

C-2 Report on Multiple Discrete Returns

The USGS Lidar Base Specification 2023 rev. A states: "Deriving and delivering multiple discrete returns are required in all conventional lidar data collection efforts. Data collection shall be capable of at least three returns per pulse."

The purpose of this section is to report on the presence and quantities of lidar returns in the LAS data. Empty return columns can indicate a collection or processing problem dealing with lidar return attribute information.

[Data Source - D:\00_MNWest\B3_Swath_Data](#)

File	First return	Second return	Third return	Other returns	Total points
CS_00261.las	386,856,448	21,140,455	4,434,470	531,337	412,962,710
CS_00262.las	2,301,771,427	79,294,791	18,029,434	2,462,368	2,401,558,020
CS_00263.las	2,438,202,015	86,903,354	19,538,659	2,724,899	2,547,368,927
CS_00264.las	2,315,755,118	81,096,142	18,284,385	2,598,875	2,417,734,520
CS_00265.las	2,507,986,370	82,165,435	18,502,592	2,582,213	2,611,236,610
CS_00266.las	2,454,139,669	84,089,122	19,909,804	2,924,879	2,561,063,474
CS_00267.las	1,383,187,157	25,054,024	4,668,345	504,024	1,413,413,550
CS_00268.las	62,271,573	3,941,750	616,911	53,485	66,883,719
CS_00269.las	1,140,008,423	58,445,374	12,844,155	1,732,669	1,213,030,621
CS_00285.las	68,831,386	9,859,946	3,252,541	608,660	82,552,533
CS_00289.las	31,643,769	12,335,196	4,571,830	972,240	49,523,035
CS_00290.las	283,381,565	22,998,515	7,227,489	1,328,604	314,936,173
CS_00292.las	653,394,347	28,058,812	7,001,281	1,084,413	689,538,853
CS_00293.las	1,171,717,747	39,672,258	9,125,501	1,386,919	1,221,902,425
CS_00295.las	1,603,855,681	55,026,713	10,996,353	1,913,141	1,671,791,888
CS_00296.las	2,115,541,382	99,388,070	24,934,756	4,433,352	2,244,297,560
CS_00297.las	2,359,712,064	148,662,517	45,273,349	9,331,258	2,562,979,188
CS_00298.las	2,361,332,236	132,889,405	39,429,234	8,155,839	2,541,806,714
CS_00299.las	2,584,153,925	75,234,615	18,085,586	2,853,714	2,680,327,840
CS_00300.las	1,362,937,848	18,386,954	3,694,467	553,658	1,385,572,927
CS_00301.las	230,547,090	14,934,894	3,751,750	595,414	249,829,148
CS_00302.las	1,120,226,349	48,347,151	12,802,791	2,187,053	1,183,563,344
CS_00303.las	2,546,987,862	83,198,350	21,698,206	3,683,736	2,655,568,154
CS_00304.las	919,570,731	17,619,922	3,707,318	584,411	941,482,382
CS_00305.las	98,186,370	1,029,126	305,428	54,681	99,575,605
CS_00306.las	1,655,259,402	63,782,807	17,127,240	2,948,298	1,739,117,747
CS_00307.las	2,465,951,147	70,480,657	16,392,389	2,523,146	2,555,347,339
CS_00308.las	1,976,968,188	77,080,672	19,169,549	3,070,026	2,076,288,435

C-2 Report on Multiple Discrete Returns - continued

File	First return	Second return	Third return	Other returns	Total points
CS_00309.las	1,584,779,983	67,631,034	17,473,098	2,925,508	1,672,809,623
CS_00310.las	2,331,105,282	91,633,139	21,267,461	2,690,292	2,446,696,174
CS_00311.las	2,416,362,780	96,280,178	24,183,704	3,484,091	2,540,310,753
CS_00312.las	2,313,839,413	98,494,196	26,289,361	4,181,125	2,442,804,095
CS_00313.las	2,398,453,460	89,793,472	22,011,653	3,237,415	2,513,496,000
CS_00314.las	2,317,117,374	83,207,537	19,169,753	2,502,788	2,421,997,452
CS_00315.las	2,398,921,442	78,616,831	17,866,752	2,276,092	2,497,681,117
CS_00316.las	37,121,459	654,232	109,613	10,563	37,895,867
CS_00317.las	2,331,823,102	67,207,879	14,786,712	1,858,356	2,415,676,049
CS_00318.las	252,654,151	4,391,284	843,600	77,891	257,966,926
CS_00319.las	536,368,350	4,828,618	783,364	67,345	542,047,677
CS_00320.las	85,938,531	1,097,649	173,858	14,590	87,224,628
CS_00321.las	1,105,627,737	65,493,604	13,080,838	1,305,266	1,185,507,445
CS_00322.las	166,834,596	17,233,272	3,605,982	397,019	188,070,869
CS_00323.las	322,667,467	20,829,946	4,835,301	587,447	348,920,161
CS_00324.las	184,323,664	14,479,988	3,144,859	302,602	202,251,113
CS_00325.las	1,219,903,284	57,556,425	12,091,260	1,158,460	1,290,709,429
CS_00326.las	1,610,871,109	80,733,806	18,777,674	2,261,989	1,712,644,578
CS_00327.las	1,589,673,447	68,908,024	16,305,586	1,997,502	1,676,884,559
CS_00328.las	1,593,311,022	87,523,880	22,697,258	3,106,277	1,706,638,437
CS_00329.las	102,858,388	5,649,076	1,404,189	177,405	110,089,058
CS_00330.las	222,662,276	16,313,324	3,215,451	334,126	242,525,177
CS_00331.las	375,856,699	31,280,962	7,832,229	1,027,048	415,996,938
CS_00332.las	212,476,864	15,272,912	3,359,343	346,853	231,455,972
CS_00333.las	1,274,075,750	68,949,458	18,215,877	2,490,339	1,363,731,424
CS_00334.las	198,796,563	3,471,131	809,111	95,134	203,171,939
CS_00335.las	1,609,506,018	91,323,531	23,151,240	3,133,335	1,727,114,124
CS_00336.las	1,643,341,503	85,336,900	20,900,459	2,674,734	1,752,253,596
CS_00337.las	1,627,592,356	65,648,480	14,754,298	1,764,177	1,709,759,311
CS_00338.las	1,624,487,405	55,785,545	12,645,712	1,537,131	1,694,455,793
CS_00339.las	1,636,827,836	51,154,487	12,065,505	1,509,055	1,701,556,883
CS_00340.las	1,609,182,530	54,495,895	13,143,981	1,642,323	1,678,464,729
CS_00341.las	1,590,963,240	56,802,825	14,872,954	2,109,842	1,664,748,861
CS_00342.las	1,598,505,325	51,366,456	12,987,627	1,759,059	1,664,618,467

C-2 Report on Multiple Discrete Returns - continued

File	First return	Second return	Third return	Other returns	Total points
CS_00343.las	1,610,753,611	45,912,043	10,628,064	1,266,020	1,668,559,738
CS_00344.las	145,298,008	2,504,948	442,269	38,275	148,283,500
CS_00346.las	1,624,964,019	54,554,805	12,190,978	1,451,854	1,693,161,656
CS_00347.las	1,566,315,198	51,816,141	11,463,453	1,370,643	1,630,965,435
CS_00348.las	1,560,295,438	39,661,976	8,609,137	936,603	1,609,503,154
CS_00349.las	123,349,238	1,005,064	181,764	18,008	124,554,074
CS_00350.las	1,653,820,232	39,788,530	8,565,430	970,223	1,703,144,415
CS_00351.las	1,556,337,437	47,985,384	10,850,559	1,286,838	1,616,460,218
CS_00352.las	1,632,496,802	61,766,327	15,262,133	1,987,993	1,711,513,255
CS_00353.las	1,144,790,656	47,213,775	11,202,256	1,391,441	1,204,598,128
CS_00354.las	307,217,901	19,315,594	4,650,399	610,144	331,794,038
CS_00380.las	333,438,865	17,763,974	3,830,022	518,849	355,551,710
CS_00381.las	150,354,047	5,379,956	912,076	97,079	156,743,158
CS_00382.las	72,474,916	968,279	122,870	11,181	73,577,246
CS_00383.las	162,180,099	5,367,194	420,620	32,466	168,000,379
CS_00397.las	367,217,544	7,943,055	1,534,855	204,289	376,899,743
CS_00398.las	110,674,922	13,004,259	3,101,636	415,751	127,196,568
CS_00399.las	167,077,748	1,392,889	181,355	24,741	168,676,733
CS_00400.las	139,219,132	1,345,743	203,495	25,892	140,794,262
CS_00427.las	187,520,243	6,077,729	1,311,646	171,166	195,080,784
CS_00428.las	1,368,866,734	50,480,706	9,068,659	1,269,282	1,429,685,381
CS_00429.las	256,775,264	13,288,527	2,797,177	423,062	273,284,030
CS_00430.las	420,180,444	19,290,824	4,123,718	649,199	444,244,185
Total	99,386,826,193	3,844,390,725	925,886,047	134,597,490	104,291,700,455