Clive Ruggles Levels 3 and 4

The results of Thom's original work relating to precise lunar alignments is contained in table 7.1 in MLO (1971). Determination of declination was based on:-

- A foresight, the direction of which was indicated by a backsight with an indicated direction.
- A constant value for the lunar perturbation (Δ) of 9' arc
- Mean values for parallax and standard values for refraction.

This was termed Level 3 by Ruggles (Levels 1 & 2 did not involve foresights)

Later in 1978 – 1982 the Thoms (father & son) worked together in an attempt to improve their data. They introduced a number of refinements:-

- Variable values for Δ (± 8'.6 or 10') as discussed earlier.
- Adjustments for refraction by temperature deduced by time of day.
- Lunar parallax of 56'.4 applied at the equinoxes and 57'.4 at the solstices.
- Graze effects for light rays passing (low) over intervening ground.
- Other theoretical small adjustments for the declination.

This was termed Level 4 by Ruggles

(Thom & Thom 1980; A.S. Thom in Ruggles and Whittle 1981, pp 29-35)

Level 3 was adopted for the present investigation. The different values for Δ were not used although they still could be.

As stated in **Declination values found** in the **Analysis**:-

The value of ± 9′ arc for Δ was used. It was found that using the more correct values for Δ makes little difference. All of the measured declinations fall within ±2′ arc of a theoretical value, which, from the start, was taken as the limit of acceptable error. (See 'Method' above). Nearly all sites had multiple visits for the purpose of declination measurement[7]. On each occasion three or four sets of timed sunsights were made and the azimuths found averaged.

None of the other refinements in Level 4 (with the possible exception of lunar parallax values) were considered necessary to achieve the aims of the current investigation.