CENTRAL REGION TECHNICAL ATTACHMENT 90-18

WARM SEASON CURVES FOR USE ON SWIS ZA SECTORS

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1.   Introduction

The SWIS color enhancement capability allows forecasters to expand upon the standard MB thunderstorm enhancement available on most sectors from the GOES TAP. The curves presented here are for use on SWIS ZA enhanced images.

The first two curves were developed at the National Severe Storms Forecast Center (NSSFC) and the Satellite Field Service Station (SFSS) at Kansas City, Missouri, for their CSIS system. Through correspondence with NSSFC and SFSS meteorologists, the temperature ranges and color schemes for two of their most commonly used thunderstorm enhancement curves were obtained. One curve is for relatively warm top thunderstorms, mainly during spring, while the other is for colder topped summer thunderstorms.

The third curve is an all purpose MB based enhancement curve combined with a low level cloud enhancement. Although this curve works very well on the KF1 sector, it was originally designed for the full disk IR CD1 image. Further attesting to its versatility is that it works well on moisture channel images, and its low level enhancement is suited for visible images.

A number of enhancement techniques have been developed by other WSFO Milwaukee forecasters. A few of these were incorporated in these curves in an attempt to develop the best all purpose curves, and to keep the need to change curves to a minimum. This was necessary since, at the present time, incoming scan lines are lost whenever the color select button is pushed on SWIS.

2.   Discussion

A.   NSSFC IR Curves 1 and 2

Minor changes were made to the NSSFC IR curves to produce a more pleasing image on SWIS. The most significant addition is called "Hide a Grid." This concept was developed by Todd Morris, formerly of the WSFO Milwaukee staff, for other enhancement curves. "Hide a Grid" changes the almost white SWIS geographical map background to a grey shade without as much contrast. This is

very useful for low level mesoscale features that are hidden by the high contrast white geographical boundaries. Nighttime fog and stratus are much more easily identified in the IR images. The grey shades for the geographical boundaries can be changed from season to season. However, the values given in the table seem to work well for most seasons.

B.   Modified MB Curve

The all purpose MB curve was originally developed to make the CD1 full disk IR images more useful, but expanded upon for use with KF1 images. Reducing the high contrast white geographical boundaries is especially useful in CD1 images, since the latitude and longitude lines distract from the image. The low level cloud enhancement was developed to work well both in IR, and visible images. With IR images the low level enhancement adds just enough contrast to help delineate stratus and stratocumulus fields during nighttime situations on KF1 images where cloud top temperatures approach ground temperatures. Ocean stratocumulus fields on CD1 images are also better highlighted, which help to determine cloud motions at different levels.

The low level enhancement section from digital count 192 to 223 can also be used as a separate curve. It is very useful in visible images to help identify meso features such as thunderstorm outflows, cloud lines, cumulus fields, and to delineate snow fields and frozen lakes from clouds. It also works well with MB enhanced CB2 images for low cloud identification, without affecting the enhanced part of the image.

The repeat turquoise part of the thunderstorm enhancement was developed by Glenn Field, also a former WSFO Milwaukee staff member.

3.   How The Curves Were Produced

Central Region Technical Attachment 88-23 (Hentz, 1988) provided a table assigning a temperature in degrees Celsius to each digital count (from 0 to 255) in the ZA curve. Enhancing any desired temperature range on an image with a ZA curve can now be done by assigning a particular color or grey shade to a range of digital counts (of known corresponding temperatures), located on the bottom of the SWIS color control work space.

The digital count versus degrees Celsius table, along with the graphical display of the CC curve, and its enhancement table contained in the GOES User Guide (Clark, 1983), were used to develop the curves listed below.

4. The Enhancement Tables

NSSFC WARM TOP CURVE   MY modifications

color		temp (c)	ZA digital count	temp (c)	ZA digital count
				color 212 H.A. grid 10	
Blue	175	-40 to -43	185 - 188		185 - 189
Green	105	-44 to -50	189 - 195		190 - 195
Black	192	-51	196		196 - 197
Red	50	-52 to -57	197 - 205		198 - 206
Pink	31	-58 to -59	206 - 211		207 - 212
White	254	-60 to -62	212 - 220		213 - 220
Black	192	-63 to -64	221 - 226		221 - 226
Yellow	92	< -65	227 - 255		227 - 244
				color 231 H.A. grid	245
				standard ZA	246 -

NSSFC COLD TOP CURVE   MY modifications

color		temp (c)	ZA digital count	temp (c)	ZA digital count
Blue	175	-40 to -49	185 - 194		
Green	105	-50 to -56	195 - 203		
Black	192	-57	204		
Red	50	-58 to -63	207 - 222		
Pink	31	-64 to -65	223 - 228		
White	254	-60 to -68	229 - 236		
Black	192	-69 to -70	237 - 242		
				Grey 238	243 - 255
Yellow	92	< -70	243 - 255		

MKE MODIFIED MB CURVE

color		temp (c)	ZA digital count
DARK green	97	-32 to -41	176 - 186
Medium green	102	-42 to -52	187 - 197
Light green	126	-53 to -58	198 - 207
Black	192	-58 to -62	208 - 219
repeat turquoise	130	-63 to -64	220 - 224
	135	-64 to -66	225 - 229
	142	-66 to -68	230 - 235
	157	-68 to -70	236 - 240
white	254	-70 to -73	241 - 248
blue	192	< -73	249 - 255

Low Level Enhancement

192	0 - 9	grey shade color 212 for
212	10	geographical boundaries
193	11 - 19	at digital count
194	20 - 24	10 and 245
195	25 - 29	
196	30 - 34	
197	35 - 39	
198	40 - 44	
199	45 - 49	
200	50 - 54	
201	55 - 59	
202	60 - 64	
203	65 - 69	
204	70 - 74	
205	75 - 79	
206	80 - 84	
208	85 - 89	
210	90 - 94	
212	95 - 99	
214	100 - 104	
216	105 - 109	
218	110 - 114	
219	115 - 119	
220	120 - 124	
221	125 - 129	
222	130 - 134	
223	135	

5. References

Clark, J. D., 1983: The GOES Users Guide. NOAA, National Environmental
    Satellite, Data, and Information Service, Washington, D.C.

Hentz, S. J., 1988: Using a digital count value/degrees Celsius table to build
    enhancement curves on SWIS, Central Region Technical Attachment 88-23.
    Available from NWS Central Region Scientific Services Division, Kansas
    City, MO.