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Appendix A

Figure 7.1c of IPCC (1990)

In the first report of the Intergovernmental Panel on Climate Change (IPCC, 1990) a 'schematic' diagram representing temperature variations over the last millennium was used (Folland *et al*., 1990: figure 7.1c, p. 202). The caption of part (c) of the figure reads: 'Schematic diagram of global temperature variations for the last thousand years. The dotted line represents conditions near the beginning of the twentieth century'. In the Supplementary IPCC Report in 1992 (Folland *et al*., 1992), the diagram had been dropped and the need for more data that would allow for the spatial aspects of past changes acknowledged. Subsequent IPCC reports included some of the first hemispheric reconstructions based on the burgeoning proxy archives (Bradley and Jones, 1993, in Nicholls *et al*., 1996 (Second IPCC Assessment Report, SAR) and MBH98, 1999; Jones *et al*., 1998; Briffa, 2000 and Crowley and Lowery, 2000 in Folland *et al*., 2001 (Third IPCC Assessment Report, TAR)). Hence the original 'schematic' 1990 diagram appeared to have been confined to history by subsequent IPCC reports, although this was never specifically stated. It has continued to reappear in a number of guises – web pages, reports (eg, Wegman *et al*., 2006), school teaching literature, sometimes with phrases evoking reminders of warmer/colder periods in the past (eg, vineyards in southern Britain, Vikings in Greenland in Mediaeval times, Frost Fairs on the Thames and icebergs off Norway in later centuries) – but as far as palaeoclimatologists were concerned the diagram was nothing more than how it was originally described in the caption: a schematic.

So where did the schematic diagram come from and who drew it? It can be traced back to a UK Department of the Environment publication entitled *Global climate change* published in 1989 (UKDoE, 1989), but no source for the record was given. Using various published diagrams from the 1970s and 1980s, the source can be isolated to a series used by H.H. Lamb, representative of central England, last published (as figure 30 on p. 84) by Lamb (1982). Figure 7 shows the IPCC diagram with the Lamb curve superimposed – clearly they are the same curve. The 'Central England' curve also appeared in Lamb (1965: figure 3 and 1977: figure 13.4), on both occasions shown as an 'annual' curve together with the extreme seasons: winter (December to February) and high summer (July and August). The IPCC diagram comes from the 1982 publication as the vertical resolution of the annual plot is greater. The data behind the 1977 version are given in table app. V.3 in Lamb (1977), but these are essentially the same as previously given in Lamb (1965). All three versions of the plot have error ranges (which are clearest in the 1982 version and indicate the range of apparent uncertainty of derived versions). The 1982 version dispenses with the three possible curves evident in Lamb (1965, 1977) and instead uses a version which accounts for the 'probable under-reporting of mild winters in Medieval times' and increased summer temperatures to meet 'certain botanical considerations'. Lamb (1965) discusses the latter point at length and raised summer temperatures in his Mediaeval reconstructions to take account of the documentary evidence of vineyards in southern and eastern England. The amount of extra warmth added during 1100–1350 was 0.3–0.4°C, or about 30% of the range in the black curve in Figure 7. At no place in any of the Lamb publications is there any discussion of an explicit calibration against instrumental data, just Lamb's qualitative judgement and interpretation of what he refers to as the 'evidence'. Variants of the curves also appear in other Lamb publications (see, eg, Lamb, 1969).

Many in the palaeoclimatic community have known that the IPCC (1990) graph was not representative of global conditions (even when it first appeared) and hence the reference to it as a schematic. Lamb's (1965, 1977, 1982) series has been used as one of the series comprising the NH composite developed by Crowley and Lowery (2000), representative of Central England. Various authors (eg, Farmer and Wigley, 1984; Wigley *et al*., 1986; Ogilvie and Farmer, 1997) have shown that such representativeness is only really the case for the instrumental part of the record from 1659 which is based on the well-known Manley (1974) series. Greater amounts of documentary data (than available to Lamb in the early 1970s) were collected and used in the Climatic Research Unit in the 1980s. These studies suggest that the sources used and the techniques employed by Lamb were not very robust (see, eg, Ogilvie and Farmer, 1997).

In summary, we show that the curve used by IPCC (1990) was locally representative (nominally of Central England) and not global, and was referred to at the time with the word 'schematic'.

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