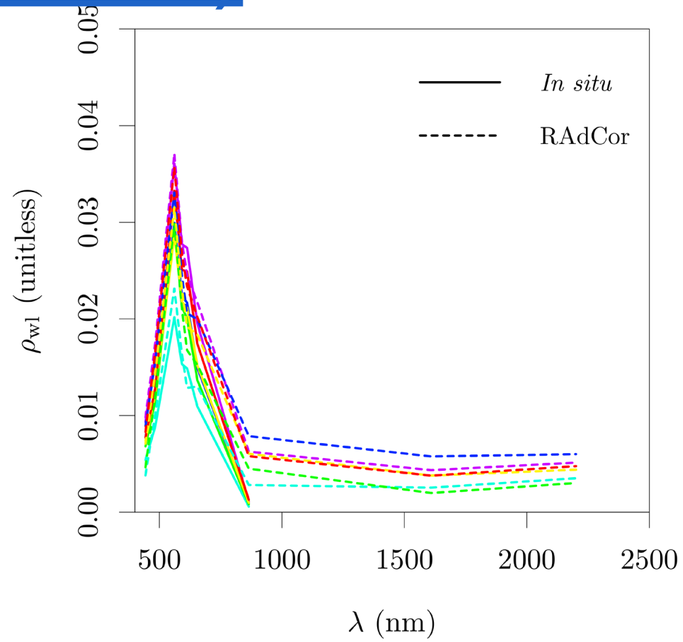


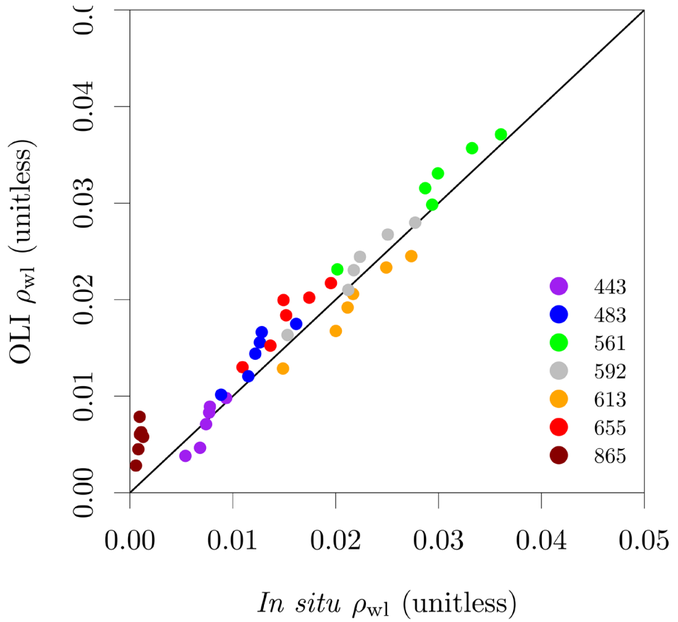








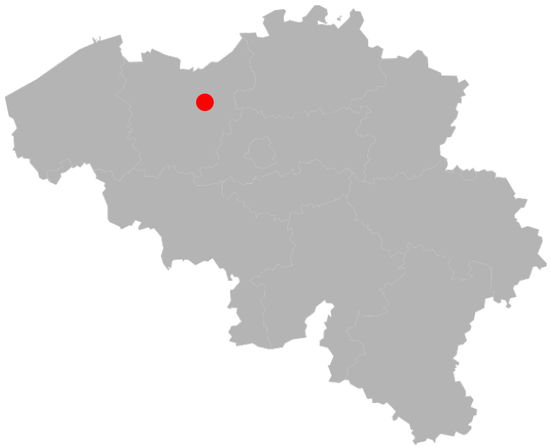




DONKMEER: OLI/LANDSAT 8 (2017-04-09)

0.86 km²

max **140 m**



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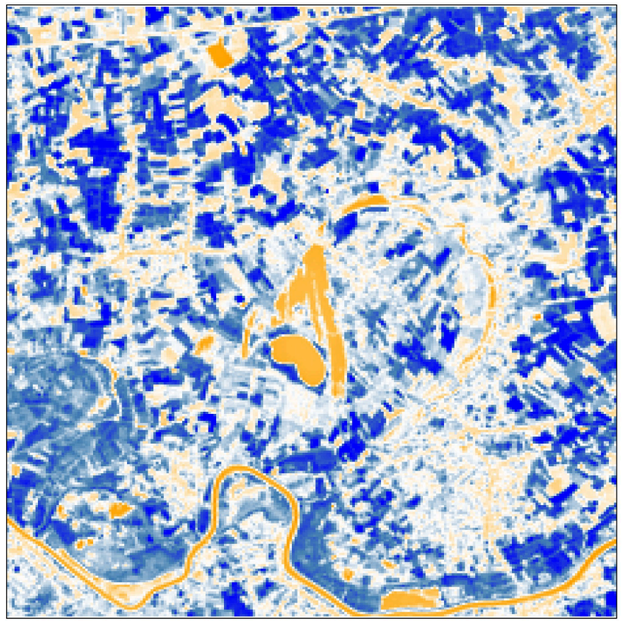
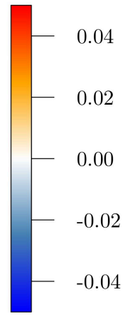
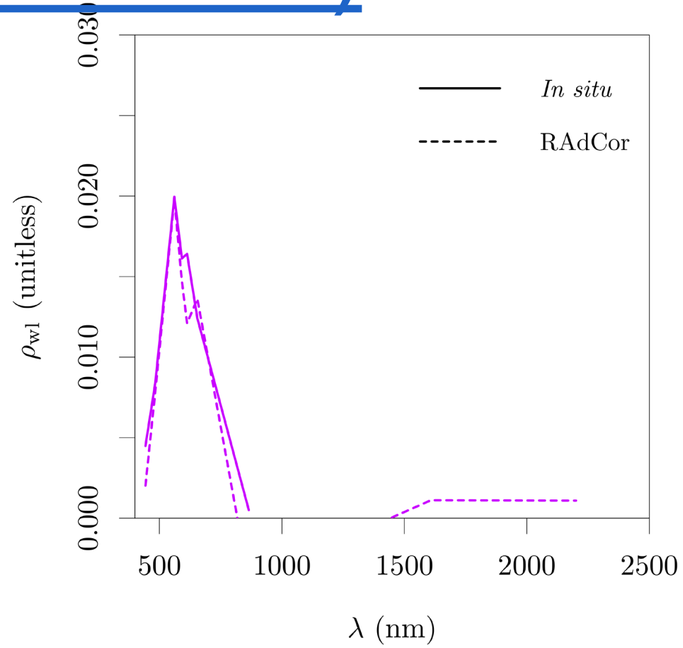
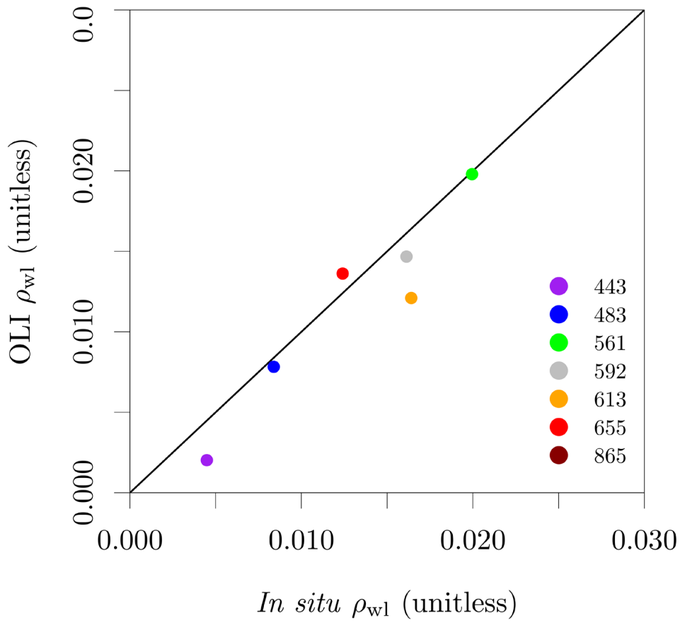
7 km



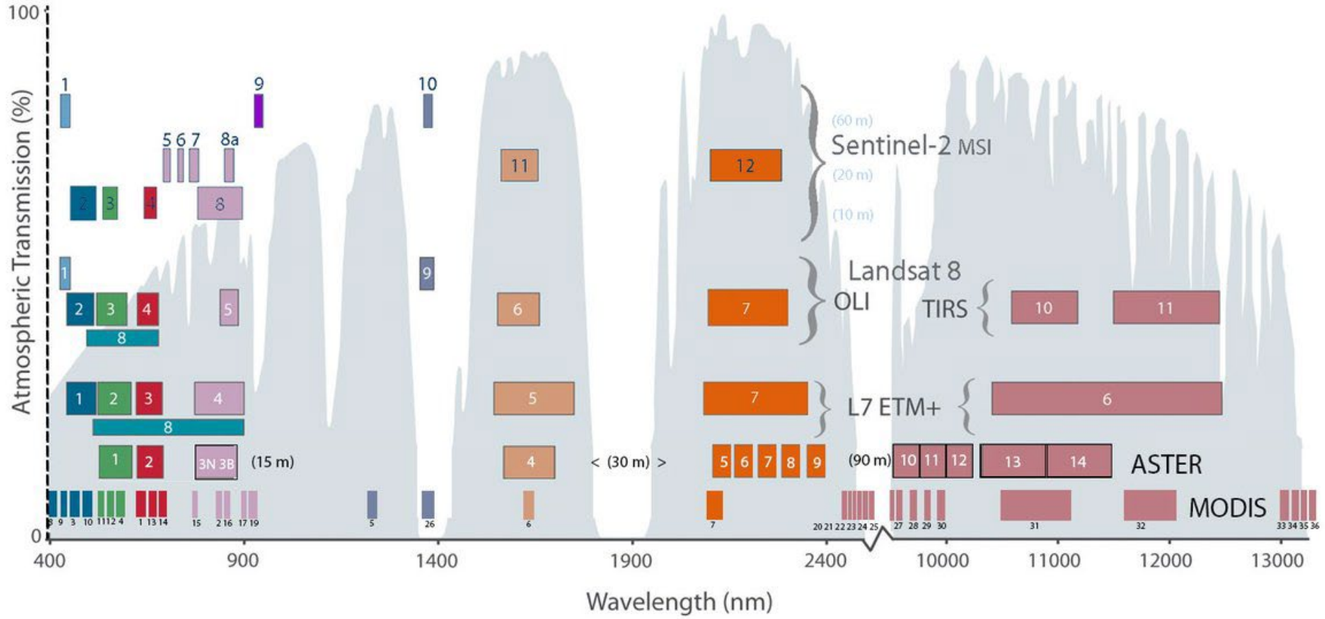




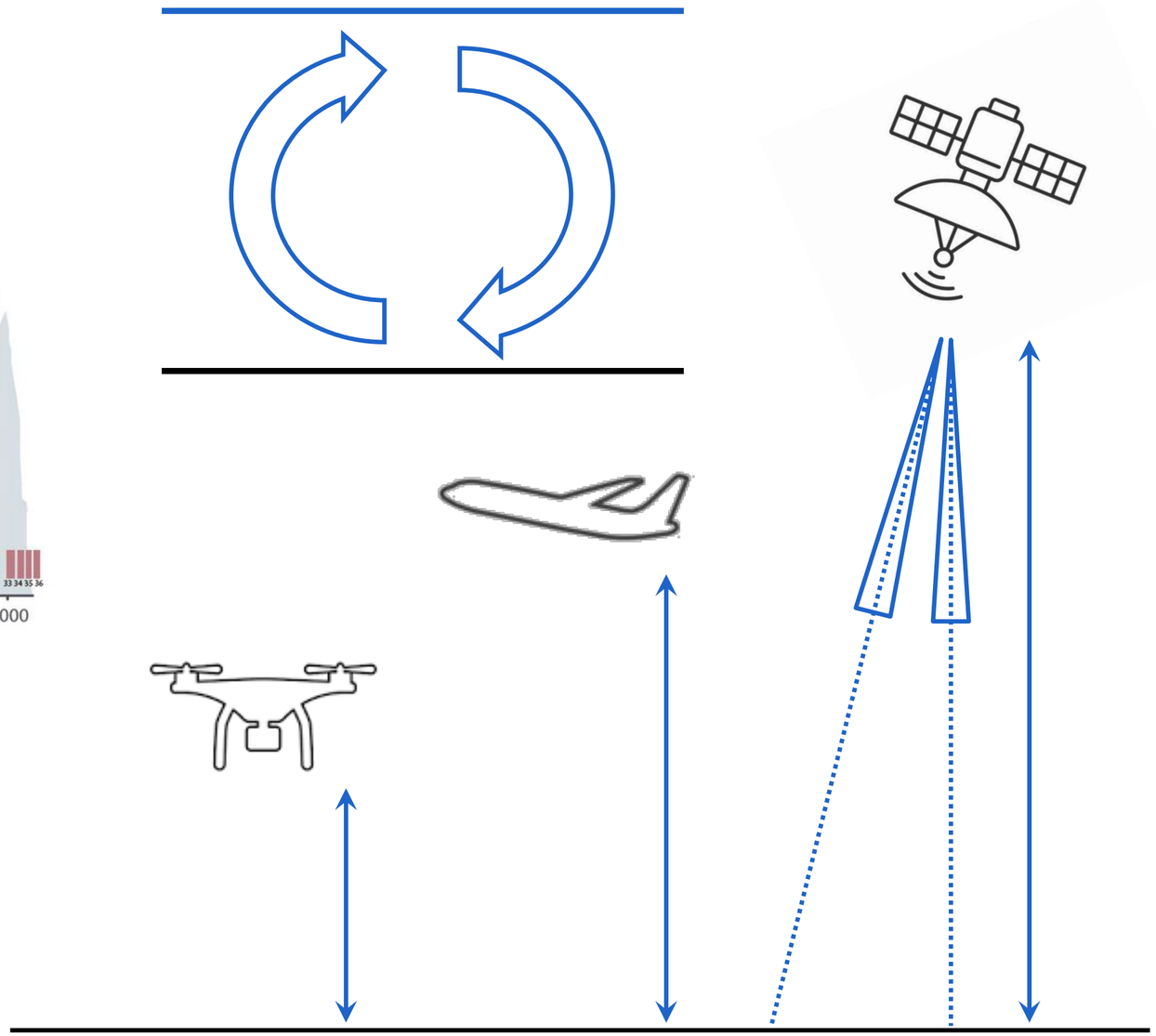


HIGHLIGHTS

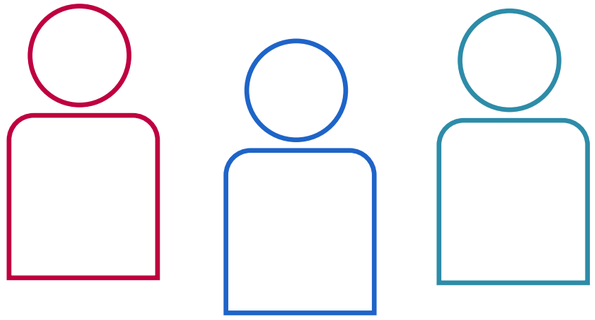
Not an adhoc procedure, better surface and atmosphere estimations



DSF = Different bandset combinations, target independent



APSF = Different heights and observation angles



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Built with end users - Early adopter community

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Research staff

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