

Propagation of the Charleston Earthquake.

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From these we may form the following equations.

	Weight.	Residuals.
$x + 0y = 0$	2	- 1.6
$x + 438y = 144$	1	- 0.8
$x + 488y = 155$	1	- 5.3
$x + 400y = 144$	1	+ 6.3
$x + 545y = 174$	1	- 0.6
$x + 604y = 174$	2	+11.6
$x + 620y = 174$	$\frac{1}{2}$	+16.6
$x + 622y = 174$	1	+17.2
$x + 645y = 204$	1	- 5.6
$x + 705y = 294$	$\frac{1}{2}$	-58.4
$x + 770y = 234$	1	+ 3.1

The normal equations are :

$$12x + 5898.5y = 1811.$$

$$5898.5x + 3577366.5y = 1100677.$$

The solution gives $x = -1.6s. \pm 7.7s.$ $y = 0.31 \pm 0.014s.$
The resulting speed is, 3.226 ± 0.147 miles or 5192 ± 236 meters per second.

Group III consists of reports which fail to give either the means of judging of the comparative accuracy of clocks and watches or of determining to what phase the observation refers. Many and indeed the majority of them are defective in both of these respects. Quite probably some of them are good observations but fail to give the evidence of it. So far as errors of clocks and watches are concerned the errors may be considered as belonging to the accidental class. But all errors as to the phase must be systematic. That some of them refer to more or less advanced phases is certain, and it becomes difficult to determine how many of them do so, and how great is the average tardiness. It is obvious that the effect of all such errors is to make the time too late and the resulting speed too slow. The general indications are, however, that this systematic error is not a large one. By comparing miscellaneous reports from those cities which have also given better verified reports belonging to groups I and II there seems to be a tendency of the average value of this error to fall between one-tenth and one-twentieth of the mean value of the time-interval.

In discussing this group it seems unnecessary to go to the length of formulating a hundred equations of condition, and an equally good result or even a better one may be obtained by the following more summary process. We may take them in sets, the first of which shall comprise all times within 200 miles of the centrum, the second set all between 200 and 300 miles, the third all between 300 and 400 miles, and so on until the last,