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Supplement of

A polarimetric scattering database for non-spherical ice particles at microwave wavelengths

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File formats of the NetCDF files that compose the database.

Crystal Species	File Name Structure	File Size	No. of Files per Frequency
Aggregates	psuaydinetal_aggregate_particle-index_type_size_realization_frequency_scattering-geometry_GMM	341M	660
Branched Planar Crystals	psuaydinetal_branchedplanar_particle-index_thicknessRatio_size_realization_frequency_scatterin g-geometry_GMM/DDA	8.1M	405
Plates	psuaydinetal_plate_particle-index_thicknessRatio_size_realization_frequency_scatterin g-geometry_GMM/DDA	8.1M	44
Columns	psuaydinetal_column_particle-index_thicknessRatio_size_realization_frequency_scatterin g-geometry_GMM/DDA	140M	30
Conical Graupel	psuaydinetal_graupel_particle-index_density_coneAngle_size_realization_frequency_scattering-geometry_DDA	7.7M	640

Table S1a: Amplitude scattering matrices file name structure. The number of files for each frequency corresponds to the number of ice particles in each crystal species in Table 2. Note that there is one amplitude scattering matrices file per particle and frequency.

DDA_dipole_location			GMM_sphere_location&size			
x	y	z	x	y	z	r

Table S1b: Geometry file with name psuaydinetal_geometry_species_index_GMM/DDA. Note that there is one geometry file per particle.

psuaydinetal_aggregates_scattering-geometry_GMM
psuaydinetal_branchedplanars_scattering-geometry_GMM/DDA
psuaydinetal_plates_scattering-geometry_GMM/DDA
psuaydinetal_columns_scattering-geometry_GMM/DDA
psuaydinetal_graupel_scattering-geometry_DDA

Table S1c: Reduced-size file names.

Dimension Name	Length					Files Applied
	agg.	den.	plate	column	graupel	
incident_polar_angle	19	10	10	10	19	both
incident_azimuth_angle	18	2	2	10	1	
scattering_polar_angle	181					amplitude scattering matrices files only
scattering_azimuth_angle	72					
particle_index	unlimited					reduced-size files only
wavelength	4					

Table S2: Dimension names for the NetCDF files containing the amplitude scattering matrices and the often used geophysical variables.

Coordinate Variables	Dimensions	Units	Range					
				agg.	den.	plate	column	graupel
incident_polar_angle (θ_p^{inc})	incident_polar_angle	degrees	min	0	0	0	0	0
			max	180	90	90	90	180
			inc.	10	10	10	10	10
incident_azimuth_angle (ϕ_p^{inc})	incident_azimuth_angle	degrees	min	0	0	0	0	0
			max	340	30	30	90	0
			inc.	20	30	30	10	0
scattering_polar_angle (θ^{sca})	scattering_polar_angle	degrees	min	0				
			max	180				
			inc.	1				
scattering_azimuth_angle (ϕ^{sca})	scattering_azimuth_angle	degrees	min	0				
			max	355				
			inc.	5				

Table S3a: Coordinate variable information for the NetCDF files containing the amplitude scattering matrices with one file for each ice particle and wavelength.

Geophysical Variables	Dimensions	Units
S1_real, S1_imag S2_real, S2_imag S3_real, S3_imag S4_real, S4_imag	incident_polar_angle incident_azimuth_angle scattering_polar_angle scattering_azimuth_angle	dimensionless

Table S3b: Geophysical variable name and unit information for the NetCDF files containing the amplitude scattering matrices.

Coordinate Variables	Dimensions	Units	Range					
			agg.	den.	plate	column	graupel	
particle_index	particle_index	dimensionless	unlimited					
wavelength (λ)	wavelength	mm	3.19, 8.4, 22.4, 31.86					
incident_polar_angle (θ_P^{inc})	incident_polar_angle	degrees	min	0	0	0	0	0
			max	180	90	90	90	180
			inc.	10	10	10	10	10
incident_azimuth_angle (ϕ_P^{inc})	incident_azimuth_angle	degrees	min	0	0	0	0	0
			max	340	30	30	90	0
			inc.	20	30	30	10	0

Table S4a: Coordinate variable information for the reduced-size NetCDF files containing the often used geophysical parameters.

Geophysical Variables	Dimensions	Units
type (aggregates only)	particle_index	dimensionless
thickness_ratio (branched planar crystals/plates/columns only)		dimensionless
cone_angle (conical graupel only)		degrees
density (conical graupel only)		mg mm ⁻³
equal_volume_sphere_radius (conical graupel only)		mm
mass		mg
maximum_dimension		mm
thickness		mm
projected_maximum_dimension		particle_index incident_polar_angle incident_azimuth_angle
projected_thickness	mm	
projected_area	mm ²	
single_scattering_albedo	particle_index wavelength incident_polar_angle incident_azimuth_angle	dimensionless
asymmetry_parameter		dimensionless
sigma_backward_hh, sigma_backward_vv, sigma_backward_hv		mm ² sr ⁻¹
sigma_ext, sigma_ext_h, sigma_ext_v		mm ²
sigma_abs, sigma_abs_h, sigma_abs_v		mm ²
sigma_sca, sigma_sca_h, sigma_sca_v		mm ²
Shh_backward_real, Shh_backward_imag Shv_backward_real, Shv_backward_imag Svh_backward_real, Svh_backward_imag,		mm

Svv_backward_real, Svv_backward_imag		
Shh_forward_real, Shh_forward_imag		mm
Shv_forward_real, Shv_forward_imag		
Svh_forward_real, Svh_forward_imag		
Svv_forward_real, Svv_forward_imag		

Table S4b: Geophysical variable name and unit information for the reduced-size NetCDF files containing the often used geophysical parameters. Note that there is one reduced-size file per ice particle species for a total of 8 (4 GMM + 4 DDA) files.