

Evaluation of Desktop Relief Shading Software

ABSTRACT

Shaded relief depiction on two-dimensional maps is increasing due to, in large part, the growth of inexpensive, easy-to-use relief shading software. The aesthetic quality of images generated from these applications compares favorably with that of higher-end, more expensive G.I.S. and rendering applications.

An evaluation of the following applications will compare and contrast their features (see separate handout): MacDEM, MapRender3D Pro, MapRender3D Lite, MicroDEM, Natural Scene Designer, Photoshop, and Cartagena (formerly Shadow). The digital elevation model used is Santa Barbara, California 30 meter, 395 pixels wide x 473 pixels high. This DEM has a good variety of terrain surfaces and range in elevation.

Finally, a display of images from the above applications are compared to ones from ArcInfo, ArcView with 3D Analyst, Bryce, MapInfo, and World Construction Set.

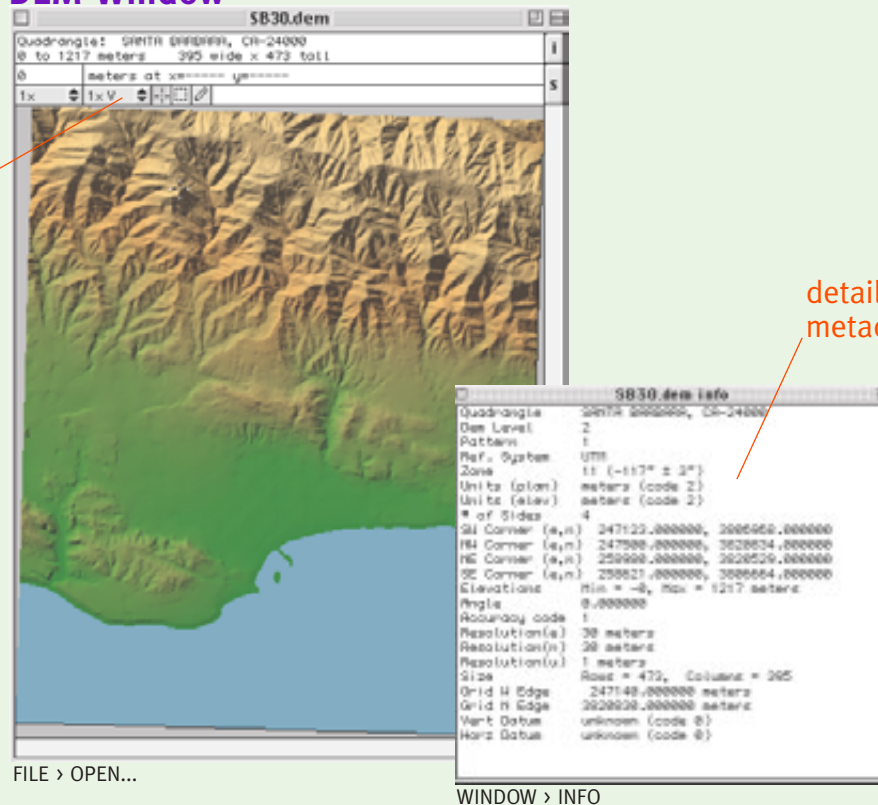
DAN VAN DORN, CARTOGRAPHER · DVANDORN@MAPLINK.COM
I.C.A. M.C.W. · MT. HOOD, OREGON · MAY 2002
N.A.C.I.S. · COLUMBUS, OHIO · OCTOBER 2002

MacDEM

DEM Window

vertical
exaggeration

detailed
metadata



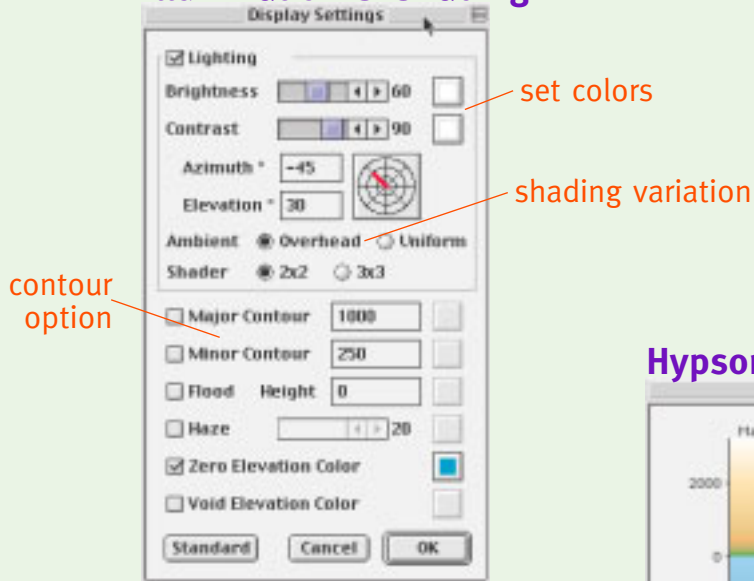
2

A BRIEF DISPLAY OF THE REVIEWED APPLICATIONS

The purple type labels which window is being shown. The orange type is a noteworthy comment about a feature in the software. Below the window are the menu commands. Don't forget to follow along with the handout, which explains these slides in more detail. Here shows the simple but effective interface of MacDEM.

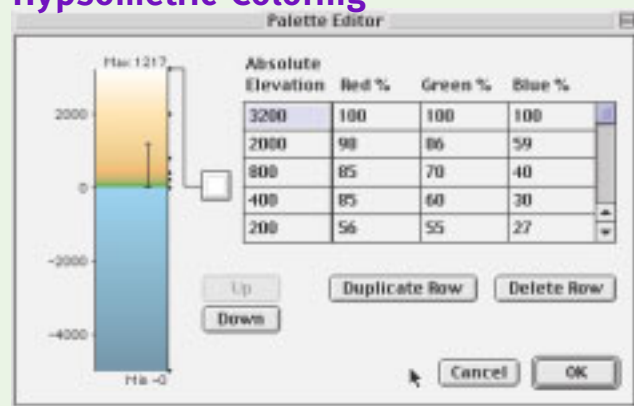
MacDEM

Illumination & Shading



DISPLAY > DISPLAY SETTINGS...

Hypsometric Coloring



PALETTE > PALETTE...

3

A BRIEF DISPLAY OF THE REVIEWED APPLICATIONS

These show more of the nice, simple (if limiting) interface found in MacDEM.

MapRender3D Pro

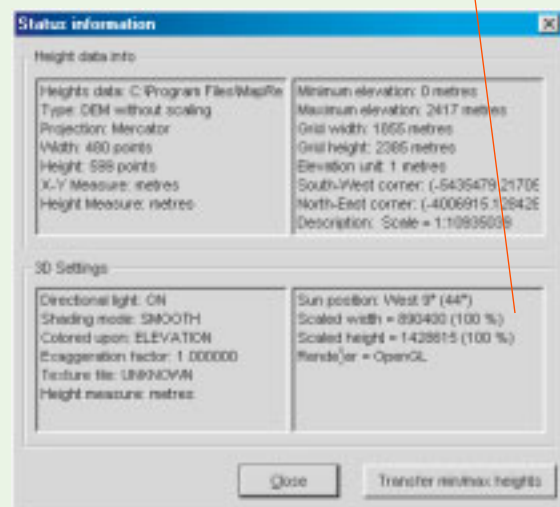
DEM Window



FILE > LOAD HEIGHT DATA...

data available
in demo version
is limited

information includes
relief settings



FILE > INFO

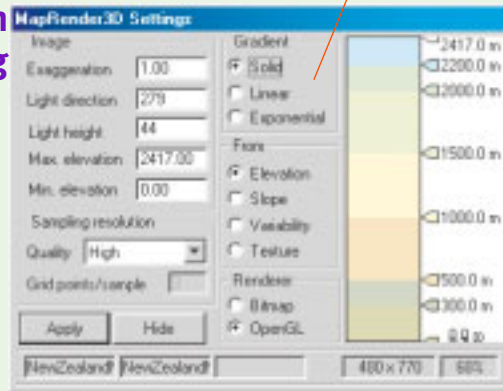
4

A BRIEF DISPLAY OF THE REVIEWED APPLICATIONS

Quickly on to MapRender3D Pro. Basic functions but fairly good results. Not sure if it's worth the price.

MapRender3D Pro

Illumination
& Shading



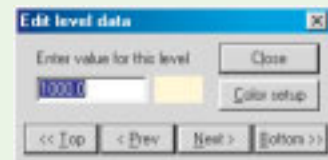
Hypsometric
Coloring

most controls are
in 1 single palette

OPTIONS > SHOW/HIDE SETTINGS



MAP > SHADOW INTENSITY...



OPTIONS > SHOW/HIDE SETTINGS >
DOUBLE-CLICK ON OUTLINED ARROW

A BRIEF DISPLAY OF THE REVIEWED APPLICATIONS

Many functions on one floating palette. Hard to turn off the hypsometric tinting.

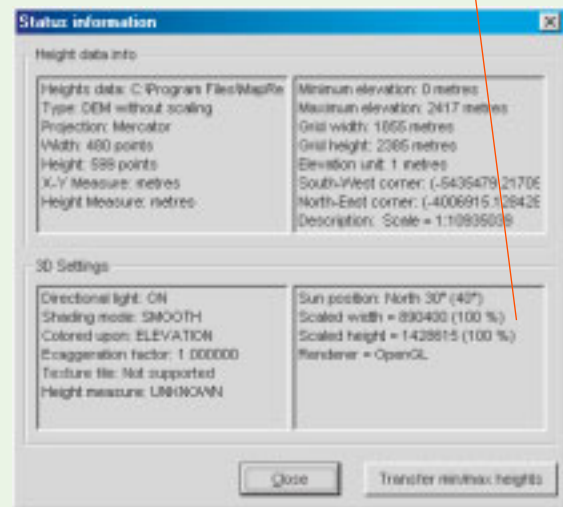
MapRender3D Lite

DEM Window



data available
in demo version
is limited

information includes
relief settings



FILE > INFO

FILE > LOAD HEIGHT DATA...

6

A BRIEF DISPLAY OF THE REVIEWED APPLICATIONS

The DEM window looks very much the same as MapRender3D Pro.

MapRender3D Lite

Illumination & Shading

cannot enter values for azimuth & altitude

Hypsometric Coloring

transition options

most controls are in 1 single palette

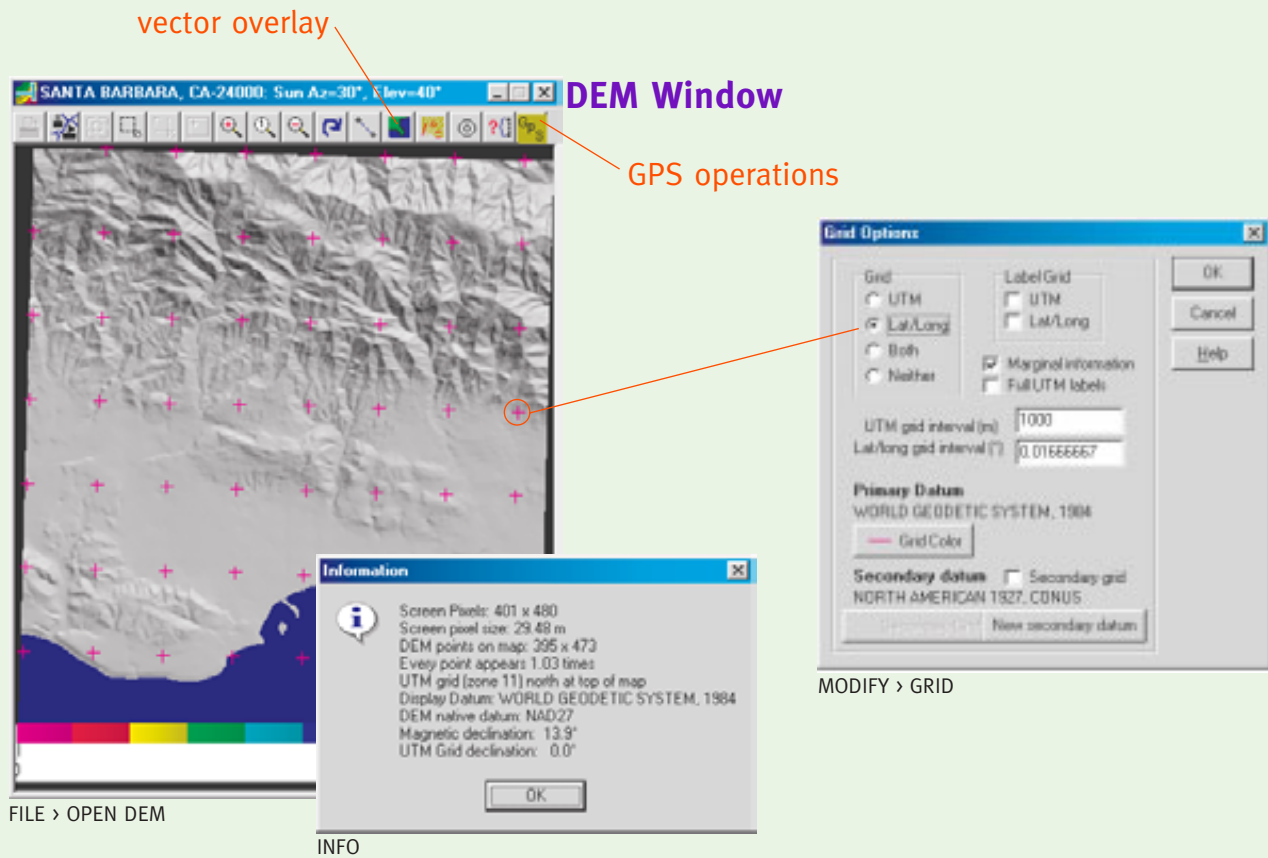
TOGGLE PAINTBRUSH BUTTON

TOGGLE PAINTBRUSH BUTTON AND DOUBLE-CLICK ON OUTLINED ARROW

MAP > SHADOW INTENSITY...

A BRIEF DISPLAY OF THE REVIEWED APPLICATIONS
The difference becomes clearer. Hence the lower cost. But rendering quality is similar.

MicroDEM

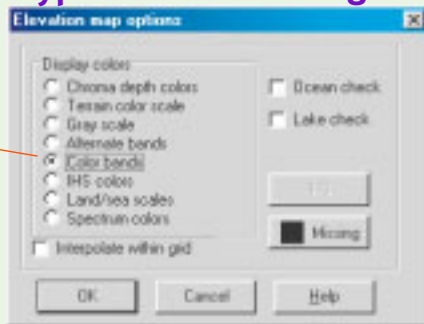


A BRIEF DISPLAY OF THE REVIEWED APPLICATIONS
The most G.I.S.-like of the applications, it performs many functions beyond shaded relief rendering.

MicroDEM

Hypsometric Coloring

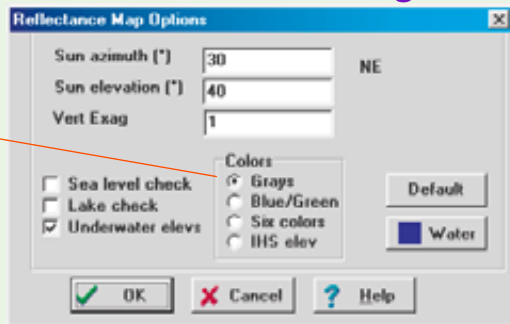
various
pre-set
options



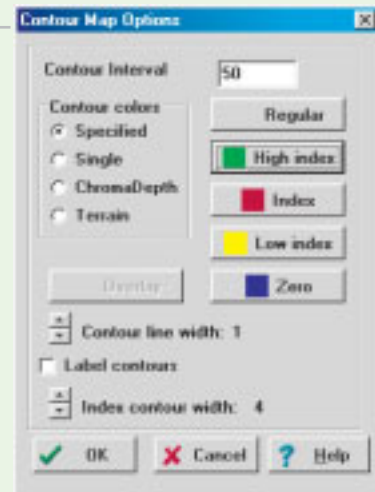
MODIFY > ELEVATION > COLOR

colors automatically
merge with
shaded relief

Illumination & Shading

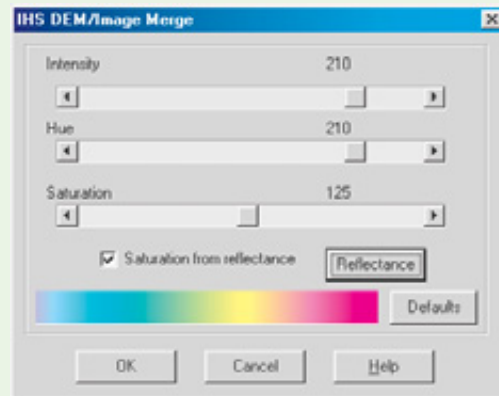


MODIFY > DISPLAY PARAMETER > REFLECTANCE



many
visualization
options

MODIFY > DISPLAY PARAMETER > CONTOUR



MODIFY > DEM/IMAGE MERGE

A BRIEF DISPLAY OF THE REVIEWED APPLICATIONS
Adequate control for rendering but limited for coloration.

Natural Scene Designer

DEM Window

DEM information is limited

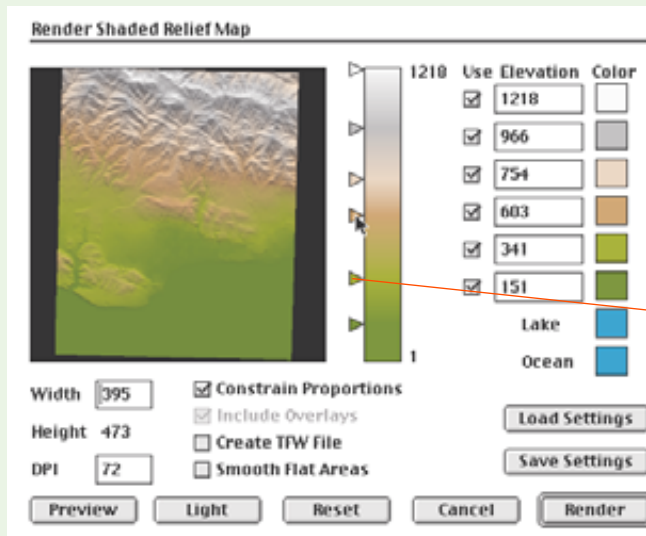
no "info"
palette



A BRIEF DISPLAY OF THE REVIEWED APPLICATIONS

This application is designed as a mini-Bryce (artificial environment creation) but imports DEMs and renders them very well.

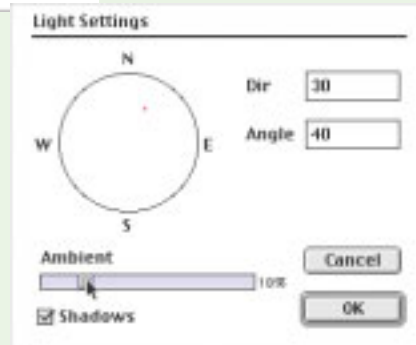
Natural Scene Designer



Hypsometric Coloring

can slide these to create "visual" classes

RENDER > RENDER SHADED RELIEF



Illumination & Shading

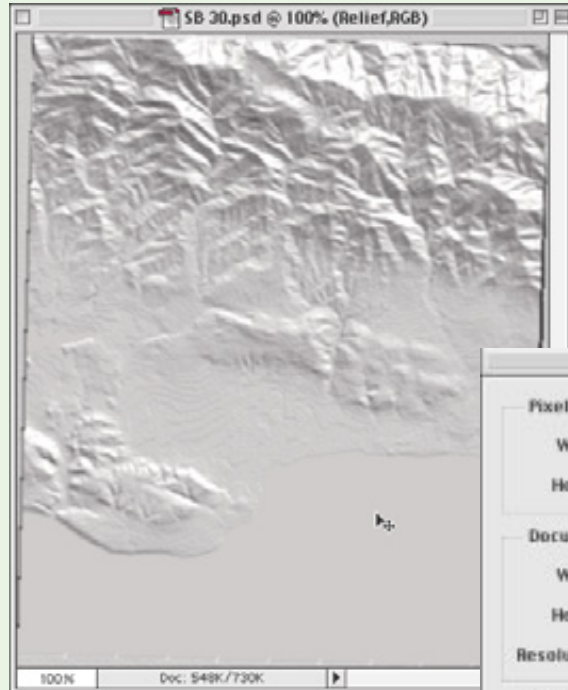
RENDER > LIGHT...

11

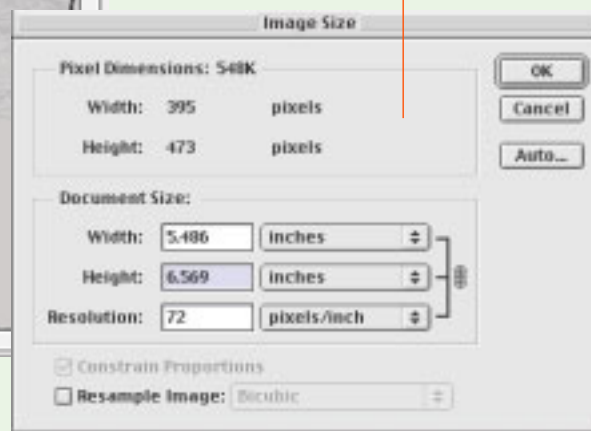
A BRIEF DISPLAY OF THE REVIEWED APPLICATIONS
Adequate settings and some unique features.

Photoshop

DEM Window



DEM not
georeferenced



PROCEDURES FOR THIS ARE WELL DOCUMENTED
AT WWW.NACIS.ORG/CP/CP28/RELIEF_TP.HTML
(TOM PATTERSON'S SITE)

IMAGE > IMAGE SIZE...

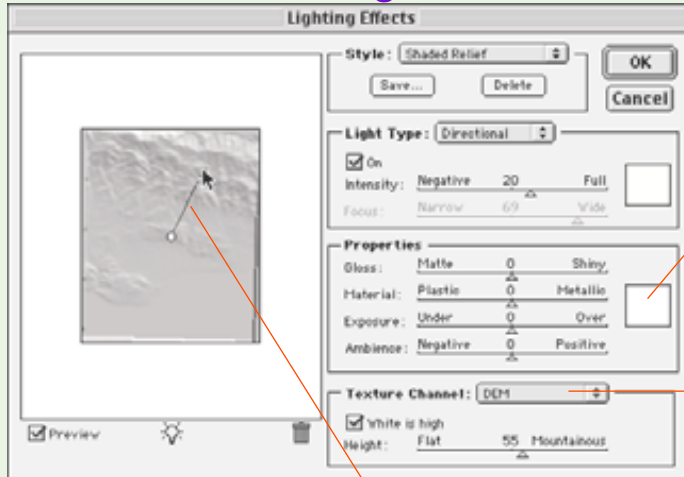
12

A BRIEF DISPLAY OF THE REVIEWED APPLICATIONS

Clearly an industry leader in raster manipulation. But it too has its limitations: non-georeferenced image is an obvious one.

Photoshop

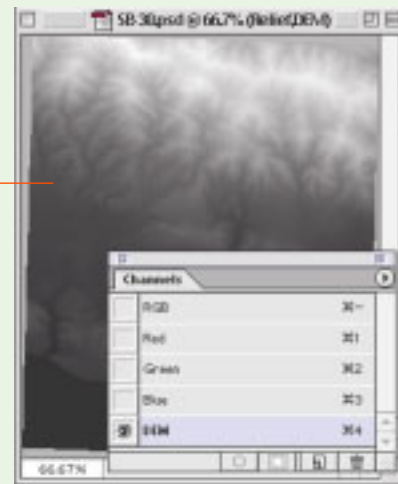
Illumination & Shading



FILTER > RENDER > LIGHTING EFFECTS...

color and various illumination options

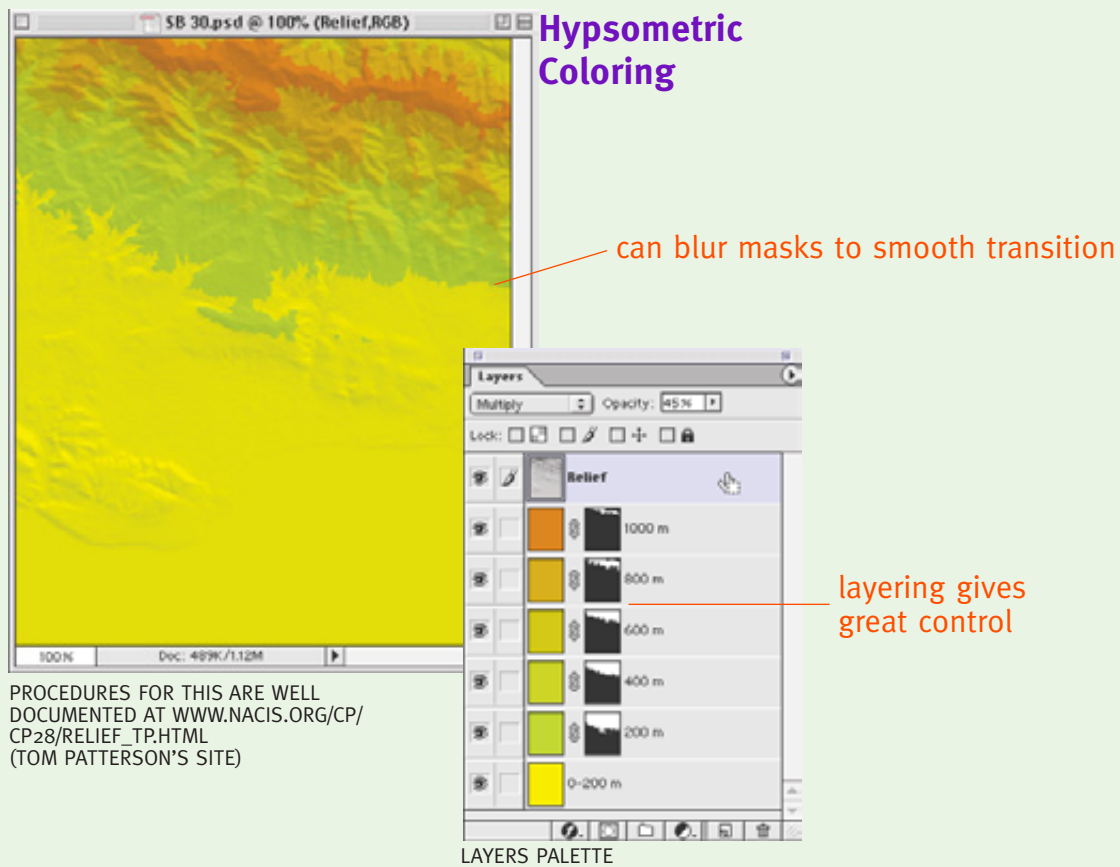
azimuth & altitude are not numeric



CHANNELS PALETTE

A BRIEF DISPLAY OF THE REVIEWED APPLICATIONS
Pleasing rendering results with unlimited filtering enhancements.
But can't duplicate numerically.

Photoshop



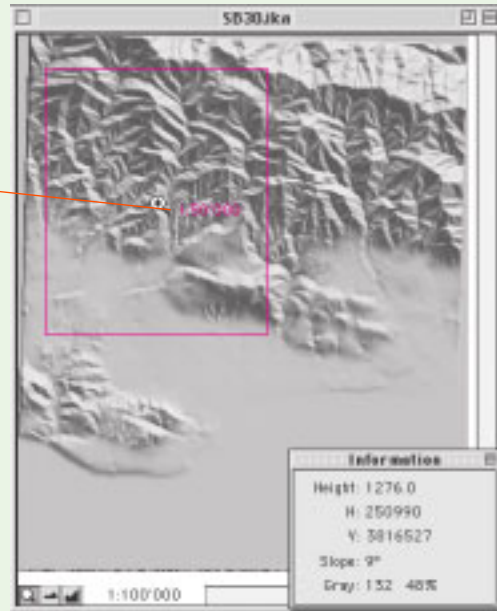
14

A BRIEF DISPLAY OF THE REVIEWED APPLICATIONS
The user is only limited by imagination and time.

Cartagena (formerly Shadow)

DEM Window

representative
fraction scale
options



FILE > OPEN DEM - FILE...

in development, but
looks great so far

The Digital Elevation Model dialog box contains the following information:

Extension:			
West:	247110	East:	258930
North:	3620830	South:	3806640

Points:	
Horizontal:	395
Vertical:	474
Distance between points: 30	

Elevation:	
Minimum:	999.0
Maximum:	2217.0

OK

DEM > INFORMATION...

A BRIEF DISPLAY OF THE REVIEWED APPLICATIONS

Some of the most promising and effective capabilities of all the applications. Although commercial release date not known.

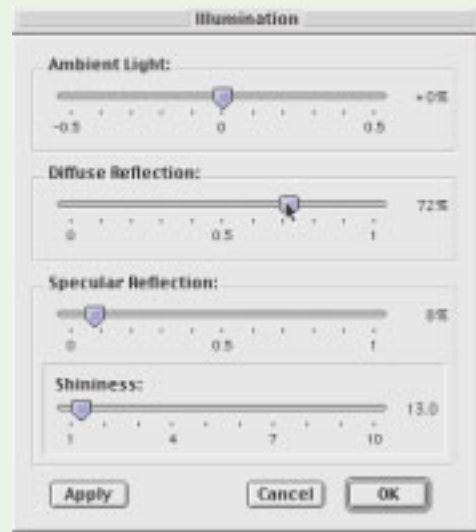
Cartagena

Illumination & Shading

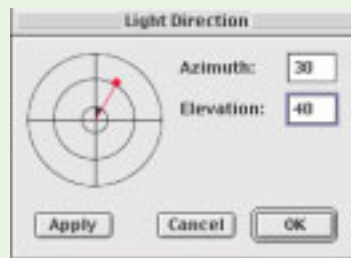


SHADING > SHADING METHOD...

can set any of these globally or locally (interactively)



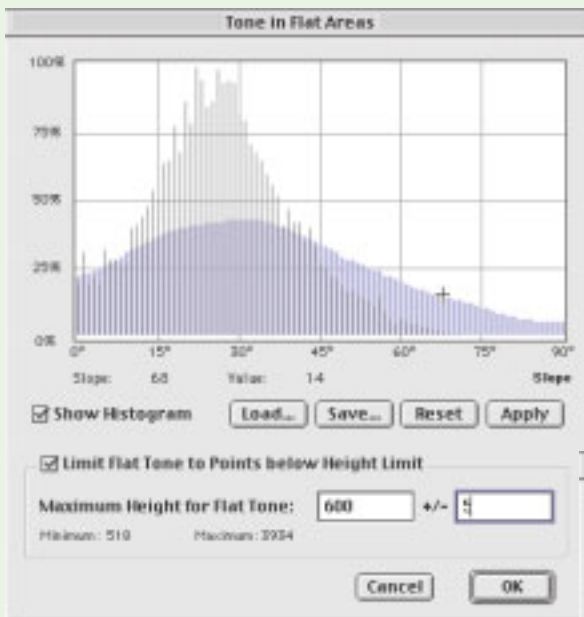
SHADING > GLOBAL ILLUMINATION...



SHADING > GLOBAL LIGHT DIRECTION...

A BRIEF DISPLAY OF THE REVIEWED APPLICATIONS
Just a sampling of the many controls.

Cartagena

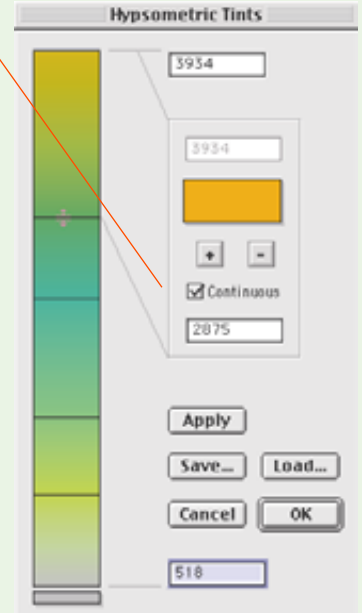


SHADING > GLOBAL TONE IN FLAT AREAS...

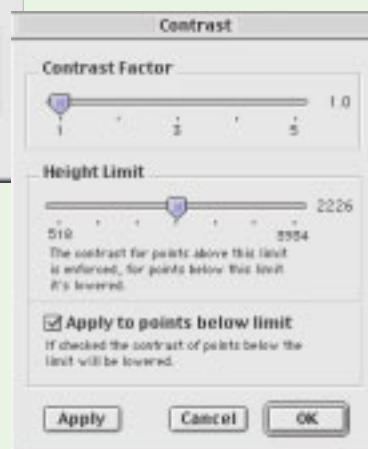
numerous palettes
for fine-tuning

can individually set
classes to be discrete
or continuous

Hypsometric Coloring



COLOR > COLOR METHOD >
APPLY COLOR > HYPSONETRIC COLOR

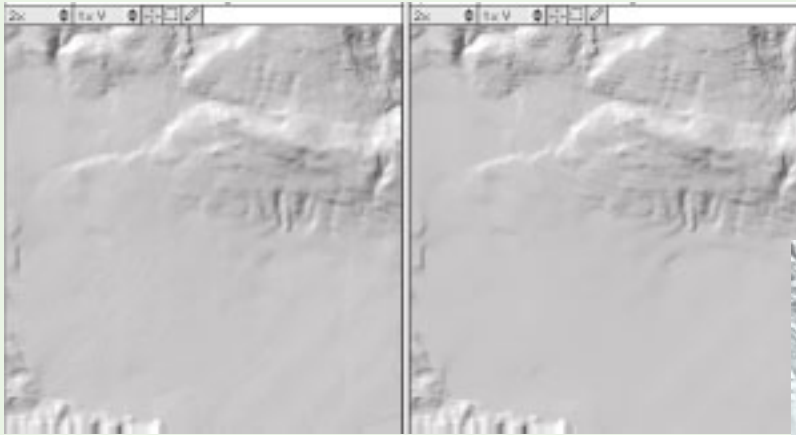


SHADING > GLOBAL CONTRAST...

A BRIEF DISPLAY OF THE REVIEWED APPLICATIONS
More palettes to finely tune the relief.

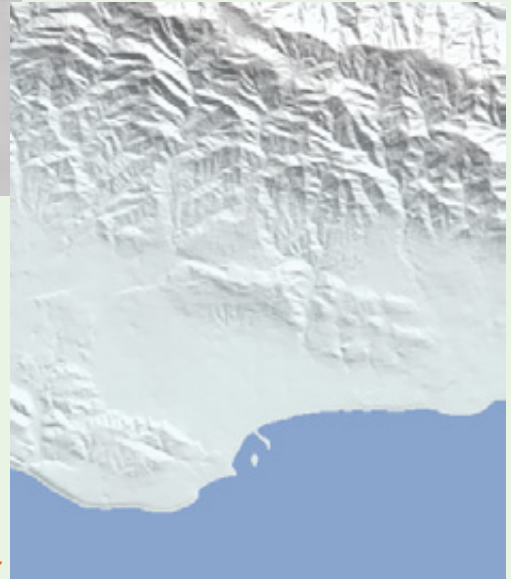
Unique and Interesting Features

MacDEM



FILTER > FILL GAPS > MEAN 3X3

filters to fill gaps and smooth data



low elevation haze filter

DISPLAY > DISPLAY SETTINGS... >
CLICK ON HAZE > SET ELEVATION AND COLOR

18

WHAT SETS THEM APART?

Surprisingly good filters add to the control in MacDEM.

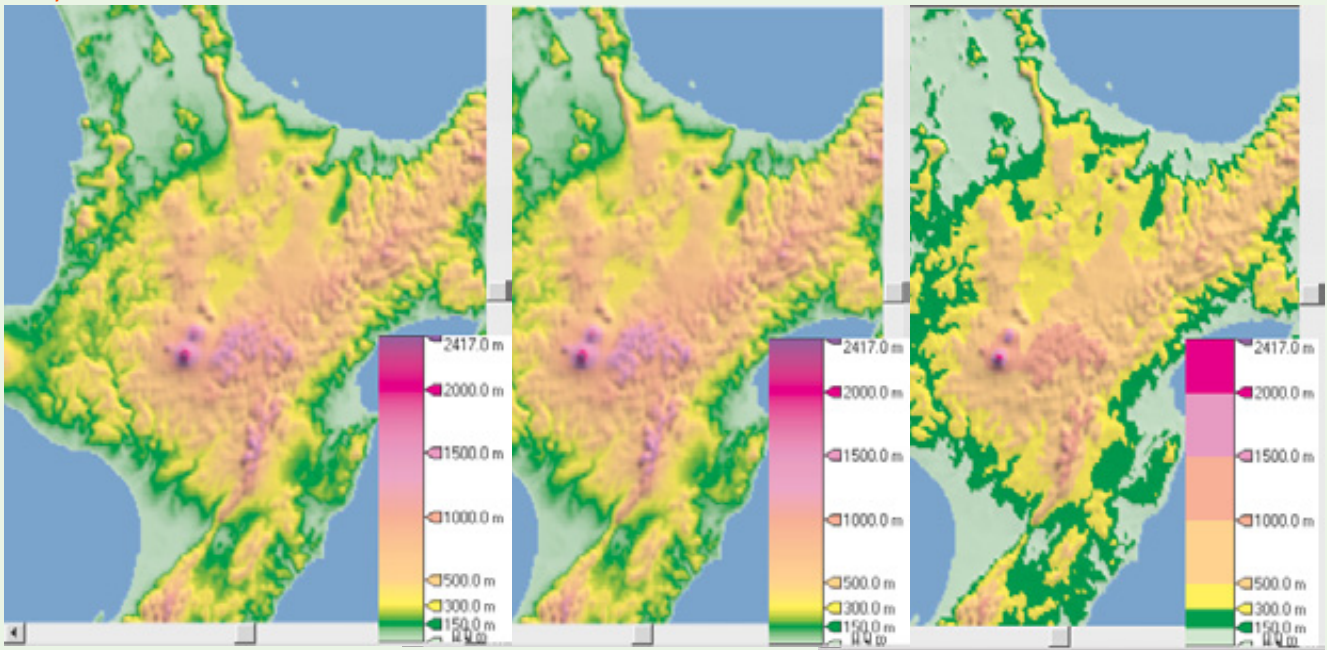
Unique and Interesting Features

MapRender3D Pro & Lite hypsometric color gradient options

exponential: “colors at higher points within a color range are emphasized”

linear (continuous)

solid (discrete)



TOGGLE SETTINGS ON > SELECT ANY OF THE ABOVE BASED ON ELEVATION

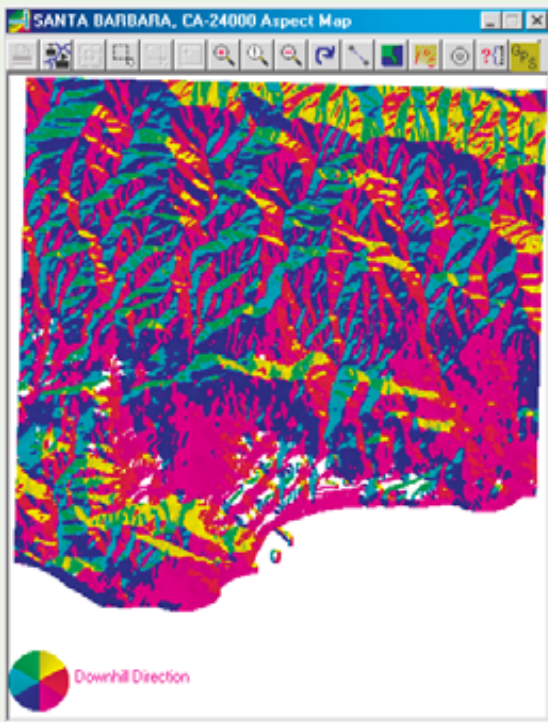
19

WHAT SETS THEM APART?

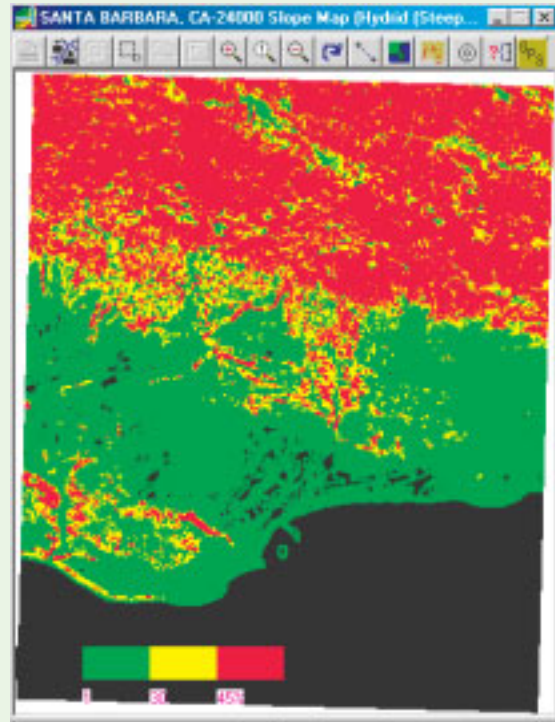
Good for comparing how different methods display.

Unique and Interesting Features

MicroDEM several analytical display options



MODIFY > DISPLAY PARAMETER > ASPECT



MODIFY > DISPLAY PARAMETER > SLOPE

20

WHAT SETS THEM APART?

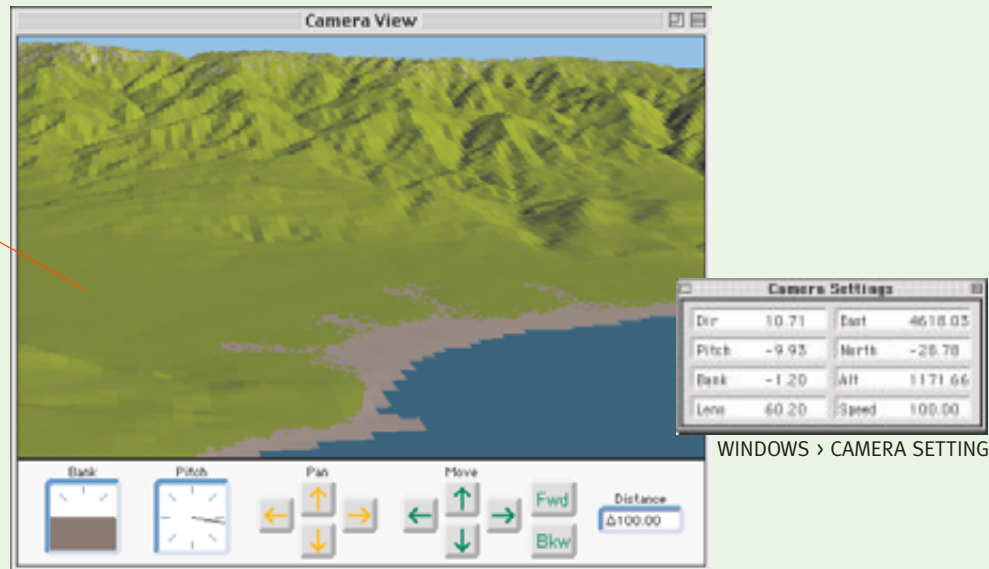
Helps to generalize and highlight specific themes.

Unique and Interesting Features

Natural Scene Designer

good interface for perspective views

low resolution
working view
for speedy
manipulation



FILE > IMPORT... > CLICK ON CAMERA VIEW WINDOW >
NAVIGATE WITH BUTTONS OR SETTINGS PALETTE

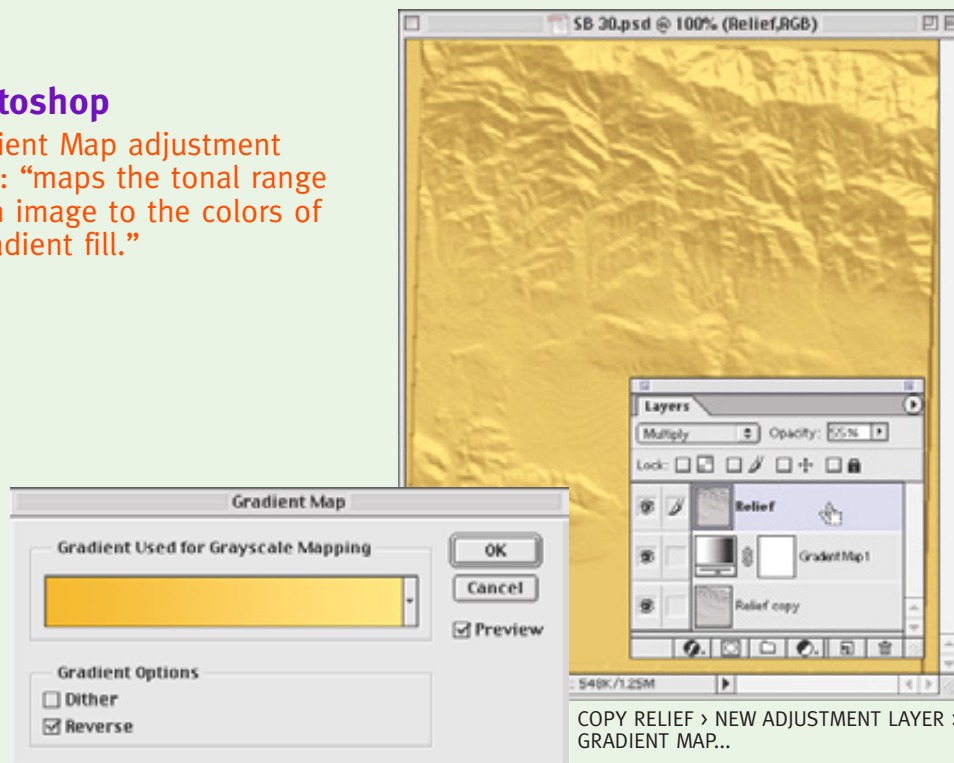
WINDOWS > CAMERA SETTINGS

WHAT SETS THEM APART?
Quick visualization of your coverage.

Unique and Interesting Features

Photoshop

Gradient Map adjustment layer: “maps the tonal range of an image to the colors of a gradient fill.”

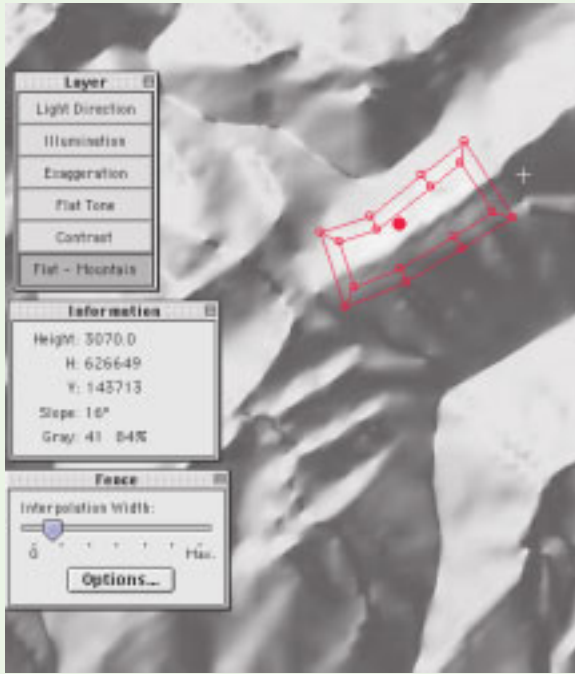


WHAT SETS THEM APART?
Sophisticated coloration techniques.

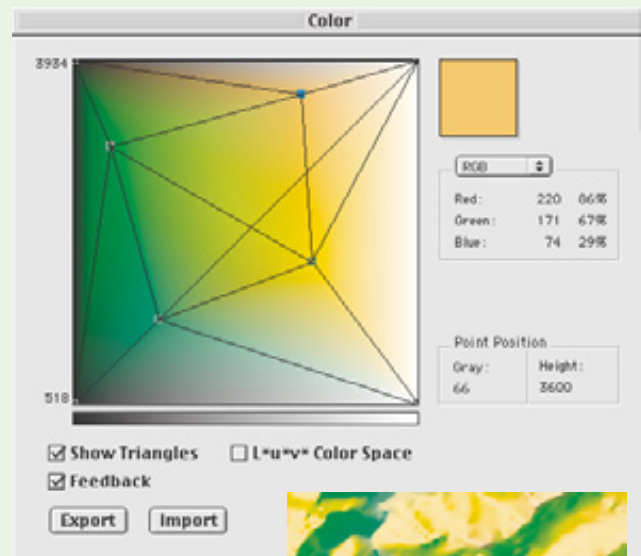
Unique and Interesting Features

Cartagena

localized editing (fence) and
exposition coloring methods



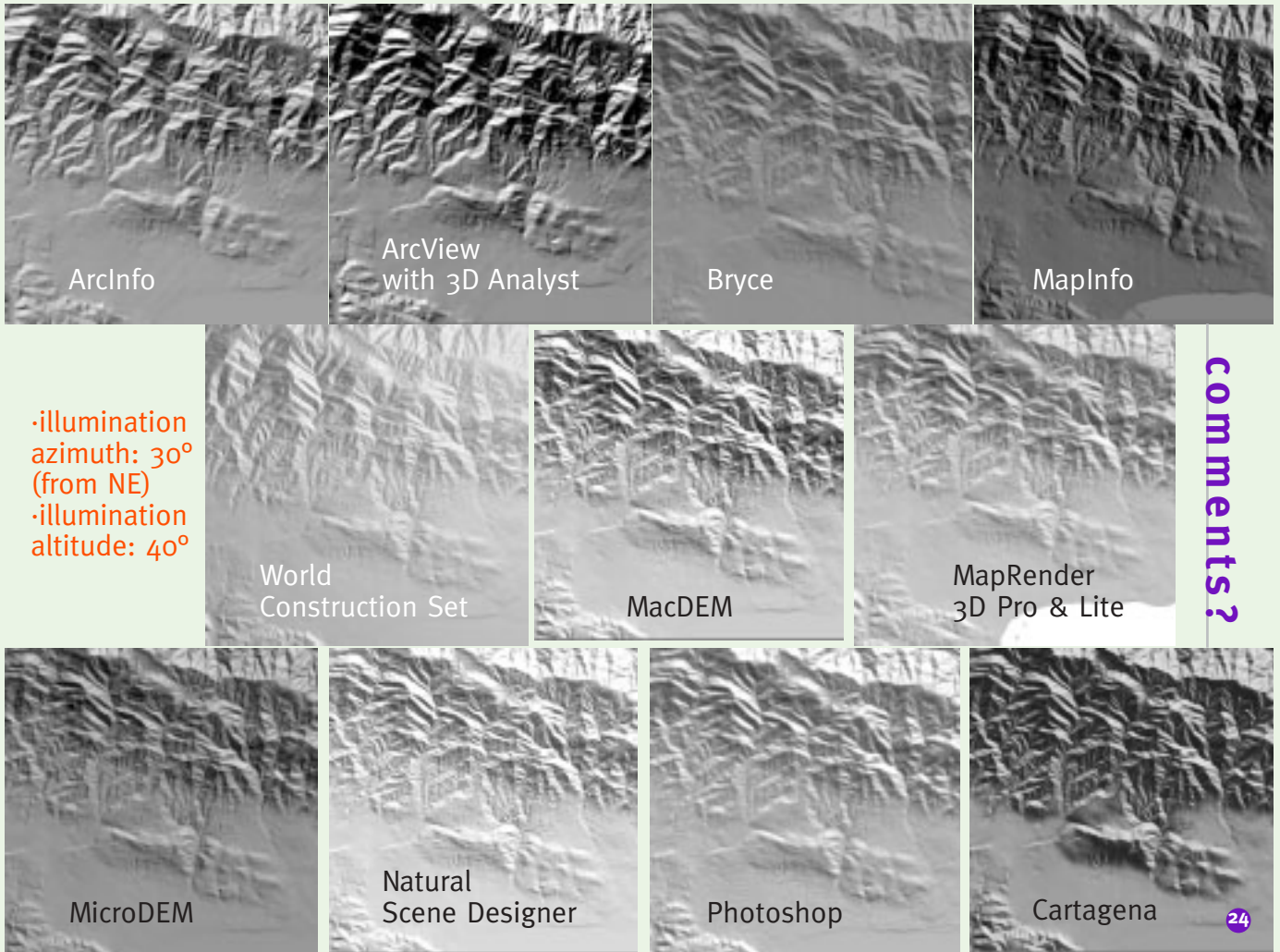
CLICK ON LAYER AND DRAW FENCE > SET INTERPOLATION >
CLICK ON OPTIONS...



COLOR > COLOR METHOD >
APPLY COLOR >
EXPOSITION COLOR

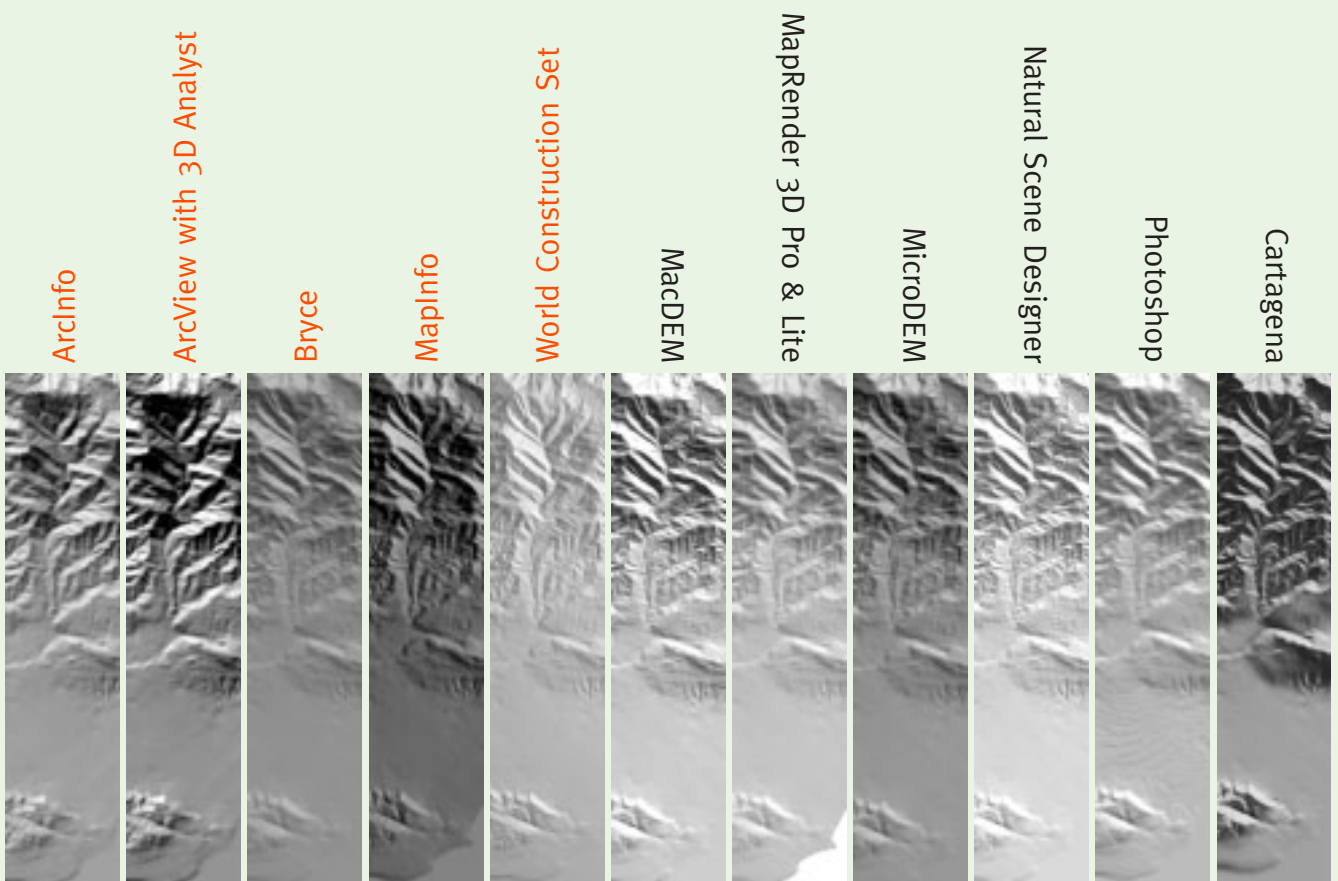
WHAT SETS THEM APART?

Localized control and artistic touches.



LET'S SEE THEM ALL TOGETHER

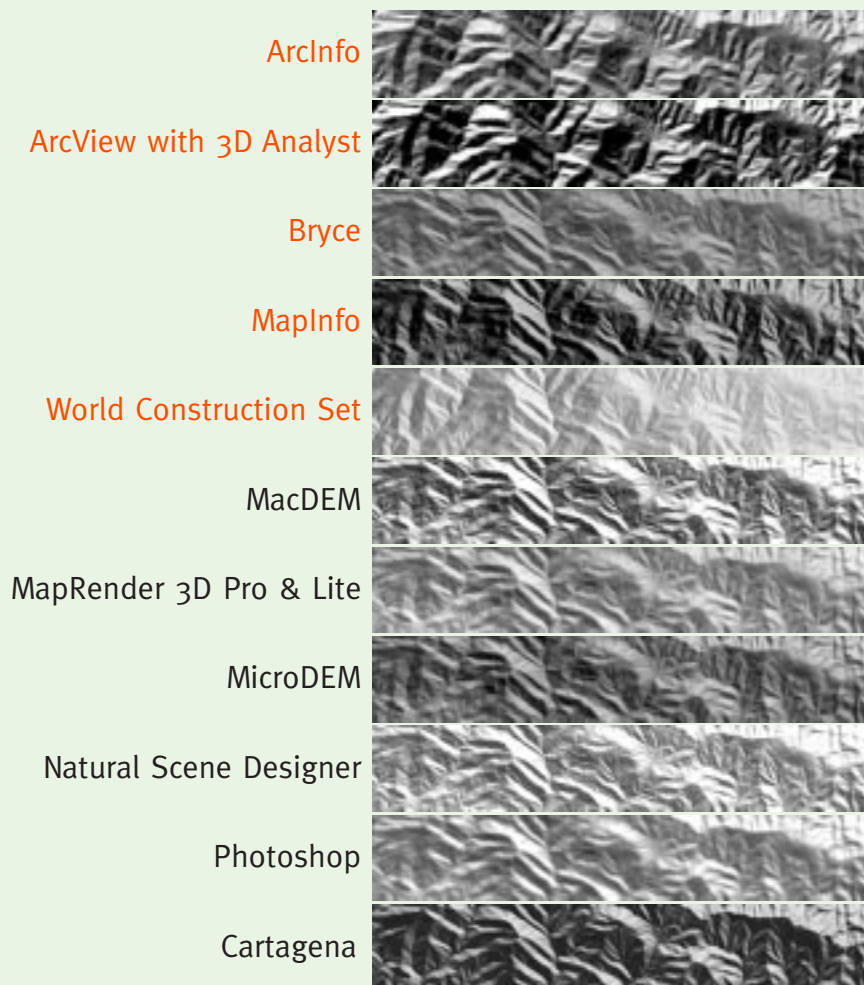
Immediately evident is the value and contrast differences among the images.



comments?

LET'S SEE THEM ALL TOGETHER

Focus on a north/south swath showing the transition between high and low elevations.



comments?

LET'S SEE THEM ALL TOGETHER

Focus on a west/east swath showing the terrain variation in the high elevations.

CONCLUSIONS

First, for producing shaded relief, the reviewed applications are just as adequate as higher-end, more expensive desktop G.I.S. and/or rendering applications.

Second, the same rendering parameters set across several applications yield visually different results.

Third, almost any shaded relief image, generated from any application, requires some touch-up and manipulation in Photoshop.

Fourth, other factors that contribute to image quality include DEM quality and resolution, graphic eye and experience of the cartographer, understanding of the intended scale (too much or too little data?), and intended medium.

THANKS TO:

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