

Plan for the Next Version of OpenSSP

More, Larger, and Better

Motivation – Why are we doing this?

- Single-scattering property is the most fundamental quantity for particulate retrievals.
 - Wrong assumptions leads to large uncertainties.
- Single-scattering properties strongly depend on particle morphology.
 - Using particles with realistic shapes reduces uncertainty.
- A radar or radiometer measurement “sees” a large volume.
 - Scattering properties (and particle shapes) of individual particles only matter to a certain degree.
 - It is the collective behavior (i.e. PSD integrated) of all the particles in the volume that matters to retrievals.
 - But, without the “correct” individuals, it is impossible to have the correct ensemble responses. (If there is, it is only by coincidence.)
- The purpose of all our painstaking effort in this endeavor is to establish a solid foundation in order to find what really matters for ensemble responses and to identify **characterizing parameters**, such as D_m , μ , Λ , etc in liquid hydrometeor retrievals.

Outline

Part I

- Brief description of OpenSSP DB
- Web interface to current OpenSSP DB

Part II

- Short-term plan for OpenSSP DB
- Beyond short-term plans

OpenSSP DB

- Brief description
- Web interface

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6. George Mason University

OpenSSP DB

– Open Single-Scattering Properties database

Currently for solid hydrometeors only.

- 20 pristine types
 - Growths simulated using the *Snowfake* approach of Gravner and Griffeath (2009)
 - Avoided using “habit” because “habit” may change during growth.
- 9 aggregate families
 - An aggregate currently is made of components of the same pristine type

Web Interface

The screenshot shows a web browser window with the URL <https://storm.pps.eosdis.nasa.gov/storm/OpenSSP.jsp>. The page header includes the NASA logo and the text "National Aeronautics and Space Administration". A navigation bar contains links for HOME, DATA ACCESS, TOOLS, PRODUCT INFORMATION, and REGISTRATION. The main content area is titled "OpenSSP Query Builder" and features a registration email field with the value "kwo-sen.kuo@nasa.gov" and a "Submit" button. Below this, there is a "Credits" section listing the Lead Scientist (Kwo-Sen Kuo), Contributing Scientists (Ziad S. Haddad, William S. Olson, Simone Tanelli), Web Developer (Matt Lammers), and Database Scientist (Noppasin Niamsuwan). A "SECURITY" section follows, providing a disclaimer about links to external websites. On the left side, there is a "Need Help?" section with links to the "STORM User Guide" and "Help Desk", and a "News" section with a dated announcement from 9/19/2016 regarding granule processing limits.

Registration Email: Don't have a registered email? [Register here!](#)

Credits
Lead Scientist: [Kwo-Sen Kuo](#)
Contributing Scientists: [Ziad S. Haddad](#), [William S. Olson](#), [Simone Tanelli](#)
Web Developer: [Matt Lammers](#)
Database Scientist: [Noppasin Niamsuwan](#)

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Need Help?

- [STORM User Guide](#)
- [Help Desk](#)

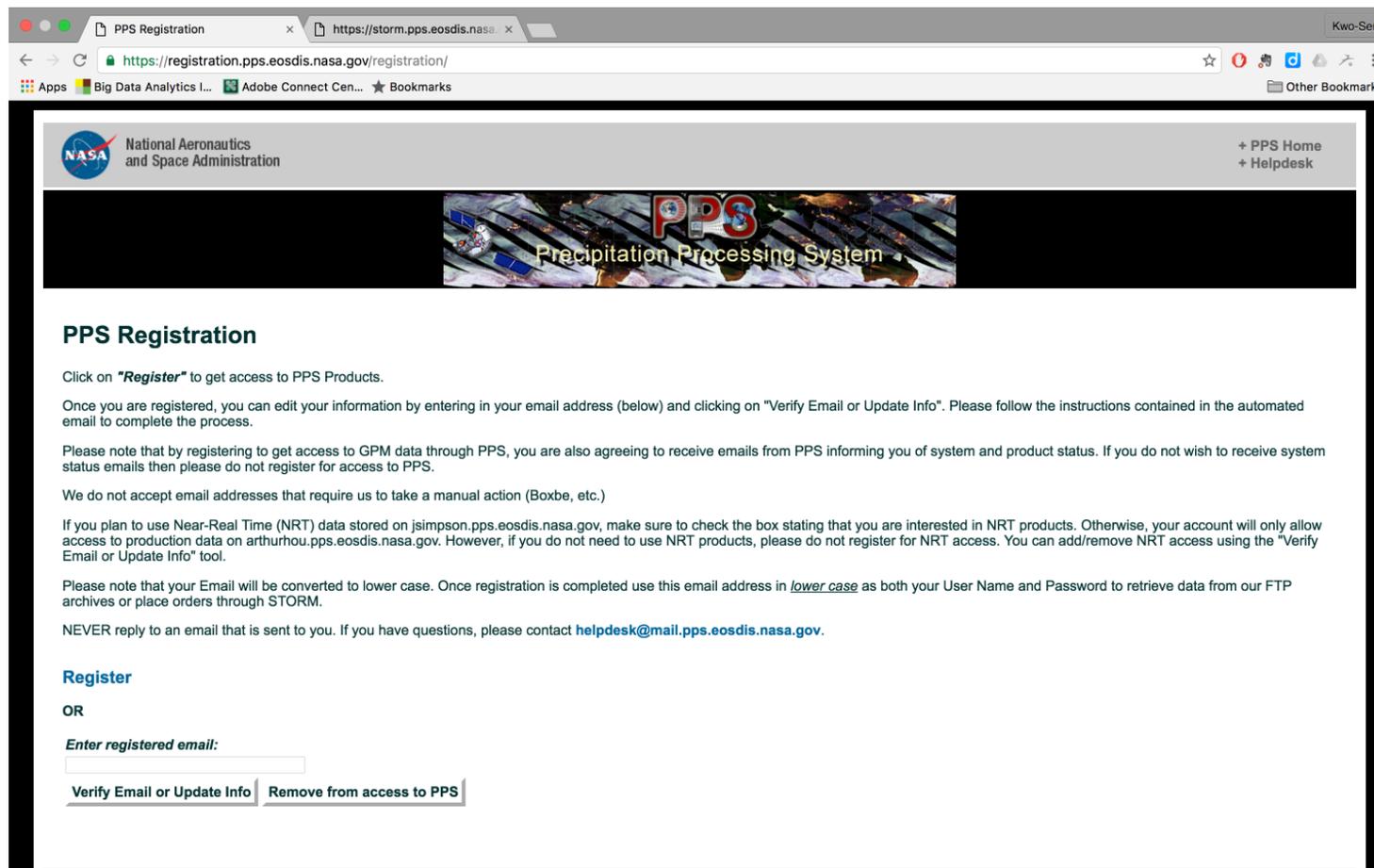
News

9/19/2016 - STORM orders are now no longer limited to 2000 granules per request. While only 2000 will display in the list, if you check the Select All box on the list, the order will process with the full number of granules in the query.

URLs

- <https://storm.pps.eosdis.nasa.gov/storm/OpenSSP.jsp>
- <http://tinyurl.com/OpenSSP>

Easy Email Address Registration



The screenshot shows a web browser window with the URL <https://storm.pps.eosdis.nasa.gov/registration/>. The page header includes the NASA logo and the text "National Aeronautics and Space Administration". In the top right corner, there are links for "+ PPS Home" and "+ Helpdesk". Below the header is a banner image with the text "PPS Precipitation Processing System".

PPS Registration

Click on **"Register"** to get access to PPS Products.

Once you are registered, you can edit your information by entering in your email address (below) and clicking on "Verify Email or Update Info". Please follow the instructions contained in the automated email to complete the process.

Please note that by registering to get access to GPM data through PPS, you are also agreeing to receive emails from PPS informing you of system and product status. If you do not wish to receive system status emails then please do not register for access to PPS.

We do not accept email addresses that require us to take a manual action (Boxbe, etc.)

If you plan to use Near-Real Time (NRT) data stored on jsimpson.pps.eosdis.nasa.gov, make sure to check the box stating that you are interested in NRT products. Otherwise, your account will only allow access to production data on arthurhou.pps.eosdis.nasa.gov. However, if you do not need to use NRT products, please do not register for NRT access. You can add/remove NRT access using the "Verify Email or Update Info" tool.

Please note that your Email will be converted to lower case. Once registration is completed use this email address in lower case as both your User Name and Password to retrieve data from our FTP archives or place orders through STORM.

NEVER reply to an email that is sent to you. If you have questions, please contact helpdesk@mail.pps.eosdis.nasa.gov.

Register

OR

Enter registered email:

[Verify Email or Update Info](#) [Remove from access to PPS](#)

Pristine Tab



National Aeronautics
and Space Administration

+ PPS Contacts
+ Related Links

OpenSSP Query Builder

Session ID (Change to Whatever You Like) 2016-10-21T17:21:29.220Z/kwo-sen.1

Pristine
Aggregate
Modeled PSD
Observed PSD

Type ⌵

 p-04	 p-08	 p-09	 p-10	 p-13
 p-14	 p-16	 p-17	 p-19	 p-20
 p-29	 p-31	 p-39	 p-40	 p-41
 p-42	 p-43	 p-44	 p-45	 p-46

Sizes [um] ⌵

Selected ⌵

Sizes [um]

Frequencies [GHz]

Frequencies [GHz] ⌵

Select All

- 3.00
- 5.00
- 10.66
- 13.61
- 18.71
- 23.82
- 35.53
- 89.06
- 94.07
- 150.10
- 165.62
- 176.42
- 180.43
- 186.43
- 190.43

Submit API Query

Aggregate Tab

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OpenSSP Query Builder

Session ID (Change to Whatever You Like)

Pristine **Aggregate** Modeled PSD Observed PSD

Family	Aggregate Examples	Sizes [um]	Selected	Frequencies [GHz]
 p-13			<i>Sizes [um]</i> <i>Frequencies [GHz]</i>	<input type="checkbox"/> Select All
 p-14				<input type="checkbox"/> 3.00
 p-04				<input type="checkbox"/> 5.00
 p-16				<input type="checkbox"/> 10.66
 p-29				<input type="checkbox"/> 13.61
 p-19				<input type="checkbox"/> 18.71
 p-46				<input type="checkbox"/> 23.82
 p-44				<input type="checkbox"/> 35.53
 p-43				<input type="checkbox"/> 89.06
				<input type="checkbox"/> 94.07
				<input type="checkbox"/> 150.10
				<input type="checkbox"/> 165.62
				<input type="checkbox"/> 176.42
				<input type="checkbox"/> 180.43
				<input type="checkbox"/> 186.43
				<input type="checkbox"/> 190.43

Submit API Query

Selecting an Aggregate Family



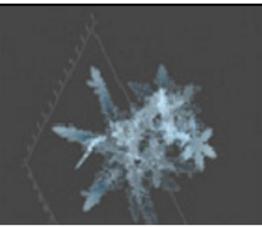
National Aeronautics
and Space Administration

+ PPS Contacts
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OpenSSP Query Builder

Session ID (Change to Whatever You Like) 2016-10-21T17:21:29.220Z/kwo-sen.1

Pristine
Aggregate
Modeled PSD
Observed PSD

Family ?	Aggregate Examples ?	Sizes [um] ?	Selected ?									
<table border="1" style="width: 100%; border-collapse: collapse; text-align: center;"> <tr> <td> p-13</td> <td style="border: 2px solid red;"> p-14</td> <td> p-04</td> </tr> <tr> <td> p-16</td> <td> p-29</td> <td> p-19</td> </tr> <tr> <td> p-46</td> <td> p-44</td> <td> p-43</td> </tr> </table>	 p-13	 p-14	 p-04	 p-16	 p-29	 p-19	 p-46	 p-44	 p-43	<div style="text-align: center; margin-bottom: 10px;">  </div> <div style="text-align: center;">  </div>	<input type="checkbox"/> Select All <input type="checkbox"/> 171.3032 <input type="checkbox"/> 173.7507 <input type="checkbox"/> 193.2091 <input type="checkbox"/> 195.1412 <input type="checkbox"/> 197.0361 <p style="text-align: center;">--200</p> <input type="checkbox"/> 204.2731 <input type="checkbox"/> 207.7069 <input type="checkbox"/> 214.2530 <input type="checkbox"/> 215.8286 <input type="checkbox"/> 220.4220 <input type="checkbox"/> 221.9113 <input type="checkbox"/> 226.2637 <input type="checkbox"/> 227.6779 <input type="checkbox"/> 229.0748 <input type="checkbox"/> 231.8184 <input type="checkbox"/> 235.8160 <input type="checkbox"/> 239.6826 <input type="checkbox"/> 240.9441 <input type="checkbox"/> 242.1926 <input type="checkbox"/> 243.4783	<input type="checkbox"/> Select All <p><i>Sizes [um]</i></p> <p><i>Frequencies [GHz]</i></p> <input type="checkbox"/> 3.00 <input type="checkbox"/> 5.00 <input type="checkbox"/> 10.66 <input type="checkbox"/> 13.61 <input type="checkbox"/> 18.71 <input type="checkbox"/> 23.82 <input type="checkbox"/> 35.53 <input type="checkbox"/> 89.06 <input type="checkbox"/> 94.07 <input type="checkbox"/> 150.10 <input type="checkbox"/> 165.62 <input type="checkbox"/> 176.42 <input type="checkbox"/> 180.43 <input type="checkbox"/> 186.43 <input type="checkbox"/> 190.43
 p-13	 p-14	 p-04										
 p-16	 p-29	 p-19										
 p-46	 p-44	 p-43										

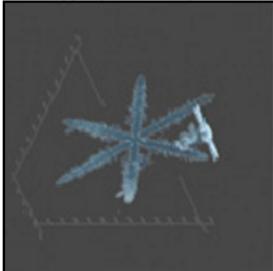
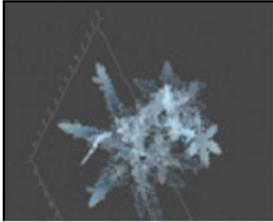
[Submit API Query](#)

Selecting Sizes and Frequencies

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+ Related Links

OpenSSP Query Builder

Session ID (Change to Whatever You Like)

Family	Aggregate Examples	Sizes [um]	Selected	Frequencies [GHz]
 p-13  p-14  p-04	 	<input checked="" type="checkbox"/> Select All <input checked="" type="checkbox"/> 171.3032 <input checked="" type="checkbox"/> 173.7507 <input checked="" type="checkbox"/> 193.2091 <input checked="" type="checkbox"/> 195.1412 <input checked="" type="checkbox"/> 197.0361 --200 <input checked="" type="checkbox"/> 204.2731 <input checked="" type="checkbox"/> 207.7069 <input checked="" type="checkbox"/> 214.2530 <input checked="" type="checkbox"/> 215.8286 <input checked="" type="checkbox"/> 220.4220 <input checked="" type="checkbox"/> 221.9113 <input checked="" type="checkbox"/> 226.2637 <input checked="" type="checkbox"/> 227.6779 <input checked="" type="checkbox"/> 229.0748 <input checked="" type="checkbox"/> 231.8184 <input checked="" type="checkbox"/> 235.8160 <input checked="" type="checkbox"/> 239.6826 <input checked="" type="checkbox"/> 240.9441 <input checked="" type="checkbox"/> 242.1926 <input checked="" type="checkbox"/> 243.4283	<input checked="" type="checkbox"/> 171.3032 <input checked="" type="checkbox"/> 173.7507 <input checked="" type="checkbox"/> 193.2091 <input checked="" type="checkbox"/> 195.1412 <input checked="" type="checkbox"/> 197.0361 <input checked="" type="checkbox"/> 204.2731 <input checked="" type="checkbox"/> 207.7069 <input checked="" type="checkbox"/> 214.2530 <input checked="" type="checkbox"/> 215.8286 <input checked="" type="checkbox"/> 220.4220 <input checked="" type="checkbox"/> 221.9113 <input checked="" type="checkbox"/> 226.2637 <input checked="" type="checkbox"/> 227.6779 <input checked="" type="checkbox"/> 229.0748 <input checked="" type="checkbox"/> 231.8184 <input checked="" type="checkbox"/> 235.8160 <input checked="" type="checkbox"/> 239.6826 <input checked="" type="checkbox"/> 240.9441 <input checked="" type="checkbox"/> 242.1926 <input checked="" type="checkbox"/> 243.4283 <input checked="" type="checkbox"/> 244.6516 <input checked="" type="checkbox"/> 245.8626	<input type="checkbox"/> Select All <input type="checkbox"/> 3.00 <input type="checkbox"/> 5.00 <input type="checkbox"/> 10.66 <input checked="" type="checkbox"/> 13.61 <input type="checkbox"/> 18.71 <input type="checkbox"/> 23.82 <input checked="" type="checkbox"/> 35.53 <input type="checkbox"/> 89.06 <input type="checkbox"/> 94.07 <input type="checkbox"/> 150.10 <input type="checkbox"/> 165.62 <input type="checkbox"/> 176.42 <input type="checkbox"/> 180.43 <input type="checkbox"/> 186.43 <input type="checkbox"/> 190.43

API call: email=kwo-sen.kuo@nasa.gov&frequency=013.609GHz,035.525GHz&size=a-0010/all,a-0011/all,a-0012/all,a-0013/all,a-0014/all,a-0030/all,a-0031/all,a-0032/all,a-0033/all,a-0034/all,a-0070/all,a-0071/all,a-0072/all,a-0073/all,a-0074/all,a-0075/all,a-0076/all,a-0077/all,a-0078/all,a-0079/all

Tab-Separated Values (TSV) Text Output

Download As Text File

Note that this button does not operate as intended on the Safari browser. It will not prompt for download, only open a new page with the text output.

#Email: kwo-sen.kuo@nasa.gov

```
Frequency[GHz] Wvlength[um] Shape Size[um] D_max[um] rho_D_max[g/cm^3] Q_bk Q_ext Q_sca Q_abs g Volume[um^3] Prj_Area[um^2] Sfc_Area[um^2] r_eq_vol[um] r_eq_pj[um] r_eq_sfc[um] L_x[um] L_y[um] L_z[um] rho_eps[g/cm^3] d_fractal
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013.609 22044.0000 a+0010 1112.684807 4119.466 0.019731639 0.0005 0.0006 0.0005 0.0001 0.0241 7.8787501E8 703404.7 2.0355E7 572.9582 473.1815 1272.713 340.0702 5061.943 5143.267 0.019474717 2.207522
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013.609 22044.0000 a+0010 1601.452449 6885.31 0.012599145 0.0017 0.0018 0.0017 0.0002 0.0667 2.3489994E9 8533800.0 7.3425E7 824.6408 1648.148 2417.225 2329.053 3171.472 4932.463 0.014109096 2.0259192
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013.609 22044.0000 a+0010 1483.697364 6148.7803 0.0140682 0.0013 0.0014 0.0013 0.0002 0.0523 1.868E9 7063358.0 6.035E7 764.0048 1499.445 2191.46 2140.478 2811.595 4226.933 0.01607039 1.9497488
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Descriptions of the column values are at the bottom of the text output.

Open with Excel

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1	#Email: kwo-sen.kuo@nasa.gov																								
2	Frequency[G	Wvlngth[um	Shape	Size[um]	D_max[um]	rho_D_max[Q	bk	Q_ext	Q_sca	Q_abs	g	Volume[um^3	Prj_Area[um	Sfc_Area[um	r_eq_vol[um	r_eq_prj[um	r_eq_sfc[um	L_x[um]	L_y[um]	L_z[um]	rho_elps[g/c	d_f	ct_d	fractal	
3	13.609	22044 a-0020		775.686402	3922.3716	0.00708988	9.25E-05	2.00E-04	9.25E-05	7.48E-05	0.013	2.44E+08	755125	7185000	387.8432	490.269	756.1508	282.8013	495.2958	3229.267	0.11823482	1.93768			
4	13.609	22044 a-0020		784.318604	3960.1135	0.00712167	9.36E-05	2.00E-04	9.36E-05	7.34E-05	0.013	2.53E+08	802375	7575000	392.1593	505.375	776.4015	372.6282	549.187	3614.747	0.07473794	1.73652			
5	13.609	22044 a-0020		1007.755	4602.7163	0.00962165	3.00E-04	4.00E-04	3.00E-04	9.71E-05	0.0206	5.36E+08	1468649	1.42E+07	503.8775	683.729	1063.202	502.1738	1289.644	3547.943	0.05103892	2.05402			
6	13.609	22044 a-0020		1076.11963	4786.9614	0.01041428	3.00E-04	4.00E-04	3.00E-04	1.00E-04	0.0211	6.52E+08	1824661	1.80E+07	538.0598	762.1073	1196.494	776.4933	2079.747	4030.522	0.02193865	2.11193			
7	13.609	22044 a-0020		1110.599	4709.034	0.01202552	4.00E-04	5.00E-04	4.00E-04	1.00E-04	0.02	7.17E+08	1998673	1.91E+07	555.2995	797.6197	1232.532	813.4153	1912.263	3717.887	0.02714269	1.9858			
8	13.609	22044 a-0020		1114.07202	4659.667	0.0125286	4.00E-04	5.00E-04	4.00E-04	1.00E-04	0.0203	7.24E+08	2013845	1.93E+07	557.036	800.6415	1238.65	842.7662	2040.602	3889.642	0.02368568	2.0961			
9	13.609	22044 a-0020		1131.49438	4648.1177	0.0132237	4.00E-04	5.00E-04	4.00E-04	1.00E-04	0.0199	7.58E+08	2158328	1.99E+07	565.7472	828.8648	1257.46	801.9087	1750.522	3192.452	0.03704056	2.02049			
10	13.609	22044 a-0020		1132.61206	4659.667	0.01316455	4.00E-04	5.00E-04	4.00E-04	1.00E-04	0.0203	7.61E+08	2220589	2.06E+07	566.306	840.7352	1281.127	819.0362	1745.737	3185.172	0.0365566	1.96369			
11	13.609	22044 a-0020		1142.87842	4634.922	0.01374358	4.00E-04	5.00E-04	4.00E-04	1.00E-04	0.0204	7.82E+08	2184976	2.06E+07	571.4392	833.9662	1279.573	776.1835	1706.057	3116.99	0.0414423	1.94289			
12	13.609	22044 a-0020		1195.995	4659.131	0.01550603	5.00E-04	6.00E-04	5.00E-04	1.00E-04	0.0196	8.96E+08	2594518	2.37E+07	597.9975	908.7688	1373.312	969.4347	1815.715	2825.398	0.03941663	2.07016			
13	13.609	22044 a-0020		1197.27344	4671.991	0.0154277	5.00E-04	6.00E-04	5.00E-04	1.00E-04	0.0199	8.99E+08	2582589	2.35E+07	598.6367	906.6773	1366.195	985.1928	1839.083	2900.1	0.03742669	1.93858			
14	13.609	22044 a-0020		1198.16101	4645.697	0.01572606	5.00E-04	6.00E-04	5.00E-04	1.00E-04	0.0198	9.01E+08	2599089	2.36E+07	599.0805	909.569	1369.25	988.0133	1841.03	2907.138	0.03727279	1.93895			
15	13.609	22044 a-0020		1265.13403	4759.7266	0.01721436	6.00E-04	7.00E-04	6.00E-04	1.00E-04	0.0202	1.06E+09	3116644	2.86E+07	632.567	995.9927	1509.009	1397.967	1823.497	2864.063	0.03178063	2.2141			
16	13.609	22044 a-0020		1298.7854	4736.56	0.0188995	7.00E-04	8.00E-04	7.00E-04	1.00E-04	0.0214	1.15E+09	3228089	3.14E+07	649.3927	1013.673	1579.983	1439.967	1843.708	3042.532	0.03107918	2.0804			
17	13.609	22044 a-0020		1314.81494	4659.667	0.02059475	7.00E-04	8.00E-04	7.00E-04	1.00E-04	0.0213	1.19E+09	3373411	3.25E+07	657.4075	1036.238	1606.95	1467.167	1821.137	2960.382	0.03292768	2.01578			
18	13.609	22044 a-0020		1321.54736	4694.944	0.02044485	7.00E-04	8.00E-04	7.00E-04	1.00E-04	0.0216	1.21E+09	3378233	3.21E+07	660.7737	1036.979	1598.51	1396.102	1744.883	2843.85	0.03817643	2.0222			
19	13.609	22044 a-0020		1410.79602	6245.198	0.01056772	9.00E-04	0.001	9.00E-04	1.00E-04	0.0297	1.47E+09	4284431	4.13E+07	705.398	1167.808	1813.652	1633.993	1971.65	3915.78	0.02550535	2.0132			
20	13.609	22044 a-0020		1413.42957	6134.737	0.01121146	9.00E-04	0.011	9.00E-04	1.00E-04	0.0293	1.48E+09	4344569	4.09E+07	706.7148	1175.976	1803.973	1733.422	2078.807	4082.332	0.02199549	2.02129			
21	13.609	22044 a-0020		1541.89136	7609.5337	0.00762631	0.0012	0.0014	0.0012	1.00E-04	0.0484	1.92E+09	5309958	5.46E+07	770.9457	1300.082	2083.495	1737.418	3772.982	4810.403	0.01332072	2.10711			
22	13.609	22044 a-0020		1624.45239	8212.187	0.00709532	0.0015	0.0017	0.0015	2.00E-04	0.0536	2.24E+09	6104717	6.15E+07	812.2262	1393.984	2211.792	2046.63	3498.345	5465.908	0.01255145	2.09593			
23	13.609	22044 a-0020		1629.56299	8228.001	0.00712127	0.0016	0.0017	0.0016	2.00E-04	0.0527	2.27E+09	6157400	6.21E+07	814.7815	1399.986	2223.723	2068.797	3477.628	5428.698	0.01269562	2.0888			
24	13.609	22044 a-0020		1635.38562	8104.0117	0.00753334	0.0016	0.0017	0.0016	2.00E-04	0.0522	2.29E+09	6220844	6.31E+07	817.6928	1407.118	2241.545	2084.26	3477.417	5400.008	0.01280335	2.1708			
25	13.609	22044 a-0020		1637.22839	8142.1743	0.00745305	0.0016	0.0017	0.0016	2.00E-04	0.0525	2.30E+09	6291883	6.26E+07	818.6142	1415.192	2231.938	2109.213	3504.428	5439.038	0.0125085	2.16847			
26	13.609	22044 a-0020		1713.96863	8278.889	0.00813429	0.0019	0.0021	0.0019	2.00E-04	0.0571	2.64E+09	7264006	7.22E+07	856.9843	1520.593	2396.395	2109.552	3451.497	5086.825	0.01557763	2.2225			
27	13.609	22044 a-0020		1721.22461	8254.393	0.0083116	0.0019	0.0021	0.0019	2.00E-04	0.0571	2.67E+09	7308058	7.53E+07	860.6123	1525.197	2448.3	2116.423	3466.728	5061.495	0.01573434	2.14459			
28	13.609	22044 a-0020		1730.6814	8210.664	0.00858507	0.0019	0.0021	0.0019	2.00E-04	0.0586	2.71E+09	7461514	7.41E+07	865.3407	1541.127	2428.473	2178.792	3564.06	5102.55	0.01499134	2.13518			
29	13.609	22044 a-0020		1734.31335	8196.6455	0.00868363	0.002	0.0021	0.002	2.00E-04	0.0581	2.73E+09	7558825	7.49E+07	867.1567	1551.144	2440.813	2184.935	3540.68	5090.185	0.01517963	2.21709			
30	13.609	22044 a-0020		1749.49841	8346.257	0.00844292	0.002	0.0022	0.002	2.00E-04	0.0588	2.80E+09	7700075	7.79E+07	874.7492	1565.57	2488.997	2220.187	3581.255	5183.632	0.01488741	1.95780			
31	13.609	22044 a-0020		1776.00439	8230.583	0.00921016	0.0022	0.0023	0.0022	2.00E-04	0.0589	2.93E+09	8280550	8.29E+07	888.0022	1623.509	2568.302	2464.59	3574.932	5099.158	0.01502452	2.13242			
32	13.609	22044 a-0020		1792.47705	8156.7456	0.0097283	0.0022	0.0024	0.0022	2.00E-04	0.0591	3.02E+09	8337419	8.39E+07	896.2385	1629.074	2583.825	2465.41	3563.782	4999.158	0.01502452	2.13242			
33	13.609	22044 a-0020		1794.67859	8180.159	0.00968059	0.0022	0.0024	0.0022	2.00E-04	0.0585	3.03E+09	8336453	8.53E+07	897.3393	1628.98	2605.372	2498.485	3590.528	5008.908	0.01474073	1.9361			
34	13.609	22044 a-0020		1815.60742	8118.189	0.01025452	0.0024	0.0025	0.0024	2.00E-04	0.059	3.13E+09	8591517	8.82E+07	907.8037	1653.713	2648.913	2519.313	3478.968	4891.06	0.01599807	2.00741			
35	13.609	22044 a-0020		1870.81104	8298.945	0.01050142	0.0026	0.0028	0.0026	2.00E-04	0.0595	3.43E+09	9080742	9.70E+07	935.4055	1700.143	2777.738	2579.818	3359.778	4953.028	0.01747658	2.0371			
36	13.609	22044 a-0020		1876.50061	8141.867	0.01122228	0.0027	0.0029	0.0027	2.00E-04	0.0597	3.46E+09	9181550	9.61E+07	938.2503	1703.642	2764.888	2603.297	3380.368	4936.692	0.01742848	1.95700			
37	13.609	22044 a-0020		1906.78894	8215.534	0.01146114	0.0028	0.003	0.0028	2.00E-04	0.0621	3.63E+09	9539931	1.01E+08	953.3945	1742.052	2829.538	3062.472	3891.173	5309.203	0.01255635	2.00438			
38	13.609	22044 a-0020		1926.15857	8200.609	0.01187859	0.0029	0.0031	0.0029	2.00E-04	0.0628	3.74E+09	1.01E+08	1.04E+08	963.0793	1793.252	2871.137	3279.585	3655.96	5022.182	0.0135988	1.93340			
39	13.609	22044 a-0020	</																						

Modeled PSD Tab

– Currently only normalized exponential PSD

NASA National Aeronautics and Space Administration

+ PPS Contacts
+ Related Links

OpenSSP Query Builder

Session ID (Change to Whatever You Like) [2016-10-21T17:32:36.625Z/kwo-sen.1](#)

Pristine Aggregate Modeled PSD Observed PSD

Pristine Type

p-04	p-08	p-09	p-10	p-13
p-14	p-16	p-17	p-19	p-20
p-29	p-31	p-39	p-40	p-41
p-42	p-43	p-44	p-45	p-46

Aggregate Family

p-13	p-14	p-04
p-16	p-29	p-19
p-46	p-44	p-43

Normalized Size Distribution

Distribution Type

- Exponential
- Gamma

Size Units

Number Concentration Units

Minimum Size:
Maximum Size:
Number of Sizes:

Submit Inputs

Frequencies [GHz]

- Select All
- 3.00
- 5.00
- 10.66
- 13.61
- 18.71
- 23.82
- 35.53
- 89.06
- 94.07
- 150.10
- 165.62
- 176.42
- 180.43
- 186.43
- 190.43

[Submit API Query](#)

Select Units and Enter Values

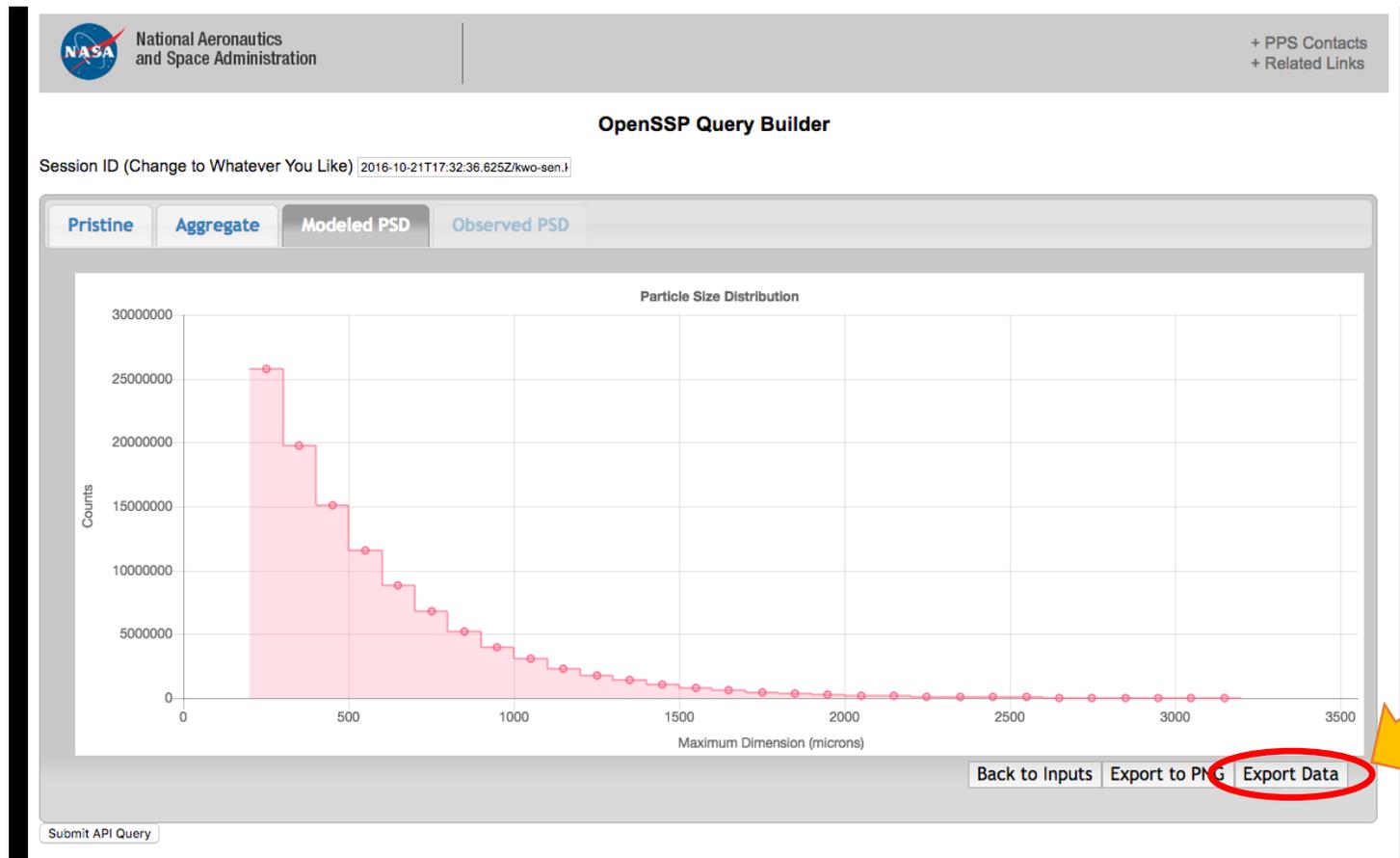
The screenshot shows the OpenSSP Query Builder interface. At the top left is the NASA logo and the text "National Aeronautics and Space Administration". At the top right are links for "+ PPS Contacts" and "+ Related Links". The main title is "OpenSSP Query Builder". Below the title is a "Session ID (Change to Whatever You Like)" field containing "2016-10-21T17:32:36.625Z/ku...".

The interface is divided into several sections:

- Pristine Type:** A grid of 16 icons representing different particle types, labeled p-04 through p-46.
- Size Units:** A dropdown menu set to "Microns". Below it are input fields for "D_m 1500" and "Bin Size 100.00".
- Number Concentration Units:** A dropdown menu set to "Meters-4". Below it is an input field for "N₀* 1E7".
- Frequencies [GHz]:** A list of frequency values with checkboxes. The values are 3.00, 5.00, 10.66, 13.61, 18.71, 23.82, 35.53, 89.06, 94.07, 150.10, 165.62, 176.42, 180.43, 186.43, and 190.43. The checkboxes for 13.61 and 35.53 are checked.

Red circles highlight the "Size Units" dropdown, the "Number Concentration Units" dropdown, and the "Submit API Query" button. A yellow arrow points to the "Submit API Query" button.

PSD Plot and Export Data



Short-term Plan

1. Web interface functionalities
2. Additional data

Web Interface Functionalities

- Finish normalized (Testud et al 2001) *Gamma* distribution for the *Modeled PSD* tab.
- Implement
 - PSD constrained by mass-dimension relation
 - *Observed PSD* tab.

Additional Data

- DDSCAT Input
 - "ddscat.dat" input files
 - "shape.dat" input files
- Particle files
 - The binary particle volume representation in three-dimensional arrays.

Beyond Short-term Plans

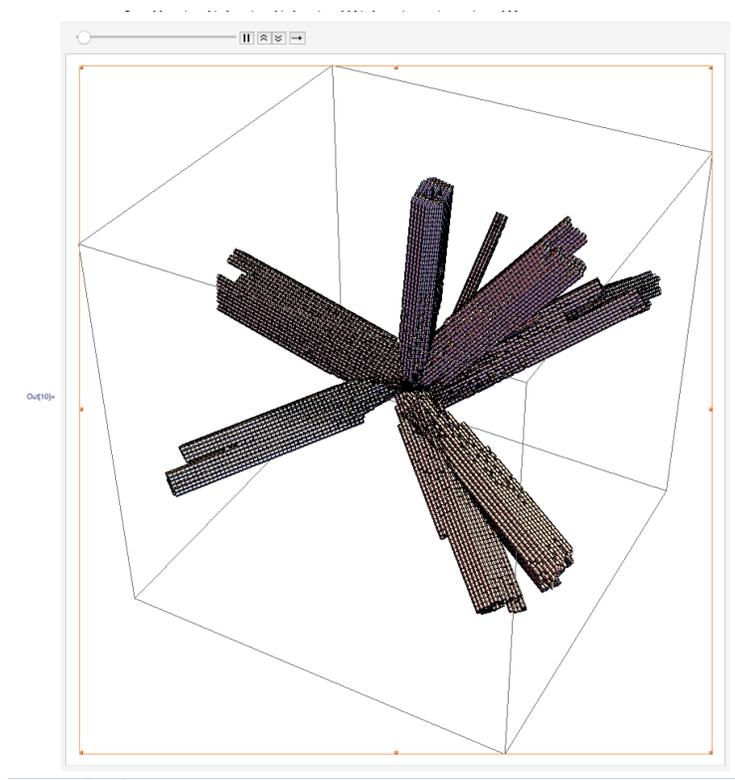
Contributors:
Kwo-Sen Kuo^{1,2}, Craig S Pelissier^{1,3},
and Thomas L Clune¹

1. NASA Goddard Space Flight Center
2. ESSIC University of Maryland-College Park
3. Science Systems and Applications Inc.

Plans in ~ Chronological Order

- Single-scattering Working Group (IPWGIWSSM?)
 - Standardizing existing single-scattering databases
- Larger pristine particles
 - CMB algorithm team wants larger, fluffier particles
- More varieties of pristine and aggregate particles
 - Poly-crystal *Snowflake*
 - More aggregate families (with mixed pristine component types?)
 - Rimed particles
- Make more efficient DDSCAT runs
 - Adaptive inter-dipole separation
 - Higher degree quadrature
 - Orientations (full scattering phase matrix)
- Characteristic Basis Function Method (CBMF) for scattering calculations
- Melting particles
 - Smoothed Particle Hydrodynamic simulations

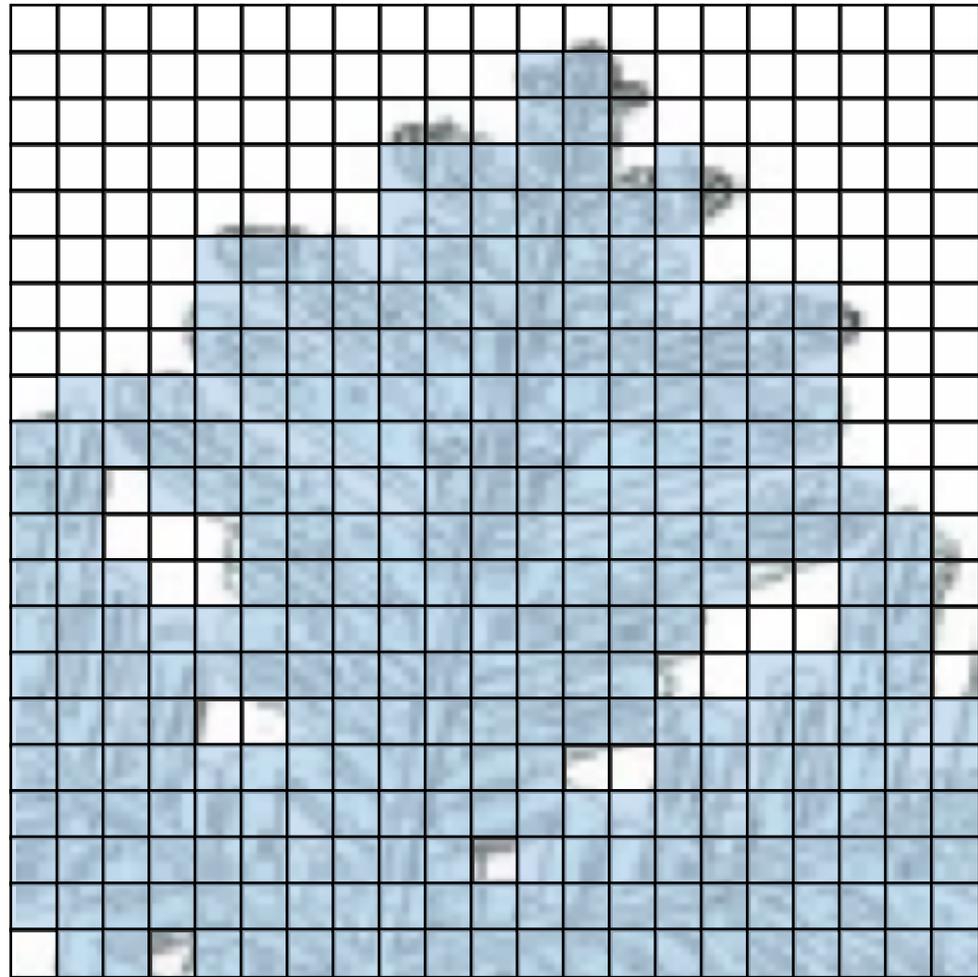
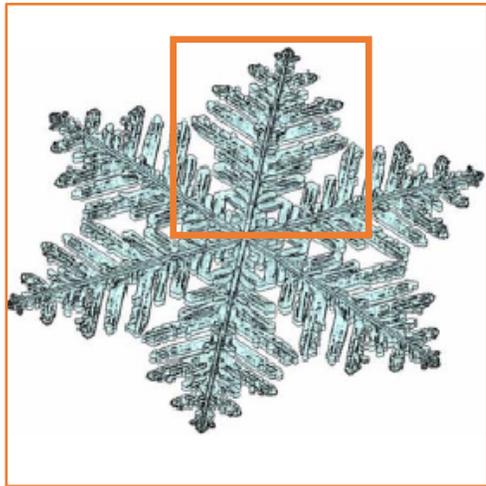
Poly-crystal *Snowflake*



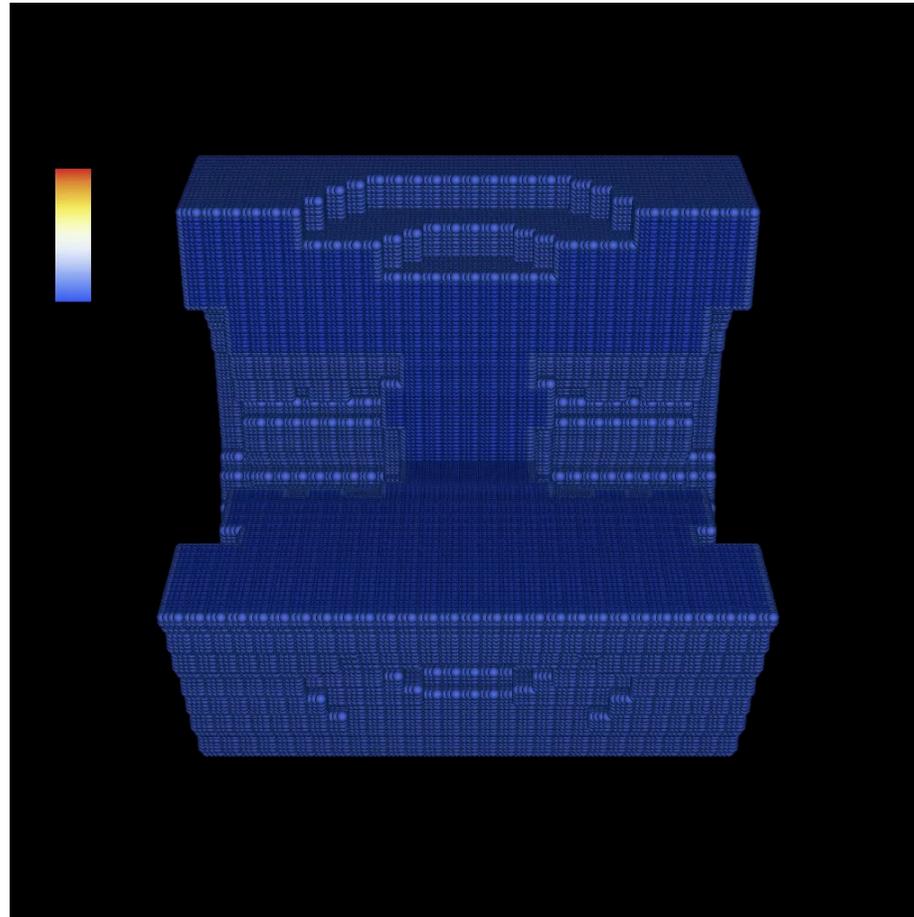
Compromise in Current Version

- Pristine particles generated by *Snowfake* (previous version without parallel I/O) are not large enough.
 - Lattice spacing ~ 1 micron.
- DDSCAT criterion demands ~ 50 micron inter-dipole separation at 200 GHz.
- Scaling lattice spacing by 50x to ~ 50 micron results in particles that are too big.
- Average and round off 3^3 lattice cells and then scale it to 50 micron.
- 50 micron inter-dipole separation is an overkill for the lower frequencies.
- DDSCAT computational expense is proportional to the volume (length³) containing the dipoles (i.e. the particle).

Adaptive Inter-dipole Separation



Smoothed Particle Hydrodynamics Simulation



Thank you!