Development of a new Solar Radiance-To-Flux Conversion to Improve SW Flux Estimations

–final presentation–

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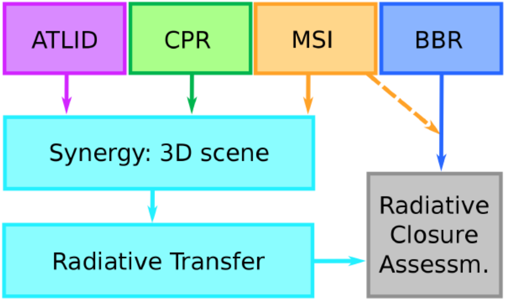
March 10, 2021

Introduction

- EarhtCare's **Radiative closure** successful if $F = F_{RT}$-F_{BBR} within 10 Wm^2



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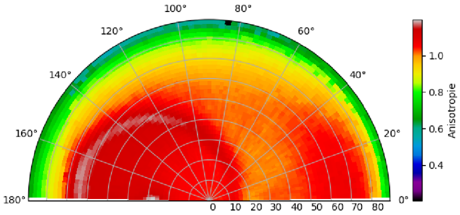

SW radiance angular dependency of an overcast scene with $= 12$

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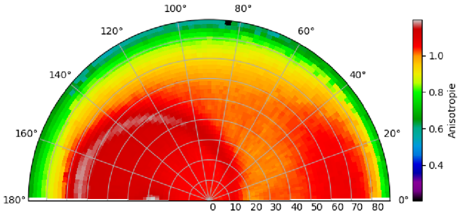

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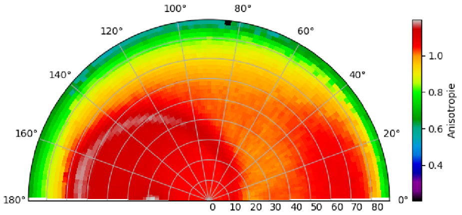

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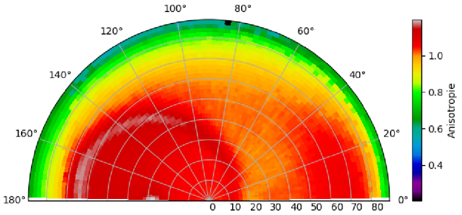

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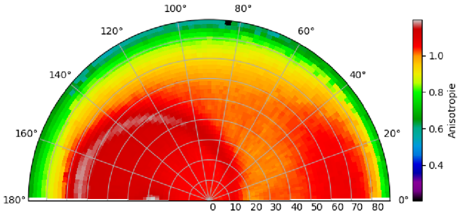
  - **State-of-art** sigmoidal approach is a function of , f and w_{10m}
  - **lack** of important **dependencies** of e.g. **cloud micro-physics**



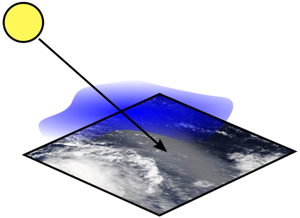
SW radiance angular dependency of an overcast scene with $= 12$

New semi-physical log-linear approach

- Incorporated **additional dependencies** of SW radiance to cloud micro-physics (via R_{eff})

$$\log I(\ _s;\ _v;\ ) \quad \log S_0 + \log \quad 2\ CTWV$$

S_0	= solar constant
	= footprint albedo
$_s;\ _v;$	= sun-observer angles



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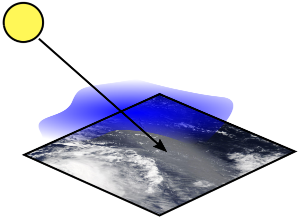

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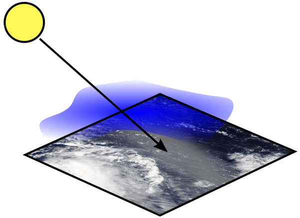

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- Relates quantities **linearly** and more continuously to **measured radiances**
- **Footprint albedo** $(f; w_{10}; \; ; R_{eff})$ is calculated using **two-stream theory**

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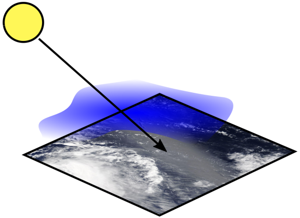
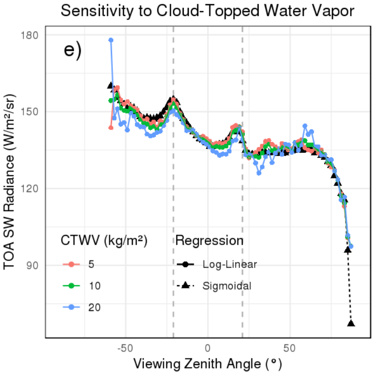
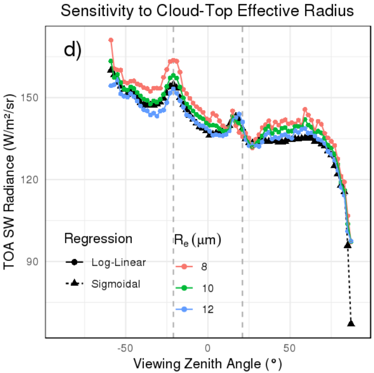


Results





$CTWV$-sensitivity along the PP $_S = 21^{\circ}$, **?**

R_{eff}-sensitivity along the PP $_S = 21^{\circ}$, **?**

Results

- **Instantaneous ux deviations** of up to 25 W/m^2 when applied to CERES-MODIS and GERB-SEVIRI observations of **marine clouds**

Daily flux of log-linear minus operational approach for July 11th 2007 **?**

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- Deviations can propagate to **daily means** (up to $10\ W=m^2$)
- and **monthly means** (up to $5\ W=m^2$)

Daily flux of log-linear minus operational approach for July 11th 2007 **?**

Thank You For Your Attention!