Application of ML in Producing Look Up Tables for RT Models

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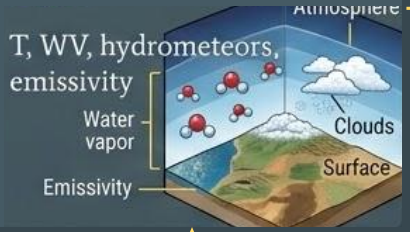
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Radiative Transfer (RT) Models in Satellite Remote Sensing

Simulating radiances for atmospheric and surface retrievals

01

Atmospheric & Surface State



→

02

RT Model

i.e., CRTM

→

03

Simulated TOA Radiance

Brightness temperatures

→

04

Compare to Observed Tb

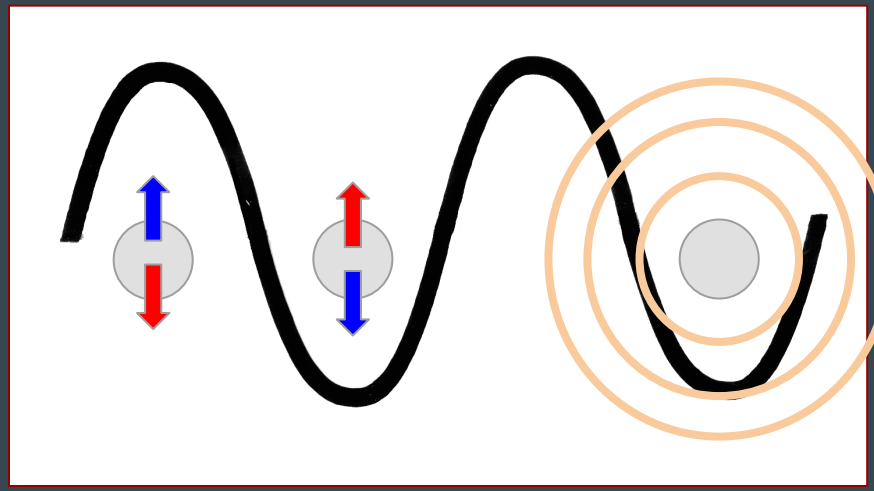
Satellite measurements

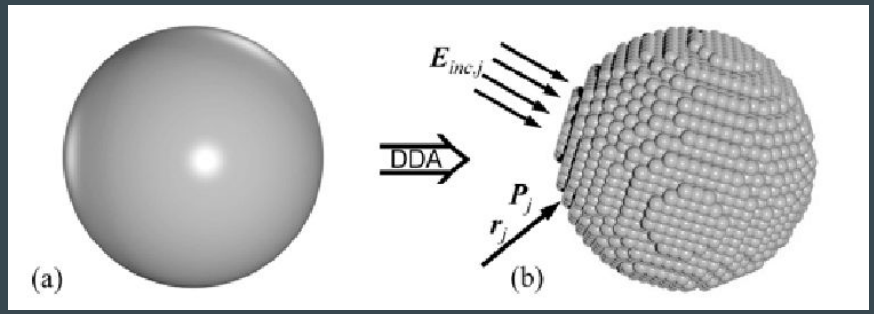
An accurate representation of how particles absorb and scatter EM waves is essential for precisely retrieving atmospheric states.

EM Scattering

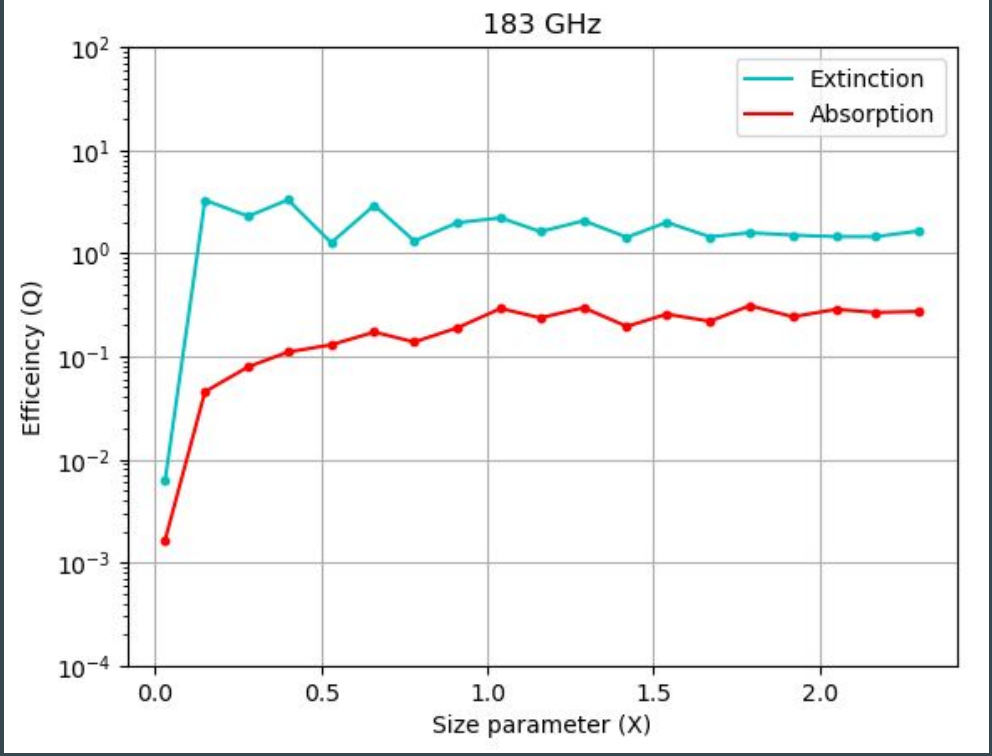
- To model larger particles (e.g. ice, rain), we represent them as arrays of small dipoles using Discrete Dipole Approximation (DDA).

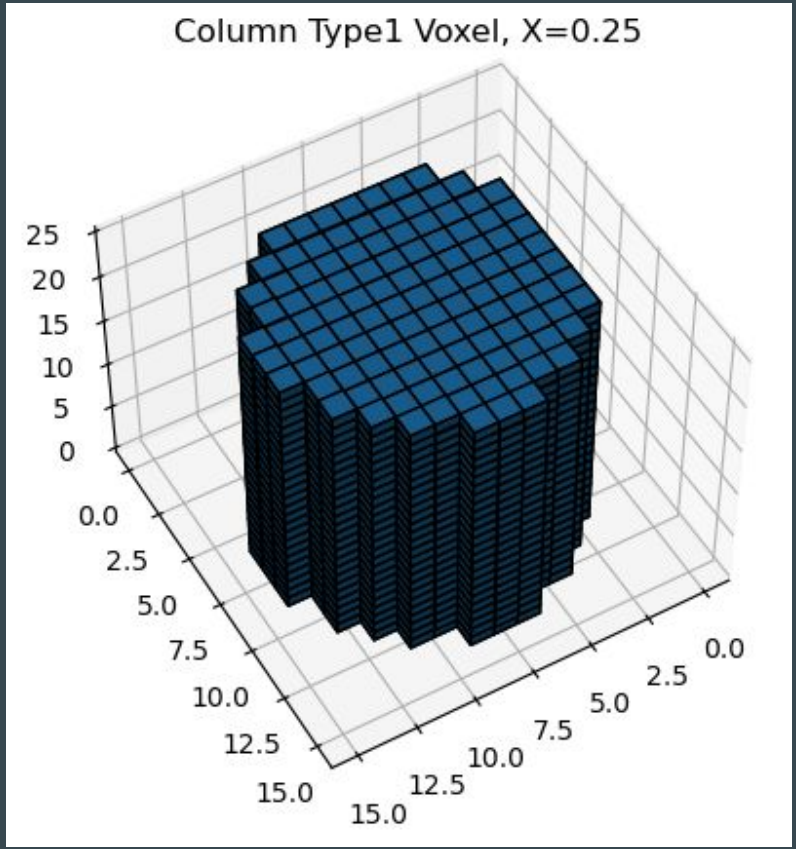
- These calculation are resource heavy, we plan to use AI to make DDA calculations faster so we can model all combinations of particles easily.





Results


183 GHz
Extinction
Absorption
Efficeincy (Q)
Size parameter (X)
10^{2}
10^{1}
10^{0}
10^{-1}
10^{-2}
10^{-3}
10^{-4}
0.0
0.5
1.0
1.5
2.0


Column Type1 Voxel, X=0.25
25
20
15
10
5
0
0.0
2.5
5.0
7.5
10.0
12.5
15.0
0.0
2.5
5.0
7.5
10.0
12.5
15.0