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To: K.BRIFFA@UEA.AC.UK
Subject: GROVE REVIEW
Date: Tue, 13 Apr 1999 16:33:08 -0400

Keith,

The attachment is in WORD and better formatted.

Brian

Dear Keith,

Enclosed please find my comments on Jean Grove's paper. It gives the impression of a cut and paste job written in haste with several minor annoying errors. It lacks the synthesis I would have expected and reads like a catalogue. The paper is also not as comprehensive as would appear from the title. Six months ago I reviewed a paper by her (for Astrid) on "The Initiation of the Little Ice Age in regions round the North Atlantic". The paper she submitted to you is clearly complementary and reviews " the rest of the world" for comparison with the classic areas discussed in the earlier paper. Yet the earlier paper is only alluded to once (rather coyly) and does not appear in the references. This surely has to be significantly recognised in the title and body of this paper, because as it stands, the review of this earlier (best dated) material is far from adequate.

I cannot speak for most of these data directly but the North American material I am familiar with is not particularly up to date (though in fairness most of Greg Wiles's stuff is still in press). I have sent her under separate cover copies of my Little Ice Age in the Rockies paper (about 6 months ago) and more recently the Luckman and Villalba review paper on glacier fluctuations of the last Millennium along the PEP-1 transect. (copies are on their way to you too).

I think her mixing the discussion of ice core records and glacier histories significantly muddies the waters on whether the term LIA should be used to refer to a glacier or a climate event. I feel this should be addressed and the paper needs a more effective conclusion. She must also decide whether she wants diagrams or tables.

I don't know how she will take these criticisms but, as she is just finishing revising the book, I would have thought she could have presented a better synthesis. I leave it to your judgement as to how to deal with these comments. The paper could be much better but that depends on how much she is willing to reorganise and to some extent rethink what she has written.

I am sending you this e-mail. Do you want me to return the manuscript to you? If you wish I can also e-mail WORD copies of the two papers to you (and her) if you wish a rapid turnaround. But you will only get the diagrams by mail. If I don't hear from you tomorrow I'll just put everything in the mail.

Cheers

Brian

Review of "The Initiation of the Little Ice Age" by Jean Grove

This paper is a useful summary but needs significant fine-tuning and possibly retitling before it should be accepted. The title promises a comprehensive review that the text does not deliver. When I first read this paper I kept asking myself- where is the discussion of all the well-dated early LIA material from Switzerland, Canada and Alaska? Then I remembered the paper by the author that I reviewed 6 months ago entitled "The Initiation of the Little Ice Age in Regions round the North Atlantic". The present paper is not a global review of evidence but a companion paper that compares the "Rest of the World" with the "European/North Atlantic record" discussed in that earlier paper. The crux of the problem is the first sentence after the title "Little Ice Age Initiation ..." at the top of page 3. I initially read this to mean that Holzhauser had submitted a paper on the European record to Climatic Change. Careful re-reading suggests that the author is actually referring to her own review paper. This misunderstanding could be avoided by explicitly acknowledging, in the introduction to the present paper, that the evidence for the circum North Atlantic Region has previously been reviewed by Grove (in press), giving the full citation in the references, and that the section entitled "LIA initiation in regions around the North Atlantic" is a brief summary of that review.

There are a number of general points that need to be made before discussing specifics.

1. This discussion begs the question of how one would recognise the beginning of the LIA (A question I raised in my earlier review) Why, for example is the line drawn between the 8-9th century medieval glacier advances and the 12-13th century ones? Possibly this is related to the author's definition of the so-called Medieval Warm Period which has recently been extensively discussed (Hughes and Diaz 1994). It might be useful to insert a brief discussion of the rationale for this boundary and a definition and defence of the use of the term Medieval Warm Period.in either the introduction or the final discussion section.
2. I also feel that there is a logical inconsistency in the way the author uses the ice core evidence in this paper. In her abstract Dr Grove indicates that "the term LIA refers to the behaviour of glaciers, not directly to the climatic circumstances causing them to expand " (abstract lines 3-4). I agree strongly agree with this usage to differentiate between a glacier event and a climatic event. However, the discussion of the definition of the LIA from the ice core work is based on either periods of greater annual snow accumulation or inferred paleotemperatures from isotopic records. i.e. these definitions are based on climatic events not glacial events. The author should perhaps address this dichotomy and discuss it more fully. If one wishes to argue for retaining the term LIA for the glacial event, it is inconsistent to identify it in ice core records based on temperature (or snowfall) records.
3. The author appears to have an implicit faith in the veracity of 14C dates which I do not share and a disdain for minimum age dating based on lichenometry or dendrochronology. There is a strong emphasis on calendar dated 14C ages throughout this paper and age determinations by other techniques are often significantly downplayed. The paper never specifically addresses the relative errors involved in age determinations by these various techniques. Lichenometry and minimum age tree-ring dating of moraines are disparaged yet, in this timeframe the error terms are almost certainly less than 14C dates from equivalent situations (i.e. dates above glacier deposits or on moraine surfaces). The comments made in this paper about lichenometric dating and dendrochronological dating of moraines (from minimum tree ages) only stress the likelihood of large errors through the use of these dating techniques. These comments may be appropriate for some moraines that date from the 12-13th centuries but they should not be unqualified, universal statements cannot remain couched in those terms. In most situations lichen and tree-ring minimum ages for moraines of the last 500 years or so are considerably more accurate than 14C ages would be.
4. In my review of her earlier paper I commented that I did not consider that sites in the Canadian Rockies could be described as "around the North

Atlantic". In this paper, it makes no geographical sense to review the results from the Rockies separately from adjacent areas in British Columbia and Alaska which they closely resemble (see Luckman and Villalba, in press). I have no objection to the comment that the Rockies material was discussed in a previous paper (and will therefore not be repeated in detail) but surely in the context of this paper these results should be presented in the discussion of evidence from Western North America. Having recently reviewed the literature for North America I also note there are omissions of significant recent material that is recently published or in press (see Luckman and Villalba attached).

5. The Tables and diagrams appear identical except for Table 10. Tables 1-9 should be deleted?

More detailed and specific comments follow.

Page	Para	Line	
1	3	4	why is lichenometry excluded?
1	4	1	Reference to Grove in press??
1	4	3.	In this paper evidence from.....???
2	2	1-2	Is dating within the last millennium considered to be the critical defining factor in identifying a glacier advance as belonging to the LIA? See comment about the inception of the LIA, above.
2	3	1	delete orphan period before text
3	2	3	Holzhauser 1998 not in the references.
3	2	5	change phrase within brackets to (Grove, in press) and insert in references.
3	3	1	... Rockies dating derived from ring width and....(revise)
3	3	6	Also Stutfield after 1272 (Luckman , in press)
3	3	11	Luckman 1995, 1996a and b??? (there is no 1995 a and b)
3	3	14	Luckman 1991 not in references. Could be Luckman 1993? Luckman et al. 1997 (never referenced) or Luckman 1996
3	4	3-4	Given the dispute about the universality of the Medieval Warm Period (see Diaz and Hughes 1994) perhaps it would be better to indicate the dating here e.g. 10-13th centuries?
4	2	1-5	based on what evidence? Lichens, historical data , 14C?
4	4		What are these moraine dates based on?
5	2	1	delete comma
5	2	3	1991a or b?
4	1	8-9	snow cover extended? = period of snow cover lengthened between these dates?
5	3		end of several lines truncated in xerox copy sent to me
6	1		as above
5	3	3	not in references, Haeberli ?? Kuhn references also missing.
6	1	19	reference for Swiss example?
6	1	end	negative summer temperature anomalies or negative annual anomalies?

7 1 2 said claimed ? = said or claimed?

7 1 5-8 admitted by who relative to what? This somewhat disparaging comment seems dismissive. Perhaps lichenometry is the only available technique. Is the author aware whether or not these glaciers ever extended into forested areas. Is there any wood associated with these moraines? Does the evidence presented by these authors and their lichenometric dates indicate the presence of early LIA moraines?

7 2 7 delete end bracket

7 2 last What is being implied here? Were the samples dated of the same species, were the records long enough to crossdate?

8 Table 1 etc Are these Tables or Figures? The Tables within the text seem almost identical to the diagrams appended at the end.

9 2 1 and Footnote 5; Rothlisberger 1986 not in refs. Rothlisberger and Geyl??

9 3 2 Figure 2 and Table 2 seem identical which will be used? References should be R and G 1986 not Rothlisberger 1986?

10 1 6 is thought?

10 1 9 geographically close or close in age?

10 1 last sentence surely should come after the next section?

11 1 last The glaciers or monsoon cover 46,000 square kilometers?

12 2 13 Why must it have preceded the LIA? based on a 14C age?

13 Table/Figure 3 explain XXXs

13 1 8 "The Dunde record shows the Little Ice Age clearly" This section needs to differentiate clearly between the glacier fluctuation record, the snow accumulation record and the isotopic temperature signal. If the term LIA is being used to define/describe glacier events then it cannot also be used- without qualification- to describe climatic events. The author is describing climate signals here not glacier advances. This section and the discussion on page 14 needs more clarification and discussion.

14 1 5 after 1264 based on what evidence?

15-16 Apart from a conference abstract listed in the references but not cited, there are no references to the spectacular work of Wiles in tree-ring dating of overridden forests in this area. In addition, the discussion of the abstract by Yager et al., is somewhat confusing. (how can one have a floating chronology from 911-1992?; are tree-ring dates or calendar equivalent 14C dates being cited here?) This section on Alaska is quite dated (see Luckman and Villalba and several references by Wiles and Calkin cited therein).

16 2 This section needs to be reworked. The data presented for Klinakini Glacier

and Franklin Glaciers are presented and then queried without reaching any conclusion. Both indicate glacier advance after the dated materials and the comments qualifying these dates apply equally well to many other dates cited in this paper. (Lag time is ignored at several other sites in the discussion). The reporting of the Bridge Glacier site is incorrect. Ryder and Thomson only identify one advance here, not two and consider both 14C ages provide limiting dates for the same event. The till described is between the paleosol and the present surface not between two paleosols. Although scattered, there are several other papers on this region- Ryder 1987, Desloges and Ryder 1990, Clague and Mathews, 1992 etc - see Luckman and Villalba, in press).

16 As stated earlier, discussion of the Canadian Rockies should be

included with western North America. There are also early LIA moraines on Mount Baker in Washington.

- 18 1 Rothlisberger and Geyh?.
- 19 1 1-2 Rationale for this statement?
- 20 1 1-2 See earlier discussion. The ice core data provide information about snow accumulation and climate- not necessarily glacier advances
- 20 1 end in-situ trees at what site? Again Thompson is referring to a climate event not a glacial event
- 20 Footnote 13 Based on what data? 1970 predates the 1976 Pacific Climate shift.
- 21 2 13-14 Again, is this bias? In my experience dating based on the oldest tree for most moraines has far smaller error terms than radiocarbon dating. In this specific case the moraine may be older but this does not justify the statement "approximate at best"
- 21 2 20 why is Rothlisberger's date of 1000-1220 cal AD acceptable in this circumstance but Ryder and Thomson's date of 1040-1210 (p16) not?
- 24 footnote 14 although the survey may have delimited glacier area, I assume it was an aerial survey !!
- 24 3 1 sub-fossil trees.
- 24 3 5 see comment on 21 2 20 above.
- 24 3 8 14C dates do not sample! Sample HV.xxx taken from a stump....etc
- 26 footnote 16 see Gordon and Harkness, 1992 Quat Sci Rev, 11 697-709 for a comprehensive review
- 28 2 see earlier comments on ice core discussions.
- 28 3 4-5 what specifically is meant here? Warmer and cooler intervals for which dates?
- 29 2 5-6 see above. Lack of obvious period of significantly cooler temperatures?
- 30 2 1-2 But you don't present any "precise dates" in this table, nor are any of the calendar dendro dates from Alaska included . If this table is intended to be a summary should not it show all of the data being discussed?
- 31 1 3-4 The implication here seems to be that a 14C date from an in-situ log gives a more precise limiting date for the subsequent glacier event than date from a log that is not in-situ? Is this the case? Or is it that dates on wood are better calibrated than dates on soils, bones or other materials?.
- 32 1 4 Luckman 1995 I think.
- 32 1 10-11 These are not dates from moraines but dates from forests overridden by glacier ice. Are there any examples of moraines dated to the 13th century presented in this paper.

Table 10 is never referred to in the text. It needs a caption. Does 13=13th century or 1300s?

33 1 1-3 NO. decreased temperatures or increased accumulation correlated
with the
LIA have been identified in these cores.

This is not a very synthetic conclusion.

34 Barlow et al., 1997 delete in press

35 Bjork Antarctic

36 Corte CONICET not CONISET

36 Eglinton Font

36 Fushimi Initials

36 Fuhimi 1978 delete reference to 1977!

37 include Grove in press

38 Holzhauser 1998??

39 Luckman 1993a should be Luckman B.H., Holdsworth, G and Osborn G.D., 1993
reorder Luckman 1993b as Luckman 1993

40 Luckman 1996b Dendroglaciology not Dendrochronology
Alberta not British Columbia

41 Nesje and Dahl 1991b delete)
Nesje et al., Jostedalsbreen ???
Nesje and Rye Geografiske ? capital G

42 Thompson 1980????

45 Wardle Omoeroa (capital)

Attachment Converted: "c:\eudora\attach\grove.norwich.doc"