Subject: Re: terrain normalisation
Posted by richard hilton on Wed, 28 Jun 2000 07:00:00 GMT
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I would be very careful with calculating the aspect of a 1km DEM when you are trying to use a 1km AVHRR image for sun angle/aspect/slope calculations. You need to use a DEM that is of much higher resolution than that. You only have "mean" height values for the 1km squares and not any information about the slope/aspect. You can infer a slope/aspect from the surrounding pixels but this can result in increasing the errors in using this value instead of assuming that the alps are flat!!!!! (the information from the surrounding pixels cannot give subpixel infomation about what is happening inside the central pixel.)

eg.

```
10   10   10
10   5    10
10   10   10
```

A 3x3 grid. you would assume that the mean slope/aspect for the central square are both 0 but.....

```
10          10          10
10  10      5         0 10
10          10          10
```

in this case there is a linear slope to the right (the extra 10 and 0 are the subpixel heights in the inner square in the extreme left and right of the square)

but in this case the slope is reversed:

```
10          10          10
10  0       5        10 10
10          10          10
```

this is obviously a simple case but I hope you can see the difference. If you are trying to calculate the sun angle then assuming the area to be flat is potentially going to be more accurate (even in a mountainous area!!!).

I think that you really need to be using a far heigher resolution DEM. and then rebin the slope/aspects up to the 1km required resolution.

We are currently doing a lot of research into existing 1km (30 arc-second to be precise) DEMs (and creating our own, called ACE (Altimeter Corrected Heights)) in particular GLOBE_v1, GTOPO30 and the 5 arc-minute JGP95E and have shown errors in heights of up to 1500m over parts of the world. I must however stress that I haven't looked at the swiss alps. I've had a look at

the area, and the source data in GTOPO30 is DTED data. This is the best type of data in the DEM, but this uses a 3 arc second pixel to represent the whole 30 arc-second region and is not a mean over the whole area. This gives vertical errors (according to GLOBE_v1) of 18-120m (they used the same data but the stats are far more acuarate!!) What affect this will have on a calculation of the slope/aspect is difficult to assess but I assume it would be fairly devastating!!

General features (rivers etc. always appear in the correct place (horizontally but not vertically) but the topography is often supersampled 100-200m contours which gives rise to mathematical features and NOT true representations of the land surface. There should be accurately surveyed maps of the swiss alps available since it is a developed country and the surveying has probable been done very well, but how much these cost and who owns them I'm afraid I don't know. I imagine that even a 50m resolution DEM for a relatively small area would be incrediably expensive.

I hope this helps

Let me know if you want anymore information.

Richard
