

Supplemental Material for the paper “Parallel Irradiance Caching for Interactive Monte-Carlo Direct Volume Rendering”

Philip Voglreiter¹, Markus Steinberger¹, Rostislav Khlebnikov¹,
Bernhard Kainz², and Dieter Schmalstieg¹

¹Institute for Computer Graphics and Vision, Graz University of Technology
²Department of Computing, Imperial College London

Measurements

The following figures describe our extensive experiments and recorded quantities.

List of Figures

1	Testrun 1: Static Scene, Convergence for full scale volumes at 1280x720, light situation 1.	9
12	screen space vs object space: average error bonsai, background off, volume res = 128, screen res = 1280x720, average error	9
2	Testrun 1: Static Scene, Convergence for full scale volumes at 1280x720, light situation 2.	10
13	screen space vs object space: average error bonsai, background off, volume res = 128, screen res = 1920x1080, average error	10
3	Testrun 1: Static Scene, Convergence for full scale volumes at 1280x720, light situation 3.	11
4	Testrun 2: Static Scene, Convergence for full scale volumes at 1920x1080, light situation 1.	11
5	Testrun 2: Static Scene, Convergence for full scale volumes at 1920x1080, light situation 2.	12
6	Testrun 2: Static Scene, Convergence for full scale volumes at 1920x1080, light situation 3.	12
7	Testrun 3: Static Scene, Convergence for half scale volumes at 1920x1080, light situation 1.	13
8	Testrun 3: Static Scene, Convergence for half scale volumes at 1920x1080, light situation 2.	13
9	Testrun 3: Static Scene, Convergence for half scale volumes at 1920x1080, light situation 3.	14
10	Testrun 4: Rotating Scene, Convergence for half scale volumes at 1920x1080, light situation 1.	14
11	Testrun 5: Rotating Scene, Behaviour of cache entry count & reference count.	15
14	screen space vs object space: average error bonsai, background off, volume res = 128, screen res = 640x480, average error	16
15	screen space vs object space: average error bonsai, background off, volume res = 256, screen res = 1280x720, average error	16
16	screen space vs object space: average error bonsai, background off, volume res = 256, screen res = 1920x1080, average error	17
17	screen space vs object space: average error bonsai, background off, volume res = 256, screen res = 640x480, average error	17
18	screen space vs object space: average error bonsai, background off, volume res = 512, screen res = 1280x720, average error	18
19	screen space vs object space: average error bonsai, background off, volume res = 512, screen res = 1920x1080, average error	18

20	screen space vs object space: average error bonsai, background off, volume res = 512, screen res = 640x480, average error	19
21	screen space vs object space: average error bonsai, background on, volume res = 128, screen res = 1280x720, average error	19
22	screen space vs object space: average error bonsai, background on, volume res = 128, screen res = 1920x1080, average error	20
23	screen space vs object space: average error bonsai, background on, volume res = 128, screen res = 640x480, average error	20
24	screen space vs object space: average error bonsai, background on, volume res = 256, screen res = 1280x720, average error	21
25	screen space vs object space: average error bonsai, background on, volume res = 256, screen res = 1920x1080, average error	21
26	screen space vs object space: average error bonsai, background on, volume res = 256, screen res = 640x480, average error	22
27	screen space vs object space: average error bonsai, background on, volume res = 512, screen res = 1280x720, average error	22
28	screen space vs object space: average error bonsai, background on, volume res = 512, screen res = 1920x1080, average error	23
29	screen space vs object space: average error bonsai, background on, volume res = 512, screen res = 640x480, average error	23
30	screen space vs object space: average error manix, background off, volume res = 128, screen res = 1280x720, average error	24
31	screen space vs object space: average error manix, background off, volume res = 128, screen res = 1920x1080, average error	24
32	screen space vs object space: average error manix, background off, volume res = 128, screen res = 640x480, average error	25
33	screen space vs object space: average error manix, background off, volume res = 256, screen res = 1280x720, average error	25
34	screen space vs object space: average error manix, background off, volume res = 256, screen res = 1920x1080, average error	26
35	screen space vs object space: average error manix, background off, volume res = 256, screen res = 640x480, average error	26
36	screen space vs object space: average error manix, background off, volume res = 512, screen res = 1280x720, average error	27
37	screen space vs object space: average error manix, background off, volume res = 512, screen res = 1920x1080, average error	27
38	screen space vs object space: average error manix, background off, volume res = 512, screen res = 640x480, average error	28
39	screen space vs object space: average error manix, background on, volume res = 128, screen res = 1280x720, average error	28
40	screen space vs object space: average error manix, background on, volume res = 128, screen res = 1920x1080, average error	29
41	screen space vs object space: average error manix, background on, volume res = 128, screen res = 640x480, average error	29
42	screen space vs object space: average error manix, background on, volume res = 256, screen res = 1280x720, average error	30

43	screen space vs object space: average error manix, background on, volume res = 256, screen res = 1920x1080, average error	30
44	screen space vs object space: average error manix, background on, volume res = 256, screen res = 640x480, average error	31
45	screen space vs object space: average error manix, background on, volume res = 512, screen res = 1280x720, average error	31
46	screen space vs object space: average error manix, background on, volume res = 512, screen res = 1920x1080, average error	32
47	screen space vs object space: average error manix, background on, volume res = 512, screen res = 640x480, average error	32
48	screen space vs object space: cache hit rate bonsai, background off, volume res = 128, screen res = 1280x720, cache hit rate	33
49	screen space vs object space: cache hit rate bonsai, background off, volume res = 128, screen res = 1920x1080, cache hit rate	33
50	screen space vs object space: cache hit rate bonsai, background off, volume res = 128, screen res = 640x480, cache hit rate	34
51	screen space vs object space: cache hit rate bonsai, background off, volume res = 256, screen res = 1280x720, cache hit rate	34
52	screen space vs object space: cache hit rate bonsai, background off, volume res = 256, screen res = 1920x1080, cache hit rate	35
53	screen space vs object space: cache hit rate bonsai, background off, volume res = 256, screen res = 640x480, cache hit rate	35
54	screen space vs object space: cache hit rate bonsai, background off, volume res = 512, screen res = 1280x720, cache hit rate	36
55	screen space vs object space: cache hit rate bonsai, background off, volume res = 512, screen res = 1920x1080, cache hit rate	36
56	screen space vs object space: cache hit rate bonsai, background off, volume res = 512, screen res = 640x480, cache hit rate	37
57	screen space vs object space: cache hit rate bonsai, background on, volume res = 128, screen res = 1280x720, cache hit rate	37
58	screen space vs object space: cache hit rate bonsai, background on, volume res = 128, screen res = 1920x1080, cache hit rate	38
59	screen space vs object space: cache hit rate bonsai, background on, volume res = 128, screen res = 640x480, cache hit rate	38
60	screen space vs object space: cache hit rate bonsai, background on, volume res = 256, screen res = 1280x720, cache hit rate	39
61	screen space vs object space: cache hit rate bonsai, background on, volume res = 256, screen res = 1920x1080, cache hit rate	39
62	screen space vs object space: cache hit rate bonsai, background on, volume res = 256, screen res = 640x480, cache hit rate	40
63	screen space vs object space: cache hit rate bonsai, background on, volume res = 512, screen res = 1280x720, cache hit rate	40
64	screen space vs object space: cache hit rate bonsai, background on, volume res = 512, screen res = 1920x1080, cache hit rate	41
65	screen space vs object space: cache hit rate bonsai, background on, volume res = 512, screen res = 640x480, cache hit rate	41

66	screen space vs object space: cache hit rate manix, background off, volume res = 128, screen res = 1280x720, cache hit rate	42
67	screen space vs object space: cache hit rate manix, background off, volume res = 128, screen res = 1920x1080, cache hit rate	42
68	screen space vs object space: cache hit rate manix, background off, volume res = 128, screen res = 640x480, cache hit rate	43
69	screen space vs object space: cache hit rate manix, background off, volume res = 256, screen res = 1280x720, cache hit rate	43
70	screen space vs object space: cache hit rate manix, background off, volume res = 256, screen res = 1920x1080, cache hit rate	44
71	screen space vs object space: cache hit rate manix, background off, volume res = 256, screen res = 640x480, cache hit rate	44
72	screen space vs object space: cache hit rate manix, background off, volume res = 512, screen res = 1280x720, cache hit rate	45
73	screen space vs object space: cache hit rate manix, background off, volume res = 512, screen res = 1920x1080, cache hit rate	45
74	screen space vs object space: cache hit rate manix, background off, volume res = 512, screen res = 640x480, cache hit rate	46
75	screen space vs object space: cache hit rate manix, background on, volume res = 128, screen res = 1280x720, cache hit rate	46
76	screen space vs object space: cache hit rate manix, background on, volume res = 128, screen res = 1920x1080, cache hit rate	47
77	screen space vs object space: cache hit rate manix, background on, volume res = 128, screen res = 640x480, cache hit rate	47
78	screen space vs object space: cache hit rate manix, background on, volume res = 256, screen res = 1280x720, cache hit rate	48
79	screen space vs object space: cache hit rate manix, background on, volume res = 256, screen res = 1920x1080, cache hit rate	48
80	screen space vs object space: cache hit rate manix, background on, volume res = 256, screen res = 640x480, cache hit rate	49
81	screen space vs object space: cache hit rate manix, background on, volume res = 512, screen res = 1280x720, cache hit rate	49
82	screen space vs object space: cache hit rate manix, background on, volume res = 512, screen res = 1920x1080, cache hit rate	50
83	screen space vs object space: cache hit rate manix, background on, volume res = 512, screen res = 640x480, cache hit rate	50
84	screen space vs object space: number of entries bonsai, background off, volume res = 128, screen res = 1280x720, entrycount	51
85	screen space vs object space: number of entries bonsai, background off, volume res = 128, screen res = 1920x1080, entrycount	51
86	screen space vs object space: number of entries bonsai, background off, volume res = 128, screen res = 640x480, entrycount	52
87	screen space vs object space: number of entries bonsai, background off, volume res = 256, screen res = 1280x720, entrycount	52
88	screen space vs object space: number of entries bonsai, background off, volume res = 256, screen res = 1920x1080, entrycount	53

89	screen space vs object space: number of entries bonsai, background off, volume res = 256, screen res = 640x480, entrycount	53
90	screen space vs object space: number of entries bonsai, background off, volume res = 512, screen res = 1280x720, entrycount	54
91	screen space vs object space: number of entries bonsai, background off, volume res = 512, screen res = 1920x1080, entrycount	54
92	screen space vs object space: number of entries bonsai, background off, volume res = 512, screen res = 640x480, entrycount	55
93	screen space vs object space: number of entries bonsai, background on, volume res = 128, screen res = 1280x720, entrycount	55
94	screen space vs object space: number of entries bonsai, background on, volume res = 128, screen res = 1920x1080, entrycount	56
95	screen space vs object space: number of entries bonsai, background on, volume res = 128, screen res = 640x480, entrycount	56
96	screen space vs object space: number of entries bonsai, background on, volume res = 256, screen res = 1280x720, entrycount	57
97	screen space vs object space: number of entries bonsai, background on, volume res = 256, screen res = 1920x1080, entrycount	57
98	screen space vs object space: number of entries bonsai, background on, volume res = 256, screen res = 640x480, entrycount	58
99	screen space vs object space: number of entries bonsai, background on, volume res = 512, screen res = 1280x720, entrycount	58
100	screen space vs object space: number of entries bonsai, background on, volume res = 512, screen res = 1920x1080, entrycount	59
101	screen space vs object space: number of entries bonsai, background on, volume res = 512, screen res = 640x480, entrycount	59
102	screen space vs object space: number of entries manix, background off, volume res = 128, screen res = 1280x720, entrycount	60
103	screen space vs object space: number of entries manix, background off, volume res = 128, screen res = 1920x1080, entrycount	60
104	screen space vs object space: number of entries manix, background off, volume res = 128, screen res = 640x480, entrycount	61
105	screen space vs object space: number of entries manix, background off, volume res = 256, screen res = 1280x720, entrycount	61
106	screen space vs object space: number of entries manix, background off, volume res = 256, screen res = 1920x1080, entrycount	62
107	screen space vs object space: number of entries manix, background off, volume res = 256, screen res = 640x480, entrycount	62
108	screen space vs object space: number of entries manix, background off, volume res = 512, screen res = 1280x720, entrycount	63
109	screen space vs object space: number of entries manix, background off, volume res = 512, screen res = 1920x1080, entrycount	63
110	screen space vs object space: number of entries manix, background off, volume res = 512, screen res = 640x480, entrycount	64
111	screen space vs object space: number of entries manix, background on, volume res = 128, screen res = 1280x720, entrycount	64

112	screen space vs object space: number of entries manix, background on, volume res = 128, screen res = 1920x1080, entrycount	65
113	screen space vs object space: number of entries manix, background on, volume res = 128, screen res = 640x480, entrycount	65
114	screen space vs object space: number of entries manix, background on, volume res = 256, screen res = 1280x720, entrycount	66
115	screen space vs object space: number of entries manix, background on, volume res = 256, screen res = 1920x1080, entrycount	66
116	screen space vs object space: number of entries manix, background on, volume res = 256, screen res = 640x480, entrycount	67
117	screen space vs object space: number of entries manix, background on, volume res = 512, screen res = 1280x720, entrycount	67
118	screen space vs object space: number of entries manix, background on, volume res = 512, screen res = 1920x1080, entrycount	68
119	screen space vs object space: number of entries manix, background on, volume res = 512, screen res = 640x480, entrycount	68
120	screen space vs object space: number of references bonsai, background off, volume res = 128, screen res = 1280x720, number of references . .	69
121	screen space vs object space: number of references bonsai, background off, volume res = 128, screen res = 1920x1080, number of references . .	69
122	screen space vs object space: number of references bonsai, background off, volume res = 128, screen res = 640x480, number of references . .	70
123	screen space vs object space: number of references bonsai, background off, volume res = 256, screen res = 1280x720, number of references . .	70
124	screen space vs object space: number of references bonsai, background off, volume res = 256, screen res = 1920x1080, number of references . .	71
125	screen space vs object space: number of references bonsai, background off, volume res = 256, screen res = 640x480, number of references . . .	71
126	screen space vs object space: number of references bonsai, background off, volume res = 512, screen res = 1280x720, number of references . .	72
127	screen space vs object space: number of references bonsai, background off, volume res = 512, screen res = 1920x1080, number of references . .	72
128	screen space vs object space: number of references bonsai, background off, volume res = 512, screen res = 640x480, number of references . .	73
129	screen space vs object space: number of references bonsai, background on, volume res = 128, screen res = 1280x720, number of references . .	73
130	screen space vs object space: number of references bonsai, background on, volume res = 128, screen res = 1920x1080, number of references . .	74
131	screen space vs object space: number of references bonsai, background on, volume res = 128, screen res = 640x480, number of references . .	74
132	screen space vs object space: number of references bonsai, background on, volume res = 256, screen res = 1280x720, number of references . .	75
133	screen space vs object space: number of references bonsai, background on, volume res = 256, screen res = 1920x1080, number of references . .	75
134	screen space vs object space: number of references bonsai, background on, volume res = 256, screen res = 640x480, number of references . .	76

135	screen space vs object space: number of references bonsai, background on, volume res = 512, screen res = 1280x720, number of references . . .	76
136	screen space vs object space: number of references bonsai, background on, volume res = 512, screen res = 1920x1080, number of references . . .	77
137	screen space vs object space: number of references bonsai, background on, volume res = 512, screen res = 640x480, number of references . . .	77
138	screen space vs object space: number of references manix, background off, volume res = 128, screen res = 1280x720, number of references . . .	78
139	screen space vs object space: number of references manix, background off, volume res = 128, screen res = 1920x1080, number of references . . .	78
140	screen space vs object space: number of references manix, background off, volume res = 128, screen res = 640x480, number of references . . .	79
141	screen space vs object space: number of references manix, background off, volume res = 256, screen res = 1280x720, number of references . . .	79
142	screen space vs object space: number of references manix, background off, volume res = 256, screen res = 1920x1080, number of references . . .	80
143	screen space vs object space: number of references manix, background off, volume res = 256, screen res = 640x480, number of references . . .	80
144	screen space vs object space: number of references manix, background off, volume res = 512, screen res = 1280x720, number of references . . .	81
145	screen space vs object space: number of references manix, background off, volume res = 512, screen res = 1920x1080, number of references . . .	81
146	screen space vs object space: number of references manix, background off, volume res = 512, screen res = 640x480, number of references . . .	82
147	screen space vs object space: number of references manix, background on, volume res = 128, screen res = 1280x720, number of references . . .	82
148	screen space vs object space: number of references manix, background on, volume res = 128, screen res = 1920x1080, number of references . . .	83
149	screen space vs object space: number of references manix, background on, volume res = 128, screen res = 640x480, number of references . . .	83
150	screen space vs object space: number of references manix, background on, volume res = 256, screen res = 1280x720, number of references . . .	84
151	screen space vs object space: number of references manix, background on, volume res = 256, screen res = 1920x1080, number of references . . .	84
152	screen space vs object space: number of references manix, background on, volume res = 256, screen res = 640x480, number of references . . .	85
153	screen space vs object space: number of references manix, background on, volume res = 512, screen res = 1280x720, number of references . . .	85
154	screen space vs object space: number of references manix, background on, volume res = 512, screen res = 1920x1080, number of references . . .	86
155	screen space vs object space: number of references manix, background on, volume res = 512, screen res = 640x480, number of references . . .	86

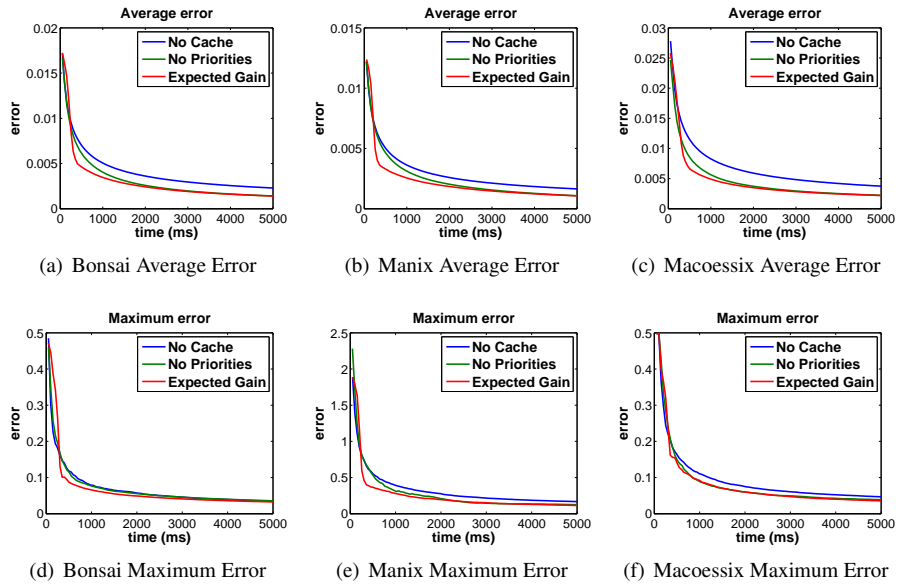


Figure 1: Testrun 1: Static Scene, Convergence for full scale volumes at 1280x720, light situation 1.

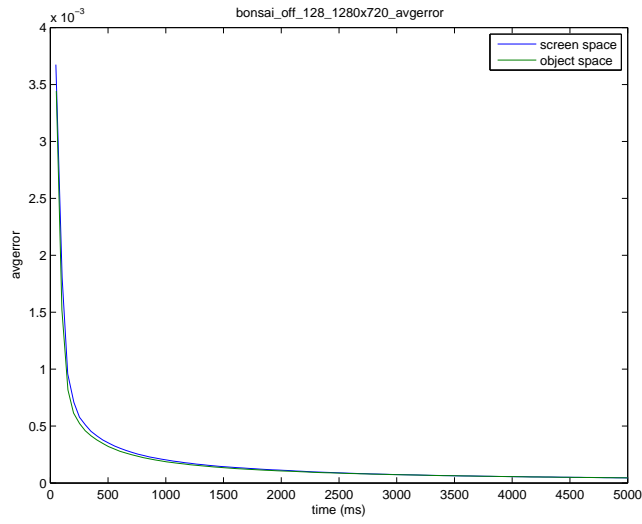


Figure 12: screen space vs object space: average error bonsai, background off, volume res = 128, screen res = 1280x720, average error

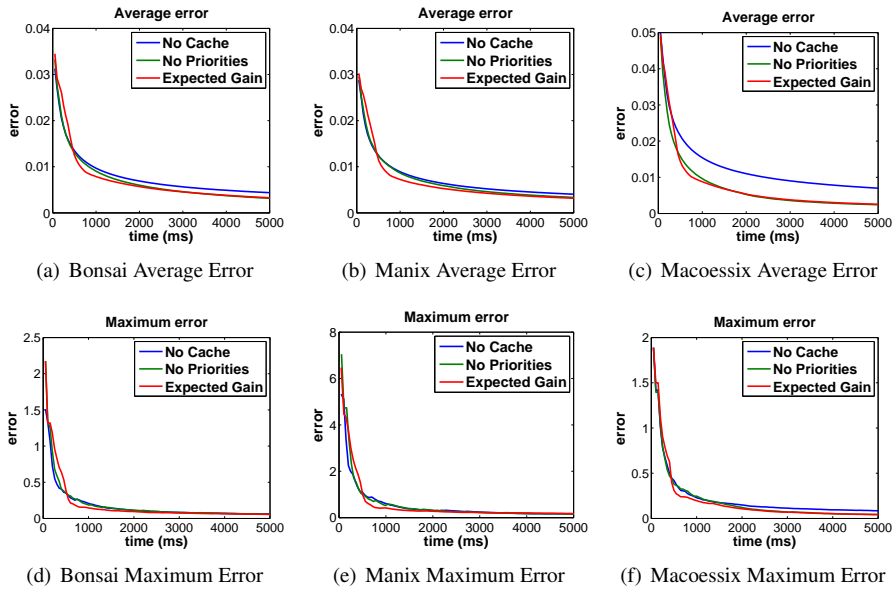


Figure 2: Testrun 1: Static Scene, Convergence for full scale volumes at 1280x720, light situation 2.

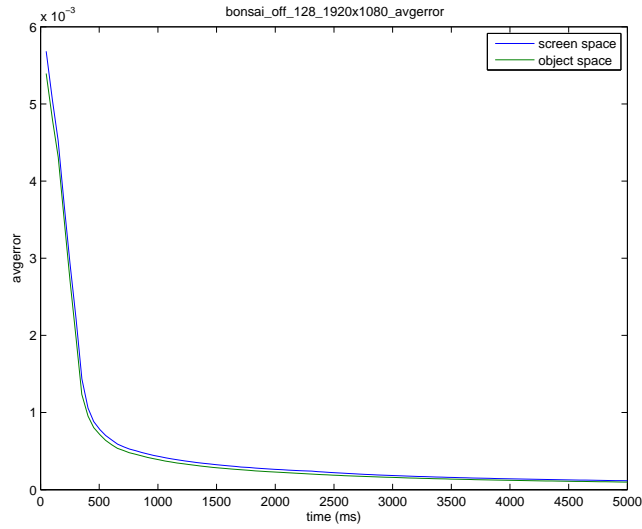


Figure 13: screen space vs object space: average error bonsai, background off, volume res = 128, screen res = 1920x1080, average error

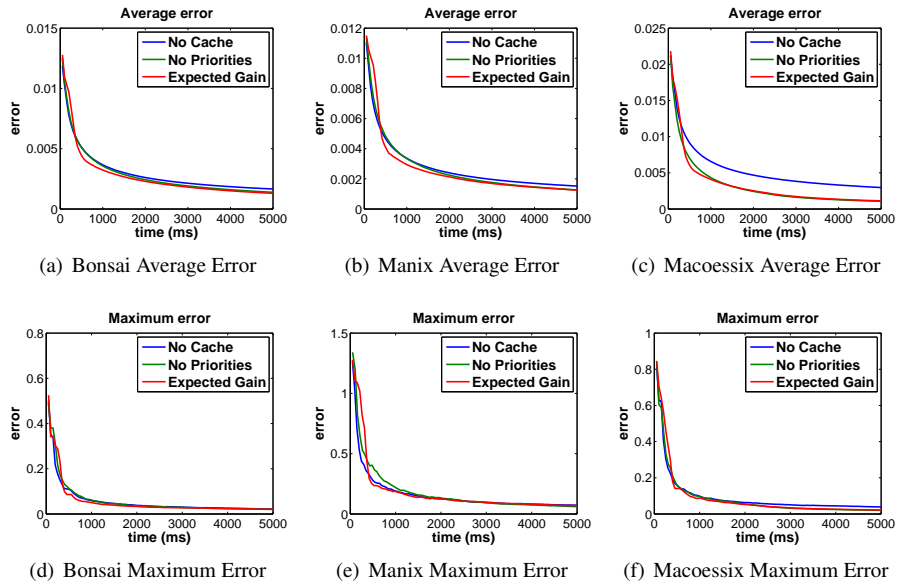


Figure 3: Testrun 1: Static Scene, Convergence for full scale volumes at 1280x720, light situation 3.

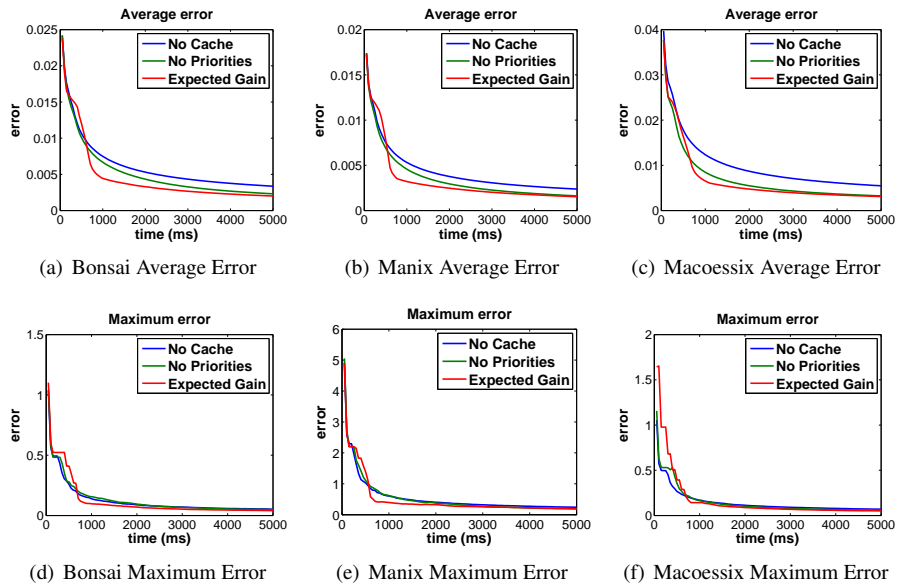


Figure 4: Testrun 2: Static Scene, Convergence for full scale volumes at 1920x1080, light situation 1.

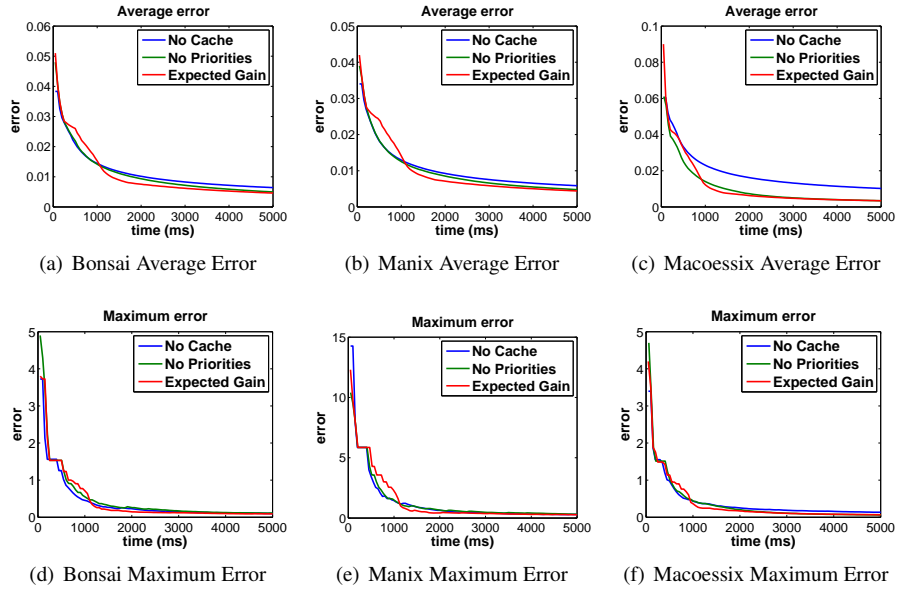


Figure 5: Testrun 2: Static Scene, Convergence for full scale volumes at 1920x1080, light situation 2.

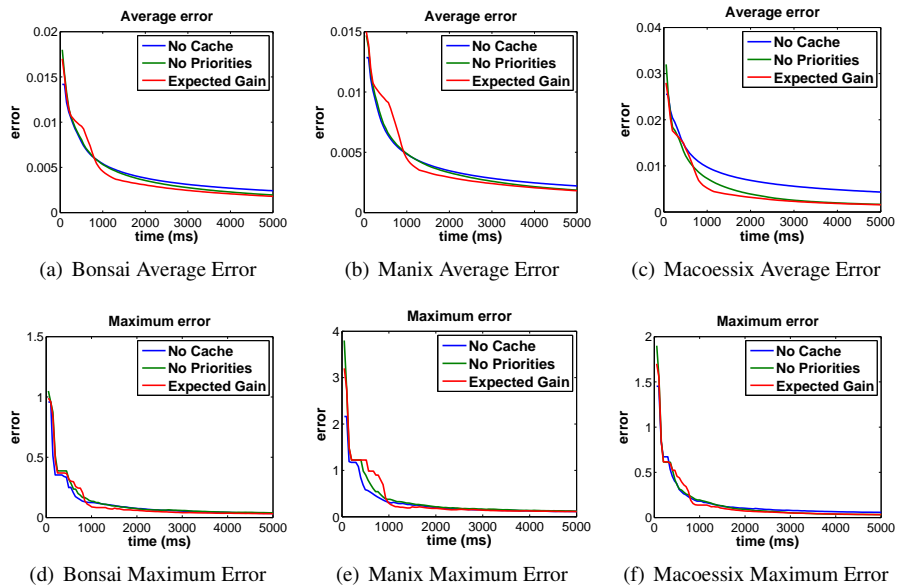


Figure 6: Testrun 2: Static Scene, Convergence for full scale volumes at 1920x1080, light situation 3.

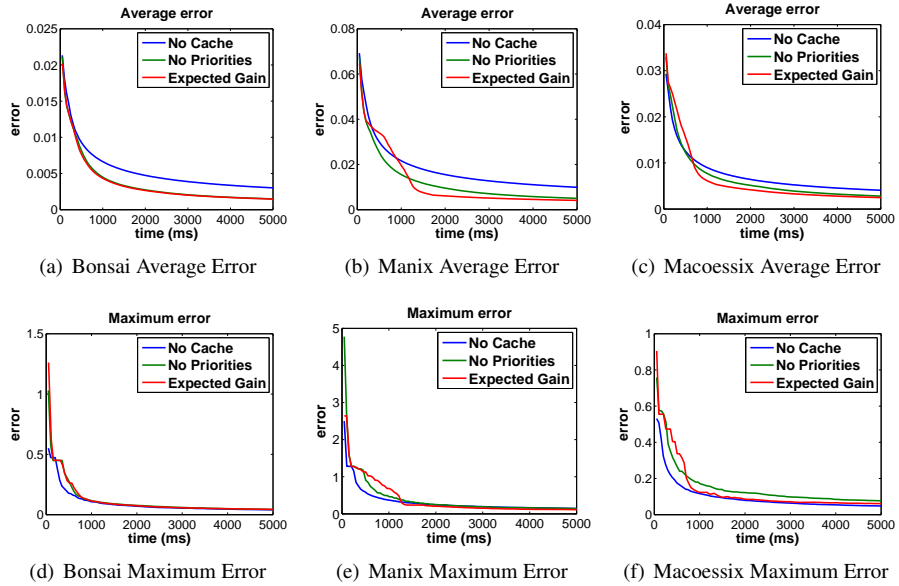


Figure 7: Testrun 3: Static Scene, Convergence for half scale volumes at 1920x1080, light situation 1.

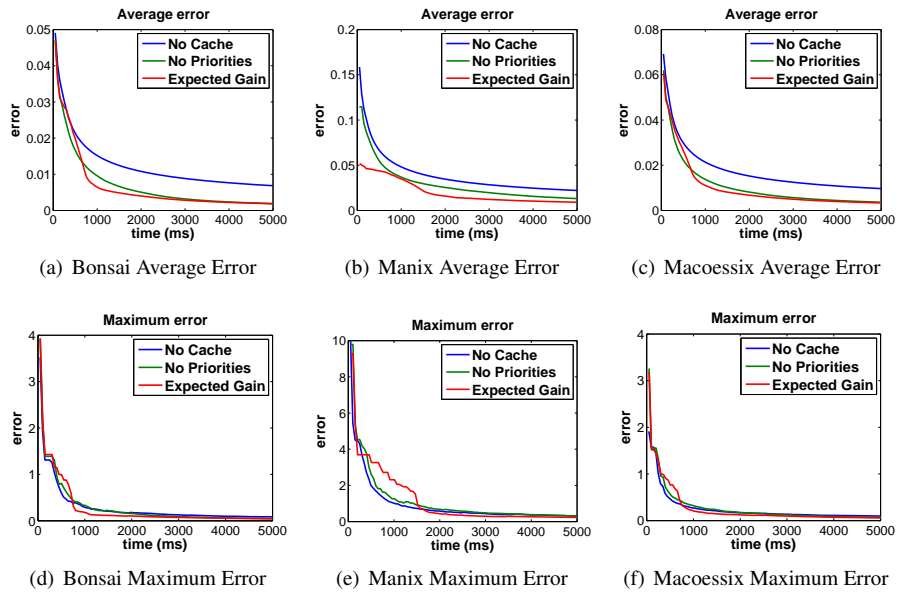


Figure 8: Testrun 3: Static Scene, Convergence for half scale volumes at 1920x1080, light situation 2.

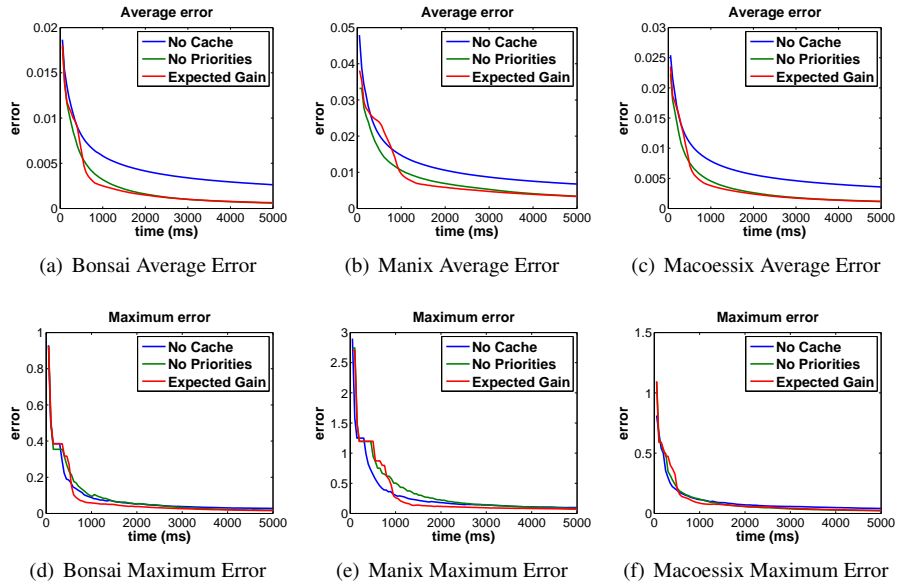


Figure 9: Testrun 3: Static Scene, Convergence for half scale volumes at 1920x1080, light situation 3.

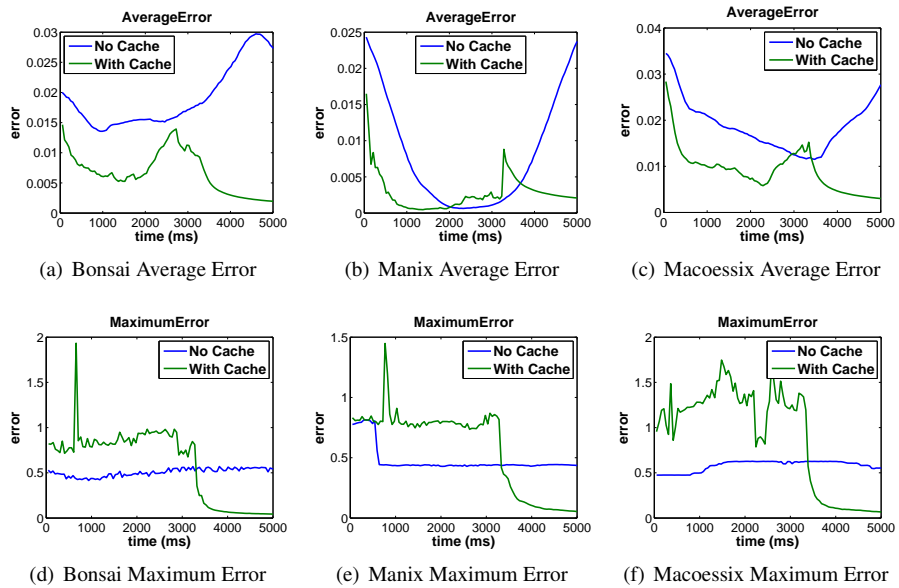


Figure 10: Testrun 4: Rotating Scene, Convergence for half scale volumes at 1920x1080, light situation 1.

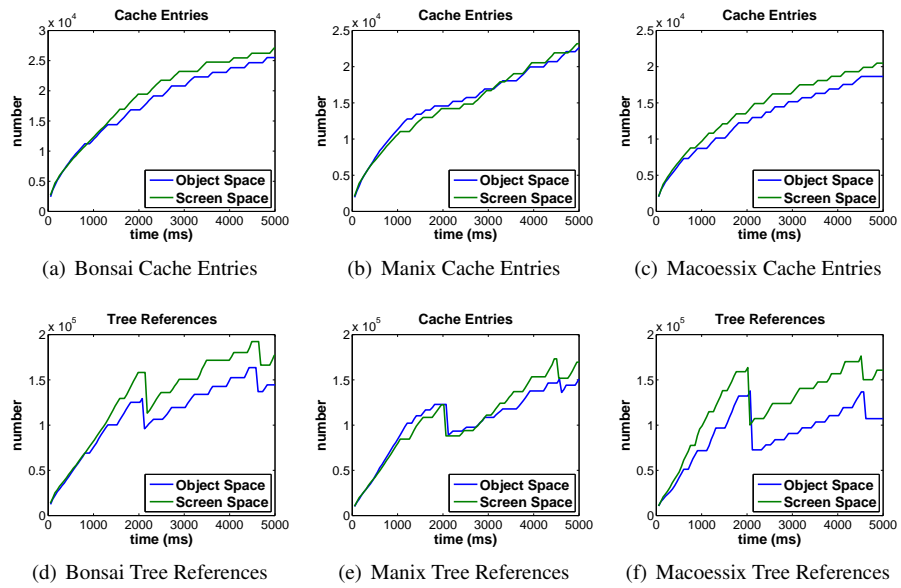


Figure 11: Testrun 5: Rotating Scene, Behaviour of cache entry count & reference count.

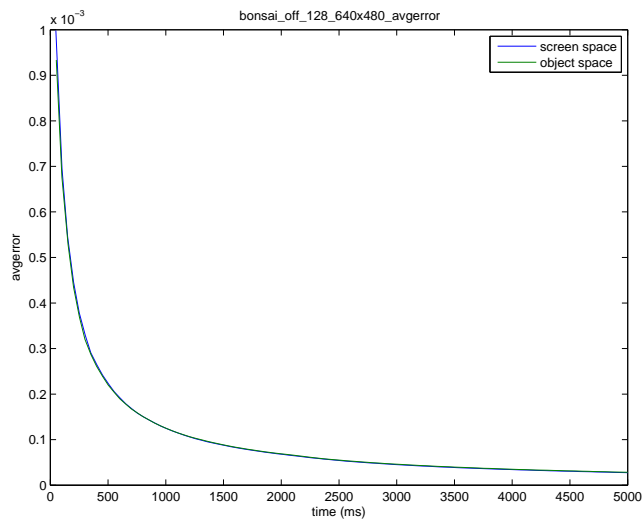


Figure 14: screen space vs object space: average error bonsai, background off, volume res = 128, screen res = 640x480, average error

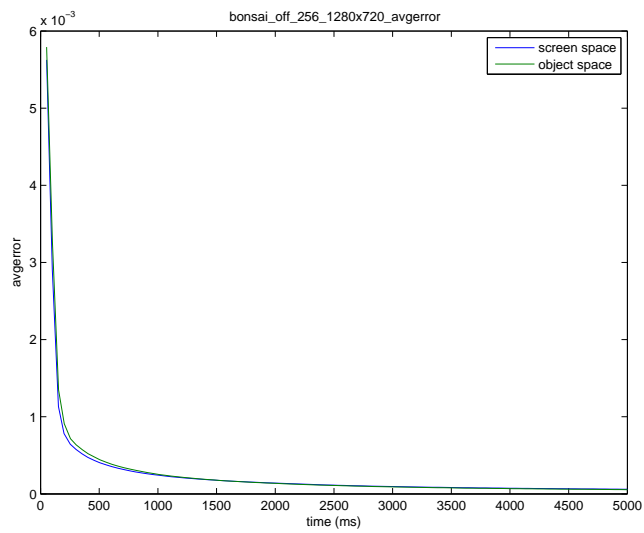


Figure 15: screen space vs object space: average error bonsai, background off, volume res = 256, screen res = 1280x720, average error

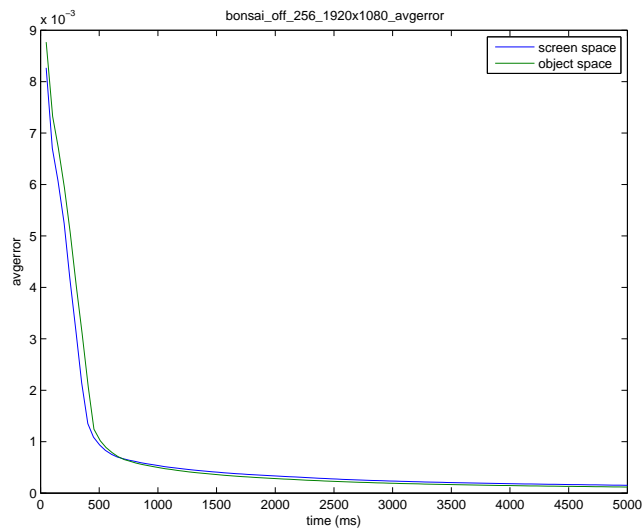


Figure 16: screen space vs object space: average error bonsai, background off, volume res = 256, screen res = 1920x1080, average error

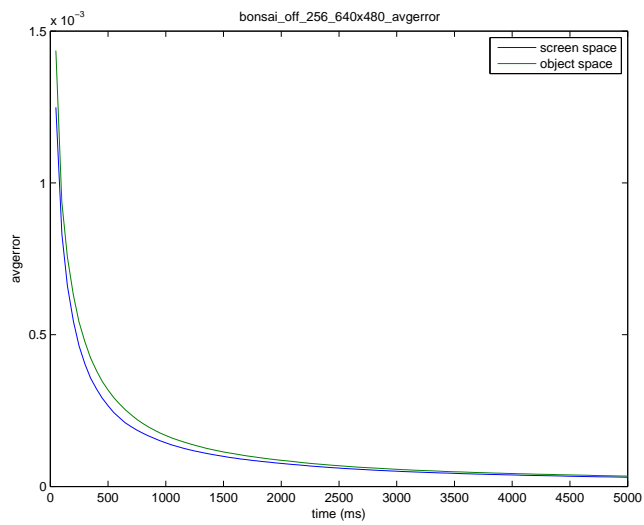


Figure 17: screen space vs object space: average error bonsai, background off, volume res = 256, screen res = 640x480, average error

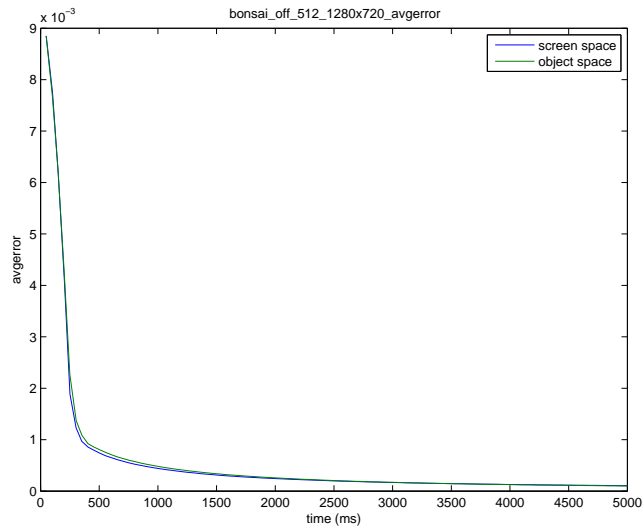


Figure 18: screen space vs object space: average error bonsai, background off, volume res = 512, screen res = 1280x720, average error

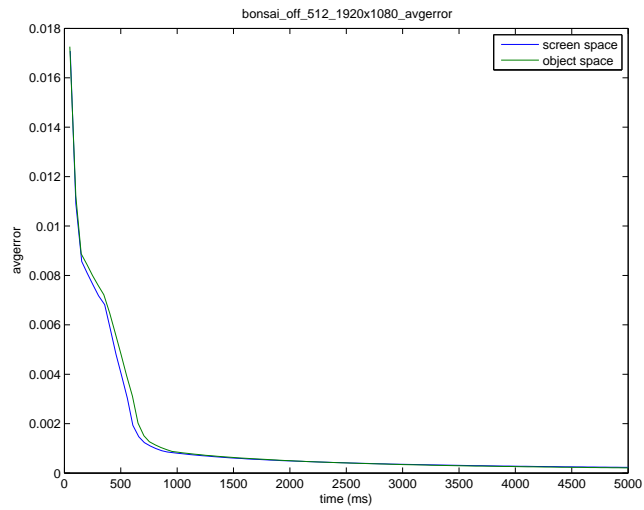


Figure 19: screen space vs object space: average error bonsai, background off, volume res = 512, screen res = 1920x1080, average error

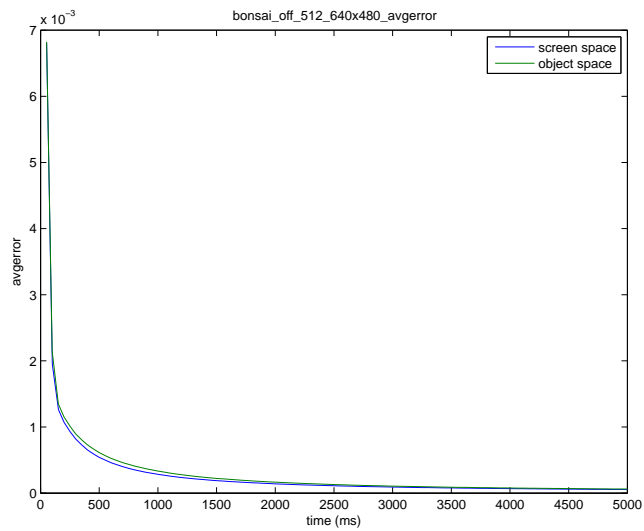


Figure 20: screen space vs object space: average error bonsai, background off, volume res = 512, screen res = 640x480, average error

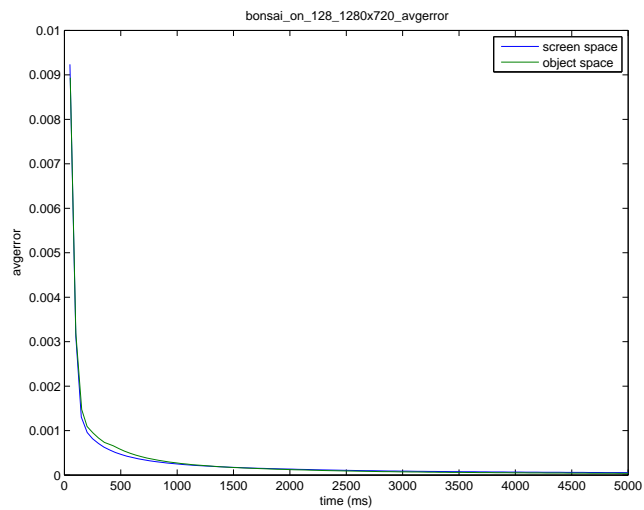


Figure 21: screen space vs object space: average error bonsai, background on, volume res = 128, screen res = 1280x720, average error

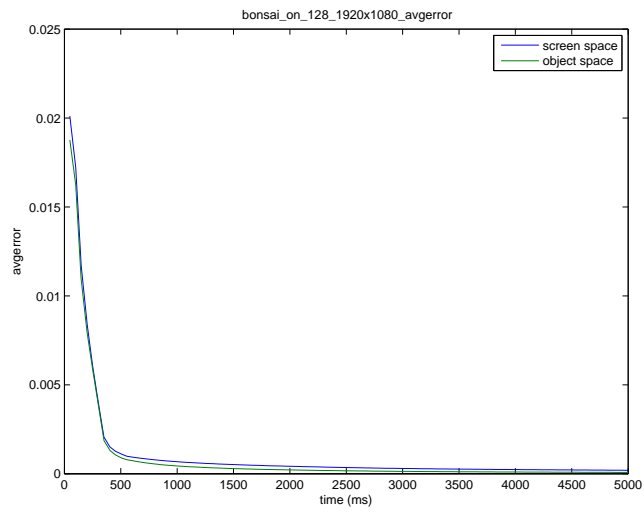


Figure 22: screen space vs object space: average error bonsai, background on, volume res = 128, screen res = 1920x1080, average error

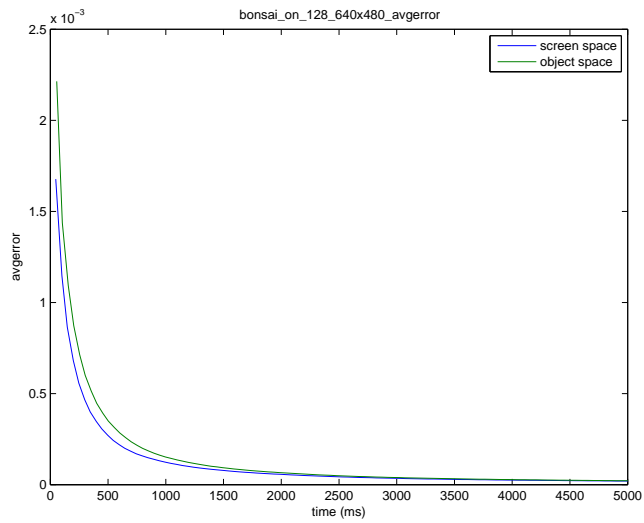


Figure 23: screen space vs object space: average error bonsai, background on, volume res = 128, screen res = 640x480, average error

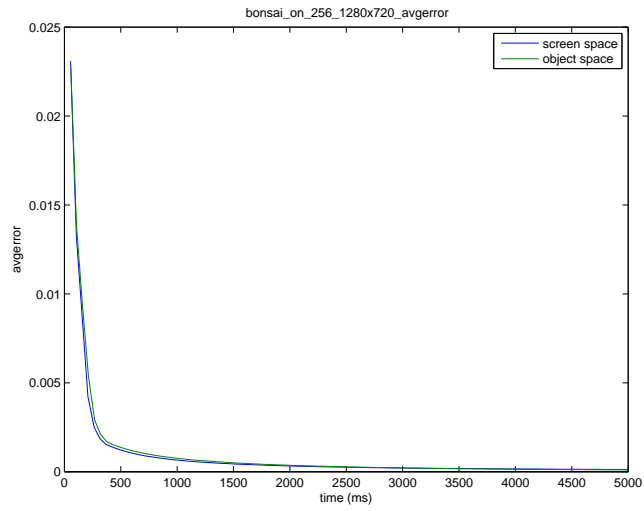


Figure 24: screen space vs object space: average error bonsai, background on, volume res = 256, screen res = 1280x720, average error

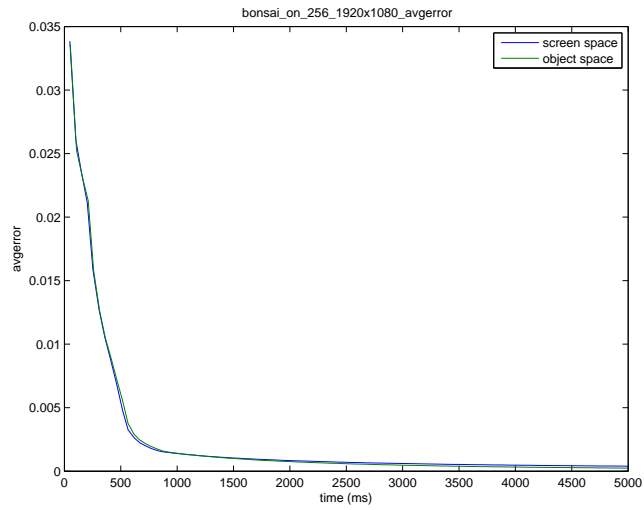


Figure 25: screen space vs object space: average error bonsai, background on, volume res = 256, screen res = 1920x1080, average error

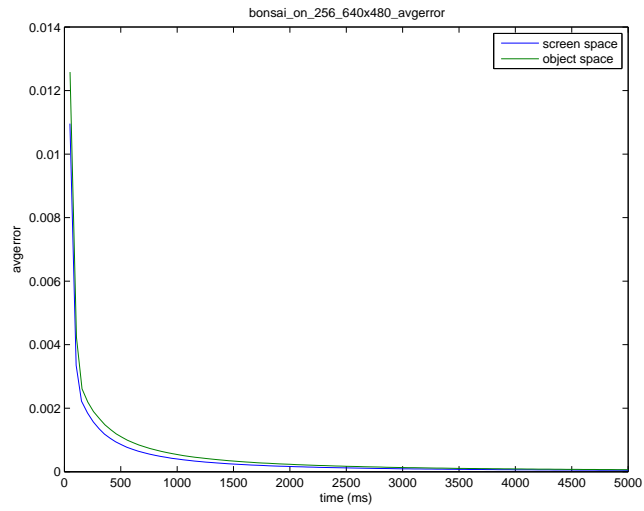


Figure 26: screen space vs object space: average error bonsai, background on, volume res = 256, screen res = 640x480, average error

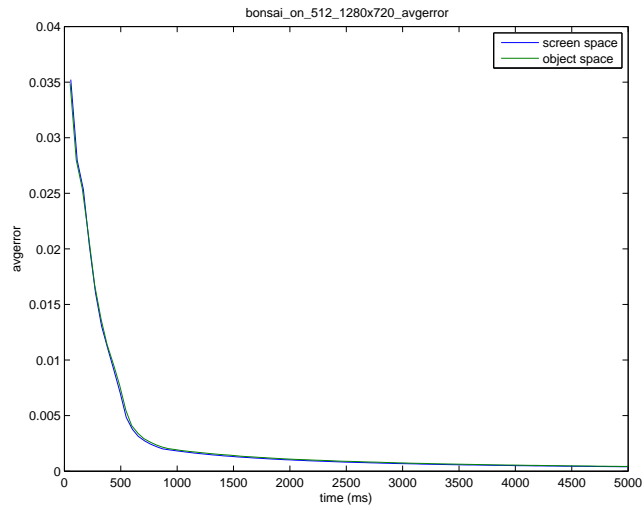


Figure 27: screen space vs object space: average error bonsai, background on, volume res = 512, screen res = 1280x720, average error

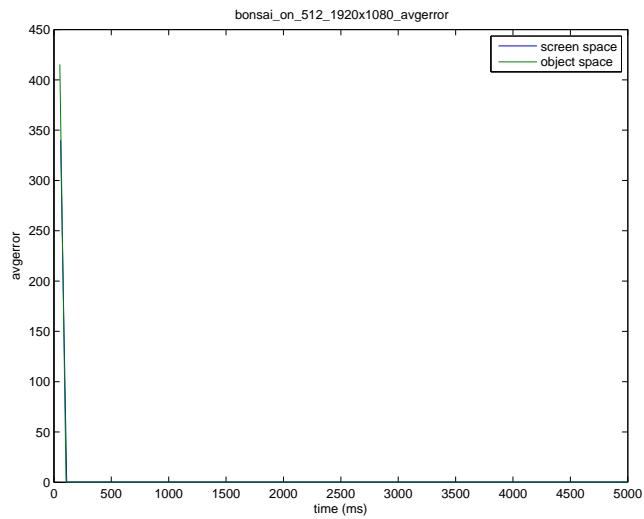


Figure 28: screen space vs object space: average error bonsai, background on, volume res = 512, screen res = 1920x1080, average error

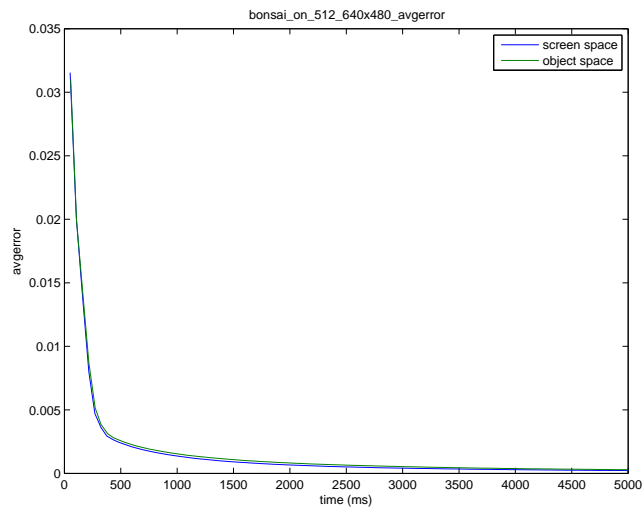


Figure 29: screen space vs object space: average error bonsai, background on, volume res = 512, screen res = 640x480, average error

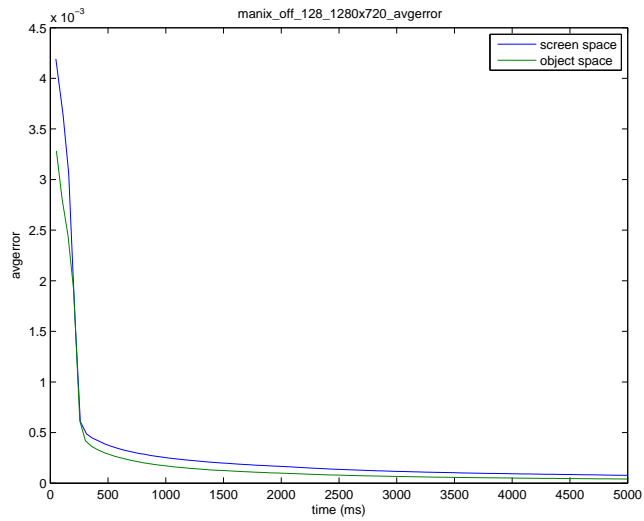


Figure 30: screen space vs object space: average error manix, background off, volume res = 128, screen res = 1280x720, average error

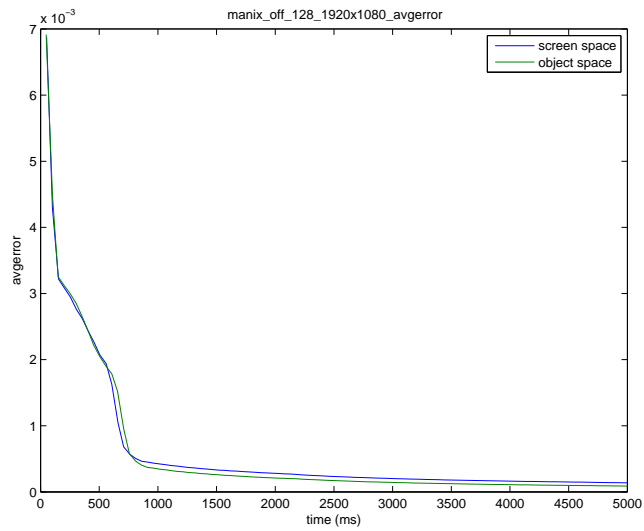


Figure 31: screen space vs object space: average error manix, background off, volume res = 128, screen res = 1920x1080, average error

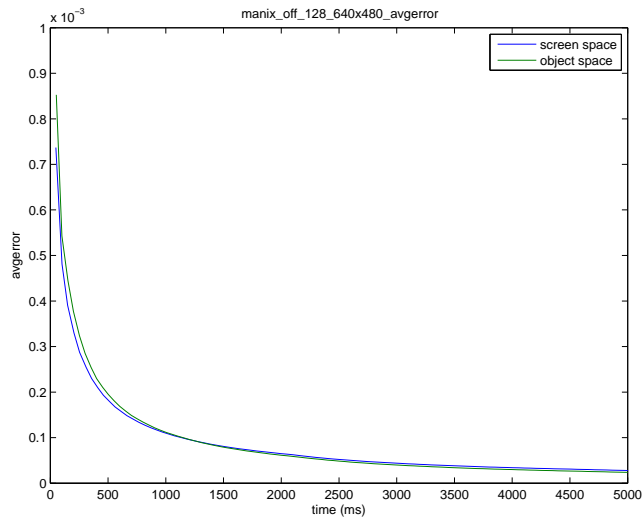


Figure 32: screen space vs object space: average error manix, background off, volume res = 128, screen res = 640x480, average error

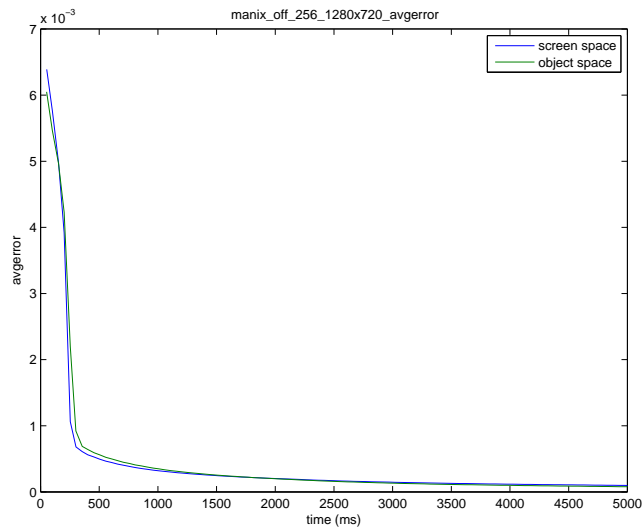


Figure 33: screen space vs object space: average error manix, background off, volume res = 256, screen res = 1280x720, average error

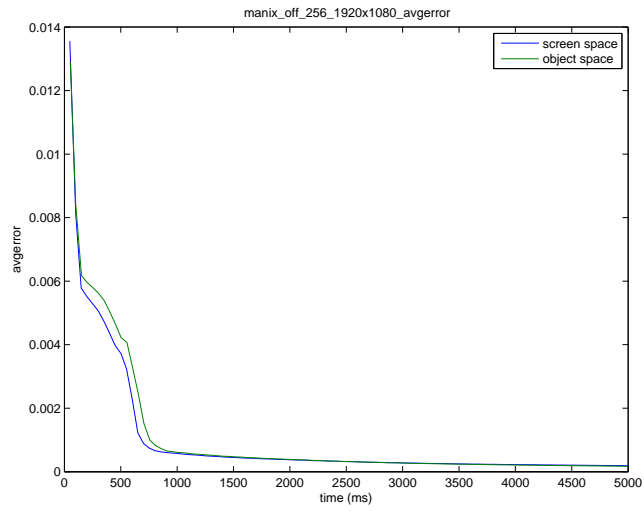


Figure 34: screen space vs object space: average error manix, background off, volume res = 256, screen res = 1920x1080, average error

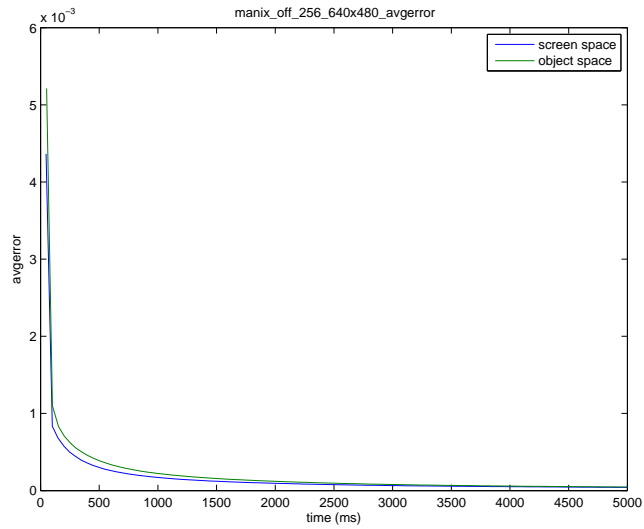


Figure 35: screen space vs object space: average error manix, background off, volume res = 256, screen res = 640x480, average error

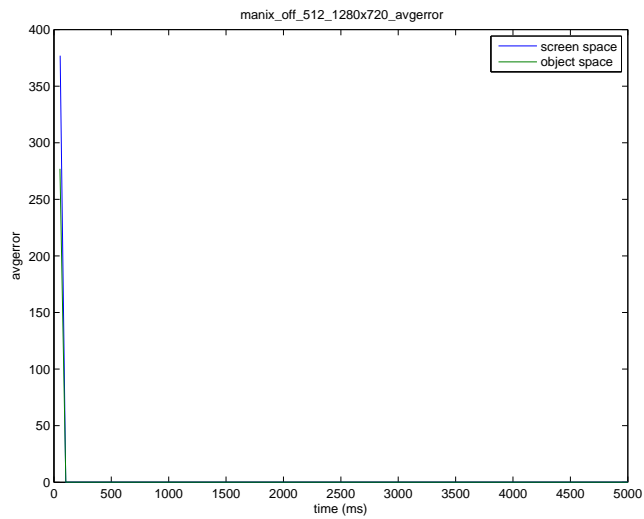


Figure 36: screen space vs object space: average error manix, background off, volume res = 512, screen res = 1280x720, average error

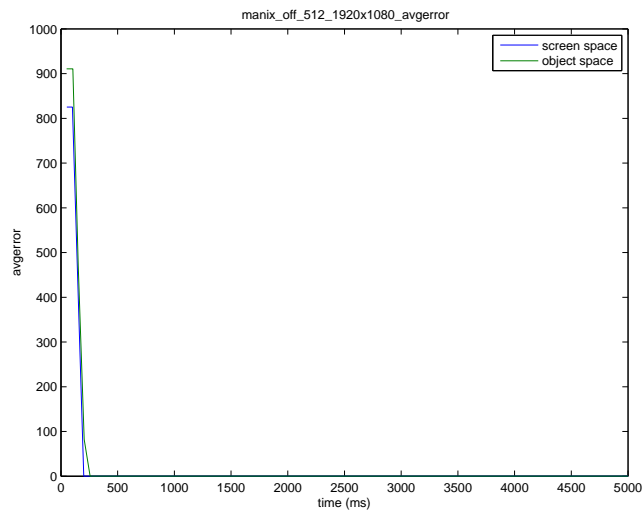


Figure 37: screen space vs object space: average error manix, background off, volume res = 512, screen res = 1920x1080, average error

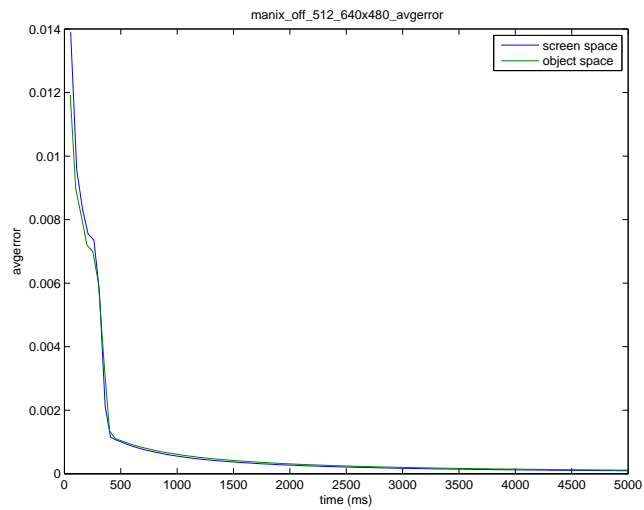


Figure 38: screen space vs object space: average error manix, background off, volume res = 512, screen res = 640x480, average error

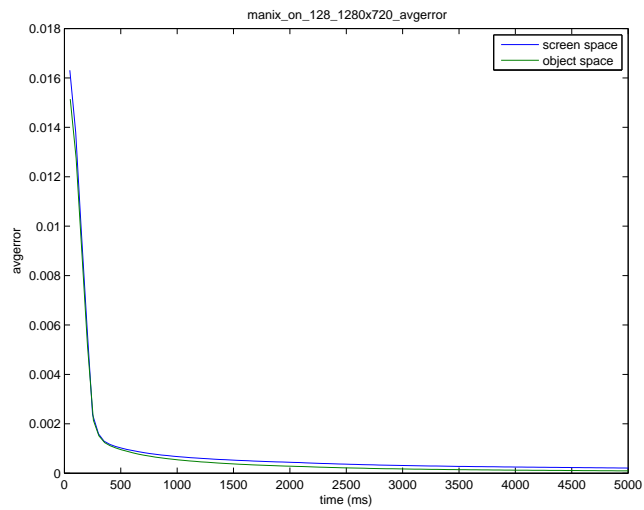


Figure 39: screen space vs object space: average error manix, background on, volume res = 128, screen res = 1280x720, average error

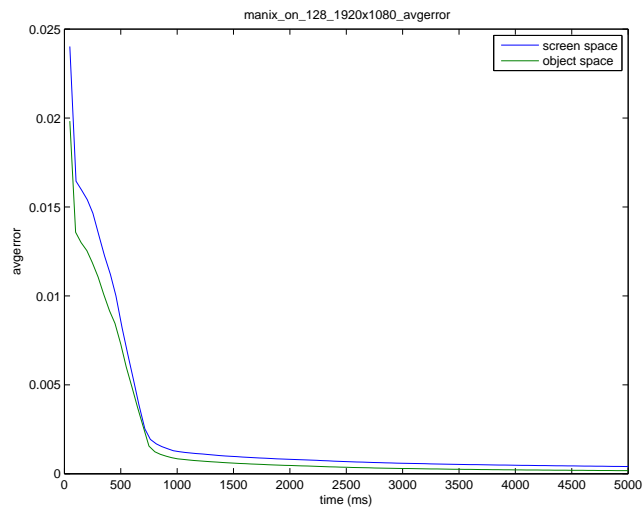


Figure 40: screen space vs object space: average error manix, background on, volume res = 128, screen res = 1920x1080, average error

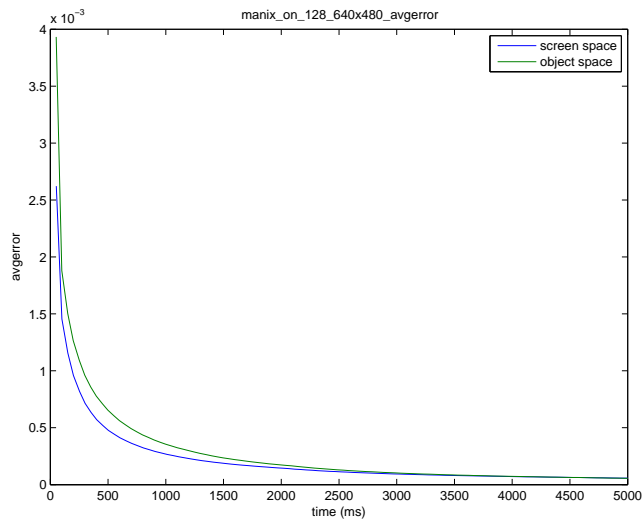


Figure 41: screen space vs object space: average error manix, background on, volume res = 128, screen res = 640x480, average error

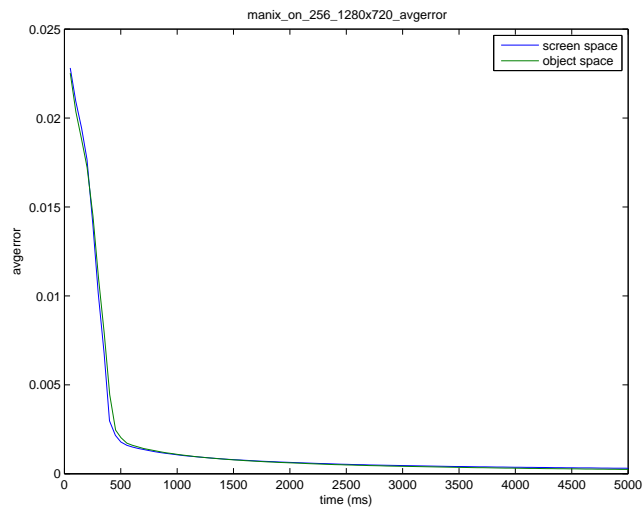


Figure 42: screen space vs object space: average error manix, background on, volume res = 256, screen res = 1280x720, average error

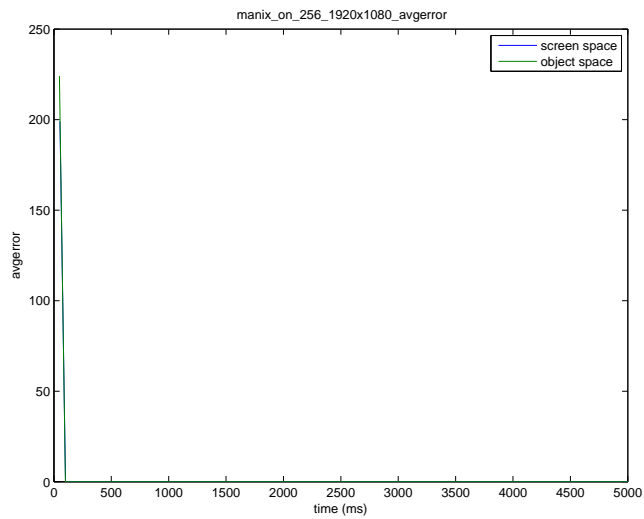


Figure 43: screen space vs object space: average error manix, background on, volume res = 256, screen res = 1920x1080, average error

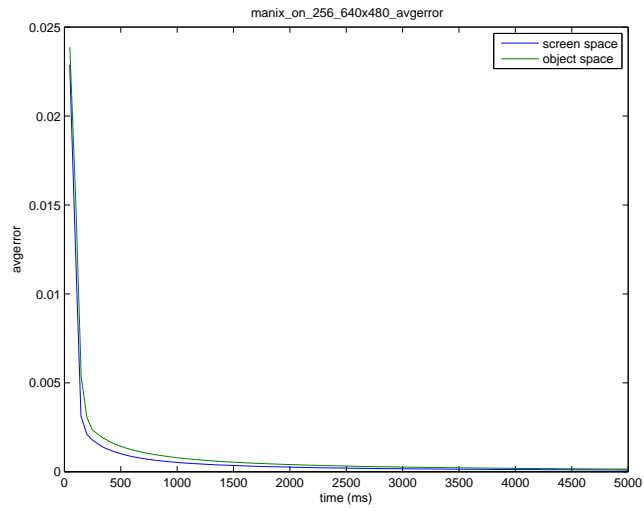


Figure 44: screen space vs object space: average error manix, background on, volume res = 256, screen res = 640x480, average error

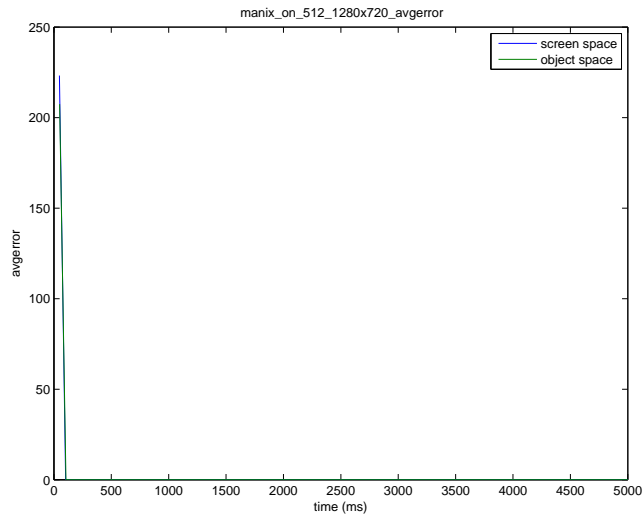


Figure 45: screen space vs object space: average error manix, background on, volume res = 512, screen res = 1280x720, average error

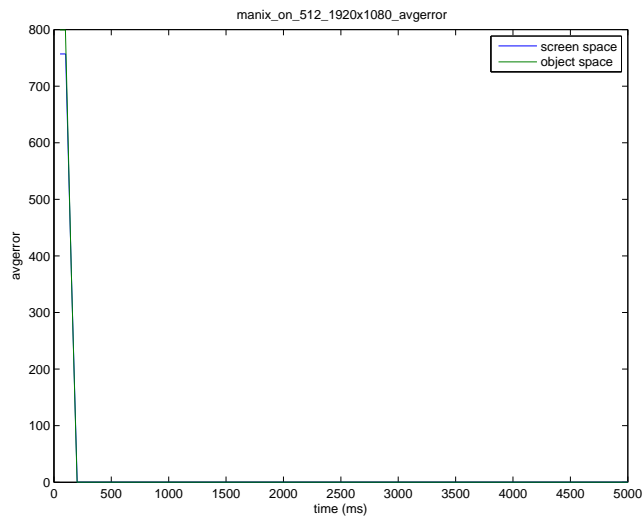


Figure 46: screen space vs object space: average error manix, background on, volume res = 512, screen res = 1920x1080, average error

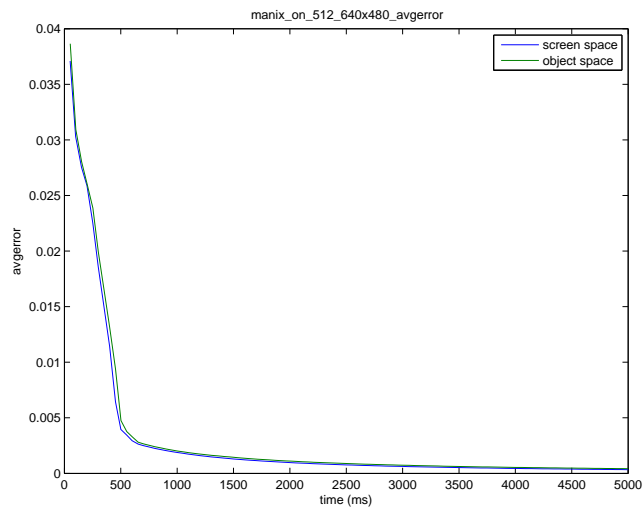


Figure 47: screen space vs object space: average error manix, background on, volume res = 512, screen res = 640x480, average error

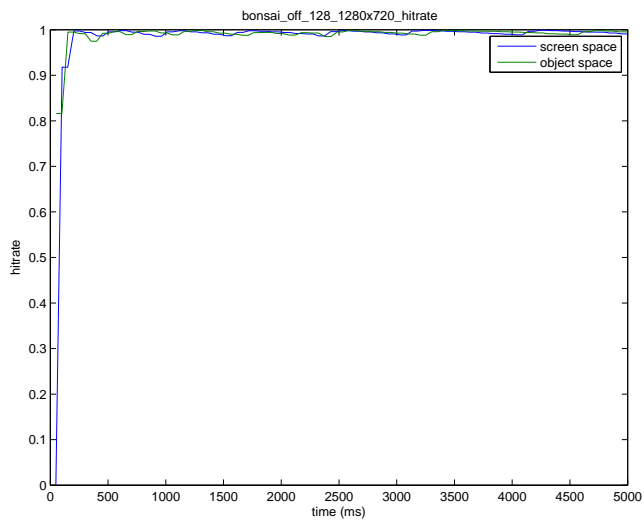


Figure 48: screen space vs object space: cache hit rate bonsai, background off, volume res = 128, screen res = 1280x720, cache hit rate

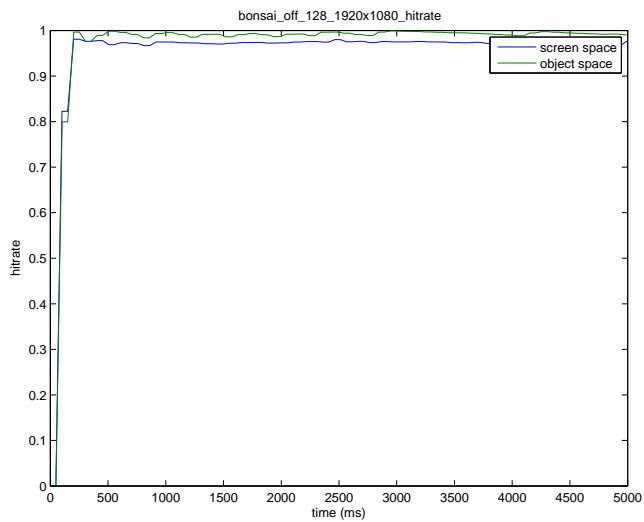


Figure 49: screen space vs object space: cache hit rate bonsai, background off, volume res = 128, screen res = 1920x1080, cache hit rate

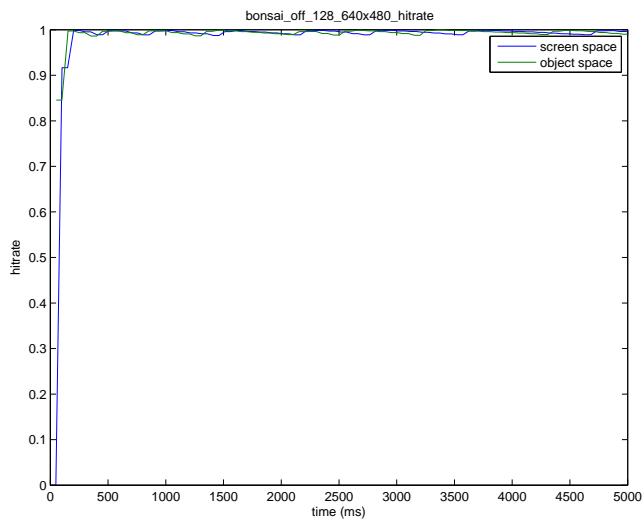


Figure 50: screen space vs object space: cache hit rate bonsai, background off, volume res = 128, screen res = 640x480, cache hit rate

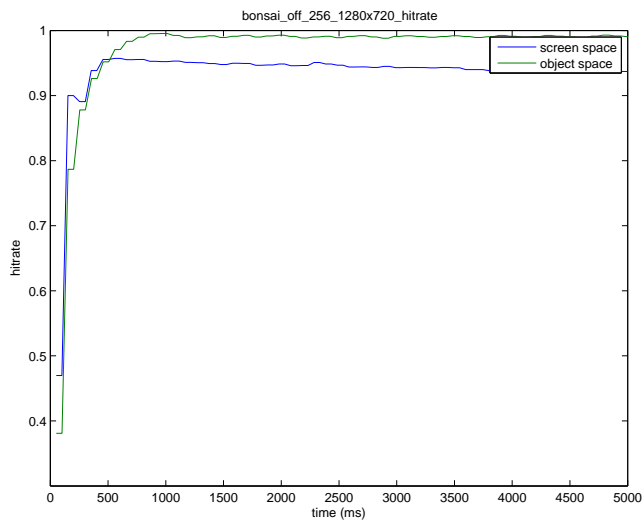


Figure 51: screen space vs object space: cache hit rate bonsai, background off, volume res = 256, screen res = 1280x720, cache hit rate

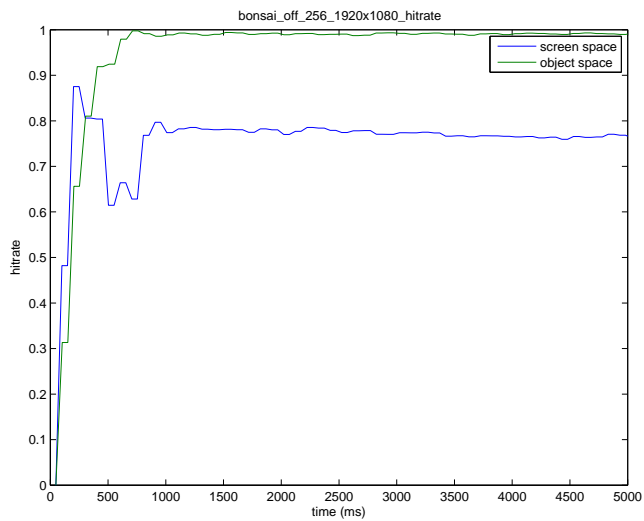


Figure 52: screen space vs object space: cache hit rate bonsai, background off, volume res = 256, screen res = 1920x1080, cache hit rate

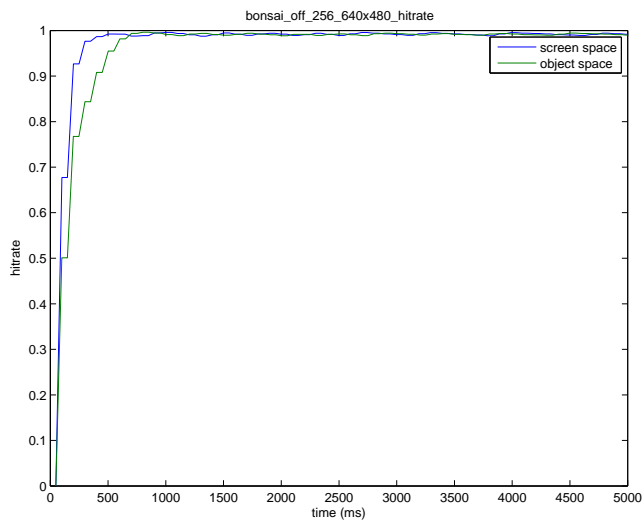


Figure 53: screen space vs object space: cache hit rate bonsai, background off, volume res = 256, screen res = 640x480, cache hit rate

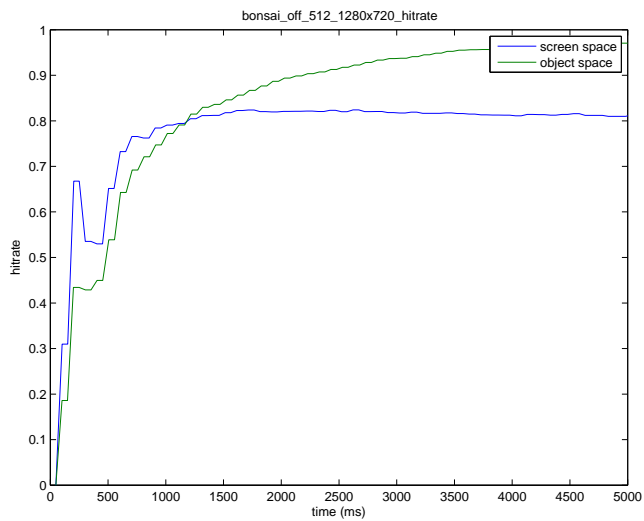


Figure 54: screen space vs object space: cache hit rate bonsai, background off, volume res = 512, screen res = 1280x720, cache hit rate

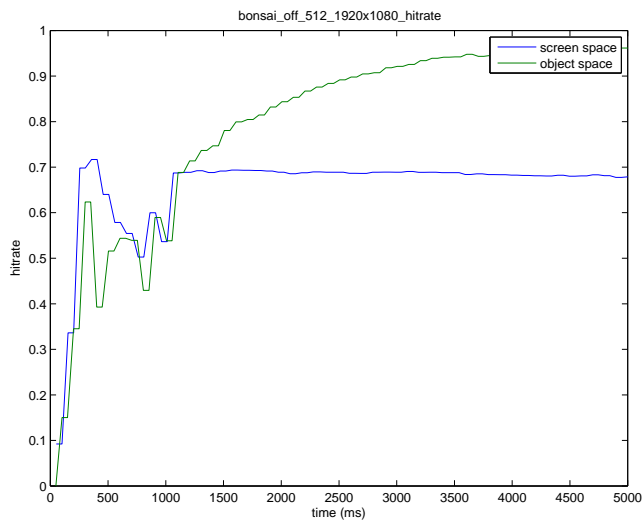


Figure 55: screen space vs object space: cache hit rate bonsai, background off, volume res = 512, screen res = 1920x1080, cache hit rate

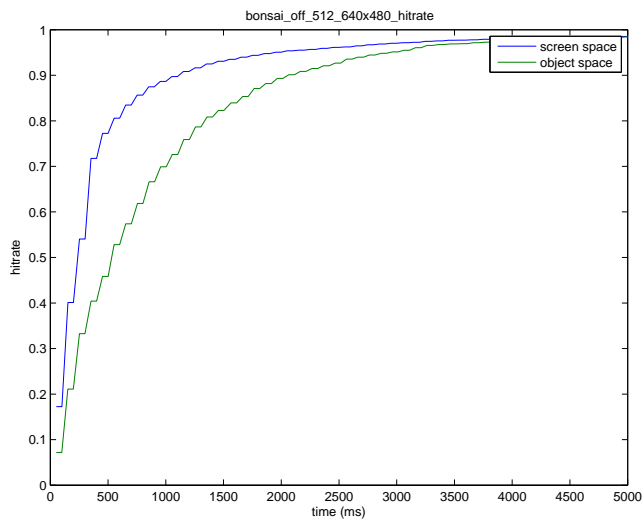


Figure 56: screen space vs object space: cache hit rate bonsai, background off, volume res = 512, screen res = 640x480, cache hit rate

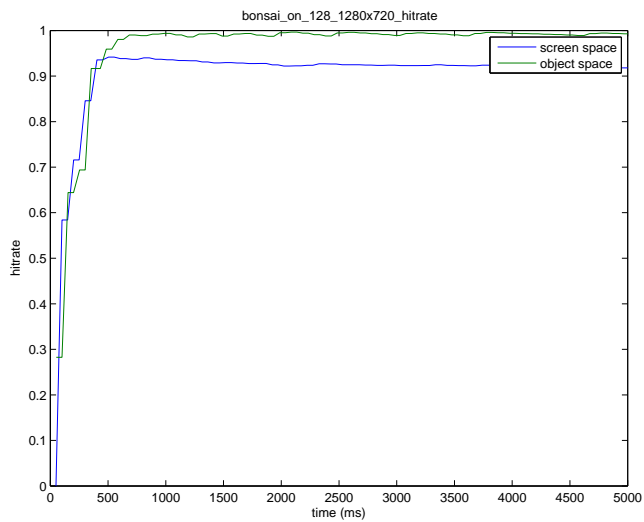


Figure 57: screen space vs object space: cache hit rate bonsai, background on, volume res = 128, screen res = 1280x720, cache hit rate

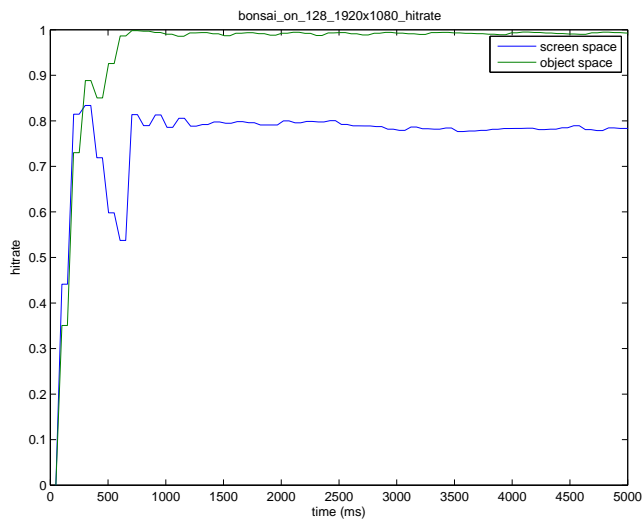


Figure 58: screen space vs object space: cache hit rate bonsai, background on, volume res = 128, screen res = 1920x1080, cache hit rate

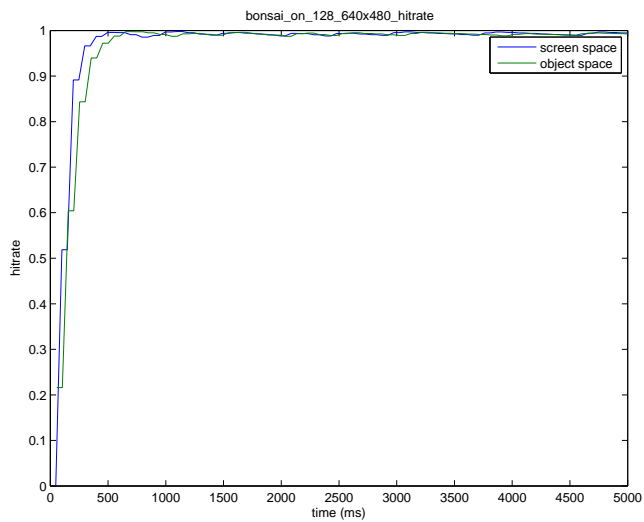


Figure 59: screen space vs object space: cache hit rate bonsai, background on, volume res = 128, screen res = 640x480, cache hit rate

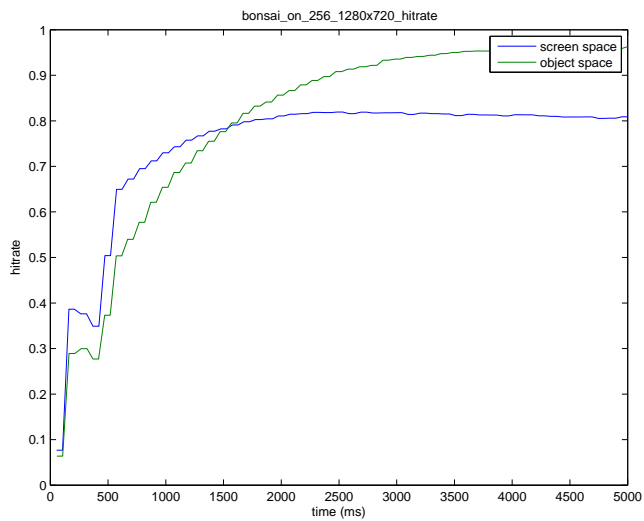


Figure 60: screen space vs object space: cache hit rate bonsai, background on, volume res = 256, screen res = 1280x720, cache hit rate

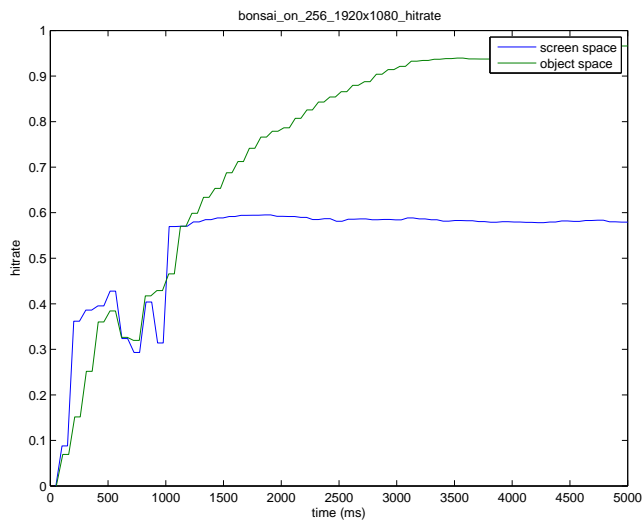


Figure 61: screen space vs object space: cache hit rate bonsai, background on, volume res = 256, screen res = 1920x1080, cache hit rate

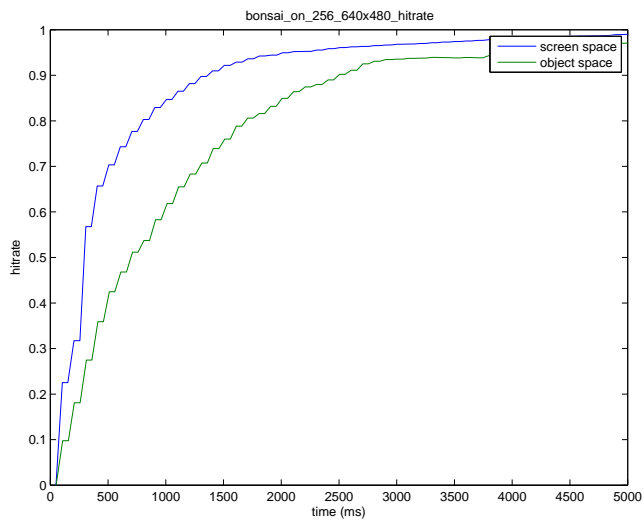


Figure 62: screen space vs object space: cache hit rate bonsai, background on, volume res = 256, screen res = 640x480, cache hit rate

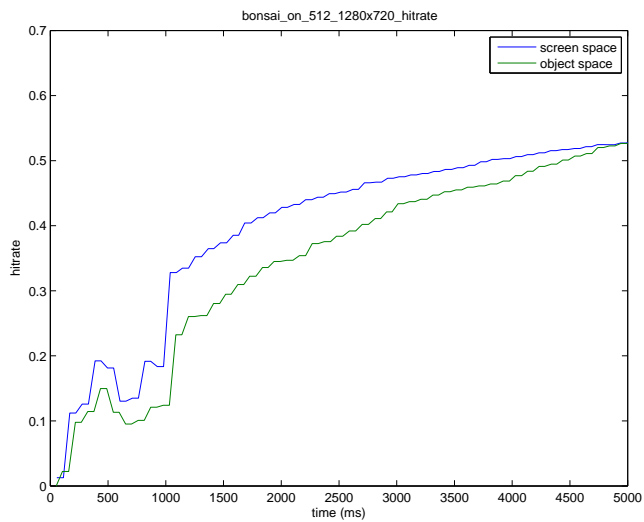


Figure 63: screen space vs object space: cache hit rate bonsai, background on, volume res = 512, screen res = 1280x720, cache hit rate

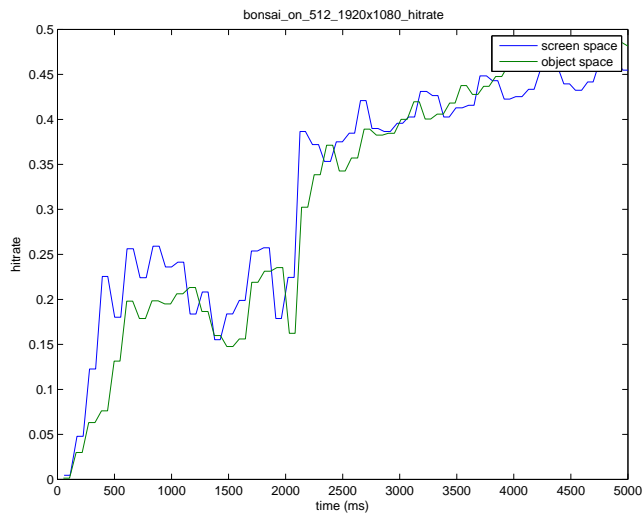


Figure 64: screen space vs object space: cache hit rate bonsai, background on, volume res = 512, screen res = 1920x1080, cache hit rate

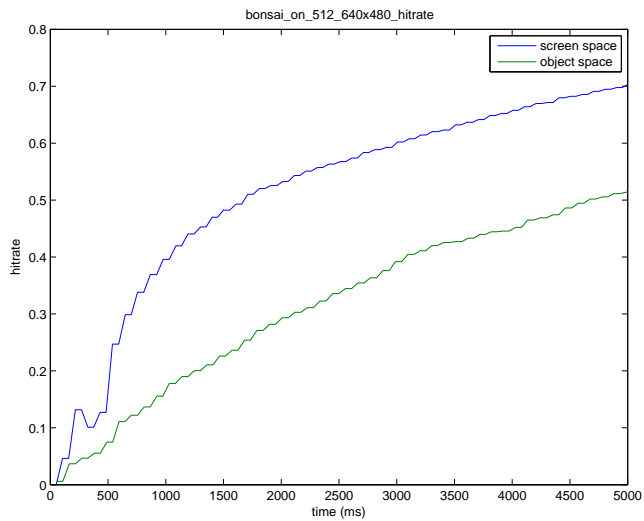


Figure 65: screen space vs object space: cache hit rate bonsai, background on, volume res = 512, screen res = 640x480, cache hit rate

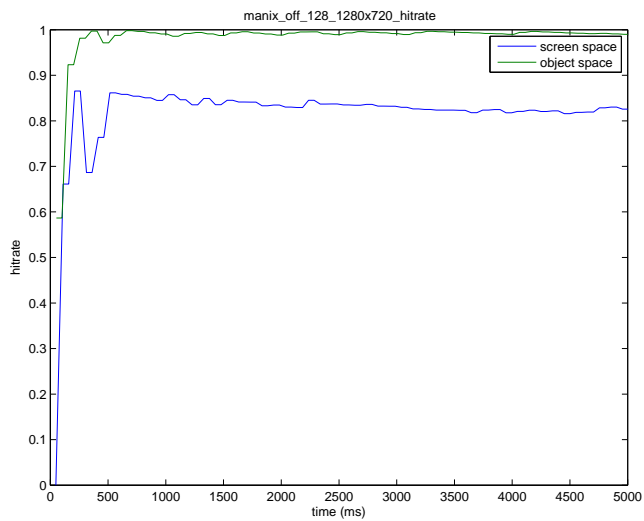


Figure 66: screen space vs object space: cache hit rate manix, background off, volume res = 128, screen res = 1280x720, cache hit rate

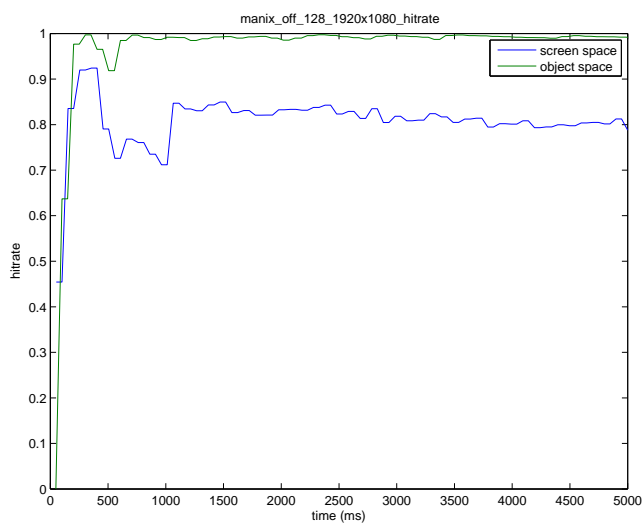


Figure 67: screen space vs object space: cache hit rate manix, background off, volume res = 128, screen res = 1920x1080, cache hit rate

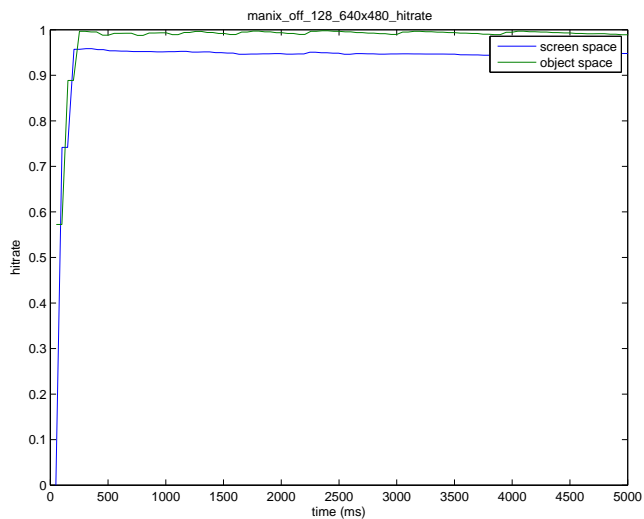


Figure 68: screen space vs object space: cache hit rate manix, background off, volume res = 128, screen res = 640x480, cache hit rate

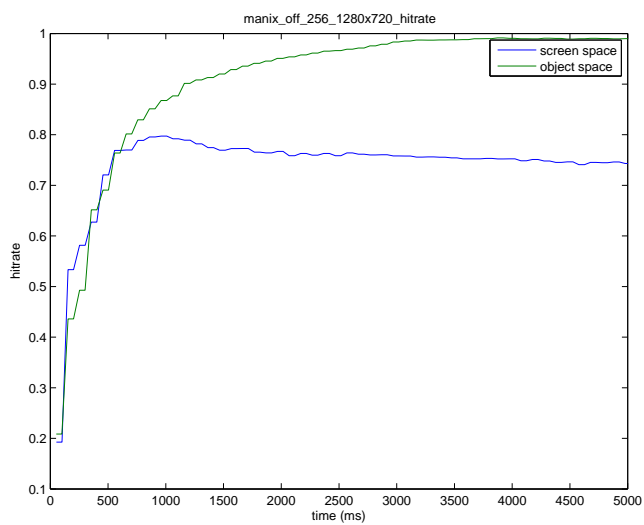


Figure 69: screen space vs object space: cache hit rate manix, background off, volume res = 256, screen res = 1280x720, cache hit rate

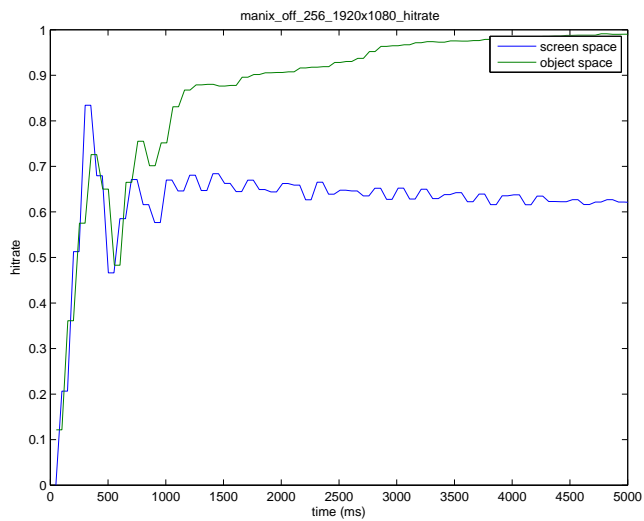


Figure 70: screen space vs object space: cache hit rate manix, background off, volume res = 256, screen res = 1920x1080, cache hit rate

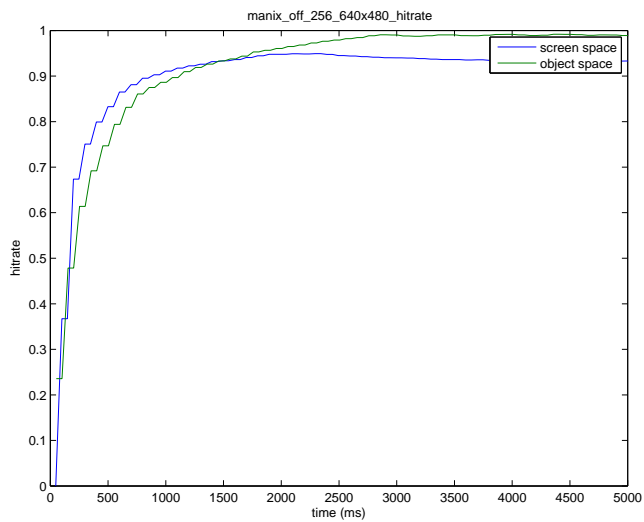


Figure 71: screen space vs object space: cache hit rate manix, background off, volume res = 256, screen res = 640x480, cache hit rate

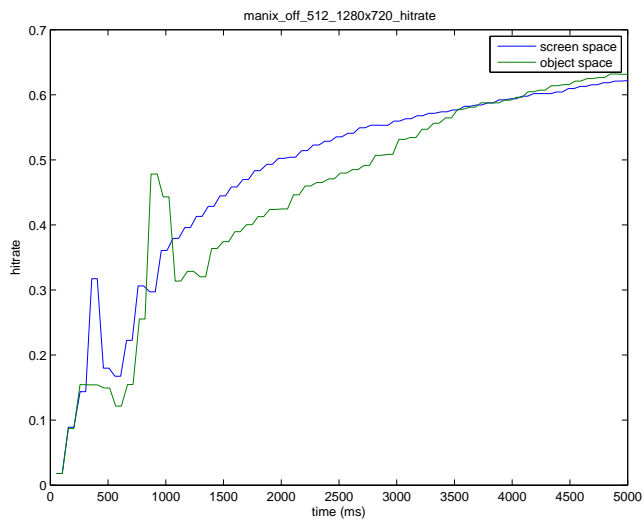


Figure 72: screen space vs object space: cache hit rate manix, background off, volume res = 512, screen res = 1280x720, cache hit rate

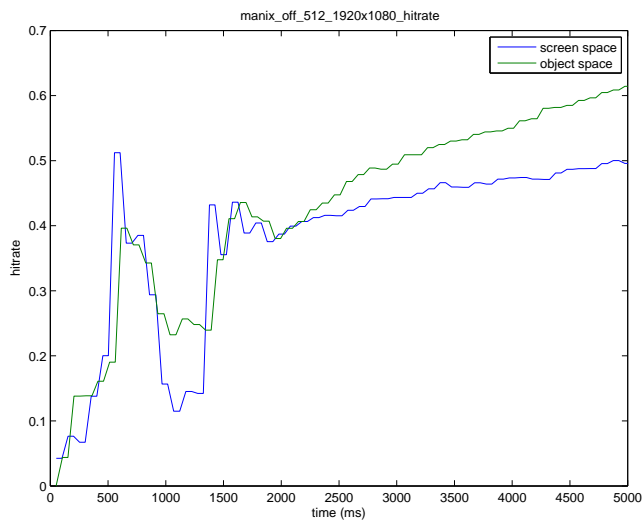


Figure 73: screen space vs object space: cache hit rate manix, background off, volume res = 512, screen res = 1920x1080, cache hit rate

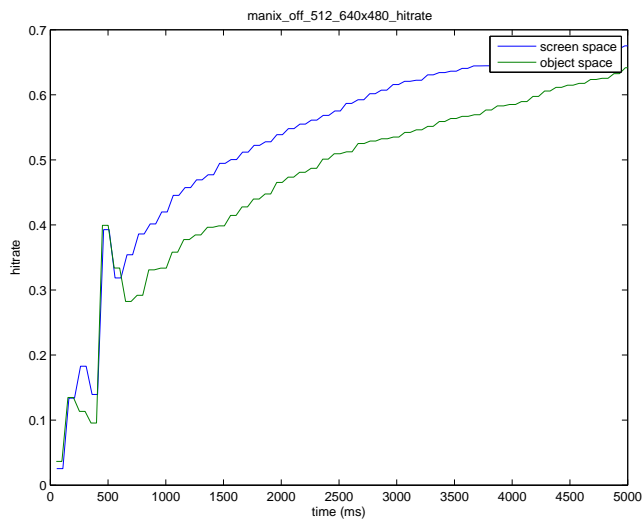


Figure 74: screen space vs object space: cache hit rate manix, background off, volume res = 512, screen res = 640x480, cache hit rate

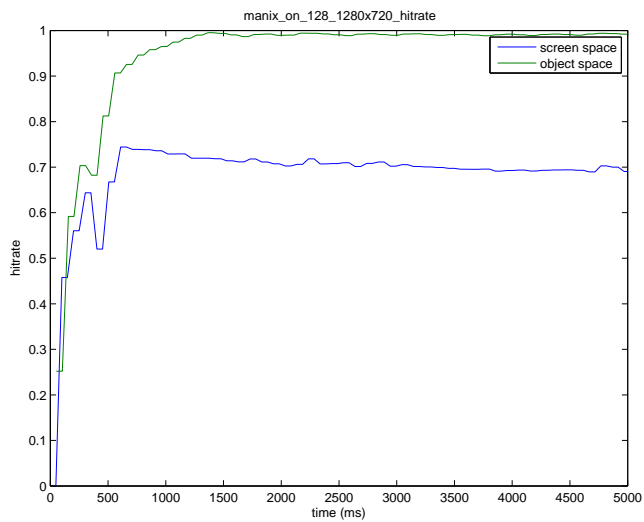


Figure 75: screen space vs object space: cache hit rate manix, background on, volume res = 128, screen res = 1280x720, cache hit rate

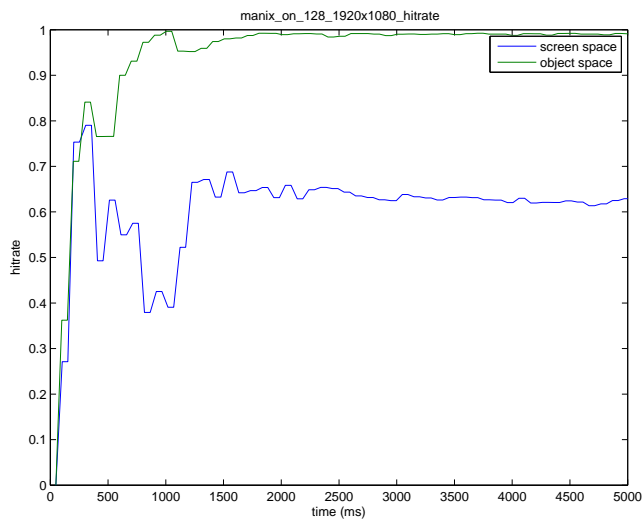


Figure 76: screen space vs object space: cache hit rate manix, background on, volume res = 128, screen res = 1920x1080, cache hit rate

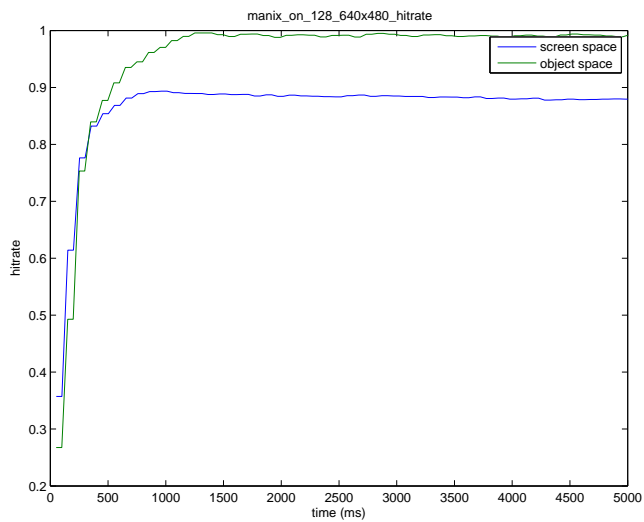


Figure 77: screen space vs object space: cache hit rate manix, background on, volume res = 128, screen res = 640x480, cache hit rate

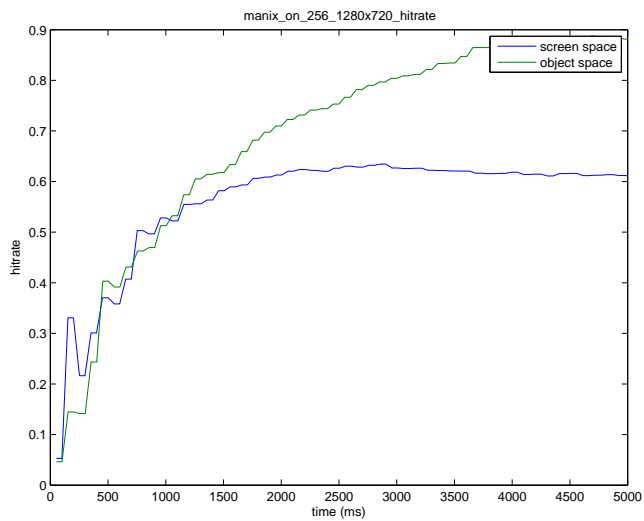


Figure 78: screen space vs object space: cache hit rate manix, background on, volume res = 256, screen res = 1280x720, cache hit rate

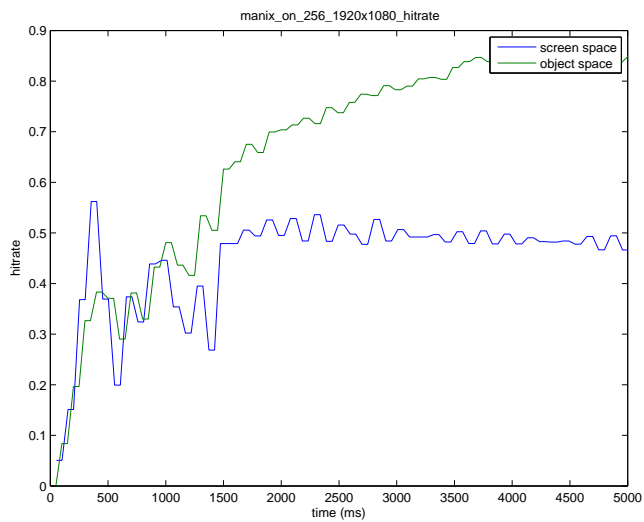


Figure 79: screen space vs object space: cache hit rate manix, background on, volume res = 256, screen res = 1920x1080, cache hit rate

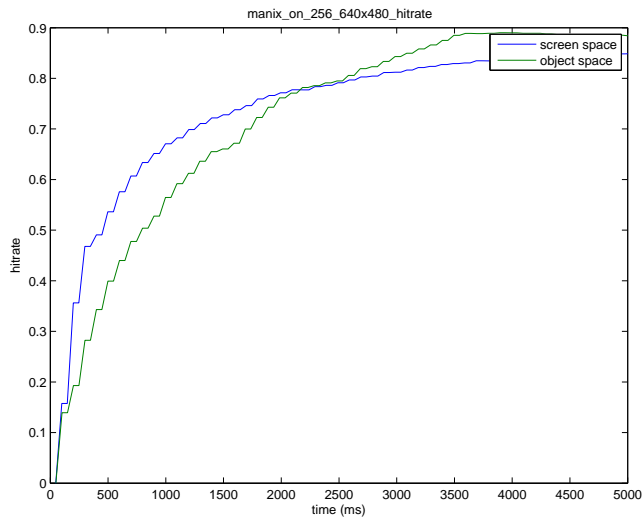


Figure 80: screen space vs object space: cache hit rate manix, background on, volume res = 256, screen res = 640x480, cache hit rate

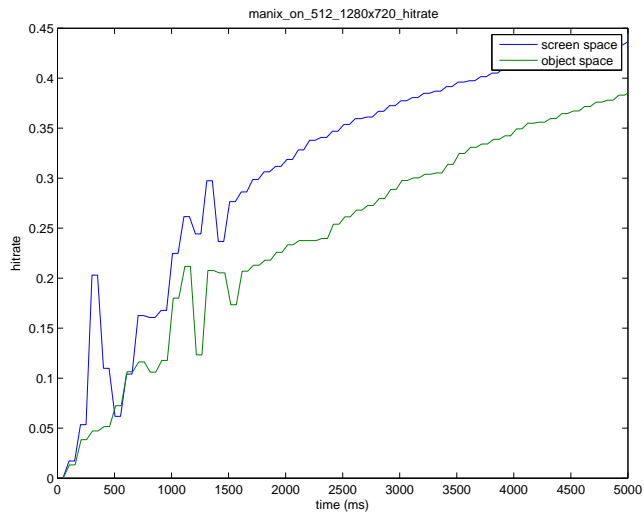


Figure 81: screen space vs object space: cache hit rate manix, background on, volume res = 512, screen res = 1280x720, cache hit rate

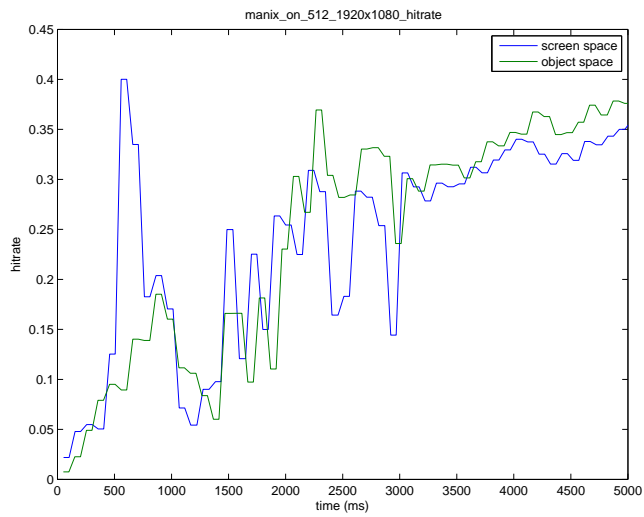


Figure 82: screen space vs object space: cache hit rate manix, background on, volume res = 512, screen res = 1920x1080, cache hit rate

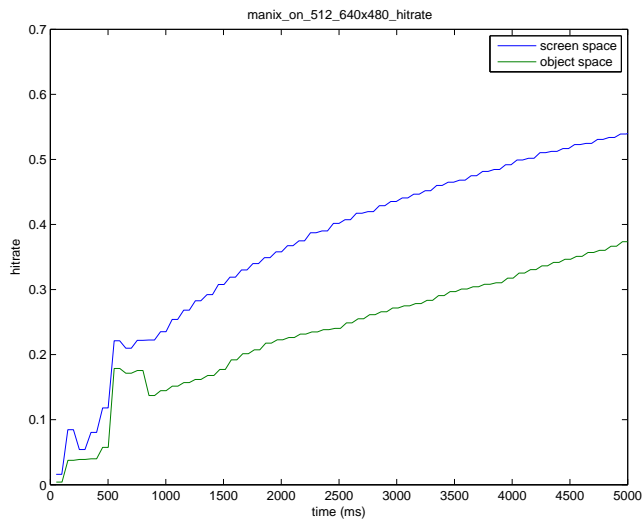


Figure 83: screen space vs object space: cache hit rate manix, background on, volume res = 512, screen res = 640x480, cache hit rate

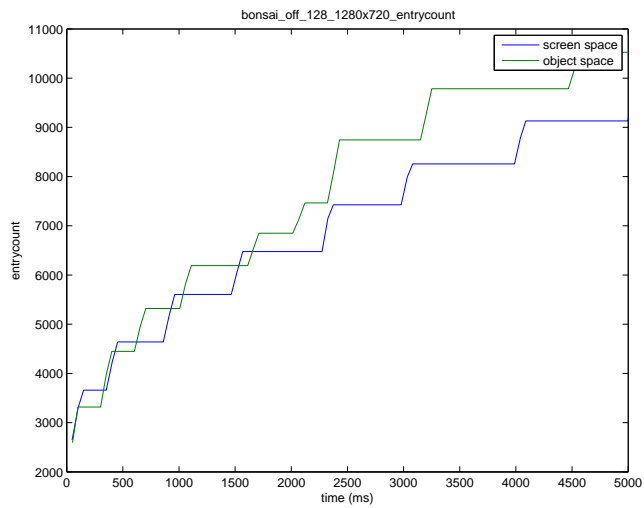


Figure 84: screen space vs object space: number of entries bonsai, background off, volume res = 128, screen res = 1280x720, entrycount

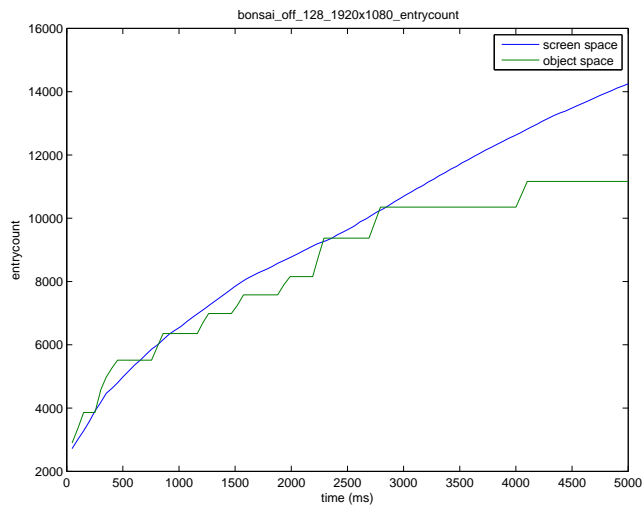


Figure 85: screen space vs object space: number of entries bonsai, background off, volume res = 128, screen res = 1920x1080, entrycount

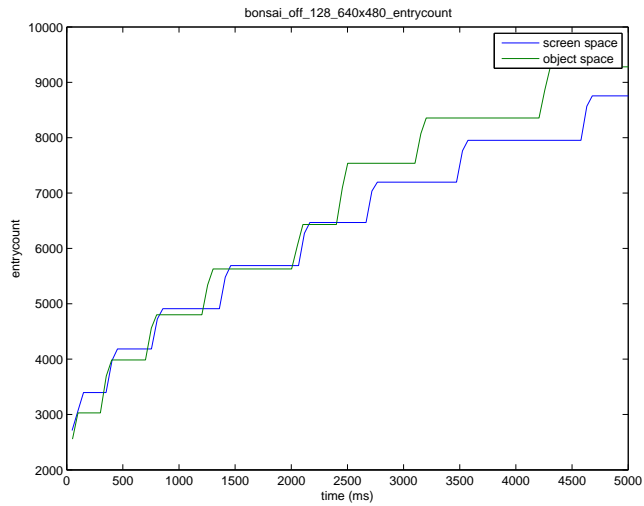


Figure 86: screen space vs object space: number of entries bonsai, background off, volume res = 128, screen res = 640x480, entrycount

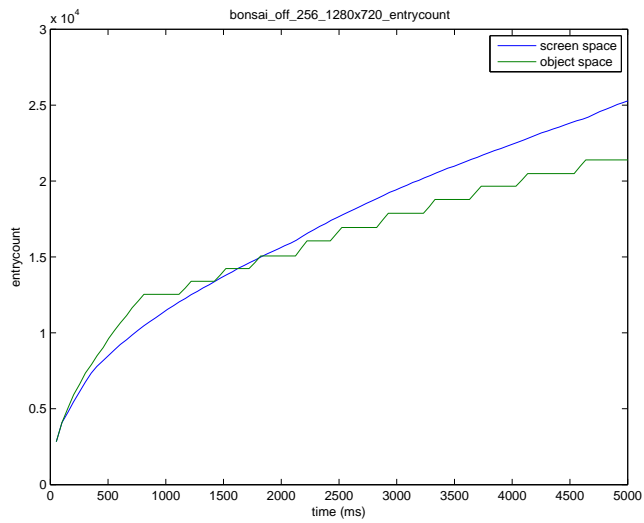


Figure 87: screen space vs object space: number of entries bonsai, background off, volume res = 256, screen res = 1280x720, entrycount

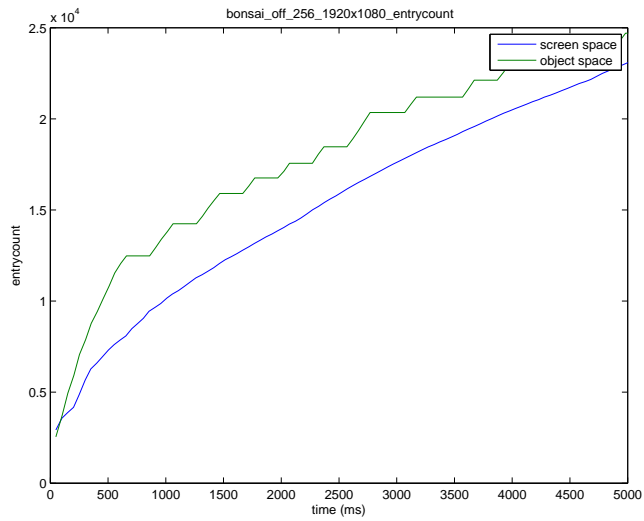


Figure 88: screen space vs object space: number of entries bonsai, background off, volume res = 256, screen res = 1920x1080, entrycount

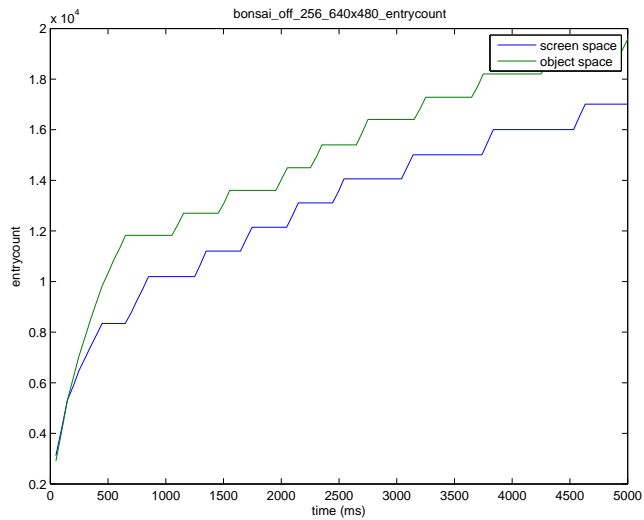


Figure 89: screen space vs object space: number of entries bonsai, background off, volume res = 256, screen res = 640x480, entrycount

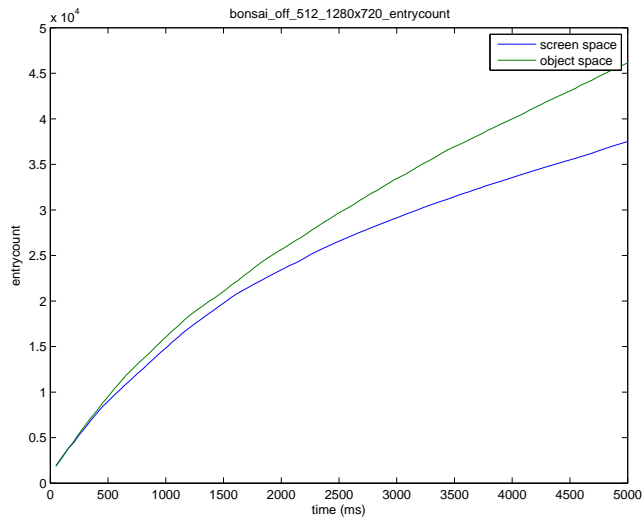


Figure 90: screen space vs object space: number of entries bonsai, background off, volume res = 512, screen res = 1280x720, entrycount

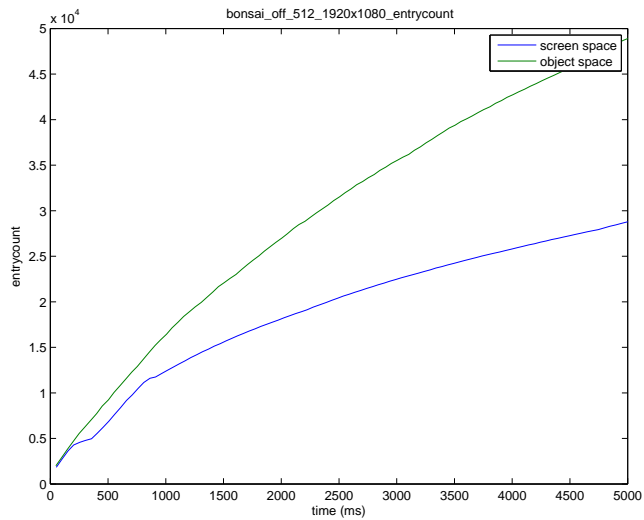


Figure 91: screen space vs object space: number of entries bonsai, background off, volume res = 512, screen res = 1920x1080, entrycount

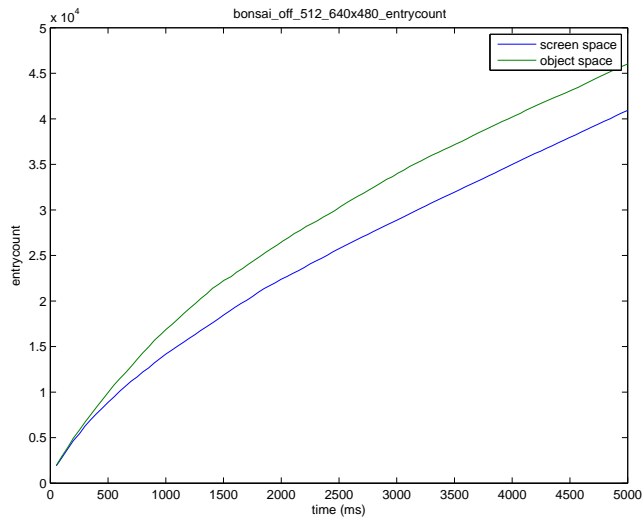


Figure 92: screen space vs object space: number of entries bonsai, background off, volume res = 512, screen res = 640x480, entrycount

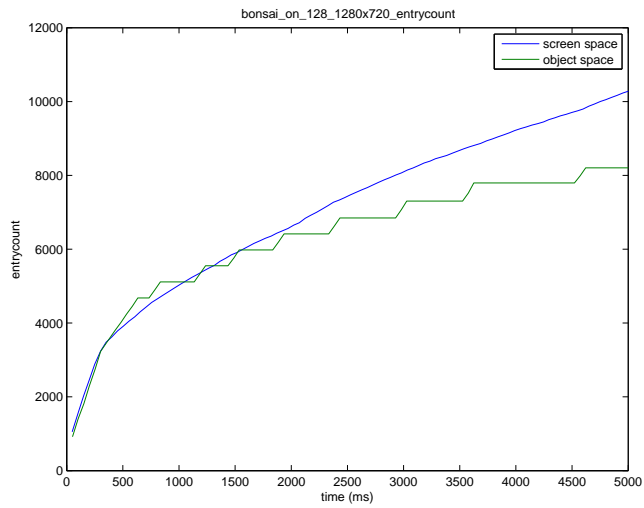


Figure 93: screen space vs object space: number of entries bonsai, background on, volume res = 128, screen res = 1280x720, entrycount

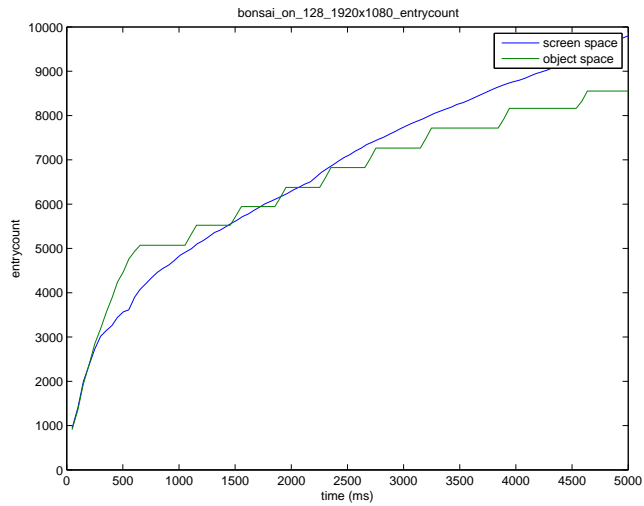


Figure 94: screen space vs object space: number of entries bonsai, background on, volume res = 128, screen res = 1920x1080, entrycount

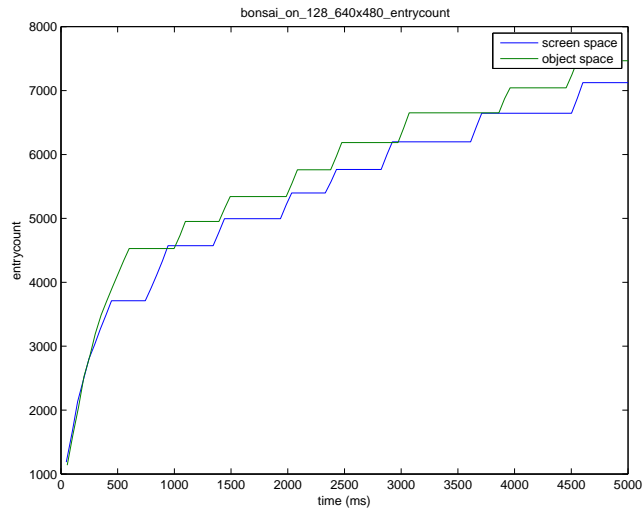


Figure 95: screen space vs object space: number of entries bonsai, background on, volume res = 128, screen res = 640x480, entrycount

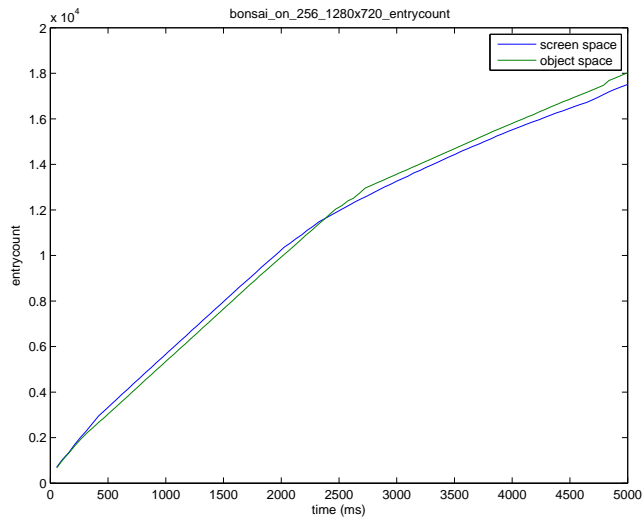


Figure 96: screen space vs object space: number of entries bonsai, background on, volume res = 256, screen res = 1280x720, entrycount

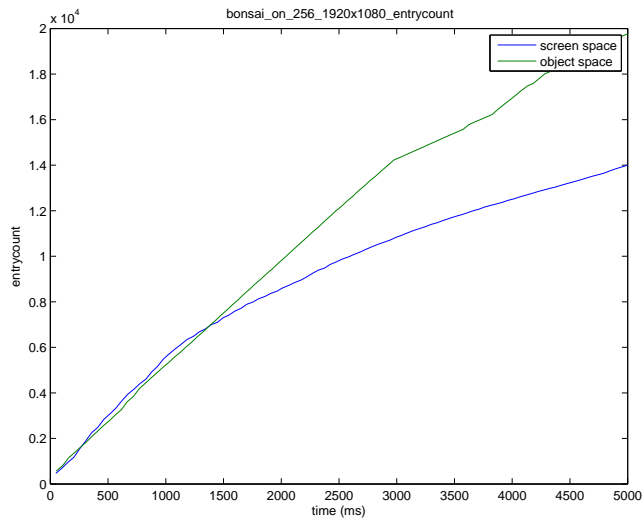


Figure 97: screen space vs object space: number of entries bonsai, background on, volume res = 256, screen res = 1920x1080, entrycount

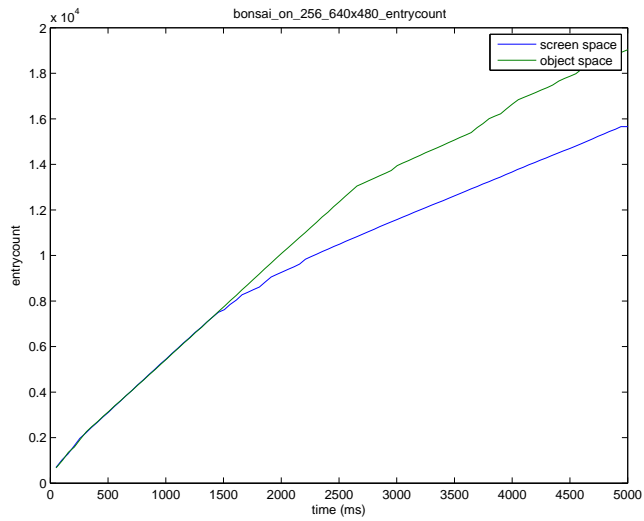


Figure 98: screen space vs object space: number of entries bonsai, background on, volume res = 256, screen res = 640x480, entrycount

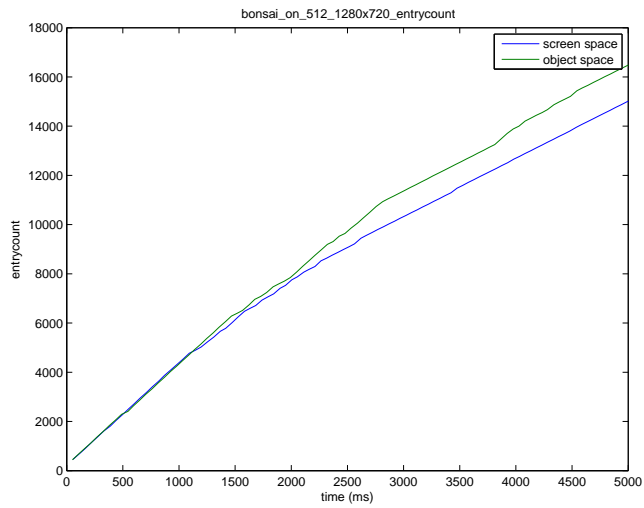


Figure 99: screen space vs object space: number of entries bonsai, background on, volume res = 512, screen res = 1280x720, entrycount

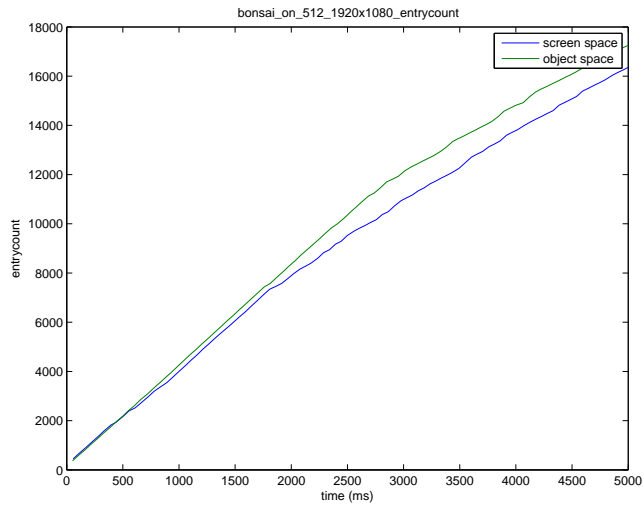


Figure 100: screen space vs object space: number of entries bonsai, background on, volume res = 512, screen res = 1920x1080, entrycount

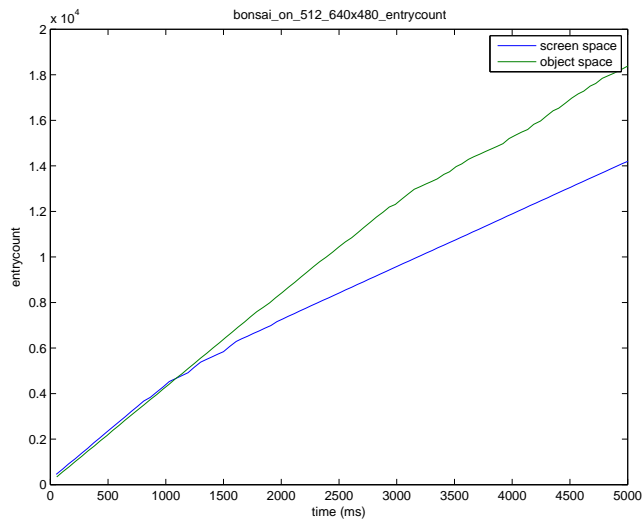


Figure 101: screen space vs object space: number of entries bonsai, background on, volume res = 512, screen res = 640x480, entrycount

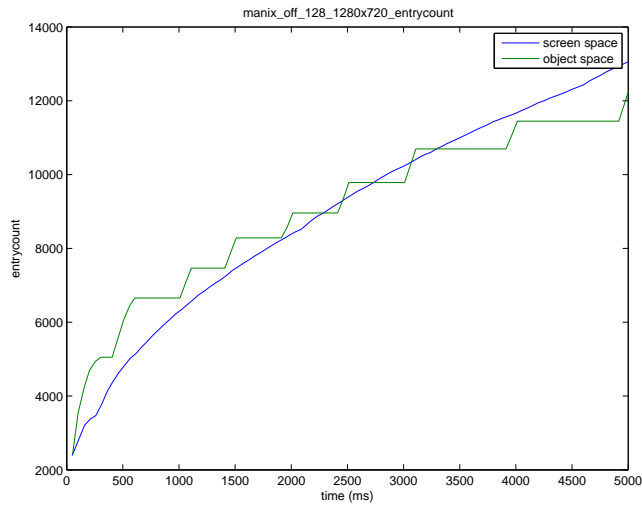


Figure 102: screen space vs object space: number of entries manix, background off, volume res = 128, screen res = 1280x720, entrycount

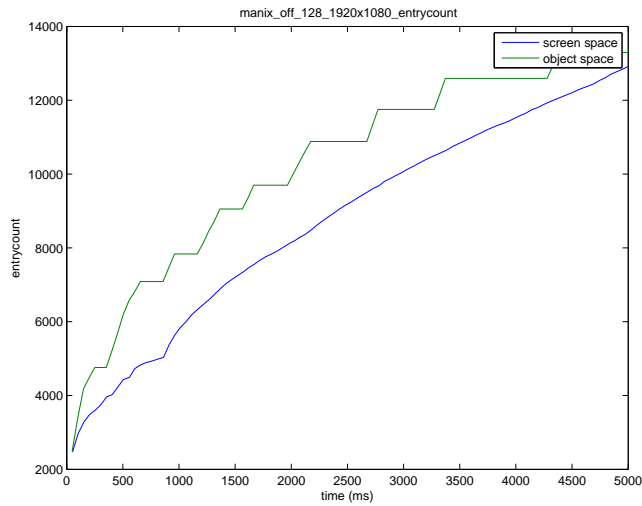


Figure 103: screen space vs object space: number of entries manix, background off, volume res = 128, screen res = 1920x1080, entrycount

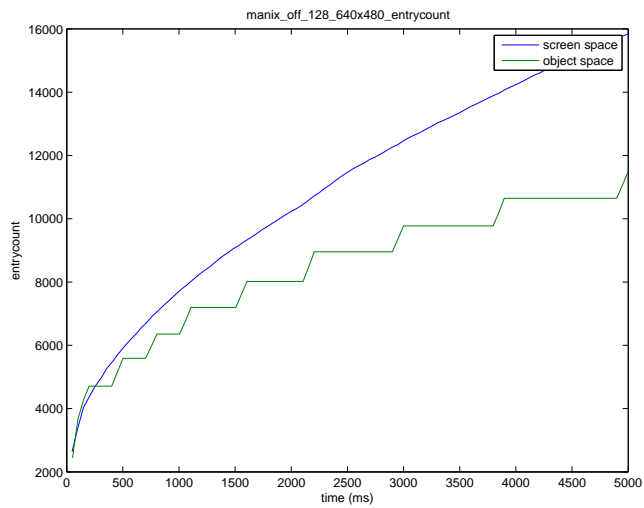


Figure 104: screen space vs object space: number of entries manix, background off, volume res = 128, screen res = 640x480, entrycount

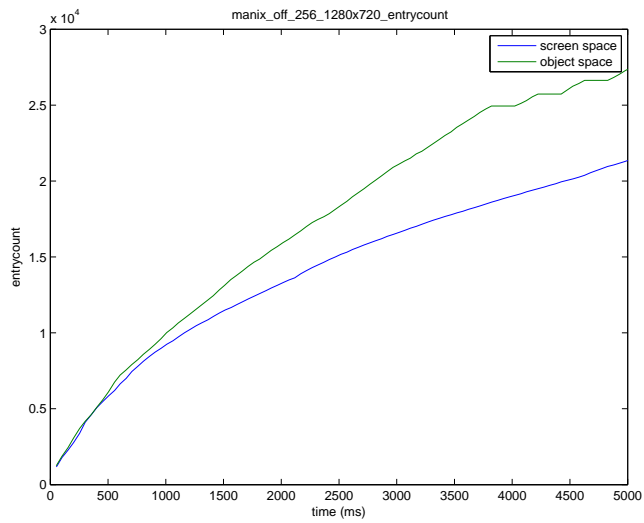


Figure 105: screen space vs object space: number of entries manix, background off, volume res = 256, screen res = 1280x720, entrycount

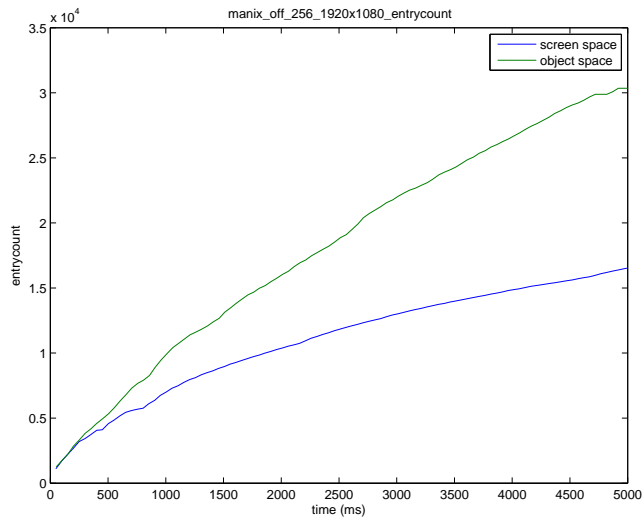


Figure 106: screen space vs object space: number of entries manix, background off, volume res = 256, screen res = 1920x1080, entrycount

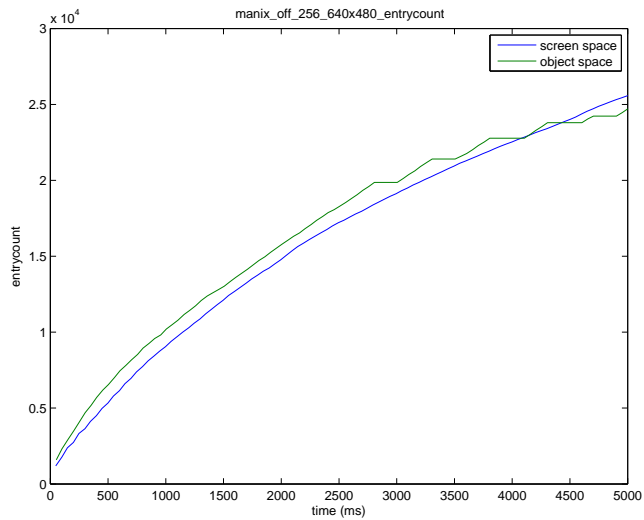


Figure 107: screen space vs object space: number of entries manix, background off, volume res = 256, screen res = 640x480, entrycount

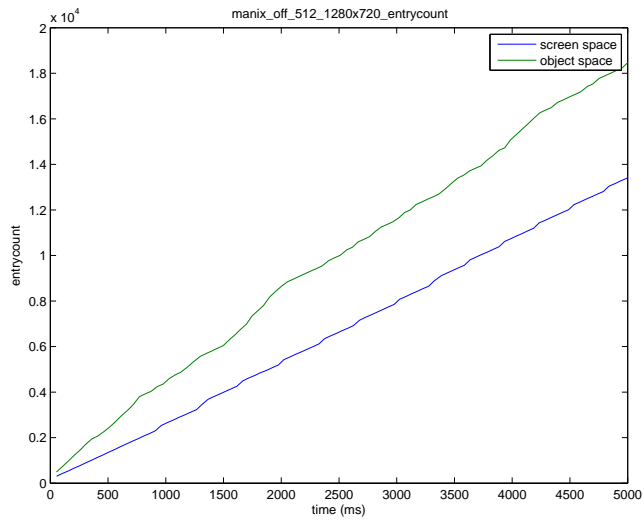


Figure 108: screen space vs object space: number of entries manix, background off, volume res = 512, screen res = 1280x720, entrycount

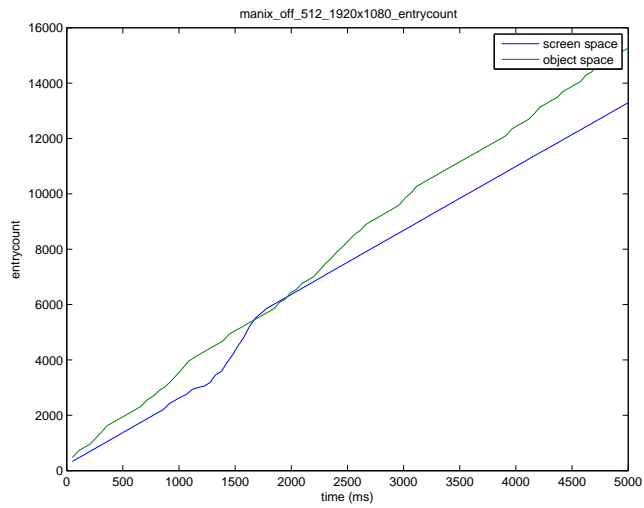


Figure 109: screen space vs object space: number of entries manix, background off, volume res = 512, screen res = 1920x1080, entrycount

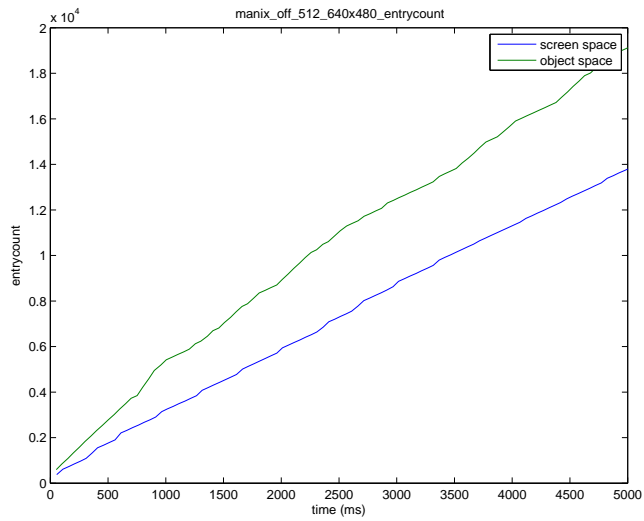


Figure 110: screen space vs object space: number of entries manix, background off, volume res = 512, screen res = 640x480, entrycount

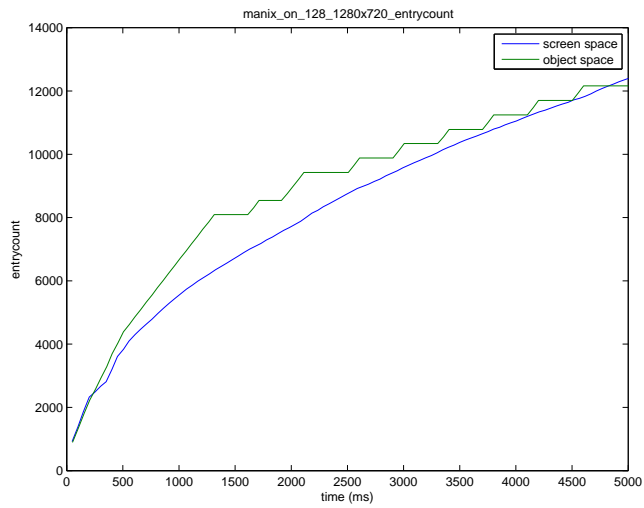


Figure 111: screen space vs object space: number of entries manix, background on, volume res = 128, screen res = 1280x720, entrycount

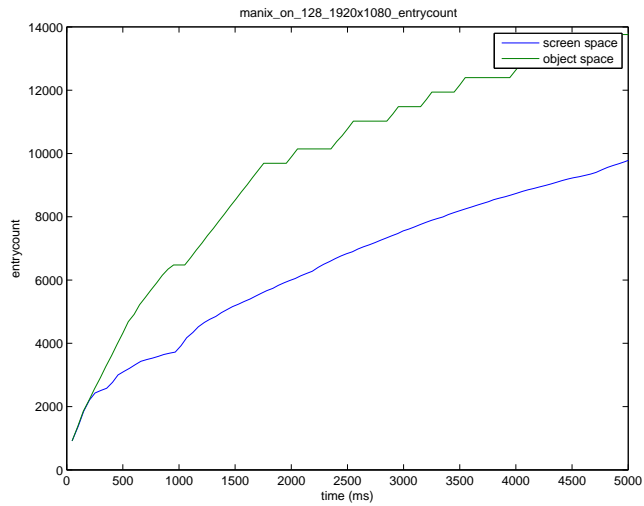


Figure 112: screen space vs object space: number of entries manix, background on, volume res = 128, screen res = 1920x1080, entrycount

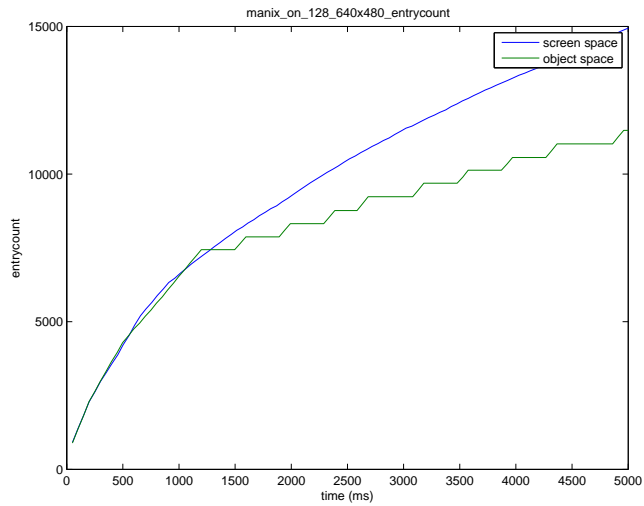


Figure 113: screen space vs object space: number of entries manix, background on, volume res = 128, screen res = 640x480, entrycount

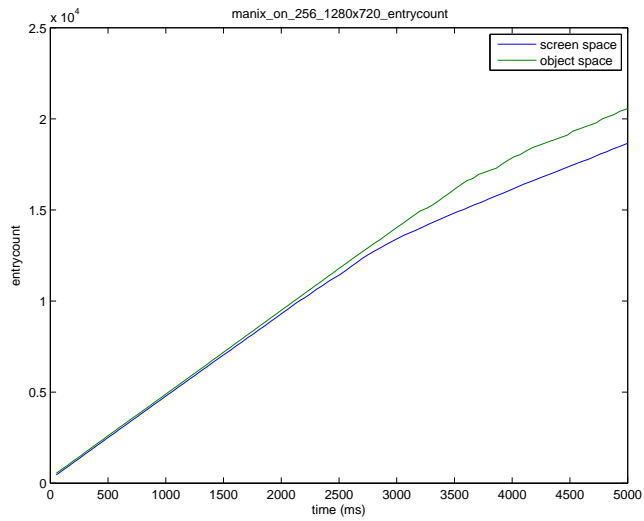


Figure 114: screen space vs object space: number of entries manix, background on, volume res = 256, screen res = 1280x720, entrycount

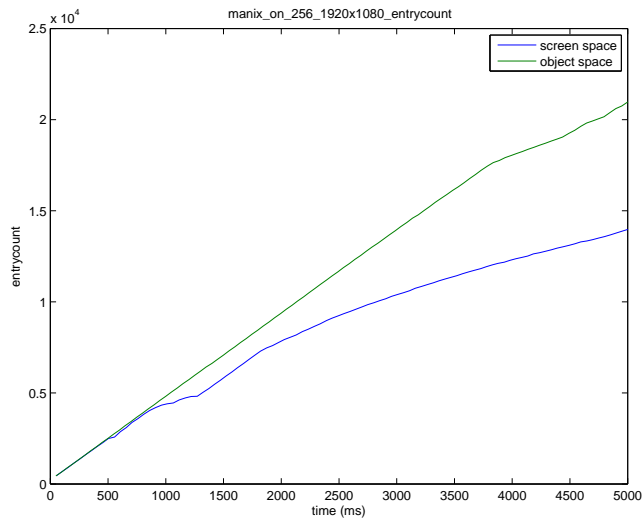


Figure 115: screen space vs object space: number of entries manix, background on, volume res = 256, screen res = 1920x1080, entrycount

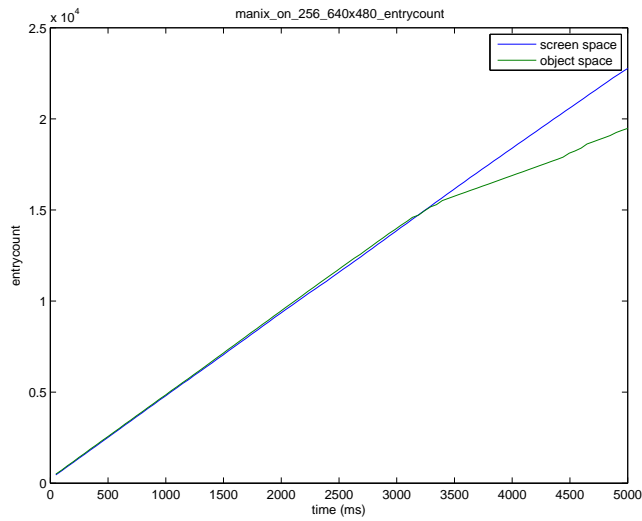


Figure 116: screen space vs object space: number of entries manix, background on, volume res = 256, screen res = 640x480, entrycount

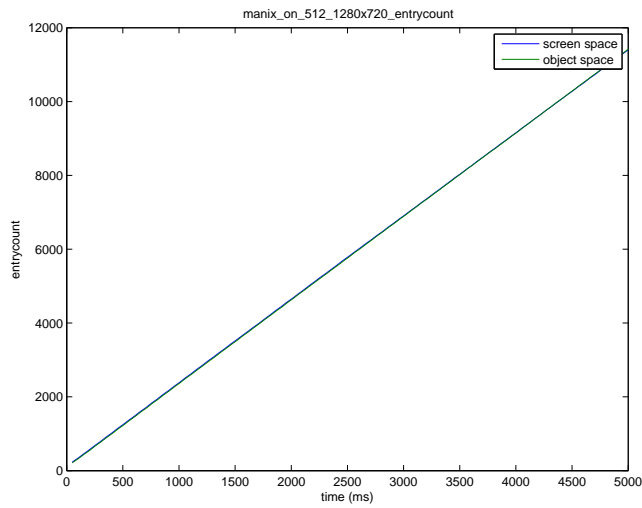


Figure 117: screen space vs object space: number of entries manix, background on, volume res = 512, screen res = 1280x720, entrycount

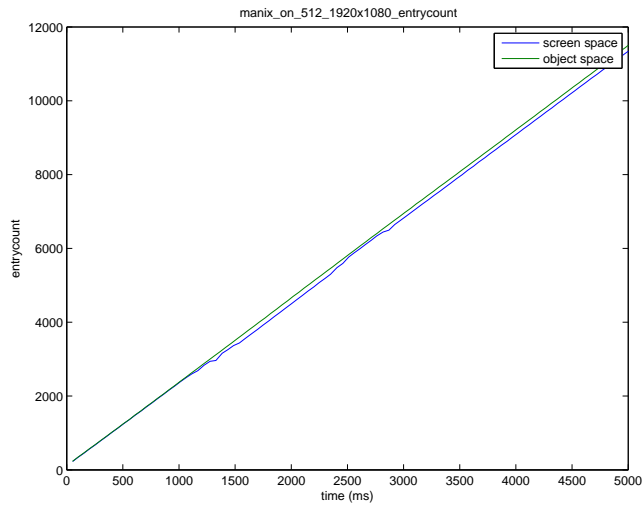


Figure 118: screen space vs object space: number of entries manix, background on, volume res = 512, screen res = 1920x1080, entrycount

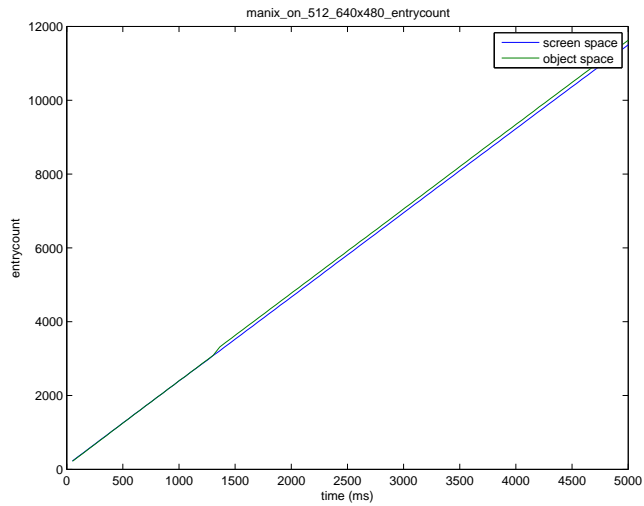


Figure 119: screen space vs object space: number of entries manix, background on, volume res = 512, screen res = 640x480, entrycount

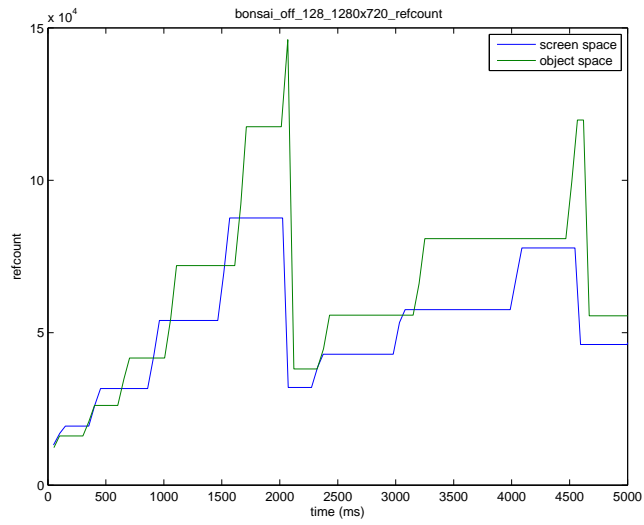


Figure 120: screen space vs object space: number of references bonsai, background off, volume res = 128, screen res = 1280x720, number of references

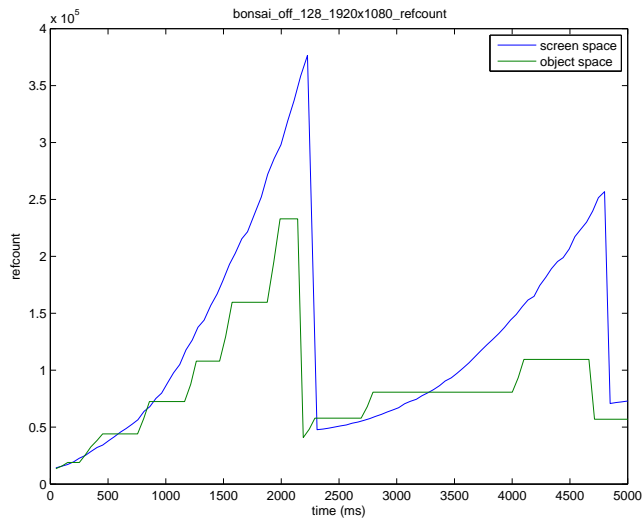


Figure 121: screen space vs object space: number of references bonsai, background off, volume res = 128, screen res = 1920x1080, number of references

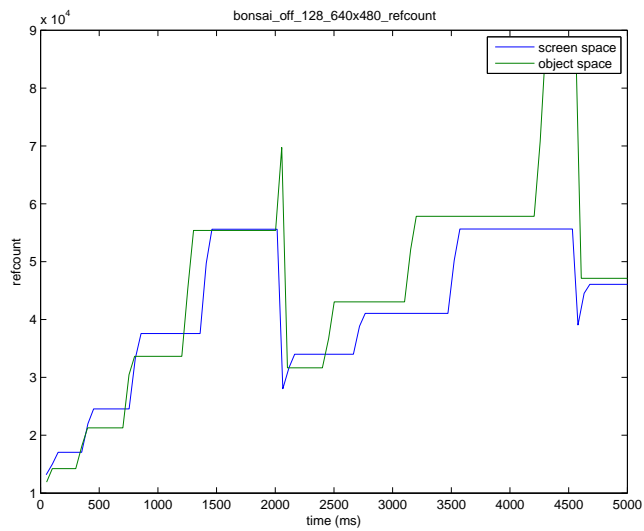


Figure 122: screen space vs object space: number of references bonsai, background off, volume res = 128, screen res = 640x480, number of references

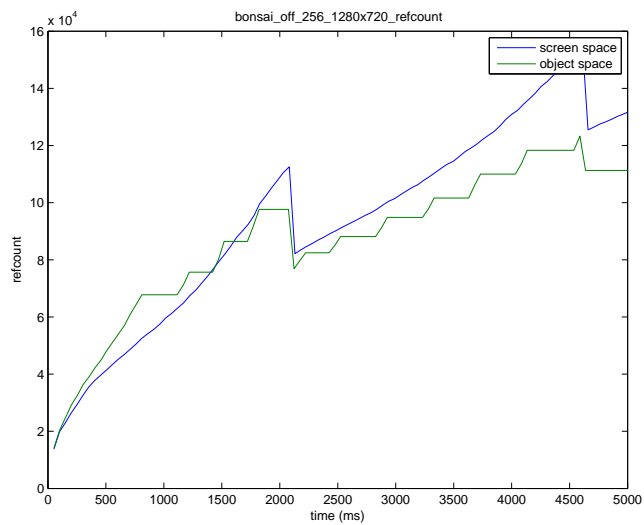


Figure 123: screen space vs object space: number of references bonsai, background off, volume res = 256, screen res = 1280x720, number of references

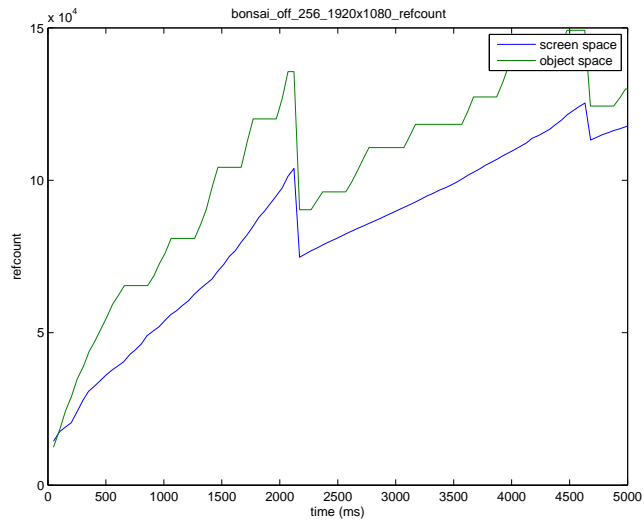


Figure 124: screen space vs object space: number of references bonsai, background off, volume res = 256, screen res = 1920x1080, number of references

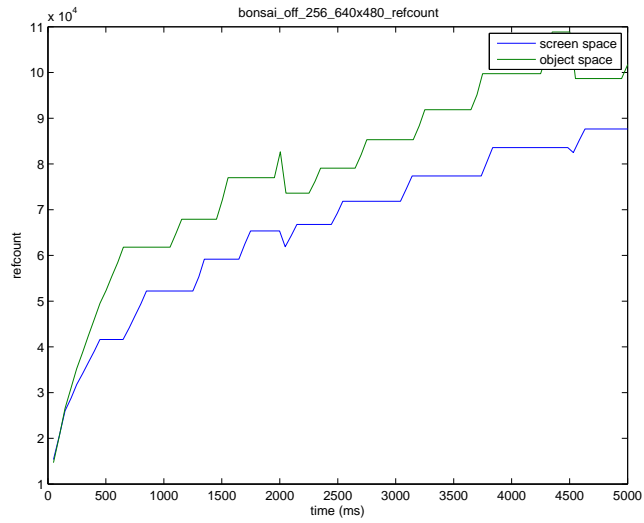


Figure 125: screen space vs object space: number of references bonsai, background off, volume res = 256, screen res = 640x480, number of references

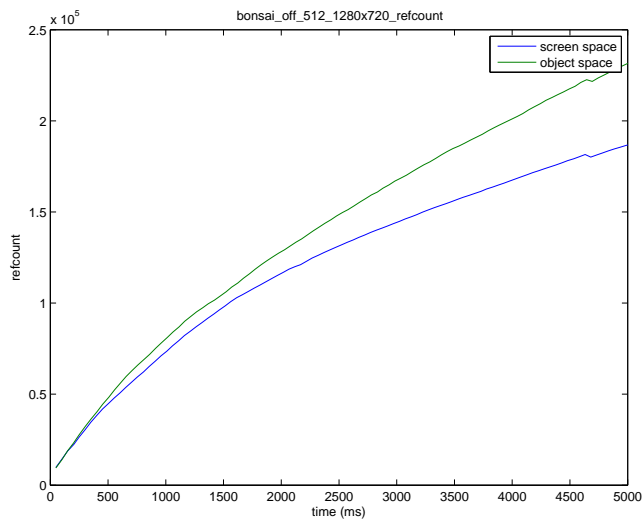


Figure 126: screen space vs object space: number of references bonsai, background off, volume res = 512, screen res = 1280x720, number of references

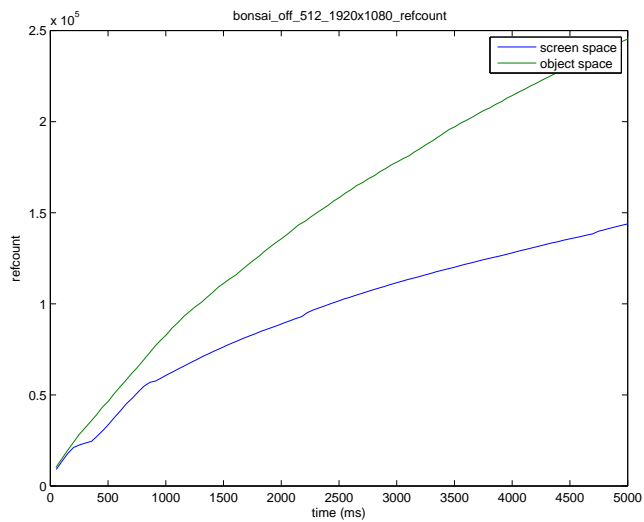


Figure 127: screen space vs object space: number of references bonsai, background off, volume res = 512, screen res = 1920x1080, number of references

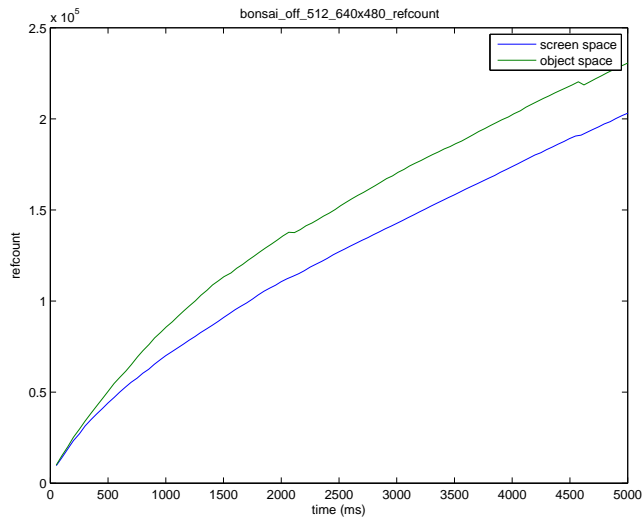


Figure 128: screen space vs object space: number of references bonsai, background off, volume res = 512, screen res = 640x480, number of references

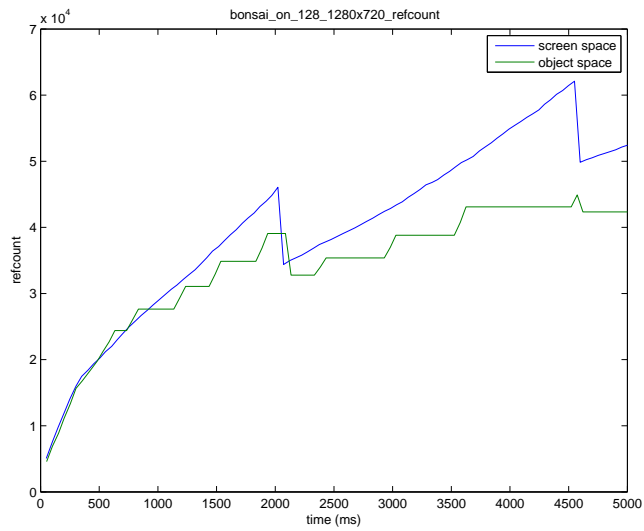


Figure 129: screen space vs object space: number of references bonsai, background on, volume res = 128, screen res = 1280x720, number of references

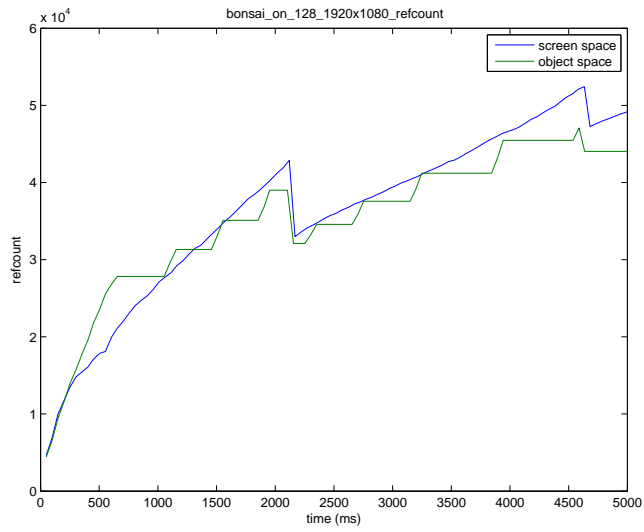


Figure 130: screen space vs object space: number of references bonsai, background on, volume res = 128, screen res = 1920x1080, number of references

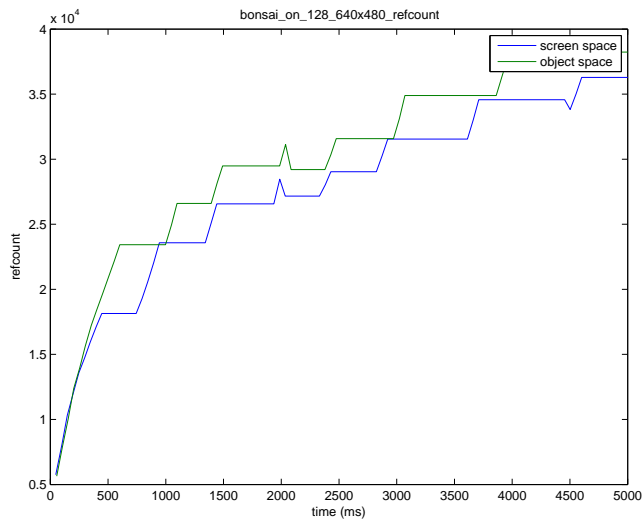


Figure 131: screen space vs object space: number of references bonsai, background on, volume res = 128, screen res = 640x480, number of references

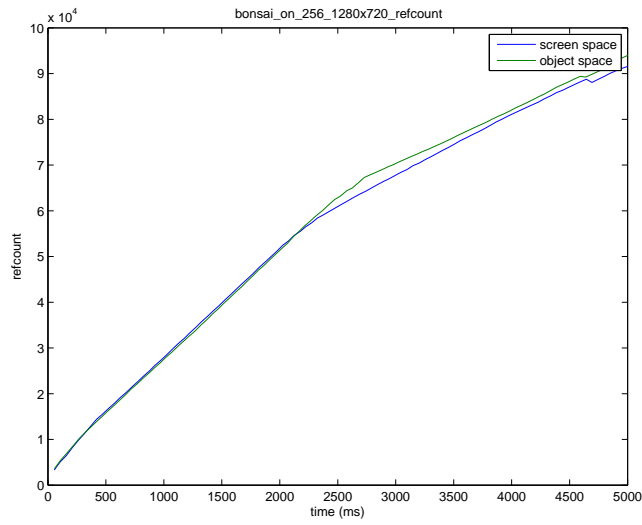


Figure 132: screen space vs object space: number of references bonsai, background on, volume res = 256, screen res = 1280x720, number of references

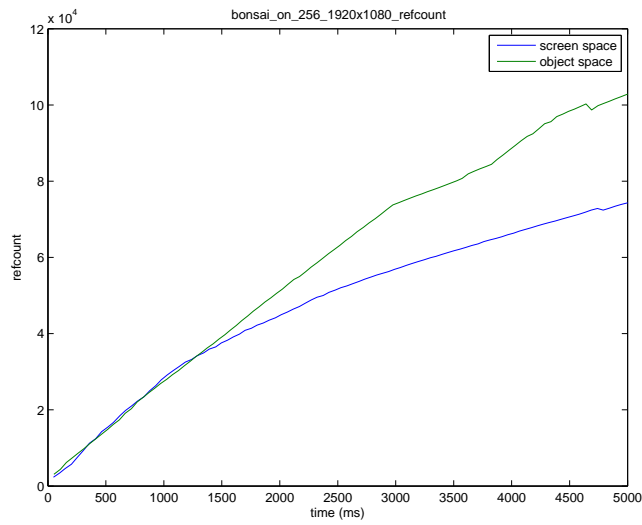


Figure 133: screen space vs object space: number of references bonsai, background on, volume res = 256, screen res = 1920x1080, number of references

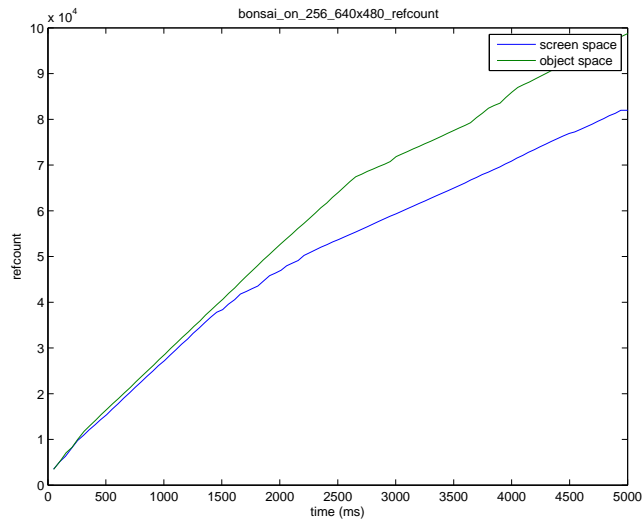


Figure 134: screen space vs object space: number of references bonsai, background on, volume res = 256, screen res = 640x480, number of references

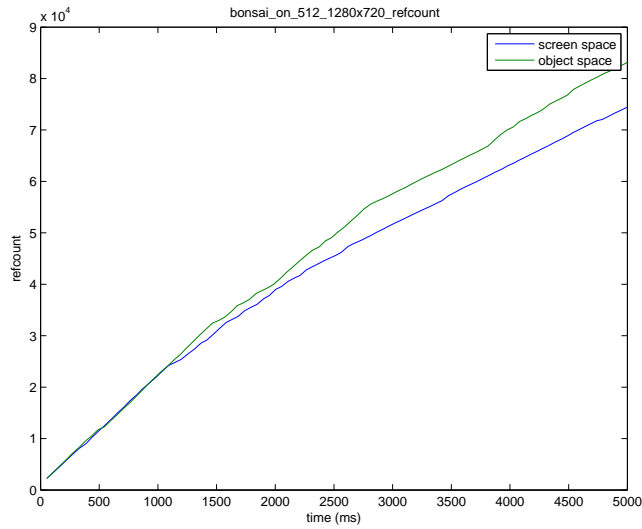


Figure 135: screen space vs object space: number of references bonsai, background on, volume res = 512, screen res = 1280x720, number of references

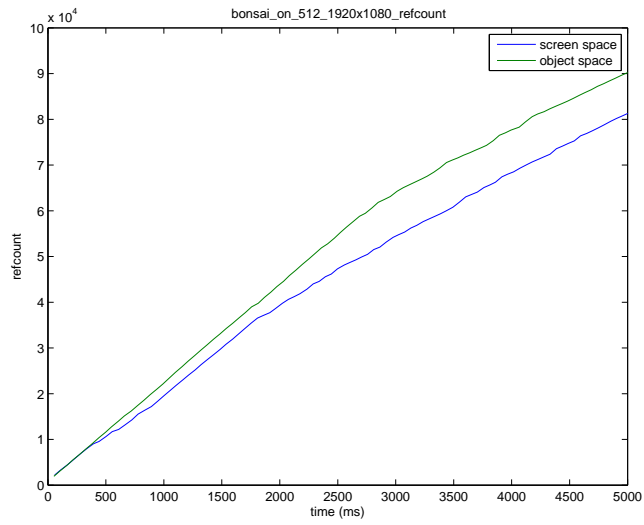


Figure 136: screen space vs object space: number of references bonsai, background on, volume res = 512, screen res = 1920x1080, number of references

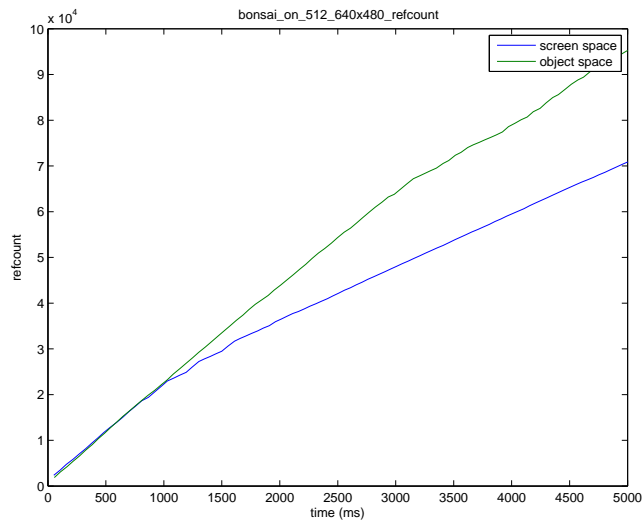


Figure 137: screen space vs object space: number of references bonsai, background on, volume res = 512, screen res = 640x480, number of references

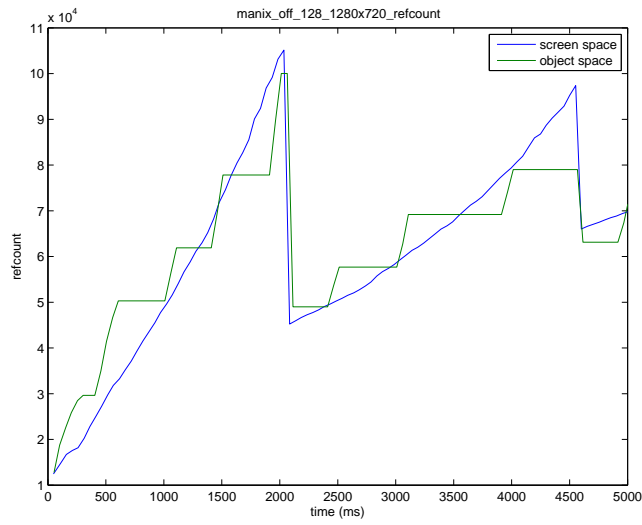


Figure 138: screen space vs object space: number of references manix, background off, volume res = 128, screen res = 1280x720, number of references

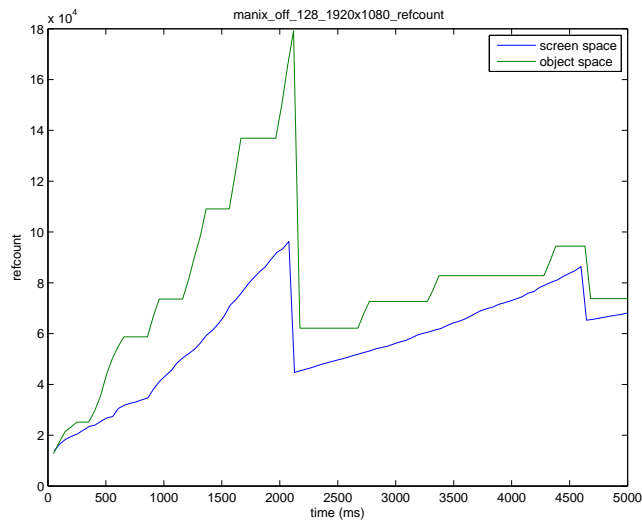


Figure 139: screen space vs object space: number of references manix, background off, volume res = 128, screen res = 1920x1080, number of references

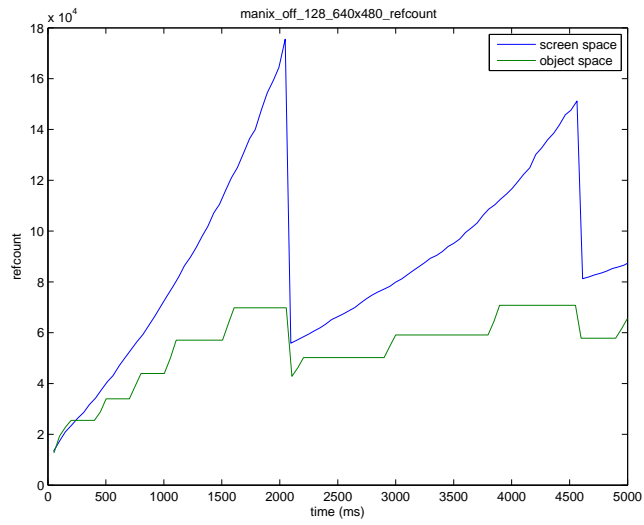


Figure 140: screen space vs object space: number of references manix, background off, volume res = 128, screen res = 640x480, number of references

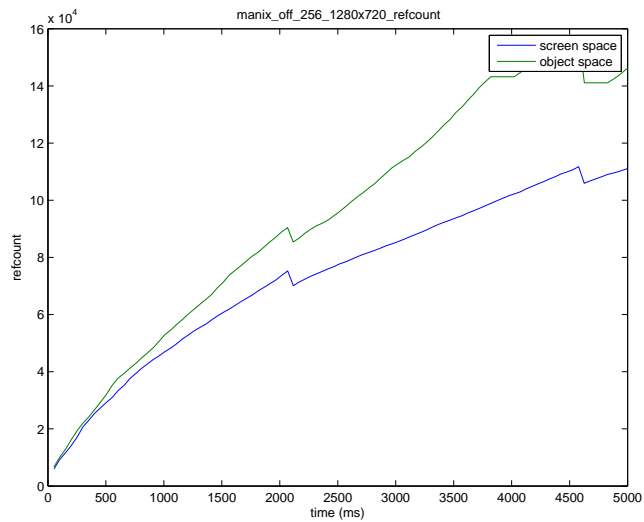


Figure 141: screen space vs object space: number of references manix, background off, volume res = 256, screen res = 1280x720, number of references

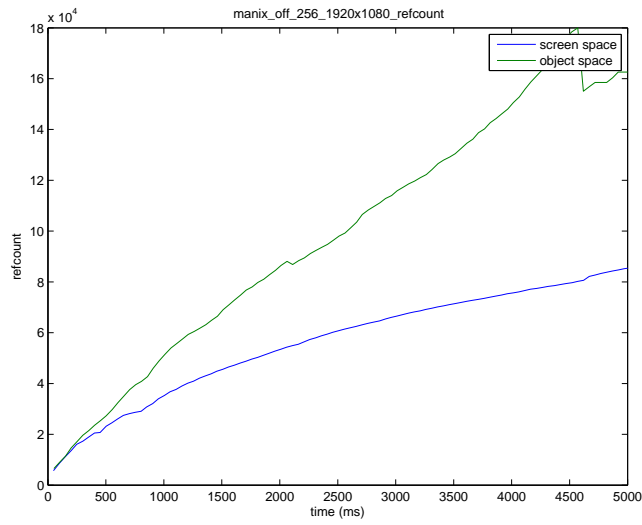


Figure 142: screen space vs object space: number of references manix, background off, volume res = 256, screen res = 1920x1080, number of references

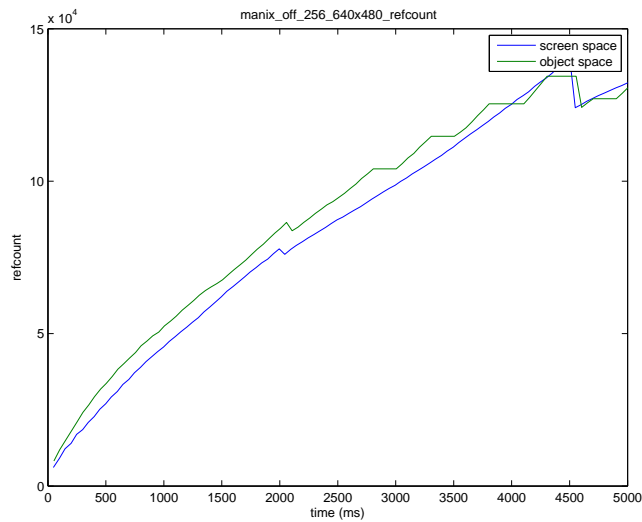


Figure 143: screen space vs object space: number of references manix, background off, volume res = 256, screen res = 640x480, number of references

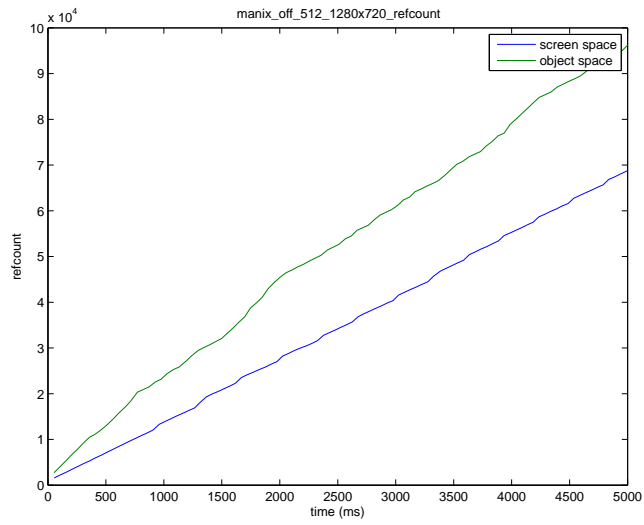


Figure 144: screen space vs object space: number of references manix, background off, volume res = 512, screen res = 1280x720, number of references

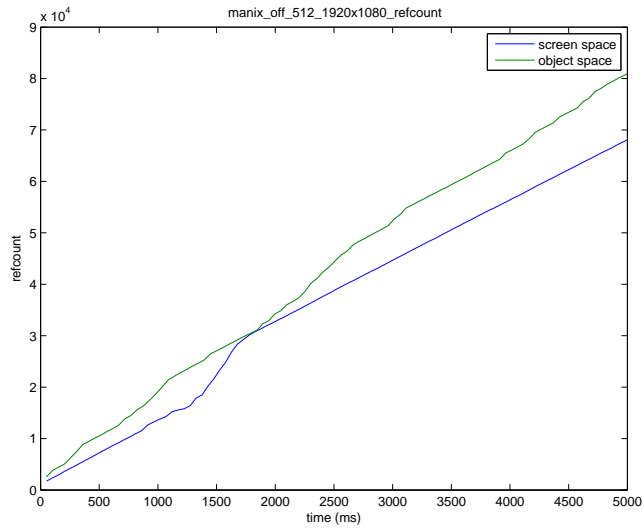


Figure 145: screen space vs object space: number of references manix, background off, volume res = 512, screen res = 1920x1080, number of references

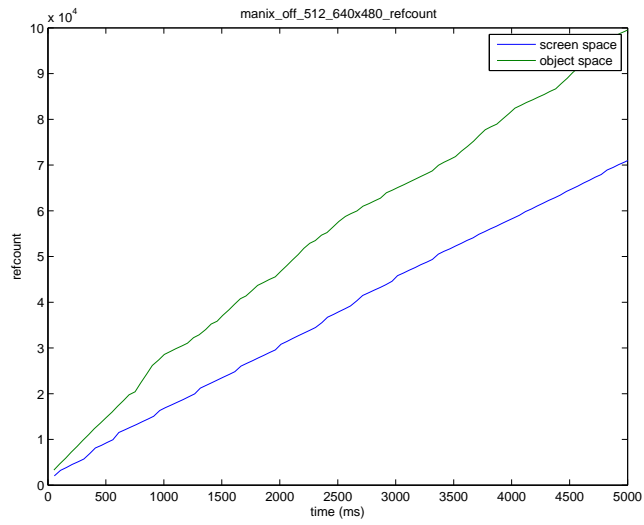


Figure 146: screen space vs object space: number of references manix, background off, volume res = 512, screen res = 640x480, number of references

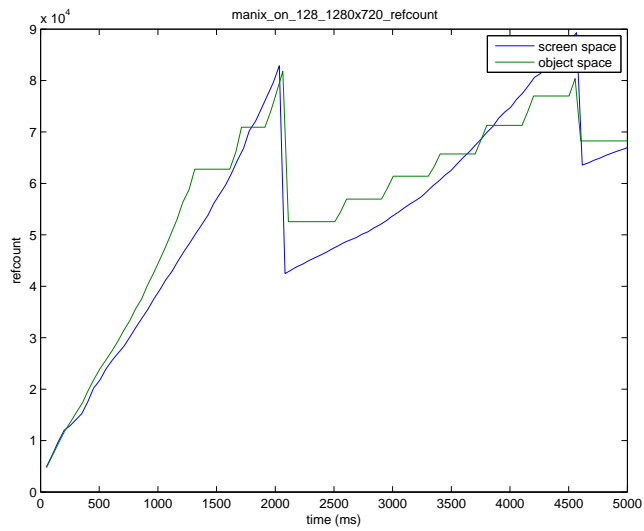


Figure 147: screen space vs object space: number of references manix, background on, volume res = 128, screen res = 1280x720, number of references

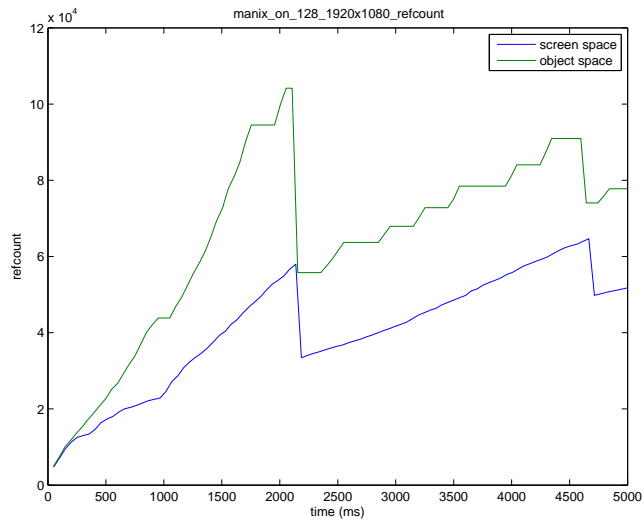


Figure 148: screen space vs object space: number of references manix, background on, volume res = 128, screen res = 1920x1080, number of references

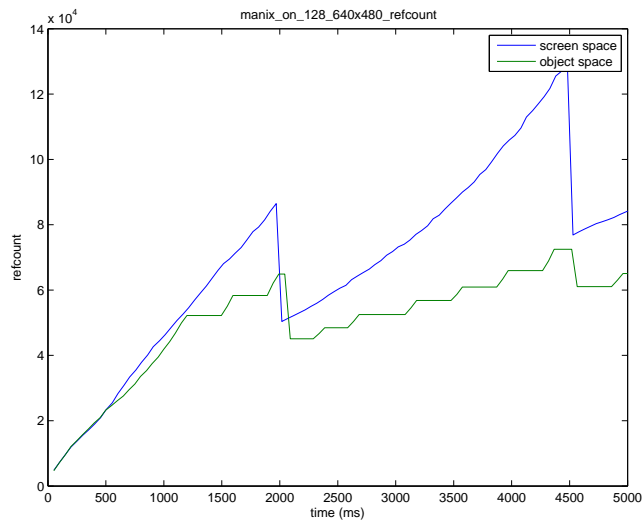


Figure 149: screen space vs object space: number of references manix, background on, volume res = 128, screen res = 640x480, number of references

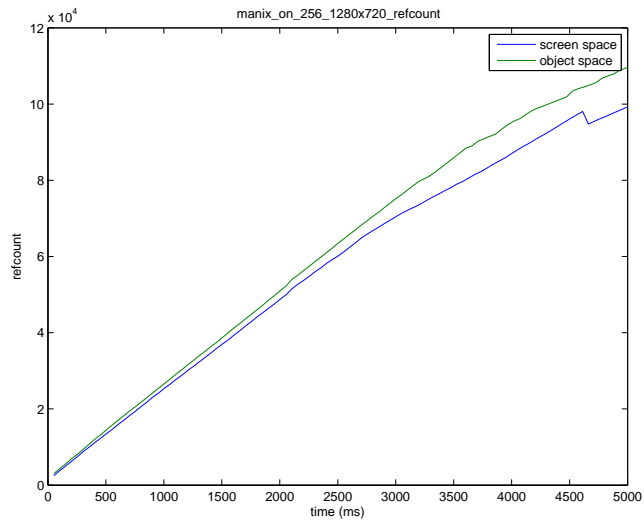


Figure 150: screen space vs object space: number of references manix, background on, volume res = 256, screen res = 1280x720, number of references

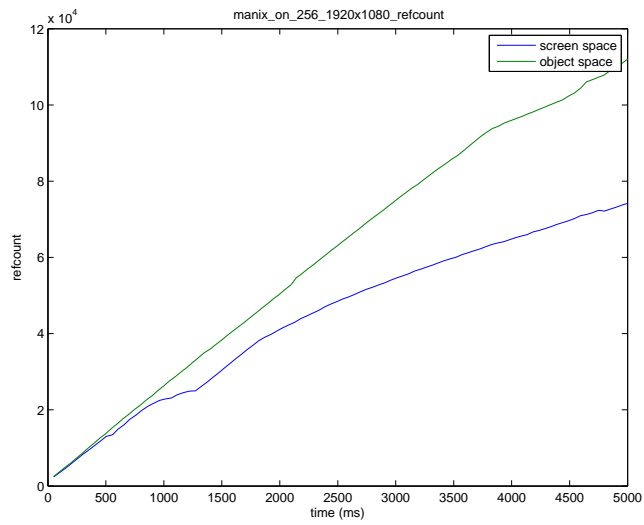


Figure 151: screen space vs object space: number of references manix, background on, volume res = 256, screen res = 1920x1080, number of references

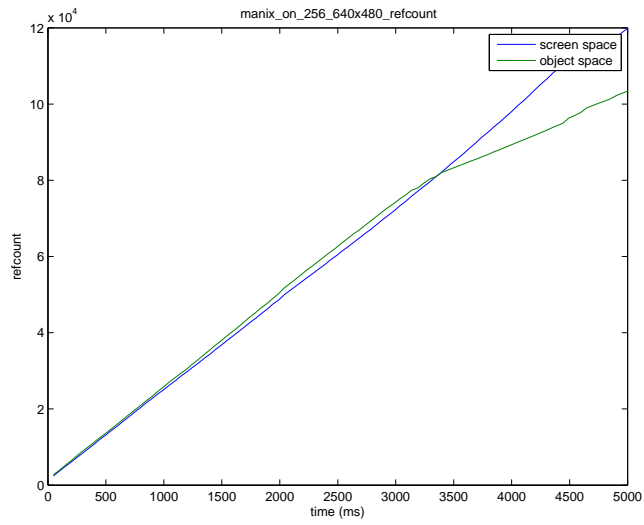


Figure 152: screen space vs object space: number of references manix, background on, volume res = 256, screen res = 640x480, number of references

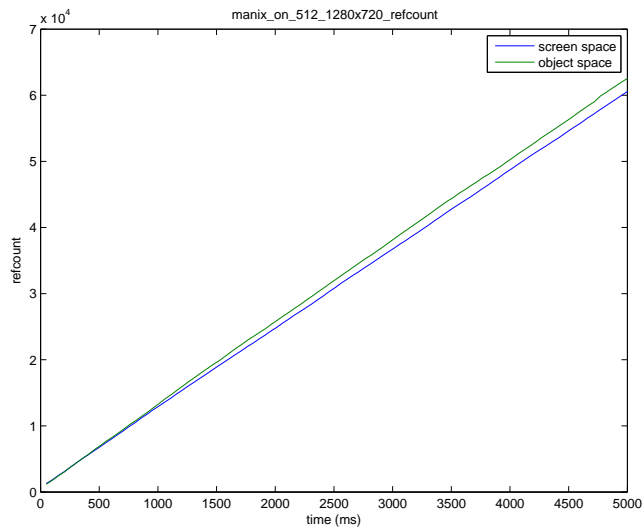


Figure 153: screen space vs object space: number of references manix, background on, volume res = 512, screen res = 1280x720, number of references

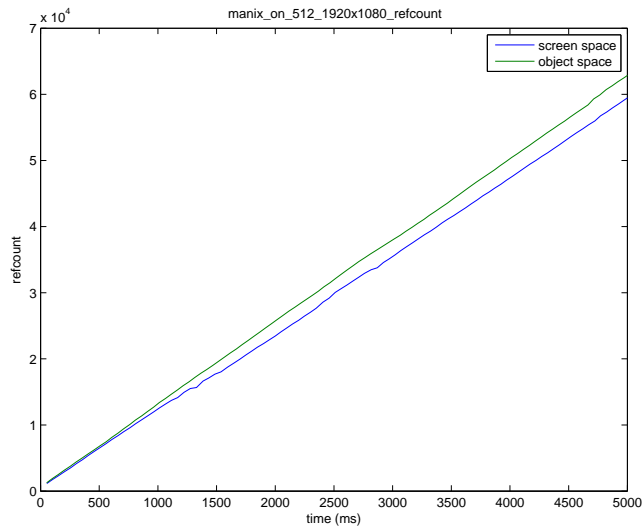


Figure 154: screen space vs object space: number of references manix, background on, volume res = 512, screen res = 1920x1080, number of references

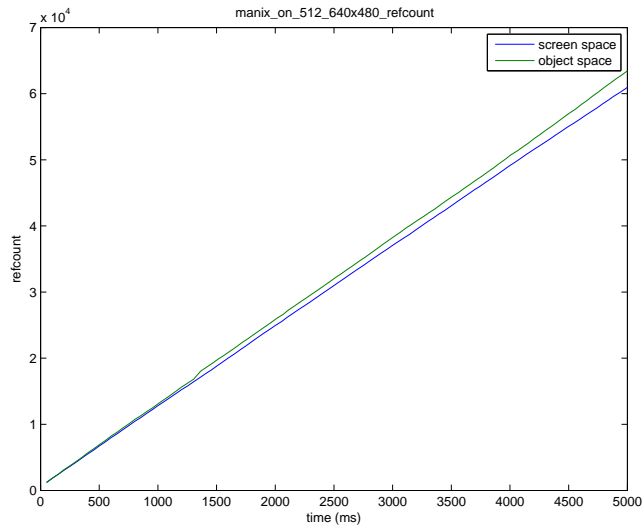


Figure 155: screen space vs object space: number of references manix, background on, volume res = 512, screen res = 640x480, number of references