Postscript: Still Our Equinox?

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The opening quote of "Whose Equinox?" refers to the east- and west- facing passages at Knowth passage tomb (Boyne Valley, Ireland). That they were equinoctially aligned was not only assumed by the excavator (Eogan 1986, 178) but also accepted unquestionably by later commentators (Kelley and Milone 2005, 168). Only recently has a detailed analysis been published which demonstrates otherwise (Prendergast and Ray 2015).

It should take no more than a few examples such as this, surely, to lead us to question the implicit assumption that any east- or west-facing alignment is "equinoctial". Yet almost twenty years on from the publication of "Whose Equinox?", the equinoxes seem to feature as prominently as they ever did in the list of potential celestial targets considered by default by archaeoastronomers and archaeologists alike, with innumerable studies considering putative equinoctial observations, alignments or indicators. In the past few months alone I have heard from three different museums planning archaeoastronomical exhibitions requesting information on buildings or monuments "with solstitial and equinoctial alignments".

There is the question of exactly what we mean by the equinox, which I tackled in the article, and of course the significance of one or more types of "equinox" can be argued in particular cultural contexts. But what I was primarily seeking to challenge, and I continue to challenge, is the implicit belief in the "universal" significance of the equinoxes: the broad assumption, in other words, that the equinoxes were of self-evident cultural significance, applicable across a broad range of human cultures. That assumption, as I argue, rests upon a Western-style conception of time and space as abstractions. Outside the Western context, if people were indeed observing and marking the rising or setting position of the Sun at or around those times, they would not have been doing so as techniques for approximating the "true" (astronomical) equinox, or any other type of equinox, but for reasons that had cultural meaning in themselves.

A number of major case studies published since "Whose Equinox?" illustrate the analogous point, that the sunrise and sunset positions that *were* significant in any particular solar horizon calendar would have been specific to place and cultural context.

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For example, Šprajc and colleagues' systematic studies of alignments in Mesoamerican architecture (Sánchez Nava and Šprajc 2015; Šprajc and Sánchez Nava 2015; Šprajc *et al.* 2016), building upon a corpus of earlier work by Aveni, Hartung, Galindo Trejo, Šprajc himself and others (see references in Šprajc 2014), identify a range of orientations upon sunrise/sunset at the solstices (interpreted as the most elemental reference points), prominent distant mountain peaks, Venus and lunar extremes, and also (at particular sites) upon sunrise and sunset on dates separated by intervals of multiples of 13 or 20 days, which were basic periods within the Mesoamerican calendar; but *not* upon the sunrise/sunset at the astronomical equinoxes (Šprajc 2001; Aveni *et al.* 2003, table 1). A very different example is provided by Hoskin's (2001) study of the principal orientations of more than 3000 tombs and temples in later prehistoric Western and Mediterranean Europe, which appear to be related to the sun-rising (SR), sun-climbing (SC), sun-descending (SD) and sun-setting (SS) regions of the horizon, and hence to the solstitial directions (and meridian) as boundaries, but not specifically to the equinoxes. To give a third example, I have argued (Ruggles 2014, 25) that the 13 towers at Chankillo in Peru (Ghezzi and Ruggles 2007) and the gaps between them represented a "true" solar horizon calendar in the sense that they provided a means to identify any calendrical date (except one near the solstices) with good precision, albeit not at regular intervals throughout the year (since the towers are more or less evenly spaced, rather than closer together at the ends of the line, when the change in the daily rising position of the Sun is smaller). In other words, the calendar was based on direct observation rather than counting and calculation. The equinoxes were irrelevant in such a scheme; and indeed, the solstitial directions just represented the ends of the solar rising range.

This last point relates to an issue I rather skipped over in the 1997 paper. Because the daily change in the Sun's rising or setting position is minuscule around the solstices, pinpointing the solstitial direction (in space) is not predicated upon pinpointing the solstice itself (in time). In other words, the existence of solstitial alignments that are accurate in space does not prove, or even imply, that the builders fixed the solstice accurately in time. For example, at Stonehenge and related monuments, where the principal axes are oriented solstitially, there is absolutely no reason to suppose that the builders had accurate calendars defining the solstice to the day: the first non-cloudy day when the Sun was seen to rise or set in the appropriate direction would have been a perfectly adequate choice for the relevant rites or ceremonials.

Of course, we could suggest that in some circumstances people determined the solstice accurately in time by, say, observing sunrise over some horizon marker a number of days before and after the solstice, counting the days and then halving the difference – but such an argument is difficult to sustain in the absence either of tangible evidence or evident cultural motivation. Only if it can be sustained – and it is a very big "if" in most cases – is it also reasonable to suppose that people counted the days between the solstices and hence halved that difference to obtain the "temporal equinox" (method 2 in the 1997 paper). In other words, the temporal equinox only makes sense if the solstices are precisely defined in time, not just in space.

In ancient Mesoamerica, we do have a context where counting the days was fundamental and hence it is perhaps not surprising that the temporal equinox appears to have been of some significance (Šprajc 2014, 719 and references therein). On the other hand, the question remains of how, as a prerequisite, the solstices could have been precisely defined in time: this could not have been achieved by direct observation but only by counting forward from other dates. Obvious candidates for such dates, from any location within the tropics, are sunrise or sunset on solar zenith passage days, which are fixed points in the seasonal year but when the position of sunrise/sunset is moving significantly from one day to the next. These dates were of undoubted significance to ancient Mesoamericans (Aveni 2001, 40f) and yet the direction of sunrise/sunset on zenith passage days seems to have been of little or no interest (Šprajc 2001, 79, 2014, 719). If the temporal equinoxes really were being marked, there is surely an unresolved issue here.

Let us return to the majority of cases where we have no evidence, and no reason to suppose, that people kept accurate track of the days by counting. Solstitial alignments in these circumstances demonstrate a spatial awareness of the changing position of the Sun in relation to the seasons, as at Newgrange passage tomb, whose solstitial alignment is clearly a material expression of perceived links between (on the one hand) death, ancestors and ancestor spirits and (on the other) the Sun, seasonality and seasonal renewal. The solstitial directions may also have been recognised as the boundaries between the areas of the horizon where the Sun rises, sets, passes over and is never seen, and in some circumstances formed a basis for quadripartite cosmologies. However, the mere existence of solstitial alignments does *not* demonstrate the existence of accurate calendars. And they certainly do not imply the likely existence of equinoctial alignments.

To conclude, it seems that we need to work as hard as ever to have the word "equinox" removed from the standard "recipe book" of potential horizon targets that are accepted without question – or thought – as innately significant in all cultural contexts. Yet perhaps the word does not need to be completely expunged from the archaeoastronomer's vocabulary. The equinox (and it might as well be the "true" astronomical equinox) remains useful as a point of reference for *us*, in the process of investigating, analysing and visualising alignment data, provided that we are not led implicitly to the assumption that it was also a meaningful point of reference for *them*.

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