From: Stuart Stothoff
Sent: Wednesday, August 16, 2006 11:25 AM
To: 'Bob Thompson'
Subject: RE: atlas of conifers etc. & OFR 99-338

Bob

Thank you for your response. I've been on vacation and have just returned to my office.

In response to your comment about length of record, I've been looking at scales from historical, through multimillenial, through multiple glacial cycles. I fully agree that interdecadal variability is important to consider, but the historical data seems to suggest that the observation period that Spaulding used was fortuitously fairly near long-term-average conditions.

Your comment about CO2 change is well taken. I hadn't considered that facet of the reconstruction.

I will be anxiously awaiting the new 10-km coverages. We need to perform a first analysis in the next month or two, but we should be able to revisit the work next year. We will likely try a similar but smaller-scale exercise using just a few species that are important from packrat middens in the southwest, generating statistics similar to the atlas. We'd probably generate distributions using some of the reconstructions from satellite imagery that are available for download, although I'm disappointed that the imagery isn't able to resolve individual species. I'm mulling over the period of climatic record to use to compare to species distributions. I'm tempted to use a 40-yr record (1961 - 2000).

I very much like the type of information presented in the atlas and appreciate the amount of work necessary to create such a document. The ranges of precipitation and temperature for some species turn out to be significantly broader than what others have used for reconstructing Yucca Mountain climates, but very preliminary comparisons with the packrat information suggest that regional changes from Owens Valley through southern Nevada seem fairly coherent using the atlas, whereas the observations would be puzzling otherwise.

stu

-----Original Message-----
From: Bob Thompson [mailto:rthompson@usgs.gov]
Sent: Monday, August 07, 2006 9:44 AM
To: sstothoff@cnwra.swri.edu
Subject: Re: atlas of conifers etc. & OFR 99-338

Hi Stu,

Your email raises several questions, and below I provide my answers (or opinions) after your text (the lines of your original text are each preceded by a “>” below). Please remember that we did this analysis many years ago, and you have been thinking about this more recently than I have.

ITEM 1.
>There are two climates represented, present-day and LGM. If I
>understand correctly, you interpreted LGM climate by taking available paleo

>packrat data and matching it to the gridded atlas of species to look up best
>matches of present-day climate.
Yes, that is correct.

ITEM 2.
>You also interpreted present-day Yucca Mountain climate with the atlas of present-
>day climate by examining the nearest grid point.
As I remember, we interpolated the Yucca Mountain climate from the surrounding grid points.

ITEM 3.
>These two values provide a ratio of LGM precipitation to present-day precipitation.
Yes, but with several reservations (discussed below).

ITEM 4.
>My difficulty arises from available evidence suggesting that the long-term record at
>Yucca Mountain area is wetter at 5000 ft elevation than the normals used in the report.
To me, this is not a simple matter, given the high degree of climatic variability in this region over the historic period. In our report we discussed the differences between our "normal" and the shorter-term modern climate data used by Spaulding (1985: Spaulding's data where from closer to Yucca Mountain, but were highly influenced by the very wet El Niño years in the mid 1980s). Your computation of the ratio of present-day to estimated-LGM precipitation may be greatly affected by your choice of time period within the instrumental record that you use to represent the "present day".

It may also be important to remember that, due to changes in water use efficiency under the very low atmospheric carbon dioxide levels of the LGM, the plants may have required more moisture than they do under present levels of CO2. Our LGM estimates should thus be viewed as the minimum amount of precipitation required for the Pleistocene vegetation assemblages.

ITEM 5.
>If in fact the Yucca Mountain area is wetter than the grid indicated, the interpretation
>can be adjusted in two ways: (a)keep the ratio of LGM to present-day precipitation
>and adjust LGM climate, or (b) keep the LGM climate and adjust the ratio.
Setting aside the possible effects of changes in water use efficiency
between the LGM and today, I think that our LGM estimates are reasonable.
The problems in interpolating modern climate to Yucca Mountain, coupled with the effects of the selection of the base time period to represent the "present day", present considerable difficulties in understanding the "modern" climate. I would go with option "b".

ITEM 6.
>My suspicion is that the local grid point for Yucca Mountain may not be well
>supported, because there are very few records in that area, or may represent the wrong
>elevation, while the grid is reasonable as a whole.
The selection of the base time period for the "present day" is perhaps the key factor here.

ITEM 7.
>First, I'd like to get your opinion on which approach you would follow.
Please see Item 5 above.

ITEM 8.
>Second, I'd like to follow your approach as best as possible using additional
>information from other sources. I have found the web site with the shapefiles for each
>species in the 3 1650 professional papers, and I can download the tree distributions.
>However, I would appreciate it if I could also obtain the 25-km grids and climatic
>properties used in OFR 99-338, as well as the distributions of the additional shrubs

>used in the analysis. Would it be possible to obtain these coverages?
This would be quite a bit of work for us. We have been redoing our base data on a 10-km grid of North America and have switched to the climatology provided by New et al. (1999) (see reference below). We are placing all of the vegetation data on this new grid, and are re-examining the distributions of arid-land shrubs in western North America. In addition, to be able to better characterize the uncertainties inherent in the estimation of climate from vegetation assemblages, we have been experimenting with several analog and mutual overlap approaches (a manuscript on the analog approaches is in USGS review and should be submitted to Quaternary Science Reviews later this month). All of this is aimed in part at reconstructing late Pleistocene climates across the Southwest. We plan to provide these data via the web (sometime within the next year, if all goes well).

We would have to do quite a bit of "archaeology" to retrieve the data sets employed in the 1999 Open File Report, and Kathy Anderson (who did much of the analysis and who is the "librarian" for the data sets) now only works part time and is gone for much of the rest of the summer. What is your time frame? Can you wait and work with the 10-km data when it is released within the year?

I hope that this helps.

Best regards,

Bob

New, M., Hulme, M., and Jones, P., 1999. Part I: Development of a 1961–90 Mean Monthly Terrestrial Climatology. Journal of Climate: Vol. 12, No. 3, pp. 829–856.

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