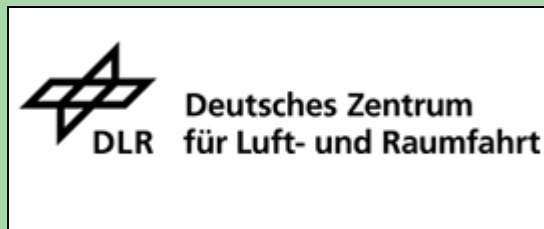


A Statistical Approach
of
Flora Species Differentiation
via
Hyperspectral Remote Sensing
by
Christopher Lindenberg (FIT2014)



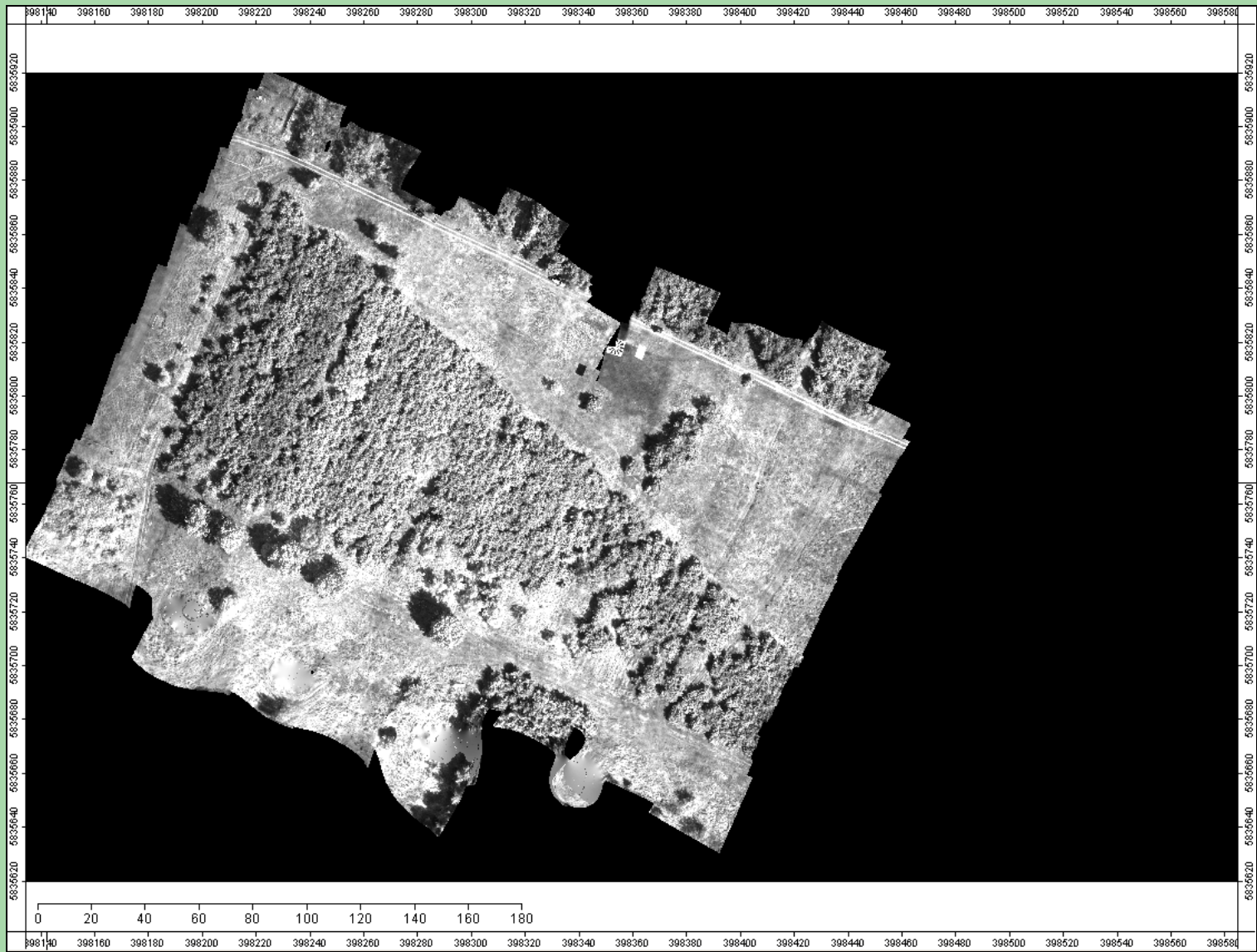
Tasks:

The identification of flora species (trees and grass societies), using hyperspectral remotely sensed data.

How many and what bands are potentially necessary to gain reliable results?

The Dataset:

- Hobrechtsfelde (16341 Panketal, Germany)
- UHD-185 „Dragonfly“ (Cubert GmbH – Real-Time Spectral Imagine)
- 138 channels (450-950nm) of 5cm pan-sharpened mosaicked images



Dataset Appearance (channel 118)



„It can be understood only,

what can be distinguished from its environment.“

(Lindenberg, Christopher; 2015)

The Idea:

- not the plain data but the information is to be derived and analyzed (data distribution pattern)
- semi object based
- generate simple statistics (mean, standard deviation, quartiles) which describe data distribution
- plot statistics with each other
- generate buffer area of similar features
- filter features within buffer area

Development and Processing:

-dataset correction



-check on dataset potential

-method „Bloodhound“

-generate raster

-choose training features

-generate density based buffering

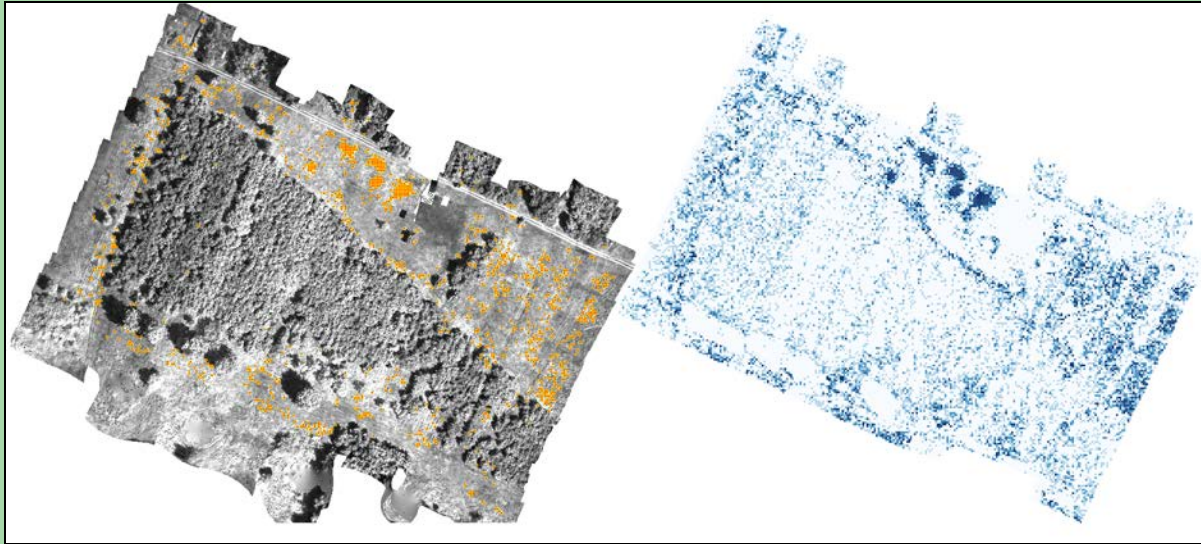
and filter statistical features



-check on most informative channels

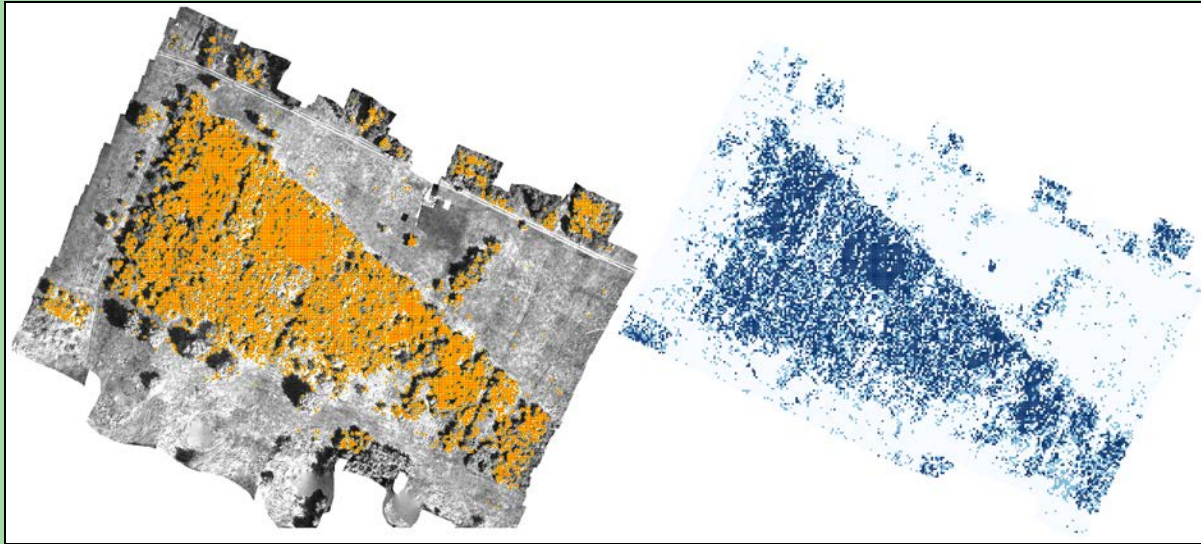


Results:



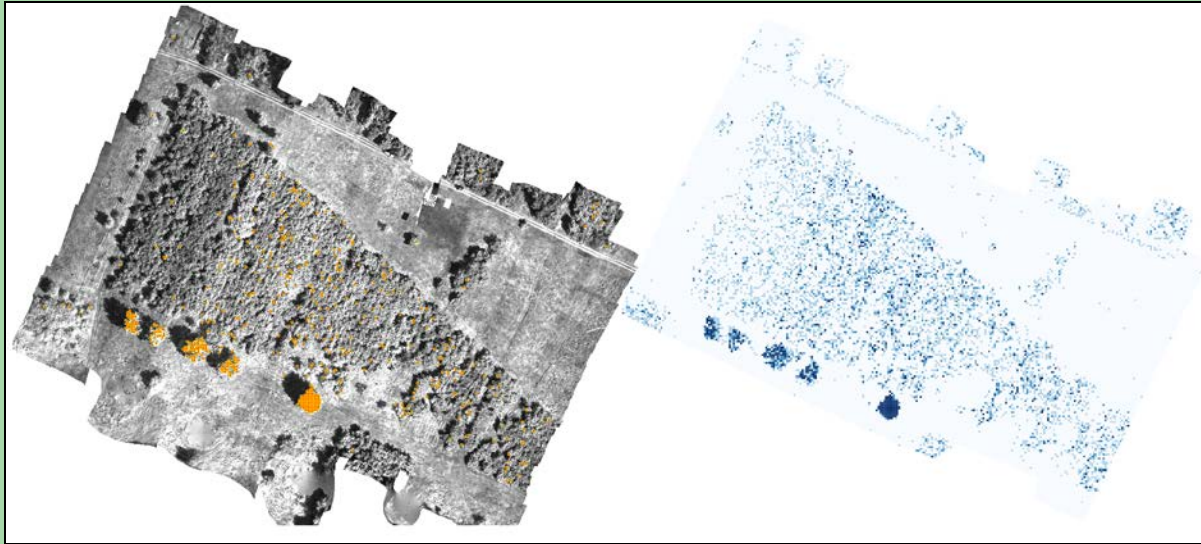
High Grass Societies (*Calamagrostis* mainly)

Results:



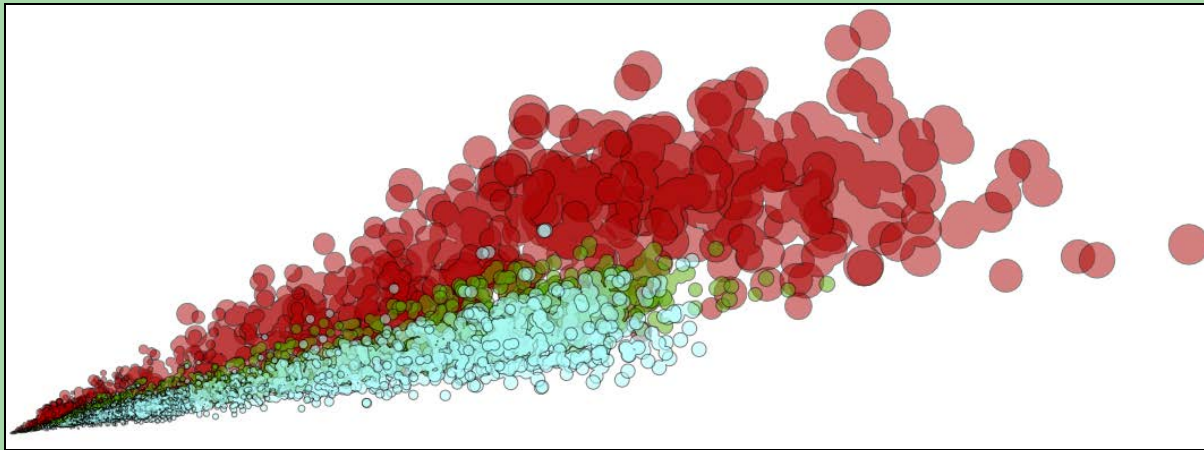
Young Pinus Societies

Results:





Populus Single Trees

Results:



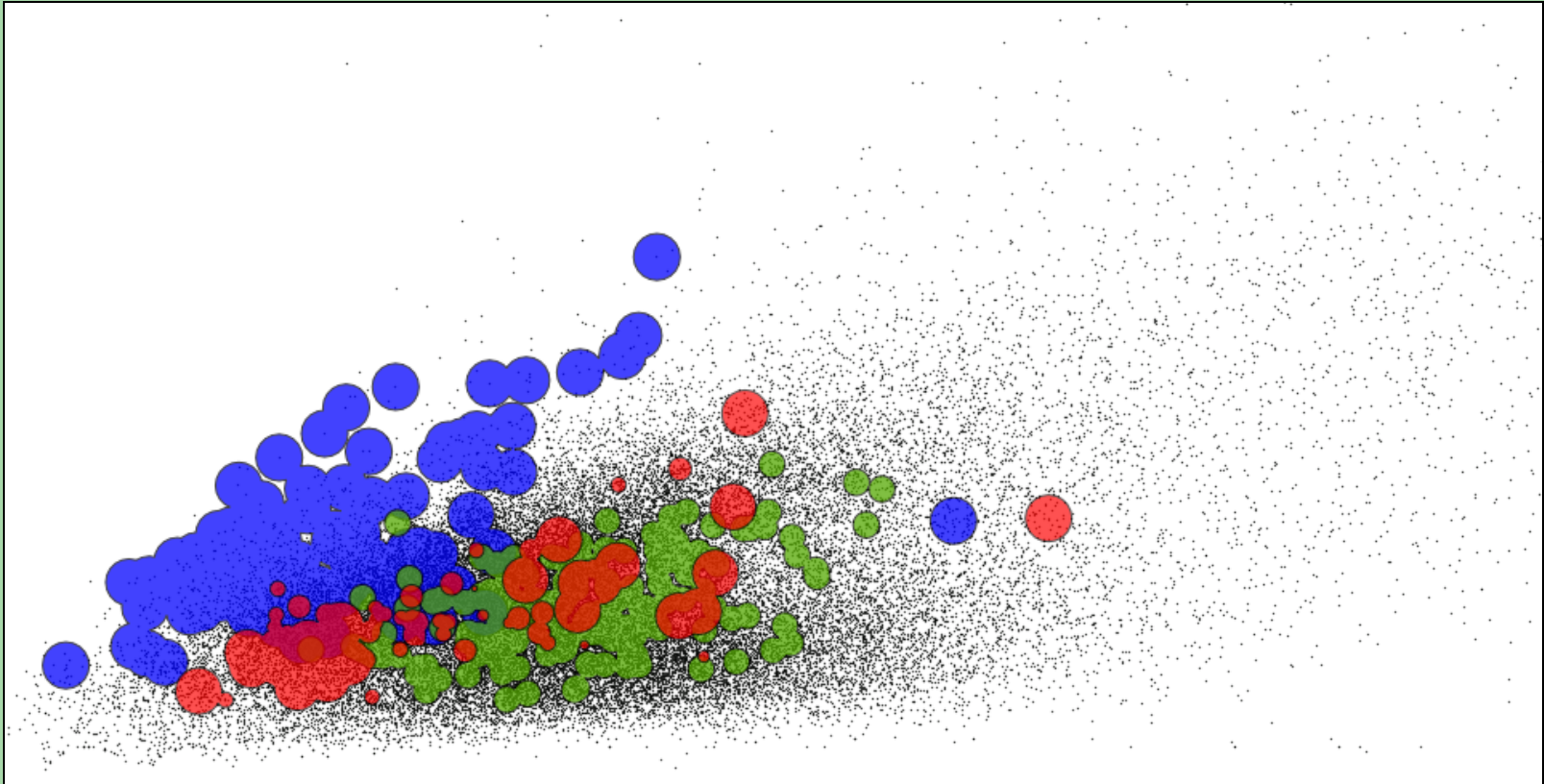
Buffer Library (mean vs. standard deviation plot; red = Populus; green = Pinus; light blue = high grass societies)

Actual Status and Future Outlook:

- unsupervised method „LSUHC“ for differentiation 
- fully object based analysis due to segmentation 
- combination of „Bloodhound“ and „LSUHC“

Thank you for your attention.

Do you have any questions?



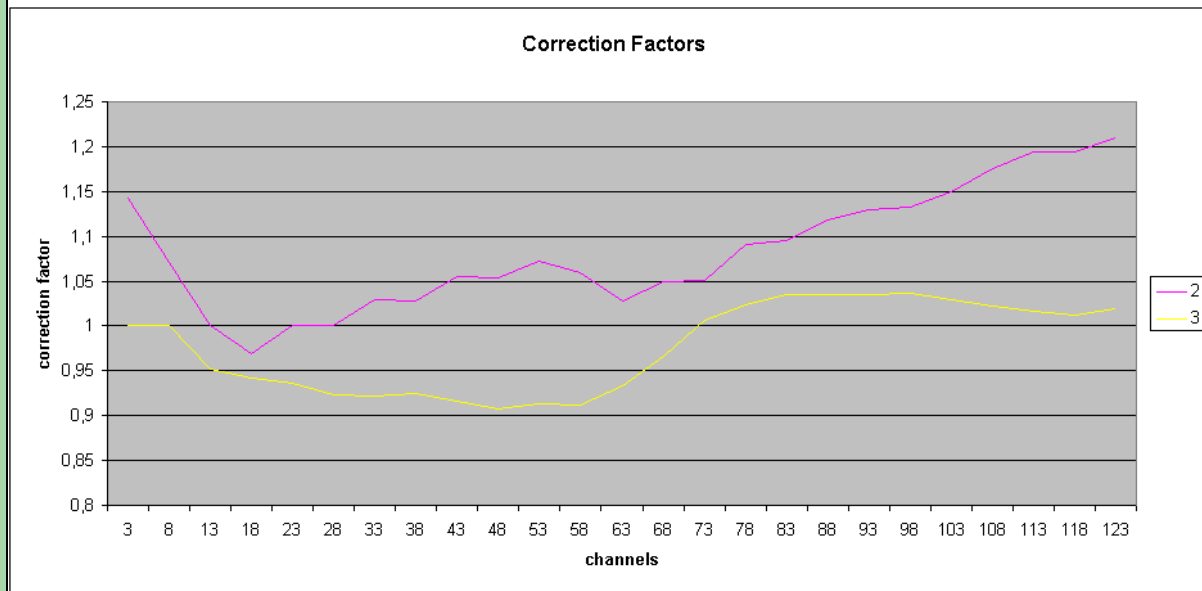
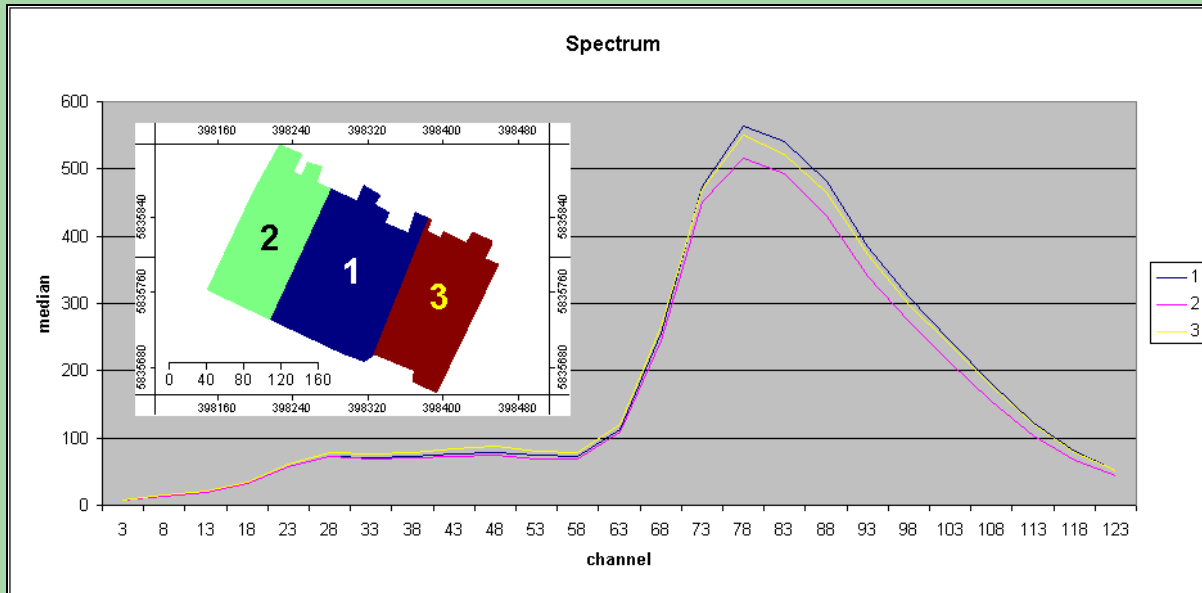
Buffer of Specific Features among Data Set Features (red = Acer Negundo;
green = Clamagrostis society; blue = Populus)



1	DataSet	Method	Charge	Pinus	Grass	Populus	AcerNegundo	totalLeft	Desired/unDesired	ExclusionQuality	Yield
64	HighGrass	LISEMDB	MS93	1456	3492	7		14836	2,38688	1,48789	5195,71173
65	HighGrass	LISEMDB	MS98	1474	3509	5		14773	2,37255	1,47896	5189,66669
66	HighGrass	LISEMDB	MS103	1620	3262	2		14184	2,01110	1,25364	4089,3847
67	HighGrass	LISEMDB	MS108	1666	3231	7		14174	1,93126	1,20388	3889,72483
68	HighGrass	LISEMDB	MS113	1643	3142	10		13954	1,90079	1,18488	3722,89178
69	HighGrass	LISEMDB	MS118	1586	3157	16		13380	1,97066	1,22844	3878,17637
70	HighGrass	LISEMDB	MS123	1334	2790	30		11975	2,04545	1,27506	3557,41834
71	Pinus	LISECHMDB	MS3	4461	3388	215		26383	1,23813	2,18446	9744,88057
72	Pinus	LISECHMDB	MS8	3583	1788	77		18620	1,92118	3,38957	12144,821
73	Pinus	LISECHMDB	MS13	3590	1218	80		17349	2,76579	4,87973	17518,2428
74	Pinus	LISECHMDB	MS18	3413	820	77		16019	3,80491	6,71305	22911,6555
75	Pinus	LISECHMDB	MS23	2741	572	80		13765	4,20399	7,41716	20330,4416
76	Pinus	LISECHMDB	MS28	2869	428	84		14094	5,60352	9,88637	28363,9997
77	Pinus	LISECHMDB	MS33	3163	376	93		14832	6,74414	11,89879	37635,8629
78	Pinus	LISECHMDB	MS38	3353	409	96		15528	6,63960	11,71436	39278,2441
79	Pinus	LISECHMDB	MS43	3293	354	92		15296	7,38341	13,02666	42896,8043
80	Pinus	LISECHMDB	MS48	3695	364	110		16760	7,79536	13,75347	50819,0896
81	Pinus	LISECHMDB	MS53	3803	356	101		16897	8,32166	14,68204	55835,8057
82	Pinus	LISECHMDB	MS58	4146	361	114		18346	8,72842	15,39969	63847,1215
83	Pinus	LISECHMDB	MS63	3880	259	119		16920	10,26455	18,10991	70266,446
84	Pinus	LISECHMDB	MS68	2730	348	39		13116	7,05426	12,44595	33977,4409
85	Pinus	LISECHMDB	MS73	2069	854	8		11956	2,40023	4,23477	8761,73375
86	Pinus	LISECHMDB	MS78	1924	1152	6		12191	1,66149	2,93138	5639,98453
87	Pinus	LISECHMDB	MS83	1957	1131	5		12276	1,72271	3,03941	5948,11911
88	Pinus	LISECHMDB	MS88	2051	1117	7		12471	1,62473	3,21941	6603,00074
89	Pinus	LISECHMDB	MS93	2078	1154	5		12306	1,79292	3,16329	6573,30807
90	Pinus	LISECHMDB	MS98	2211	1162	9		12833	1,88813	3,33126	7365,40999
91	Pinus	LISECHMDB	MS103	2278	1145	8		12980	1,97572	3,48579	7940,62101
92	Pinus	LISECHMDB	MS108	2486	1282	9		14048	1,92564	3,39744	8446,02461
93	Pinus	LISECHMDB	MS113	2525	1240	15		14466	2,01195	3,54972	8963,04084
94	Pinus	LISECHMDB	MS118	2567	1183	25		14360	2,12500	3,74917	9624,12244
95	Pinus	LISECHMDB	MS123	2474	1077	32		13570	2,23084	3,93590	9737,42624
96	Acer Negundo	LISECHdbB1.0	MS3	1268	1004	37	14	8564	0,00606	1,41386	19,794085
97	Acer Negundo	LISECHdbB2.0	MS3	2914	2550	96	43	18879	0,00773	1,80342	77,5470735
98	Acer Negundo	LISECHdbB1.9	MS3	2773	2410	90	40	17985	0,00759	1,76891	70,7563636
99	Acer Negundo	LISECHdbB2.1	MS3	3076	2704	104	45	19707	0,00765	1,78338	80,2519617
100	Acer Negundo	LISECHdbB2.3	MS3	3314	3020	112	47	21257	0,00729	1,70024	79,9113943
101	Acer Negundo	LISECHdbB1.5	MS3	2152	1817	62	29	14045	0,00719	1,67760	48,6504085
102	Acer Negundo	LISECHdbB1.7	MS3	2483	2110	75	35	16077	0,00750	1,74840	61,1939567
103	Acer Negundo	LISECHdbB1.0	MSk3	1101	905	79	17	6792	0,00815	1,90128	32,3217656
104	Acer Negundo	LISECHdbB2.0	MSk3	2623	2906	185	34	17440	0,00595	1,38753	47,1759757
105	Acer Negundo	LISECHdbB1.5	MSk3	1864	1783	131	23	11965	0,00609	1,41961	32,6510395
106	Acer Negundo	LISECHdbB1.7	MSk3	2186	2153	156	26	14052	0,00578	1,34880	35,0687506
107	Acer Negundo	LISECHdbB1.9	MSk3	2479	2580	175	31	16220	0,00592	1,38112	42,8147057
108	Acer Negundo	LISECHdbB2.1	MSk3	2742	3158	193	37	18500	0,00607	1,41603	52,3932771
109	Acer Negundo	LISECHdbB2.3	MSk3	2974	3700	215	39	20622	0,00566	1,32011	51,4844791
110	Acer Negundo	LISECHdbB2.5	MSk3	3252	4166	227	40	22730	0,00523	1,22007	48,8029176
111	Acer Negundo	LISECHdbB1.0	SSk3	1188	2613	74	18	11246	0,00465	1,08319	19,4973953
112	Acer Negundo	LISECHdbB2.0	SSk3	2937	5720	198	44	25371	0,00497	1,15869	50,9823771
113	Acer Negundo	LISECHdbB1.9	SSk3	2784	5464	192	42	24260	0,00498	1,16041	48,7370713
114	Acer Negundo	LISECHdbB2.1	SSk3	3078	5948	208	46	26430	0,00498	1,16164	53,4354027
115	Acer Negundo	LISECHdbB2.3	SSk3	3333	6393	222	50	28339	0,00503	1,17203	58,6013371

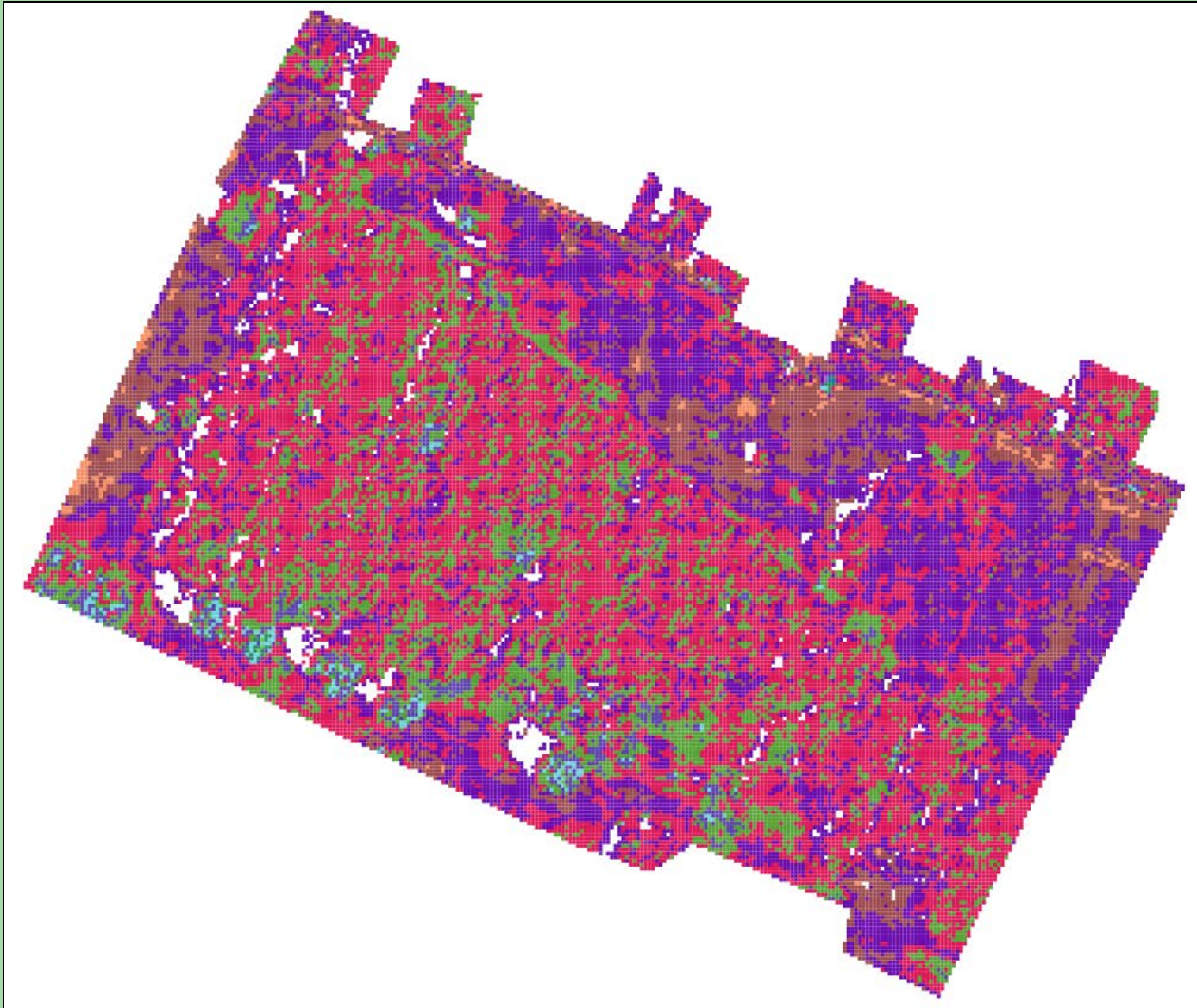
Example of Interim Results with Quality vs. Quantity Exclusion Relationship Estimation





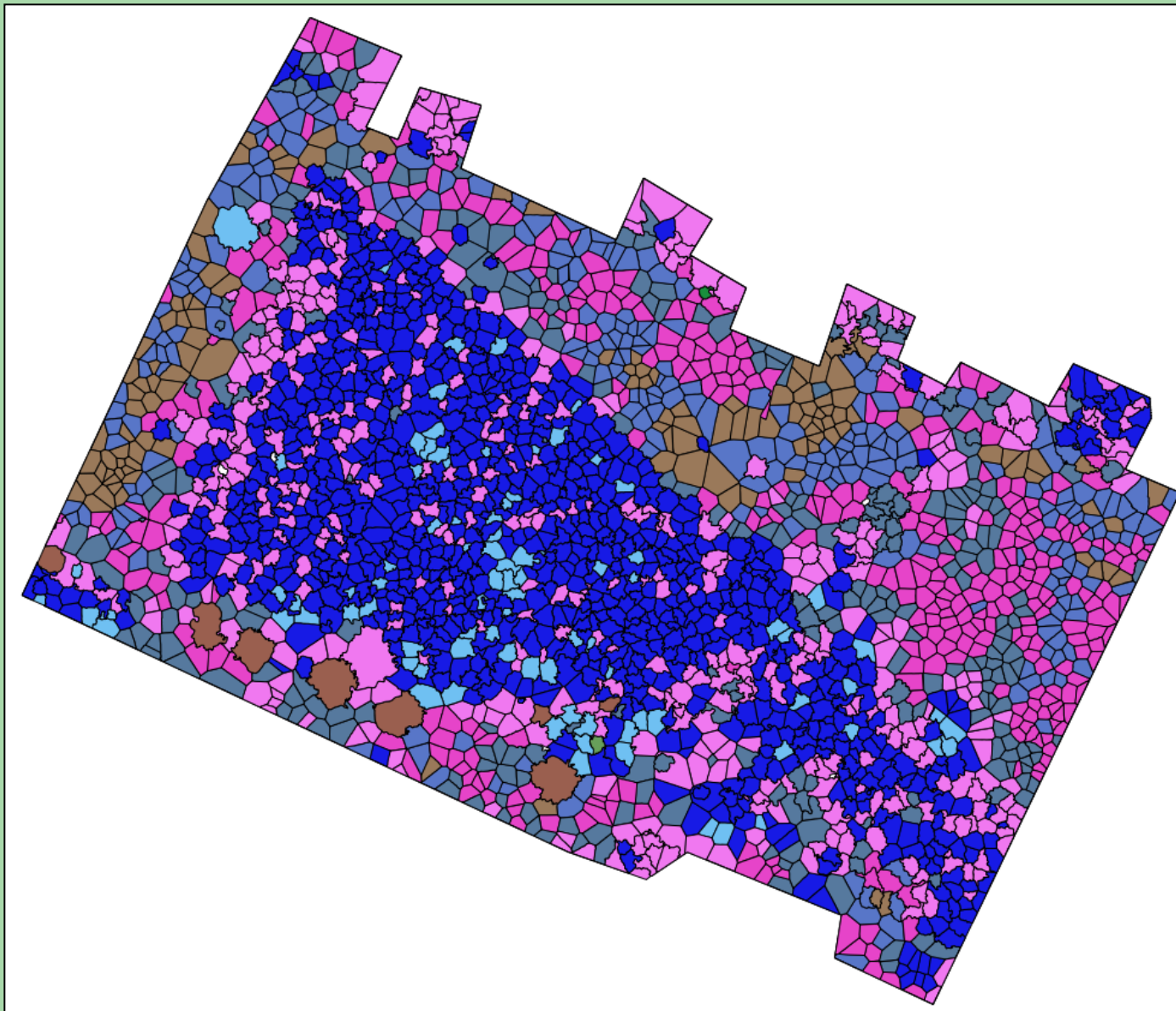
Origin Data Spectrum and Brightness Correction Factors





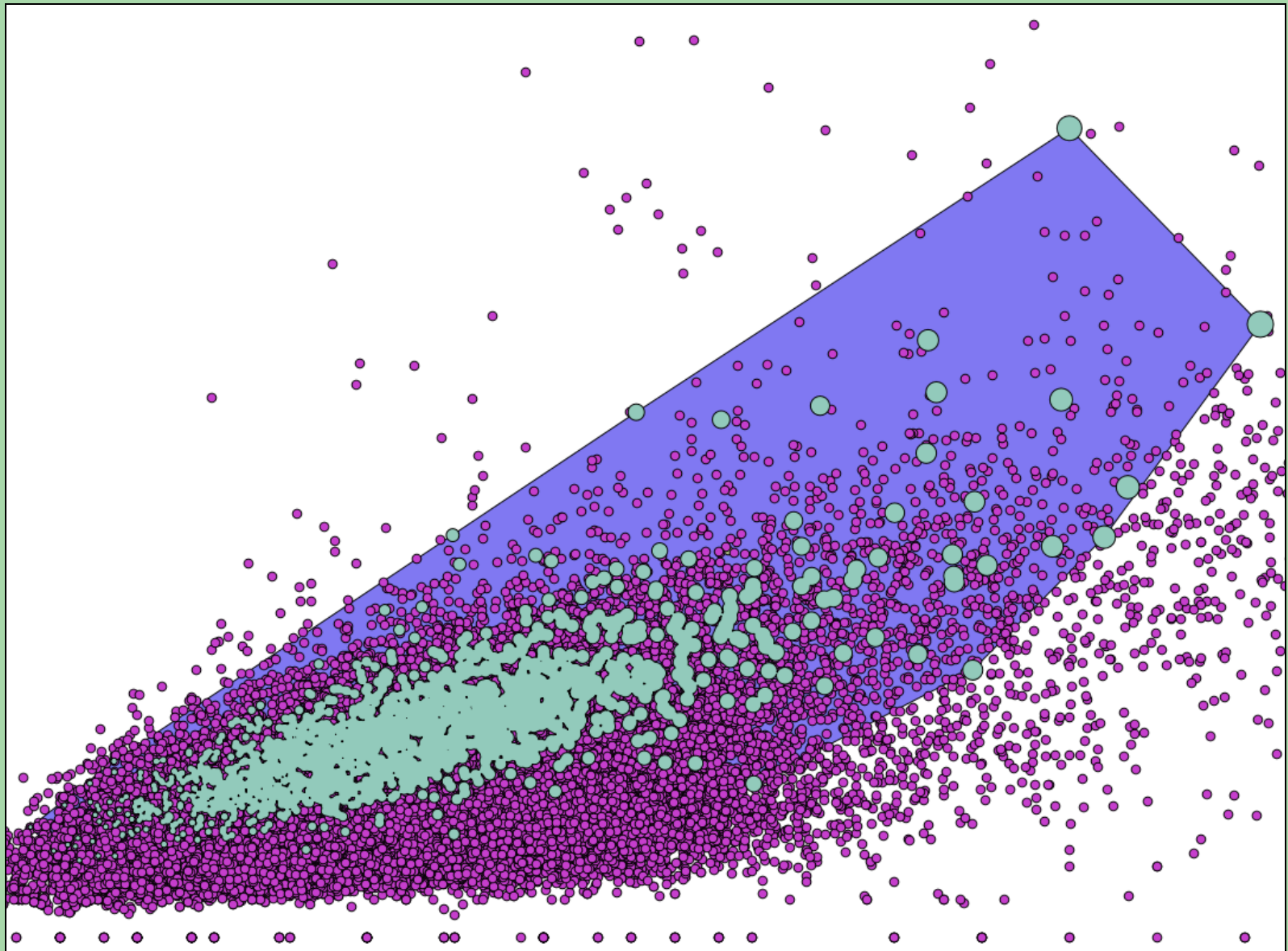
Raster UnSupervised Classification 10ths Quantiles 50 Classes





Segmented UnSupervised Classification 10ths Quantiles RedEdge 25 Classes





Density based Buffering

