

color Schemes for Scientific Data with the SRON-COLORS package

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1 Introduction













Colors for scientific data must be chosen very carefully. The SRON-COLORS package makes the color schemes proposed by Paul Tol in his [SRON Technical Note](#) easily accessible with LaTeX.

2 SRON color palettes

The SRON Technical Note describes two different distinct color palettes











































`palette1` The following table lists the colors of palette 1.

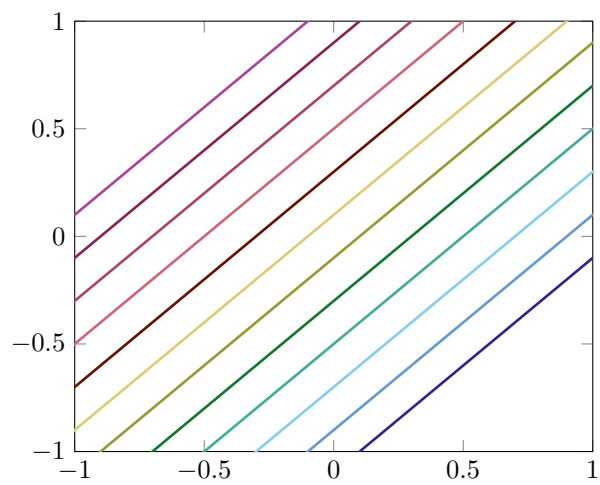
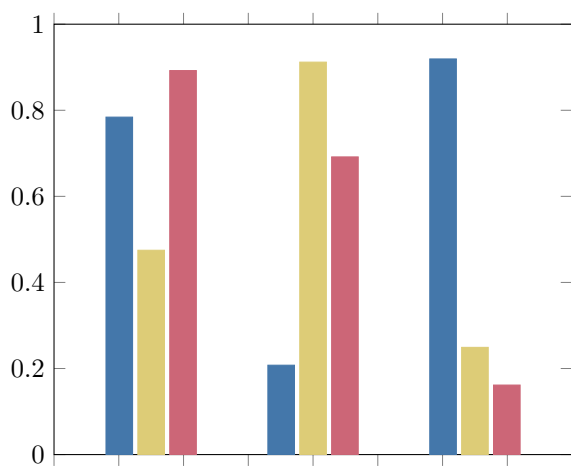
Name	RGB	HTML
palette1color0	 68 119 170	 4477AA
palette1color1	 51 34 136	 332288
palette1color2	 102 153 204	 6699CC
palette1color3	 136 204 238	 88CCEE
palette1color4	 68 170 153	 44AA99
palette1color5	 17 119 51	 117733
palette1color6	 153 153 51	 999933

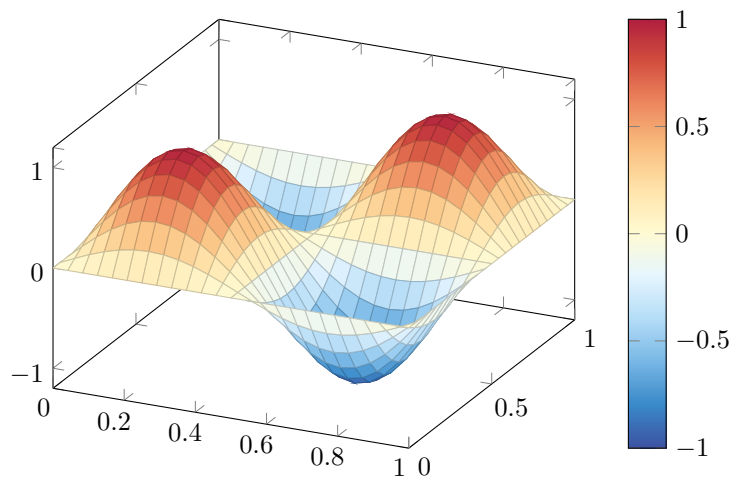
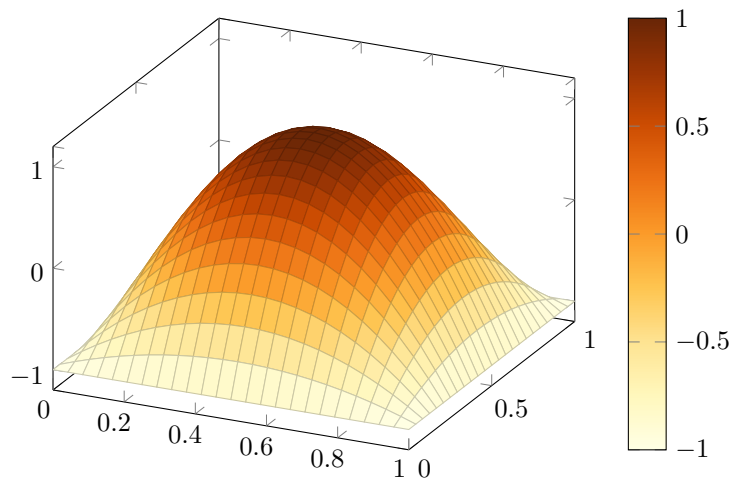
palette1color7	 221 204 119	 DDCC77
palette1color8	 102 17 0	 661100
palette1color9	 204 102 119	 CC6677
palette1color10	 170 68 102	 AA4466
palette1color11	 136 34 85	 882255
palette1color12	 170 68 153	 AA4499

palette1cycleX Using the color palette **palette1** 12 different **pgfplotscyclelists** are defined. Just replace the X with the number of colors you need in your plot. Then those colors are selected, that they are most distinct to each other.

palette2 The following table lists the colors of palette 2.

Name	RGB	HTML
palette2color0light	 119 170 221	 77AADD
palette2color1light	 119 204 204	 77CCCC
palette2color2light	 136 204 170	 88CCAA
palette2color3light	 221 221 119	 DDDD77
palette2color4light	 221 170 119	 DDAA77
palette2color5light	 221 119 136	 DD7788
palette2color6light	 204 153 187	 CC99BB
palette2color0medium	 68 119 170	 4477AA
palette2color1medium	 68 170 170	 44AAAA
palette2color2medium	 68 170 119	 44AA77
palette2color3medium	 170 170 68	 AAAA44
palette2color4medium	 170 119 68	 AA7744
palette2color5medium	 170 68 85	 AA4455
palette2color6medium	 170 68 136	 AA4488
palette2color0dark	 17 68 119	 114477
palette2color1dark	 17 119 119	 117777
palette2color2dark	 17 119 68	 117744
palette2color3dark	 119 119 17	 777711
palette2color4dark	 119 68 17	 774411
palette2color5dark	 119 17 34	 771122
palette2color6dark	 119 17 85	 771155





3 Implementation

3.1 Required Packages

Load required packages.

```

1 \RequirePackage{etoolbox}
2 \RequirePackage{tikz}
3 \RequirePackage{pgfplots}
4 \RequirePackage{pgffor}

```

3.2 Helper Macros

`\sroncreateplotcyclelist` Helper macro to conveniently create plotcyclelists.

```
5 \newcommand{\sroncreateplotcyclelist}[3]{
6   % check if key otherwise treat it like a macro list
7   \pgfkeysifdefined{#2}{
8     \pgfkeys{#2/.get = \@sron@list}
9   }{
10    \let\@sron@list#2
11  }
12
13  % create helper macro on
14  \def\@sron@tempcmd{ }
15  \foreach \drawtype in {#3} {
16    \global\exppto\@sron@tempcmd{\drawtype=\noexpand\color,}
17  }
18  % create custom
19  \def\@sron@temp{ }
20  \foreach \color in \@sron@list {
21    \ifx\color\@empty\else
22      \global\exppto\@sron@temp{{\@sron@tempcmd}, }
23    \fi
24  }
25  % create plot cycle list based on http://tex.stackexchange.com/a/14418/30195
26  \begingroup
27  \edef\@sron@createcyclelist{%
28    \noexpand\pgfplotscreateplotcyclelist{#1}{%
29      \unexpanded\expandafter{\@sron@temp}%
30    }%
31  }%
32  \expandafter
33  \endgroup\@sron@createcyclelist
34 }
```

3.3 Color Palettes

3.3.1 Palette 1

`palette1` Define the colors of palette 1.

```
35 \definecolor{palette1color0}{HTML}{4477AA}
36 \definecolor{palette1color1}{HTML}{332288}
37 \definecolor{palette1color2}{HTML}{6699CC}
38 \definecolor{palette1color3}{HTML}{88CCEE}
39 \definecolor{palette1color4}{HTML}{44AA99}
40 \definecolor{palette1color5}{HTML}{117733}
41 \definecolor{palette1color6}{HTML}{999933}
42 \definecolor{palette1color7}{HTML}{DDCC77}
43 \definecolor{palette1color8}{HTML}{661100}
44 \definecolor{palette1color9}{HTML}{CC6677}
45 \definecolor{palette1color10}{HTML}{AA4466}
46 \definecolor{palette1color11}{HTML}{882255}
47 \definecolor{palette1color12}{HTML}{AA4499}
```

`palette1cycle1` Define SRON palettes 1 cycles with different number of colors

```
48 \pgfkeys{
49   /sron/palette 1/.cd,
50   cycle 1/.initial = {%
51     palette1color0,
52   },
53   cycle 2/.initial = {%
54     palette1color0,
55     palette1color9
56   },
57   cycle 3/.initial = {%
58     palette1color0,
59     palette1color7,
60     palette1color9,
61   },
62   cycle 4/.initial = {%
63     palette1color0,
64     palette1color5,
65     palette1color7,
```

```

66     palette1color9
67 },
68 cycle 5/.initial = {%
69     palette1color1,
70     palette1color3,
71     palette1color5,
72     palette1color7,
73     palette1color9,
74 },
75 cycle 6/.initial = {%
76     palette1color1,
77     palette1color3,
78     palette1color5,
79     palette1color7,
80     palette1color9,
81     palette1color12,
82 },
83 cycle 7/.initial = {%
84     palette1color1,
85     palette1color3,
86     palette1color4,
87     palette1color5,
88     palette1color7,
89     palette1color9,
90     palette1color12,
91 },
92 cycle 8/.initial = {%
93     palette1color1,
94     palette1color3,
95     palette1color4,
96     palette1color5,
97     palette1color6,
98     palette1color7,
99     palette1color9,
100    palette1color12,
101 },
102 cycle 9/.initial = {%
103     palette1color1,
104     palette1color3,
105     palette1color4,

```

```

106     palette1color5,
107     palette1color6,
108     palette1color7,
109     palette1color9,
110     palette1color11,
111     palette1color12,
112 },
113 cycle 10/.initial = {%
114     palette1color1,
115     palette1color3,
116     palette1color4,
117     palette1color5,
118     palette1color6,
119     palette1color7,
120     palette1color8,
121     palette1color9,
122     palette1color11
123     palette1color12,
124 },
125 cycle 11/.initial = {%
126     palette1color1,
127     palette1color2,
128     palette1color3,
129     palette1color4,
130     palette1color5,
131     palette1color6,
132     palette1color7,
133     palette1color8,
134     palette1color9,
135     palette1color11,
136     palette1color12,
137 },
138 cycle 12/.initial = {%
139     palette1color1,
140     palette1color2,
141     palette1color3,
142     palette1color4,
143     palette1color5,
144     palette1color6,
145     palette1color7,

```



```

146     palette1color8,
147     palette1color9,
148     palette1color10,
149     palette1color11,
150     palette1color12,
151   },
152 }

```

palette1cycleX For every number of colors from 1 to 12 define a **pgfplotsstylelist**.

```

153 \sroncreateplotcyclelist{palette1cycle1}{/sron/palette 1/cycle 1}{color}
154 \sroncreateplotcyclelist{palette1cycle2}{/sron/palette 1/cycle 2}{color}
155 \sroncreateplotcyclelist{palette1cycle3}{/sron/palette 1/cycle 3}{color}
156 \sroncreateplotcyclelist{palette1cycle4}{/sron/palette 1/cycle 4}{color}
157 \sroncreateplotcyclelist{palette1cycle5}{/sron/palette 1/cycle 5}{color}
158 \sroncreateplotcyclelist{palette1cycle6}{/sron/palette 1/cycle 6}{color}
159 \sroncreateplotcyclelist{palette1cycle7}{/sron/palette 1/cycle 7}{color}
160 \sroncreateplotcyclelist{palette1cycle8}{/sron/palette 1/cycle 8}{color}
161 \sroncreateplotcyclelist{palette1cycle9}{/sron/palette 1/cycle 9}{color}
162 \sroncreateplotcyclelist{palette1cycle10}{/sron/palette 1/cycle 10}{color}
163 \sroncreateplotcyclelist{palette1cycle11}{/sron/palette 1/cycle 11}{color}
164 \sroncreateplotcyclelist{palette1cycle12}{/sron/palette 1/cycle 12}{color}

```

palette1cycleXbar For every number of colors from 1 to 12 define a **pgfplotsstylelist** for bar charts.

```

165 \sroncreateplotcyclelist{palette1cycle1bar}{/sron/palette 1/cycle 1}{draw,fill}
166 \sroncreateplotcyclelist{palette1cycle2bar}{/sron/palette 1/cycle 2}{draw,fill}
167 \sroncreateplotcyclelist{palette1cycle3bar}{/sron/palette 1/cycle 3}{draw,fill}
168 \sroncreateplotcyclelist{palette1cycle4bar}{/sron/palette 1/cycle 4}{draw,fill}
169 \sroncreateplotcyclelist{palette1cycle5bar}{/sron/palette 1/cycle 5}{draw,fill}
170 \sroncreateplotcyclelist{palette1cycle6bar}{/sron/palette 1/cycle 6}{draw,fill}
171 \sroncreateplotcyclelist{palette1cycle7bar}{/sron/palette 1/cycle 7}{draw,fill}
172 \sroncreateplotcyclelist{palette1cycle8bar}{/sron/palette 1/cycle 8}{draw,fill}
173 \sroncreateplotcyclelist{palette1cycle9bar}{/sron/palette 1/cycle 9}{draw,fill}
174 \sroncreateplotcyclelist{palette1cycle10bar}{/sron/palette 1/cy-
    cle 10}{draw,fill}
175 \sroncreateplotcyclelist{palette1cycle11bar}{/sron/palette 1/cy-
    cle 11}{draw,fill}
176 \sroncreateplotcyclelist{palette1cycle12bar}{/sron/palette 1/cy-
    cle 12}{draw,fill}

```

3.3.2 Palette 2

`palette2` Define the colors of palette 2.

```
177 \definecolor{palette2color0light}{HTML}{77AADD}  
178 \definecolor{palette2color1light}{HTML}{77CCCC}  
179 \definecolor{palette2color2light}{HTML}{88CCAA}  
180 \definecolor{palette2color3light}{HTML}{DDDD77}  
181 \definecolor{palette2color4light}{HTML}{DDAA77}  
182 \definecolor{palette2color5light}{HTML}{DD7788}  
183 \definecolor{palette2color6light}{HTML}{CC99BB}  
184 \definecolor{palette2color0medium}{HTML}{4477AA}  
185 \definecolor{palette2color1medium}{HTML}{44AAAA}  
186 \definecolor{palette2color2medium}{HTML}{44AA77}  
187 \definecolor{palette2color3medium}{HTML}{AAAA44}  
188 \definecolor{palette2color4medium}{HTML}{AA7744}  
189 \definecolor{palette2color5medium}{HTML}{AA4455}  
190 \definecolor{palette2color6medium}{HTML}{AA4488}  
191 \definecolor{palette2color0dark}{HTML}{114477}  
192 \definecolor{palette2color1dark}{HTML}{117777}  
193 \definecolor{palette2color2dark}{HTML}{117744}  
194 \definecolor{palette2color3dark}{HTML}{777711}  
195 \definecolor{palette2color4dark}{HTML}{774411}  
196 \definecolor{palette2color5dark}{HTML}{771122}  
197 \definecolor{palette2color6dark}{HTML}{771155}
```

3.4 Color Maps

`colormapSeqPal` Define palette of color map for sequential data.

```
198 \definecolor{colormapSeqpalcolor0}{HTML}{FFFFE5}  
199 \definecolor{colormapSeqpalcolor1}{HTML}{FFF7BC}  
200 \definecolor{colormapSeqpalcolor2}{HTML}{FEE391}  
201 \definecolor{colormapSeqpalcolor3}{HTML}{FEC44F}  
202 \definecolor{colormapSeqpalcolor4}{HTML}{FB9A29}  
203 \definecolor{colormapSeqpalcolor5}{HTML}{EC7014}  
204 \definecolor{colormapSeqpalcolor6}{HTML}{CC4C02}  
205 \definecolor{colormapSeqpalcolor7}{HTML}{993404}  
206 \definecolor{colormapSeqpalcolor8}{HTML}{662506}
```

colormapSeq Color map for sequential data.

```
207 \pgfplotscreatecolormap{colormapSeq}{%
208   color(0cm)=(colormapSeqpalcolor0);
209   color(1cm)=(colormapSeqpalcolor1);
210   color(2cm)=(colormapSeqpalcolor2);
211   color(3cm)=(colormapSeqpalcolor3);
212   color(4cm)=(colormapSeqpalcolor4);
213   color(5cm)=(colormapSeqpalcolor5);
214   color(6cm)=(colormapSeqpalcolor6);
215   color(7cm)=(colormapSeqpalcolor7);
216   color(8cm)=(colormapSeqpalcolor8);
217 }
```

Style with color map for sequential data.

```
218 \pgfplotsset{
219   /pgfplots/colormap/colormapSeq/.style={
220     /pgfplots/colormap name = colormapSeq
221   }
222 }
```

colormapDivpal Define palette of color map for diverging data.

```
223 \definecolor{colormapDivpalcolor0}{HTML}{3D52A1}
224 \definecolor{colormapDivpalcolor1}{HTML}{3A89C9}
225 \definecolor{colormapDivpalcolor2}{HTML}{77B7E5}
226 \definecolor{colormapDivpalcolor3}{HTML}{B4DDF7}
227 \definecolor{colormapDivpalcolor4}{HTML}{E6F5FE}
228 \definecolor{colormapDivpalcolor5}{HTML}{FFFAD2}
229 \definecolor{colormapDivpalcolor6}{HTML}{FFE3AA}
230 \definecolor{colormapDivpalcolor7}{HTML}{F9BD7E}
231 \definecolor{colormapDivpalcolor8}{HTML}{ED875E}
232 \definecolor{colormapDivpalcolor9}{HTML}{D24D3E}
233 \definecolor{colormapDivpalcolor10}{HTML}{AE1C3E}
```

colormapDiv Color map for diverging data.

```
234 \pgfplotscreatecolormap{colormapDiv}{%
235   color(0cm)=(colormapDivpalcolor0);
236   color(1cm)=(colormapDivpalcolor1);
237   color(2cm)=(colormapDivpalcolor2);
```

```

238 color(3cm)=(colormapDivpalcolor3);
239 color(4cm)=(colormapDivpalcolor4);
240 color(5cm)=(colormapDivpalcolor5);
241 color(6cm)=(colormapDivpalcolor6);
242 color(7cm)=(colormapDivpalcolor7);
243 color(8cm)=(colormapDivpalcolor8);
244 color(9cm)=(colormapDivpalcolor9);
245 color(10cm)=(colormapDivpalcolor10);
246 }

```

Style with color map for diverging data.

```

247 \pgfplotsset{
248   /pgfplots/colormap/colormapDiv/.style={
249     /pgfplots/colormap name = colormapDiv
250   }
251 }

```

colormapRainpal Define palette for color map with a continuous rainbow scheme.

```

252 \definecolor{colormapRainpalcolor0}{HTML}{781C81}
253 \definecolor{colormapRainpalcolor1}{HTML}{413B93}
254 \definecolor{colormapRainpalcolor2}{HTML}{4065B1}
255 \definecolor{colormapRainpalcolor3}{HTML}{488BC2}
256 \definecolor{colormapRainpalcolor4}{HTML}{55A1B1}
257 \definecolor{colormapRainpalcolor5}{HTML}{63AD99}
258 \definecolor{colormapRainpalcolor6}{HTML}{7FB972}
259 \definecolor{colormapRainpalcolor7}{HTML}{B5BD4C}
260 \definecolor{colormapRainpalcolor8}{HTML}{D9AD3C}
261 \definecolor{colormapRainpalcolor9}{HTML}{E68E34}
262 \definecolor{colormapRainpalcolor10}{HTML}{E6642C}
263 \definecolor{colormapRainpalcolor11}{HTML}{D92120}

```

colormapRain Color map with rainbow scheme.

```

264 \pgfplotscreatecolormap{colormapRain}{%
265   color(0cm)=(colormapRainpalcolor0);
266   color(1cm)=(colormapRainpalcolor1);
267   color(2cm)=(colormapRainpalcolor2);
268   color(3cm)=(colormapRainpalcolor3);
269   color(4cm)=(colormapRainpalcolor4);

```

```

270 color(5cm)=(colormapRainpalcolor5);
271 color(6cm)=(colormapRainpalcolor6);
272 color(7cm)=(colormapRainpalcolor7);
273 color(8cm)=(colormapRainpalcolor8);
274 color(9cm)=(colormapRainpalcolor9);
275 color(10cm)=(colormapRainpalcolor10);
276 color(11cm)=(colormapRainpalcolor11);
277 }

```

Style for color map with rainbow scheme.

```

278 \pgfplotsset{
279   /pgfplots/colormap/colormapRain/.style={
280     /pgfplots/colormap name = colormapRain
281   }
282 }

```