

No. 13.

1930.

## Geodætisk Institut

Proviantgaarden, Copenhagen, Denmark.

### Bulletin

of the seismological station

## KØBENHAVN

$\varphi = 55^{\circ}41' N.$   $\lambda = 12^{\circ}27' E.$   $h = 13$  m.

Lithologic foundation: chalk.

No. 13. Jan.—March 1930.

Instruments:

Galitzin pendulums with galvanometric registration.

Constants:

| Component | $l$        | $T_1$        | $A_1$     | $\mu^2$ | $T$         | $k$ |
|-----------|------------|--------------|-----------|---------|-------------|-----|
| $N$       | cm<br>12.5 | sec<br>12.63 | cm<br>100 | 0.15    | sec<br>12.6 | 105 |
| $Z$       | 14.4       | 11.55        | 100       | 0.2     | 8           | 95  |

Wiechert 1000 kg. horizontal seismograph.

Wiechert 1300 kg. vertical seismograph.

Constants:

| Component | $T$ | $\nu$ | $\rho$ | $V$ |
|-----------|-----|-------|--------|-----|
|           | sec |       | mm     |     |
| $N$       | 9.6 | 4.3   | 0.8    | 225 |
| $E$       | 9.6 | 4.4   | 0.4    | 195 |
| $Z$       | 5.6 | 4.2   | 0.2    | 165 |

Milne-Shaw seismographs,  $N$  and  $E$  components, with the approximate constants  $T = 12^s$   $\nu = 20$   $V = 300$ .

Wood-Anderson torsion seismometers,  $N$  component,  $T = c. 11^s$ ;  $E$  component,  $T = c. 4^s$ ; working intermittingly.

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| No. | Date         | Hour | Forerunners |            |              |            | L          | Un-<br>defined | △  | Remarks  |
|-----|--------------|------|-------------|------------|--------------|------------|------------|----------------|----|--|
|     |              |      | P           |            | S            |            |            |                |    |  |
|     | 1930<br>Jan. |      | <i>m s</i>  | <i>m s</i> | <i>h m s</i> | <i>m s</i> | <i>h m</i> | <i>h m</i>     | °  |  |
| 1*  | 5*           | 1    | 30 49       | 39 49      |              |            | .9         |                |    | Sea of Okhotsk.                                |
| 2   | 5            | 19   | 3 50        | 13.3       |              |            | .5         |                |    | Kurile Islands.                                |
| 3   | 7            | 1    |             |            |              |            | .3         |                |    |  |
| 4   | 7            | 17   |             |            |              |            | .9         |                |    |  |
| 5   | 10           | 18   |             |            |              |            | .9         |                |    |  |
| 6   | 14           | 22   |             |            | 24.1         |            | 1.1        |                |    |  |
| 7   | 16           | 0    |             |            | 7.3          |            | .2         |                |    |  |
| 8   | 17           | 17   |             |            |              |            | .7         |                |    |  |
| 9   | 18           | 7    |             |            | 23.5         |            | .9         |                |    |  |
| 10  | 23           | 3    |             |            |              |            |            | .6             |    |  |
| 11  | 23           | 11   |             |            |              |            |            | 7              |    |  |
| 12  | 25           | 2    |             |            |              |            | .4         |                |    |  |
| 13  | 28           | 7    |             |            |              |            | .3         |                |    |  |
|     | Febr.        |      |             |            |              |            |            |                |    |  |
| 14  | 1            | 19   |             |            |              |            | .7         |                |    |  |
| 15* | 2*           | 15   | 7 26        | 16 46*     | 11.9         | 21.7       | .5         |                | 71 | Aleutian Islands.                              |
| 16  | 5            | 1    |             |            |              |            | .1         |                |    |  |
| 17  | 7            | 7    |             |            |              |            | .5         |                |    | Faint forerunners.                             |
| 18  | 7            | 9    |             |            |              |            | .4         |                |    |  |
| 19  | 7            | 13   |             |            |              |            | .5         |                |    | Faint.   |
| 20  | 7            | 16   |             |            | 58 20        |            | 1.3        |                |    |  |
| 21  | 8            | 0    |             |            |              |            |            | 53             |    | Faint.   |
| 22  | 8            | 4    |             |            |              |            |            | .0             |    | "  |
| 23  | 8            | 5    |             | 30 8       |              |            | 36         |                |    | Kurdistan.                                     |
| 24  | 8            | 6    |             | 43 35      |              |            | 51         |                |    | Afghanistan.                                   |
| 25  | 12           | 6    |             |            |              |            | 1.7        |                |    | Faint forerunners disturbed by<br>microseisms. |
| 26* | 14*          | 18   | 42 50       |            |              |            |            |                |    | Aegean Sea.                                    |
| 27  | 14           | 21   |             |            | 0 47         |            | 1.1        |                |    |  |
| 28  | 15           | 19   |             |            |              |            | .4         |                |    |  |
| 29  | 18           | 2    |             |            | 14.5         | 24.5       | .8         |                |    |  |
| 30  | 18           | 7    |             |            |              |            | .3         |                |    |  |
| 31* | 23*          | 18   | 23 18       | 26 50      |              |            |            | 28             |    | 19 Aegean Sea.                                 |
| 32  | 24           | 21   |             |            | 9            | 14 36      | .7         |                |    |  |
| 33  | 26           | 3    |             |            |              |            | .2         |                |    |  |
| 34  | 27           | 3    |             |            |              |            | .6         |                |    |  |
| 35  | 28           | 1    |             | 16 20      |              |            | .4         |                |    | Atlantic Ocean.                                |
|     | March        |      |             |            |              |            |            |                |    |  |
| 36  | 1            | 6    |             |            |              |            | .0         |                |    |  |
| 37  | 6            | 0    |             |            | 0.0          |            |            |                |    | Not very distant.                              |
| 38  | 6            | 3    |             | 53 3       |              |            |            |                |    | L faint.                                       |
| 39  | 6            | 8    |             |            |              |            | 32         |                |    |  |
| 40* | 6*           | 9    |             | 27 21      | 23 45        | 27 51      | 31         |                |    | Archipelago.                                   |
| 41  | 6            | 15   |             |            | 55.1         | 70.5       | 1.8        |                |    |  |
| 42  | 7            | 6    |             |            |              |            | .9         |                |    |  |
| 43  | 7            | 11   |             |            |              |            | .6         |                |    |  |
| 44  | 8            | 3    |             |            | 58.2         | 68 10      | 1.4        |                |    |  |
| 45  | 9            | 10   |             |            |              |            | .4         |                |    |  |

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| No. | Date          | Hour | Forerunners |            |              |            | L          | Un-<br>defined | △  | Remarks |
|-----|---------------|------|-------------|------------|--------------|------------|------------|----------------|----|---------|
|     |               |      | P           |            | S            |            |            |                |    |         |
|     |               |      | <i>m s</i>  | <i>m s</i> | <i>h m s</i> | <i>m s</i> | <i>h m</i> | <i>h m</i>     | °  |         |
|     | 1930<br>March |      |             |            |              |            |            |                |    |         |
| 46  | 10            | 14   |             |            |              |            | .5         |                |    |         |
| 47* | 10*           | 16   | 37 31       | 45 41      | 39 39        | 46 28      |            |                | 60 |         |
| 48  | 15            | 4    |             |            |              |            | .8         |                |    |         |
| 49  | 15            | 7    |             |            |              |            | .9         |                |    |         |
| 50  | 15            | 9    |             |            | 22.7         |            | 27         |                |    |         |
| 51  | 16            | 5    |             |            |              |            | .8         |                |    |         |
| 52  | 20            | 14   |             |            |              |            | .0         |                |    |         |
| 53  | 22            | 9    |             |            |              |            | .5         |                |    |         |
| 54  | 23            | 20   |             |            |              |            | .0         |                |    |         |
| 55* | 26*           | 7    | 26 37       |            |              |            | 1.0        |                |    |         |
| 56  | 26            | 11   |             |            |              |            |            | 45             |    |         |
| 57  | 26            | 12   |             |            |              |            | .5         |                |    |         |
| 58  | 30            | 1    |             |            |              |            | .2         |                |    |         |
| 59  | 30            | 8    |             |            | .9           |            | 1.2        |                |    |         |
| 60  | 30            | 15   |             |            | 38.5         | 47.8       | 1.3        |                |    |         |
| 61* | 31*           | 12   | 37 56       | 41.3       |              |            | 44         |                |    |         |

Sea of Okhotsk.

Timor.  
 Superposed on following shock.

Disturbed.

Aegean Sea.

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NOTES

- No. 1. Jan. 5. 1<sup>h</sup>. Sea of Okhotsk. Phases not clearly marked; disturbed by microseisms. *L* irregular.
- No. 15. Febr. 2. 15<sup>h</sup>. Aleutian Islands. *PP* 10<sup>m</sup>12<sup>s</sup>; *PPP* 11<sup>m</sup>.9, stronger. *S* followed by much movement, but other phases not clearly marked. *M* regular.
- No. 26. Febr. 14. 18<sup>h</sup>. Aegean Sea;  $\Delta = c. 20^\circ$ . Destructive in Crete. Strong microseismic movement. Light too faint on *GN*; *WN* indistinct owing to bad smoking. The beginning of *P* small; on *Z* increase of movement 43<sup>m</sup>10<sup>s</sup>; large oscillations *i<sub>Z</sub>* 43<sup>m</sup>23<sup>s</sup>; 43<sup>m</sup>53<sup>s</sup>. On *E* some increase of movement 46<sup>m</sup>22<sup>s</sup> (*S* or microseisms?); 46<sup>m</sup>42<sup>s</sup> (*S*); 46<sup>m</sup>50<sup>s</sup>\* very large oscillations on all; on *E*; *i* 47<sup>m</sup>22<sup>s</sup>, large. *L* irregular, smaller than *S*, the beginning uncertain. Deep focus?
- No. 31. Febr. 23. 18<sup>h</sup>. Aegean Sea. This earthquake seems to belong to the same epicentral region as no. 26, but the difference in the seismograms is striking. In this case *P*, *S* and *L* are distinct and clearly separated phases. There are no further phases; *L* is much larger than the forerunners.
- No. 40. March 6. 9<sup>h</sup>. Archipelago. Possibly some disturbance due to work at the station. *P* faint; 22<sup>m</sup>53<sup>s</sup>\* on *WZ* not quite certain. 23<sup>m</sup>12<sup>s</sup> certain on *WZ*, but on *GZ* first discernible movement 23<sup>m</sup>17<sup>s</sup>. *S* more clearly marked; *L* faint.
- No. 47. March 10. 16<sup>h</sup>. *P* very faint, visible on *WZ* only. *PP* clearly marked on *GN* and *Z*. *S* a large oscillation, followed on *N* by clearly marked phase. *L* irregular, the beginning uncertain.
- No. 55. March 26. 7<sup>h</sup>. Timor.  $\Delta = c. 110^\circ$ . Phases clearly marked. *P* 30<sup>m</sup>.3; *PP* 31<sup>m</sup>17<sup>s</sup>; *e* 32<sup>m</sup>8<sup>s</sup>; *PPP* 33<sup>m</sup>24<sup>s</sup>; *e* 35<sup>m</sup>.5; *S<sub>c</sub>P<sub>c</sub>S<sub>E</sub>* 37<sup>m</sup>.4; *S<sub>c</sub>P<sub>c</sub>P<sub>c</sub>S<sub>E</sub>* 38<sup>m</sup>.2; *S* 38<sup>m</sup>56<sup>s</sup>; *PS* 40<sup>m</sup>.5; *SS* c. 46<sup>m</sup>.5; *SSS* c. 50<sup>m</sup>.4. *L* earliest on *N*; of long duration.
- No. 61. March 31. 12<sup>h</sup>. Aegean Sea;  $\Delta = c. 20^\circ$ . Recorded on Wiechert and Wood-Anderson instruments only. *S* a distinct phase, but the beginning uncertain. *M* irregular.

No. 14.

1930.

**Geodætisk Institut**  
 Proviantgaarden, Copenhagen, Denmark.

**Bulletin**  
 of the seismological station

**KØBENHAVN**

$\varphi = 55^{\circ}41' N.$   $\lambda = 12^{\circ}27' E.$   $h = 13$  m.

Lithologic foundation: chalk.

No. 14. April—June 1930.

Instruments:

Galitzin pendulums with galvanometric registration.

Constants:

| Component | $l$        | $T_1$        | $A_1$     |                               | $\mu^2$ | $T$         | $k$ |
|-----------|------------|--------------|-----------|-------------------------------|---------|-------------|-----|
| $N$       | cm<br>12.5 | sec<br>12.63 | cm<br>100 |                               | 0.15    | sec<br>12.6 | 104 |
| $E$       | 12.5       | 12.69        | 100       | $\frac{9}{4} - \frac{17}{5}$  | 0.1     | 12          | 100 |
|           |            |              |           | $\frac{24}{5} - \frac{30}{6}$ | 0.05    | 12.5        | 100 |
| $Z$       | 14.4       | 11.55        | 100       | $\frac{1}{4} - \frac{9}{4}$   | 0.2     | 8           | 95  |

$E$  was remounted on April 9th.

$Z$  was dismantled on April 9th and remounted on June 19th; in June the constants were undetermined.

Wiechert 1000 kg. horizontal seismograph.

Wiechert 1300 kg. vertical seismograph.

Constants:

| Component | $T$        | $\nu$ | $\rho$    | $V$ |
|-----------|------------|-------|-----------|-----|
| $N$       | sec<br>9.7 | 4.4   | mm<br>0.8 | 223 |
| $E$       | 9.5        | 4.5   | 0.5       | 195 |
| $Z$       | 5.6        | 4.3   | 0.2       | 160 |

Milne-Shaw seismograph,  $E$  component, with the approximate constants  $T = 12^s$   $\nu = 20$   $V = 300$ .

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| No. | Date          | Hour | Forerunners |    |   |   | L | Un-<br>defined | △ | Remarks |      |      |    |    |                                |                    |
|-----|---------------|------|-------------|----|---|---|---|----------------|---|---------|------|------|----|----|--------------------------------|--------------------|
|     |               |      | P           |    | S |   |   |                |   |         |      |      |    |    |                                |                    |
|     |               |      | m           | s  | h | m | s | m              | s | h       | m    | h    | m  | °  |                                |                    |
| 1   | 1930<br>April | 2    |             |    |   |   |   |                |   | .2      |      |      |    |    |                                |                    |
| 2   |               | 20   |             |    |   |   |   |                |   | .8      |      |      |    |    |                                |                    |
| 3   |               | 9    |             |    |   |   |   |                |   | 1.4     |      |      |    |    |                                |                    |
| 4   |               | 11   | 35.8        |    |   |   |   |                |   | 1.0     |      |      |    |    | Disturbed.                     |                    |
| 5   |               | 5    | 33          | 5  |   |   |   |                |   |         |      |      | 43 | 24 | Kamtchatka.                    |                    |
| 6   |               | 14   |             |    |   |   |   |                |   |         |      |      | 45 |    | Armenia.                       |                    |
| 7   |               | 10   |             |    |   |   |   |                |   |         |      |      |    |    |                                |                    |
| 8   |               | 10   |             |    |   |   |   |                |   | 56.0    |      |      |    |    |                                |                    |
| 9   |               | 4    |             |    |   |   |   |                |   | .7      |      |      |    |    |                                |                    |
| 10  |               | 13   | 50          | 18 |   |   |   |                |   |         |      |      | 57 | 26 | Overlapped by following shock. |                    |
| 11  |               | 14   |             |    |   |   |   |                |   |         |      |      | 8  |    |                                |                    |
| 12  |               | 14   |             |    |   |   |   |                |   | 51.3    |      |      |    |    |                                |                    |
| 13  |               | 2    |             |    |   |   |   |                |   | .4      |      |      |    |    |                                |                    |
| 14* |               | 20   | 11          | 4  |   |   |   |                |   |         |      |      |    | 20 | Greece.                        |                    |
| 15  |               | 13   |             |    |   |   |   |                |   | .3      |      |      |    |    |                                |                    |
| 16  |               | 10   |             |    |   |   |   |                |   | .6      |      |      |    |    |                                |                    |
| 17  |               | 16   |             |    |   |   |   |                |   | 44.9    |      |      |    |    |                                |                    |
| 18  |               | 10   |             |    |   |   |   |                |   | 41.1    |      |      |    |    |                                |                    |
| 19* |               | 12   |             |    |   |   |   |                |   | 11.1    | 16   | 23   |    |    | Atlantic Ocean.                |                    |
| 20  |               | 19   |             |    |   |   |   |                |   |         |      |      | 31 |    |                                |                    |
| 21  |               | 22   |             |    |   |   |   |                |   | .6      |      |      |    |    |                                |                    |
| 22  |               | 14   |             |    |   |   |   |                |   | .9      |      |      |    |    | Faint.                         |                    |
| 23  |               | 18   |             |    |   |   |   |                |   | 47      | 42   |      |    |    |                                |                    |
| 24* |               | 22   | 0           | 26 |   |   |   |                |   | 9       | 57   | 14.8 | 18 | 72 |                                |                    |
| 25  |               | 0    |             |    |   |   |   |                |   | 35      | 8    |      |    |    | Forerunner on Z.               |                    |
| 26  |               | 11   |             |    |   |   |   |                |   | .8      |      |      |    |    |                                |                    |
| 27  |               | 15   |             |    |   |   |   |                |   | .7      |      |      |    |    | Faint preceding movement.      |                    |
| 28  |               | 7    |             |    |   |   |   |                |   | .1      |      |      |    |    |                                |                    |
| 29  |               | 11   |             |    |   |   |   |                |   | .6      |      |      |    |    | Faint.                         |                    |
| 30  |               | 16   |             |    |   |   |   |                |   | .1      |      |      |    |    |                                |                    |
| 31* |               | 16   | 29          | 42 |   |   |   |                |   |         |      | 43.9 |    | 71 | "<br>Aleutian Islands.         |                    |
| 32  |               | 10   |             |    |   |   |   |                |   | .8      |      |      |    |    |                                |                    |
| 33  |               | 14   |             |    |   |   |   |                |   | 43.2    | 50.6 |      |    |    |                                |                    |
| 34  |               | 16   |             |    |   |   |   |                |   | .7      |      |      |    |    |                                |                    |
| 35  |               | 21   |             |    |   |   |   |                |   | 56      | 65.9 |      |    |    |                                |                    |
| 36  |               | 13   |             |    |   |   |   |                |   | 27      |      |      |    |    | Overlapped by following shock. |                    |
| 37  |               | 14   |             |    |   |   |   |                |   | .1      |      |      |    |    |                                |                    |
| 38* |               | 18   | 45          | 30 |   |   |   |                |   |         |      | 49   | 37 | 58 | 43*                            |                    |
| 39  |               | 9    |             |    |   |   |   |                |   | .1      |      |      |    |    | China.                         |                    |
| 40  |               | 16   |             |    |   |   |   |                |   | 25      | 19   |      |    |    |                                |                    |
| 41  | May           | 1    | 9           | 56 |   |   |   |                |   |         |      | 12   | 56 |    | 76                             | Japan.             |
| 42  |               | 5    |             |    |   |   |   |                |   | .0      |      |      |    |    |                                |                    |
| 43  |               | 10   |             |    |   |   |   |                |   | .5      |      |      |    |    |                                |                    |
| 44  |               | 2    |             |    |   |   |   |                |   |         | 4    |      |    |    |                                |                    |
| 45  |               | 6    |             |    |   |   |   |                |   | 21      | 4    | 24   | 36 |    |                                |                    |
| 46  |               | 16   |             |    |   |   |   |                |   | .6      |      |      |    |    |                                |                    |
| 47* |               | 13   | 57          | 22 |   |   |   |                |   |         |      | 66   | 39 |    |                                |                    |
| 48  |               | 7    |             |    |   |   |   |                |   |         |      | 10   |    |    | 70                             | Burma.<br>Armenia. |

København.

| No. | Date              | Hour | Forerunners |     |      |    | L    | Un-<br>defined | △    | Remarks |    |                                      |
|-----|-------------------|------|-------------|-----|------|----|------|----------------|------|---------|----|--------------------------------------|
|     |                   |      | P           |     | S    |    |      |                |      |         |    |                                      |
|     |                   |      | m           | s   | m    | s  | h    | m              | h    | m       | °  |                                      |
| 49* | 1930<br>May<br>6* | 22   | i40         | 14  | 45   | 0  |      |                |      |         | 29 | Persia.                              |
| 50  | 7                 | 6    |             |     |      |    |      | .0             |      |         |    |                                      |
| 51* | 7*                | 9    |             |     |      |    |      | .7             |      |         |    |                                      |
| 52  | 7                 | 13   |             |     |      |    |      | 63             |      |         |    | Some preceding movement.             |
| 53  | 7                 | 14   |             |     |      |    | 37   | 1              |      |         |    |                                      |
| 54  | 8                 | 5    |             |     |      |    | 40   | 5              |      |         |    | Persia.                              |
| 55  | 8                 | 13   |             |     |      |    | 6    | 11.9           |      |         |    | Overlapped by next shock.            |
| 56  | 8                 | 13   |             |     |      |    | 59   |                |      |         |    | " " " "                              |
| 57  | 8                 | 15   |             |     |      |    |      |                |      | 17      |    | " " " "                              |
| 58* | 8*                | 15   | 41          | 16  | i46  | 0  | 41   | 59             | 47.5 |         | 29 | Armenia.                             |
| 59  | 8                 | 23   |             |     |      |    |      | .5             |      |         |    |                                      |
| 60  | 8                 | 23   |             |     |      |    | 43   |                |      |         |    |                                      |
| 61  | 9                 | 2    |             |     |      |    |      | .0             |      |         |    |                                      |
| 62  | 9                 | 7    | 12          | 43* | 17   | 6  | 18.1 |                |      |         | 26 | Mediterranean Sea.                   |
| 63  | 9                 | 8    |             |     |      |    |      |                |      | .2      |    |                                      |
| 64  | 9                 | 14   |             |     |      |    |      | .8             |      |         |    |                                      |
| 65  | 9                 | 21   |             |     |      |    |      | 23             |      |         |    |                                      |
| 66  | 10                | 0    |             |     |      |    |      | .8             |      |         |    |                                      |
| 67  | 10                | 21   |             |     |      |    | 54.1 |                |      |         |    |                                      |
| 68  | 10                | 22   |             |     |      |    | 34   |                |      |         |    |                                      |
| 69  | 11                | 0    |             |     |      |    |      | .9             |      |         |    |                                      |
| 70  | 11                | 11   |             |     |      |    |      | 15             |      |         |    |                                      |
| 71* | 11*               | 22   | 43          | 34  | 49   | 52 | 45.3 | 50             | 11   |         | 42 | Faint preceding movement.<br>Persia. |
| 72  | 12                | 0    | 28          | 59  | 35.1 |    |      | .7             |      |         | 41 | "                                    |
| 73  | 12                | 13   |             |     |      |    |      | .2             |      |         |    |                                      |
| 74  | 12                | 22   |             |     |      |    |      | .9             |      |         |    |                                      |
| 75  | 13                | 1    |             |     |      |    |      | .2             |      |         |    | Faint.                               |
| 76  | 13                | 8    |             |     |      |    | 39.4 |                |      |         |    | Disturbed.                           |
| 77  | 13                | 18   |             |     |      |    |      | .7             |      |         |    |                                      |
| 78  | 13                | 20   |             |     |      |    |      | .7             |      |         |    |                                      |
| 79  | 14                | 0    |             |     |      |    |      |                |      | 6       |    | Italy.                               |
| 80  | 14                | 12   |             |     |      |    |      |                |      | .6      |    | Faint.                               |
| 81  | 14                | 19   |             |     |      |    | 52   | 59             |      |         |    |                                      |
| 82  | 16                | 2    |             |     |      |    |      | .9             |      |         |    | Overlapped by next shock.            |
| 83  | 16                | 3    |             |     |      |    |      | .3             |      |         |    |                                      |
| 84  | 16                | 20   |             |     |      |    |      | .9             |      |         |    |                                      |
| 85  | 18                | 0    |             |     |      |    | .6   |                |      |         |    |                                      |
| 86  | 19                | 3    |             |     |      |    | .6   |                |      |         |    |                                      |
| 87  | 19                | 15   | 16          | 7   | 26   | 12 | 26   | 57             |      |         | 79 |                                      |
| 88  | 20                | 8    |             |     |      |    | 10   |                |      |         |    |                                      |
| 89  | 20                | 11   | 26          | 25  | 35   | 38 | 40.6 |                |      |         | 69 | Aleutian Islands. Disturbed.         |
| 90  | 21                | 12   |             |     |      |    |      | .5             |      |         |    |                                      |
| 91  | 21                | 14   |             |     |      |    |      |                |      | .1      |    |                                      |
| 92  | 21                | 21   |             |     |      |    |      | .2             |      |         |    |                                      |
| 93  | 21                | 22   | 15          | 20  | 20.4 |    |      |                | 24   |         | 31 | Atlantic Ocean.                      |
| 94  | 23                | 0    |             |     |      |    |      | .7             |      |         |    |                                      |
| 95  | 23                | 9    |             |     |      |    | 55   |                |      |         |    |                                      |
| 96* | 23*               | 16   | 50          | 4   | 59   | 55 | 60   | 7              | 65   |         | 76 | Japan.                               |
| 97  | 24                | 22   |             |     |      |    |      | .3             |      |         |    |                                      |
| 98  | 26                | 16   |             |     |      |    |      | .5             |      |         | 8  |                                      |

København.

| No.  | Date        | Hour | Forerunners |            |                |            | L          | Un-<br>defined | △                         | Remarks |
|------|-------------|------|-------------|------------|----------------|------------|------------|----------------|---------------------------|---------|
|      |             |      | P           | S          |                |            |            |                |                           |         |
|      |             |      | <i>m s</i>  | <i>m s</i> | <i>h m s</i>   | <i>m s</i> | <i>h m</i> | <i>h m</i>     | °                         |         |
|      | 1930<br>May |      |             |            |                |            |            |                |                           |         |
| 99   | 26          | 22   |             |            | 59             |            | 1.2        |                |                           |         |
| 100  | 27          | 13   |             |            |                |            | .2         |                |                           |         |
| 101  | 27          | 17   |             |            |                |            |            | .1             | Faint.                    |         |
| 102  | 29          | 3    |             |            |                |            |            | .2             | "                         |         |
| 103  | 29          | 17   |             |            |                |            |            | 25             | Armenia.                  |         |
| 104  | 31          | 10   |             |            | .7             |            | 1.0        |                |                           |         |
| 105  | 31          | 18   | 10 18       | 20 6       | 25.0           |            | .6         |                | 76 Japan.                 |         |
|      | June        |      |             |            |                |            |            |                |                           |         |
| 106  | 1           | 3    |             |            |                |            | .5         |                |                           |         |
| 107  | 1           | 13   |             |            | 28.9           | 37.8       | 1.3        |                | Faint preceding movement. |         |
| 108  | 1           | 21   |             |            |                |            | .9         |                |                           |         |
| 109  | 3           | 18   |             |            | 19.4           |            | .6         |                |                           |         |
| 110  | 4           | 7    | 33 58       | 38 40      |                |            |            |                | 28 Persia.                |         |
| 111  | 4           | 10   |             |            | 8.8            | 14 17      | .8         |                | Disturbed.                |         |
| 112  | 5           | 12   |             |            | 6.0            |            | .7         |                |                           |         |
| 113  | 5           | 17   |             |            |                |            | .1         |                |                           |         |
| 114  | 5           | 22   | 3 24        | 7.6        |                |            |            | 11             | 24 Mediterranean Sea.     |         |
| 115  | 9           | 4    |             |            |                |            |            | 47             |                           |         |
| 116* | 11*         | 1    |             |            | 10 3           | 19 39      |            |                | Salomon Islands.          |         |
| 117  | 11          | 11   |             |            |                |            | .3         |                |                           |         |
| 118  | 11          | 14   |             |            |                |            | .5         |                |                           |         |
| 119  | 13          | 1    | 5 27        | 15.0       |                |            | .5         |                | 73                        |         |
| 120  | 15          | 8    |             |            |                |            | .9         |                | Disturbed.                |         |
| 121  | 15          | 21   |             |            | 27.7           | 50.5       | 1.2        |                |                           |         |
| 122  | 17          | 20   |             |            |                |            |            | 34             |                           |         |
| 123  | 18          | 16   |             |            |                |            | .5         |                |                           |         |
| 124  | 19          | 13   |             |            | 31.5           |            | 1.0        |                | 2 shocks acc. to URSS.    |         |
| 125  | 21          | 22   |             |            |                |            | .0         |                |                           |         |
| 126  | 22          | 18   |             |            | 57.3           | 62.6       | 1.3        |                |                           |         |
| 127  | 23          | 19   |             |            | 54.5           | 64.6       | 1.5        |                |                           |         |
| 128  | 25          | 1    |             |            |                |            | .3         |                |                           |         |
| 129* | 25*         | 10   | 31 35       | 43 16      | 42 14          | 44.8       | 1.0        |                | 66 Peru.                  |         |
| 130  | 25          | 12   | 17 1        | 25 50      | 26 53          |            | .6         |                |                           |         |
| 131  | 25          | 13   |             |            |                |            | .7         |                |                           |         |
| 132* | 25*         | 21   |             |            | <i>i</i> 27 32 |            |            |                |                           |         |
| 133* | 25*         | 21   | 35 31       | 47 15      | 46 15          | 48.7       | 1.1        |                | Peru.                     |         |
| 134  | 26          | 4    |             |            |                |            | .7         |                | Faint.                    |         |
| 135  | 28          | 19   |             |            |                |            | .9         |                |                           |         |
| 136  | 30          | 0    |             |            |                |            | .5         |                |                           |         |

No. 14. Apr  
21<sup>m</sup>  
No. 19. Apr  
SS.  
No. 24. Apr  
wav  
No. 31. Apr  
puls  
No. 38. Apr  
beg  
No. 47. May  
S b  
68<sup>m</sup>  
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No. 49. May  
larg  
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No. 51. May  
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No. 58. May  
on  
No. 71. May  
No. 96. May  
fol  
No. 116. Jun  
SS  
with  
No. 129. Jun  
owi  
*iz* 4  
No. 132. Jun  
No. 133. Jun  
PS



København.

NOTES

- No. 14. April 17. 20<sup>h</sup>. Greece. First movement faint; increase 11<sup>m</sup>6<sup>s</sup> and 11<sup>m</sup>8<sup>s</sup>. *S* large and clearly marked; *L* shortly after *S* 21<sup>m</sup> large *M*.
- No. 19. April 21. 12<sup>h</sup>. Atlantic Ocean.  $\Delta = c. 110$ . *PP* 11<sup>m</sup>.1, faint, on *GN* only.  $\overline{S_e P_e S}$  16<sup>m</sup>23<sup>s</sup>;  $e$  17<sup>m</sup>.7; *PS* 20<sup>m</sup>.4; *SS* 26<sup>m</sup>.8; *SSS* 31<sup>m</sup>.1. *L* earliest on *E*; regular.
- No. 24. April 23. 22<sup>h</sup>. First movement faint, on *Z* only;  $P_N$  0<sup>m</sup>28<sup>s</sup>. On *E*, the first part of *L* is a group of long-period, regular waves of relatively large amplitude.
- No. 31. April 26. 16<sup>h</sup>. *P* and *S* clearly marked. *P* reflections faint. *S* followed by much movement, 40<sup>m</sup>5<sup>s</sup> clearest marked impulse. The first part of *L* irregular; after 17<sup>h</sup> regular *M* waves.
- No. 38. April 28. 18<sup>h</sup>. China. Not strong record, but all phases, including *L*, have very clearly marked beginnings. *L* irregular begins 67<sup>m</sup>.7 on *N*, on *E* 71<sup>m</sup>.6; *M* group on *N* about 71<sup>m</sup>.5.
- No. 47. May 5. 13<sup>h</sup>. Burma. Very strong record. Condensation. *P* reflections not clearly marked:  $PP_E$  60<sup>m</sup>.0;  $PPP_E$  61<sup>m</sup>.9. *S* begins earliest on *N*;  $S_E$  66<sup>m</sup>49<sup>s</sup>. After *S* large oscillations; best defined impulses: 67<sup>m</sup>29<sup>s</sup>, sharpest on *E*;  $e_E$  68<sup>m</sup>.2;  $e_N$  68<sup>m</sup>.6;  $e_N$  69<sup>m</sup>.2;  $e_N$  70<sup>m</sup>.7;  $e_E$  72<sup>m</sup>.7;  $e_N$  73<sup>m</sup>.2. Large irregular oscillations continue into *L*. On *N* a group of very large *M* waves begin 87<sup>m</sup>; on *E* and *Z*, *M* waves begin 91<sup>m</sup>; several groups of large waves.
- No. 49. May 6. 22<sup>h</sup>. Persia. Very strong record. *P* begins faintly, dilatation, increases  $i$  40<sup>m</sup>20<sup>s</sup>; 40<sup>m</sup>41<sup>s</sup>;  $i$  41<sup>m</sup>1<sup>s</sup>, followed by large oscillations.  $e_E$  42<sup>m</sup>.2. *S* largest on *E*;  $i_{N,Z}$  45<sup>m</sup>23<sup>s</sup>, followed by very large movement.  $i_E$  46<sup>m</sup>.6;  $i_N$  (*L*) 47<sup>m</sup>.6. On *N*, very large *M* group begins 50<sup>m</sup>.0;  $M_E$  some minutes later.
- No. 51. May 7. 9<sup>h</sup>. Some long-period disturbance which continues until about 21<sup>h</sup> makes the reading of this and the following records uncertain.
- No. 58. May 8. 15<sup>h</sup>. Armenia. *S* largest on *E*; followed by movement of long period. The beginning of *L* not certain; *M* earliest on *N*.
- No. 71. May 11. 22<sup>h</sup>. Persia. Small, but phases clearly marked.  $e_E$  53<sup>m</sup>.6;  $e_N$  (*L*) 54<sup>m</sup>.7;  $e_E$  (*L*) 55<sup>m</sup>.5.
- No. 96. May 23. 16<sup>h</sup>. Japan. *P* just visible, on *Z* only. *S* and the next phase clearly marked, each by a large oscillation. The following movement small.
- No. 116. June 11. 1<sup>h</sup>. Solomon Islands;  $\Delta = c. 120^\circ$ . *PP* 10<sup>m</sup>3<sup>s</sup>, clearly marked; *PPP* 12<sup>m</sup>.5; *PS* 19<sup>m</sup>39<sup>s</sup>;  $e$  19<sup>m</sup>45<sup>s</sup>;  $e$  21<sup>m</sup>18<sup>s</sup>; *SS* 27<sup>m</sup>9<sup>s</sup>. About 2 min. after *SS* series of regular waves begin, of the appearance of *L* waves. *L* begins about 1<sup>h</sup>.7 with less regular waves of longer period; *M* about 2<sup>h</sup>.0.
- No. 129. June 25. 10<sup>h</sup>. Peru;  $\Delta = c. 100^\circ$ . Record not strong, but phases clearly marked. The beginning of *P* not quite certain owing to disturbance of the *Z* record. *PP* 35<sup>m</sup>.6.  $\overline{S_e P_e S}$  on *E* only, 42<sup>m</sup>14<sup>s</sup>;  $S_N$ , best marked on *N*, 43<sup>m</sup>16<sup>s</sup>.  $PS_E$  44<sup>m</sup>.8  $i_Z$  45<sup>m</sup>33<sup>s</sup>; *SS* 50<sup>m</sup>.4. *L* earliest on *N*; regular, of long duration.
- No. 132. June 25. 21<sup>h</sup>27<sup>m</sup>32<sup>s</sup>, large oscillation on *Z* followed by very small movement, lasting a few minutes only.
- No. 133. June 25. 21<sup>h</sup>. Peru;  $\Delta = c. 100^\circ$ . Stronger than no. 129; same phases recorded. *PP* 39<sup>m</sup>.6;  $\overline{S_e P_e S_E}$  46<sup>m</sup>15<sup>s</sup>;  $S_N$  47<sup>m</sup>15<sup>s</sup>;  $PS_E$  48<sup>m</sup>.7,  $e_Z$  49<sup>m</sup>35<sup>s</sup>; *SS* 54<sup>m</sup>.3. *L* earliest on *N*; regular, of long duration.

1980

No. 12

Relazione

NOTIZIA

Apr. 17. 1980. ...  
Apr. 18. 1980. ...  
Apr. 19. 1980. ...  
Apr. 20. 1980. ...  
Apr. 21. 1980. ...  
Apr. 22. 1980. ...  
Apr. 23. 1980. ...  
Apr. 24. 1980. ...  
Apr. 25. 1980. ...  
Apr. 26. 1980. ...  
Apr. 27. 1980. ...  
Apr. 28. 1980. ...  
Apr. 29. 1980. ...  
Apr. 30. 1980. ...

No. 15.

1930.

## Geodætisk Institut

Proviantgaarden, Copenhagen, Denmark.

### Bulletin of the seismological station

# KØBENHAVN

$\varphi = 55^{\circ} 41' N$ .  $\lambda = 12^{\circ} 27' E$ .  $h = 13$  m.

Lithologic foundation: chalk.

No. 15. July—Sept. 1930.

Instruments:

Galitzin pendulums with galvanometric registration.

Constants:

| Component | $l$  | $T_1$ | $A_1$ |                     | $\mu^2$ | $T$  | $k$ |
|-----------|------|-------|-------|---------------------|---------|------|-----|
|           | cm   | sec   | cm    |                     |         | sec  |     |
| $N$       | 12.5 | 12.63 | 100   |                     | 0.15    | 12.6 | 105 |
| $E$       | 12.5 | 12.69 | 100   |                     | 0.1     | 12.6 | 100 |
| $Z$       | 14.4 | 11.55 | 100   | from $\frac{5}{10}$ | -0.1    | 10   | 95  |

$Z$  was recording regularly, but the temperature compensation was adjusted and therefore the constants were undetermined until Sept. 5th.

Wiechert 1000 kg. horizontal seismograph.

Wiechert 1300 kg. vertical seismograph.

Constants:

| Component | $T$ | $\nu$ | $\rho$ | $V$ |
|-----------|-----|-------|--------|-----|
|           | sec |       | mm     |     |
| $N$       | 9.7 | 4.6   | 0.7    | 223 |
| $E$       | 9.6 | 4.6   | 0.6    | 194 |
| $Z$       | 5.7 | 4.2   | 0.2    | 160 |

Milne-Shaw seismographs,  $N$  and  $E$  components, with the approximate constants  $T = 12^s$   $\nu = 20$   $V = 300$

Wood-Anderson torsion seismometers, ( $1/7-2/8$ ),  $N$  component,  $T = c. 11^s$ ;  $E$  component,  $T = c. 4^s$ .

København.

| No. | Date         | Hour | Forerunners |       |       |       | L   | Un-<br>defined | △  | Remarks                    |
|-----|--------------|------|-------------|-------|-------|-------|-----|----------------|----|----------------------------|
|     |              |      | P           | S     |       |       |     |                |    |                            |
|     | 1930<br>July |      | m s         | m s   | h m s | m s   | h m | h m            | °  |                            |
| 1   | 1            | 1    | 20 17       | 29.5  | 22.9  | 33.7  | .7  |                | 73 |                            |
| 2   | 1            | 20   |             |       |       |       |     | .2             |    | Seismic?                   |
| 3*  | 2*           | 21   | 14 4        | 22.4  | 16 38 | 26.3  |     |                | 61 | Tibet.                     |
| 4   | 3            | 0    | 29 32       | 37 45 |       |       | 52  |                |    | " . P uncertain.           |
| 5   | 4            | 5    |             |       |       |       | .3  |                |    |                            |
| 6   | 4            | 21   |             |       |       |       |     | .2             |    |                            |
| 7   | 4            | 22   |             |       |       |       | .2  |                |    | Faint.                     |
| 8   | 5            | 18   |             |       | 16 55 |       | .9  |                |    |                            |
| 9   | 5            | 23   |             |       | 20.6  |       | 24  |                |    | Faint preceding movement.  |
| 10  | 7            | 13   |             |       | 56.3  |       | 1.2 |                |    |                            |
| 11  | 7            | 20   |             |       |       |       | .6  |                |    |                            |
| 12  | 8            | 10   |             |       |       |       | .3  |                |    |                            |
| 13  | 8            | 17   |             |       |       |       | .6  |                |    |                            |
| 14  | 9            | 4    |             |       |       |       |     | .8             |    |                            |
| 15  | 10           | 13   |             |       |       |       |     | .1             |    | Faint.                     |
| 16  | 10           | 20   |             |       |       |       |     |                | 15 | "                          |
| 17  | 11           | 7    |             |       | 25 46 | 30.1  |     |                |    |                            |
| 18  | 13           | 1    |             |       | 34 50 |       | 1.2 |                |    |                            |
| 19  | 13           | 14   |             |       |       |       | .1  |                |    |                            |
| 20  | 13           | 14   |             |       | 19.2  |       | .6  |                |    |                            |
| 21* | 13*          | 19   | 37 8        | 45 8  | 40.3  | 48.9  | .9  |                | 58 | China.                     |
| 22  | 14           | 20   |             |       | 55.6  |       | 1.1 |                |    |                            |
| 23* | 14*          | 22   | 53 14*      |       | 63 44 | 68.0  |     |                |    | Central America.           |
| 24  | 16           | 3    |             |       |       |       | .7  |                |    |                            |
| 25  | 17           | 14   | 46 41       | 56 39 |       |       | .3  |                | 77 | Disturbed.                 |
| 26  | 17           | 18   |             |       |       |       | .9  |                |    | Faint.                     |
| 27  | 19           | 15   |             |       |       |       |     | .7             |    | "                          |
| 28  | 19           | 23   |             |       | 49.9  |       | 1.0 |                |    |                            |
| 29  | 20           | 11   |             |       |       |       | .2  |                |    |                            |
| 30  | 20           | 15   |             |       |       |       | .4  |                |    |                            |
| 31  | 21           | 14   |             |       | 28 33 |       |     |                |    |                            |
| 32  | 22           | 12   |             |       |       |       | .0  |                |    |                            |
| 33* | 22*          | 19   | 37 10       | 46 25 | 42.1  |       | 1.0 |                | 70 | Kurile Islands.            |
| 34* | 23*          | 0    | 12 6        | 15 3  |       |       |     |                | 15 | Italy.                     |
| 35  | 23           | 5    |             |       |       |       |     | 38             |    | "                          |
| 36  | 23           | 14   |             |       |       |       | 1   |                |    | "                          |
| 37  | 23           | 18   |             |       |       |       |     | 10             |    | Faint.                     |
| 38  | 23           | 19   |             |       |       |       | .4  |                |    |                            |
| 39  | 24           | 8    |             |       |       |       |     | .5             |    | Faint.                     |
| 40  | 24           | 12   |             |       |       |       | 12  |                |    |                            |
| 41  | 24           | 15   |             |       |       |       | .2  |                |    | Faint.                     |
| 42  | 24           | 21   |             |       |       |       | .0  |                |    |                            |
| 43  | 25           | 19   | 52.0        | 56.5  |       |       | 61  |                |    |                            |
| 44  | 25           | 22   |             |       |       |       | .2  |                |    |                            |
| 45  | 27           | 15   |             |       | 24.4  |       | .8  |                |    |                            |
| 46  | 27           | 19   | 11 24       |       | 14.7  | 21 57 | .7  |                |    |                            |
| 47  | 28           | 17   |             |       |       |       |     | .2             |    | Faint.                     |
| 48  | 28           | 18   |             |       | .4    | 28.5  |     |                |    |                            |
| 49  | 29           | 6    | 36.9        |       | 39.9  | 46.8  | 1.0 |                |    | P faint, time not certain. |
| 50  | 31           | 0    |             |       |       |       |     | 29             |    |                            |

København.

| No. | Date               | Hour | Forerunners |       |        |      | L   | Un-<br>defined | △  | Remarks                        |
|-----|--------------------|------|-------------|-------|--------|------|-----|----------------|----|--------------------------------|
|     |                    |      | P           | S     |        |      |     |                |    |                                |
|     |                    |      | m s         | m s   | h m s  | m s  | h m | h m            | °  |                                |
| 51  | 1930<br>July<br>31 | 5    |             |       |        |      |     | 32             |    |                                |
| 52  | Aug.<br>1          | 0    |             |       |        |      | .9  |                |    |                                |
| 53  | 2                  | 3    |             |       | 17 8   |      |     |                |    |                                |
| 54* | 2*                 | 16   |             |       | 26.2   |      | 1.3 |                |    |                                |
| 55  | 2                  | 23   |             |       |        |      | .4  |                |    | Faint.                         |
| 56  | 3                  | 2    |             |       |        |      | .5  |                |    | "                              |
| 57  | 3                  | 22   |             |       | 11 41  |      | .5  |                |    |                                |
| 58* | 4*                 | 5    | 16 47       |       |        |      |     |                |    |                                |
| 59  | 4                  | 12   |             |       |        |      | .5  |                |    |                                |
| 60  | 4                  | 16   |             |       |        |      | .7  |                |    |                                |
| 61  | 5                  | 0    |             |       | 31.1   | 32.9 | .9  |                |    |                                |
| 62  | 5                  | 23   |             |       | 32 15  |      |     | 36             |    | Aegean Sea.                    |
| 63  | 6                  | 8    |             |       |        |      | .1  |                |    |                                |
| 64  | 8                  | 0    |             |       |        |      | .5  |                |    |                                |
| 65  | 9                  | 18   |             |       | 14 47* | 19.2 |     | 23             |    |                                |
| 66  | 9                  | 20   |             |       |        |      | .6  |                |    |                                |
| 67  | 9                  | 22   |             |       |        |      | .1  |                |    |                                |
| 68  | 9                  | 22   |             |       | 58.3   |      |     | 64             |    |                                |
| 69  | 10                 | 1    |             |       |        |      | .1  |                |    |                                |
| 70  | 13                 | 5    |             |       |        |      | .9  |                |    |                                |
| 71  | 13                 | 6    |             |       |        |      | .8  |                |    |                                |
| 72  | 13                 | 21   |             |       | 46.9   |      | 1.1 |                |    |                                |
| 73  | 17                 | 9    |             |       | 50 28  |      | 1.2 |                |    |                                |
| 74  | 17                 | 12   | 37 12       | 43 28 | 39 1   | 46.8 |     |                |    |                                |
| 75* | 18*                | 10   | 8 40*       |       | 13 22  | 19 8 |     | 41             |    | 42 Persia.<br>Atlantic Ocean.  |
| 76  | 19                 | 5    |             |       |        |      | .9  |                |    |                                |
| 77  | 19                 | 18   |             |       |        |      | .4  |                |    |                                |
| 78* | 20*                | 21   | 6.3         | 16 21 |        |      |     | 31             |    | 78 Formosa.                    |
| 79  | 21                 | 7    |             |       | 7.0    |      |     | 11             |    |                                |
| 80  | 21                 | 11   |             |       |        |      | .4  |                |    |                                |
| 81  | 21                 | 15   |             |       |        |      | .8  |                |    | Faint.                         |
| 82  | 22                 | 0    |             |       | 53 58  |      |     | 59             |    |                                |
| 83  | 22                 | 10   |             |       |        |      |     | 8              |    |                                |
| 84* | 23*                | 11   | 1 2         | 7 16  | 2 47   | 10.6 |     |                |    | 42 Persia.<br>Faint.           |
| 85  | 23                 | 15   |             |       |        |      |     | .5             |    |                                |
| 86  | 24                 | 10   |             |       |        |      | .2  |                |    | Forerunners disturbed.         |
| 87  | 24                 | 11   |             |       |        |      | .4  |                |    | Superposed on preceding shock. |
| 88  | 27                 | 15   |             |       | .2     |      | .9  |                |    |                                |
| 89  | 29                 | 7    |             |       |        |      | .8  |                |    |                                |
| 90  | 29                 | 9    |             |       |        |      | .1  |                |    | Preceding movement disturbed.  |
| 91  | 29                 | 20   |             |       | 23     |      | .6  |                |    |                                |
| 92  | 31                 | 4    |             |       |        |      | .3  |                |    | Faint.                         |
| 93  | Sept.<br>1         | 5    |             |       | 37.8   |      | .9  |                |    |                                |
| 94  | 1                  | 17   | 52 10       | 59 22 | 54.1   | 63   |     | 69             | 51 | Himalaya.                      |
| 95  | 2                  | 16   |             |       |        |      | .6  |                |    |                                |
| 96  | 2                  | 19   | 6 7         | 11 54 |        |      |     | 20             | 38 | Persia.                        |

København.

| No.  | Date          | Hour | Forerunners |    |    |    | L      | Un-<br>defined | △ | Remarks |    |    |                       |
|------|---------------|------|-------------|----|----|----|--------|----------------|---|---------|----|----|-----------------------|
|      |               |      | P           |    | S  |    |        |                |   |         |    |    |                       |
|      |               |      | m           | s  | m  | s  | h      | m              | s | h       | m  | °  |                       |
|      | 1930<br>Sept. |      |             |    |    |    |        |                |   |         |    |    |                       |
| 97   | 5             | 16   |             |    |    |    | 34.9   |                |   | 42      |    |    | Persia.               |
| 98   | 7             | 11   |             |    |    |    |        |                |   | 8       |    |    |                       |
| 99   | 9             | 11   |             |    |    |    |        |                |   | .5      |    |    |                       |
| 100  | 10            | 15   |             |    |    |    |        |                |   |         | .1 |    | Faint.                |
| 101  | 10            | 23   |             |    |    |    |        |                |   | .2      |    |    | "                     |
| 102  | 11            | 3    |             |    |    |    |        |                |   | .6      |    |    | "                     |
| 103  | 11            | 4    |             |    |    |    |        |                |   | .5      |    |    | "                     |
| 104* | 11*           | 12   | 41          | 41 | 45 | 49 | 41 48  |                |   | 49      |    | 24 | Asia Minor.           |
| 105  | 11            | 17   |             |    |    |    | 30.0   | 37.7           |   |         |    |    | Hindu Kush.           |
| 106  | 12            | 8    | 22.9        |    |    |    |        |                |   | 30      |    |    | Archipelago.          |
| 107  | 12            | 9    |             |    |    |    | 30.6   |                |   | 33      |    |    | "                     |
| 108  | 12            | 13   |             |    |    |    |        |                |   |         | 42 |    |                       |
| 109  | 13            | 18   |             |    |    |    |        |                |   | .6      |    |    |                       |
| 110  | 13            | 20   | 10          | 13 | 13 | 49 |        |                |   | 16      |    | 20 | Mediterranean Sea.    |
| 111  | 13            | 23   |             |    |    |    | 37     |                |   | 1.4     |    |    |                       |
| 112  | 14            | 3    |             |    |    |    | 21.1   |                |   | 1.3     |    |    |                       |
| 113  | 14            | 17   |             |    |    |    | 32 11  | 35 30          |   | 1.3     |    |    |                       |
| 114  | 16            | 0    |             |    |    |    |        |                |   |         | .2 |    |                       |
| 115  | 17            | 3    |             |    |    |    |        |                |   | .9      |    |    |                       |
| 116  | 17            | 17   |             |    |    |    | 17.2   |                |   | .4      |    |    |                       |
| 117  | 20            | 13   |             |    |    |    |        |                |   | .5      |    |    |                       |
| 118* | 21*           | 23   | 15          | 7  | 23 | 58 | 19 13* | 28.3           |   | .6      |    | 66 | China.                |
| 119* | 22*           | 1    |             |    |    |    | 51 15* |                |   | 1.9     |    |    |                       |
| 120  | 22            | 5    |             |    |    |    | 14 38  |                |   | .5      |    |    | China.                |
| 121* | 22*           | 14   | 29          | 50 | 38 | 27 | 38 55  | 42.7           |   | .9      |    | 64 | Assam.                |
| 122  | 22            | 16   |             |    |    |    | 40 37  | 36.0           |   | 43.7    |    |    | Turkestan. Disturbed. |
| 123  | 22            | 21   |             |    |    |    |        |                |   | .8      |    |    |                       |
| 124  | 23            | 6    |             |    |    |    |        |                |   | .9      |    |    |                       |
| 125  | 23            | 10   |             |    |    |    | 25     |                |   | .6      |    |    |                       |
| 126  | 23            | 12   |             |    |    |    |        |                |   | .7      |    |    |                       |
| 127  | 24            | 0    |             |    |    |    | 1.7    |                |   | .5      |    |    |                       |
| 128  | 24            | 3    |             |    |    |    |        |                |   | .9      |    |    |                       |
| 129  | 24            | 8    |             |    |    |    |        |                |   | .5      |    |    |                       |
| 130  | 24            | 12   |             |    |    |    | 31.0   |                |   | .9      |    |    |                       |
| 131  | 24            | 16   |             |    |    |    |        |                |   | .7      |    |    |                       |
| 132  | 25            | 12   |             |    |    |    |        |                |   | .7      |    |    |                       |
| 133  | 25            | 17   |             |    |    |    |        |                |   | .5      |    |    |                       |
| 134* | 25*           | 18   |             |    |    |    | 26.5   | 30 29          |   |         |    |    | Burma.                |
| 135  | 25            | 19   |             |    |    |    |        |                |   | .2      |    |    |                       |
| 136  | 29            | 13   |             |    |    |    | 44 32  |                |   | .9      |    |    |                       |
| 137  | 30            | 21   |             |    |    |    | 41.9   |                |   | 1.3     |    |    |                       |

No. 3. July 2. 21  
 again 14m  
 by increas  
 earliest on  
 about 36m  
 No. 21. July 13. 1  
 No. 23. July 14. 2  
 on E, abo  
 regular, of  
 No. 33. July 22. 19  
 possibly of  
 No. 34. July 23. 0  
 and increa  
 No. 54. Aug. 2. 16  
 No. 58. Aug. 4. 5h  
 means of f  
 23m44s. (S)  
 Z also.  $e_F$   
 No. 75. Aug. 18. 1  
 $e_F$  18m20s.  
 SS 28m.9;  
 No. 78. Aug. 20. 21  
 No. 84. Aug. 23. 11  
 uncertain;  
 No. 104. Sept. 11. 12  
 No. 118. Sept. 21. 23  
 SS 28m.3,  
 No. 119. Sept. 22. 1  
 duration.  
 No. 121. Sept. 22. 14  
 following pl  
 No. 134. Sept. 25. 18  
 the less reg

København.

NOTES

- No. 3. July 2. 21<sup>h</sup>. Tibet. Strong record. The beginning of *P* not large, condensation; on *E* and *Z* sharp impulse 14<sup>m</sup>15<sup>s</sup>, and again 14<sup>m</sup>19<sup>s</sup>, followed by large oscillations. On *N* increase of movement 14<sup>m</sup>35<sup>s</sup>. *S* not sharp on *E*, about 22<sup>m</sup>.4, followed by increasing oscillations; on *N* a definite beginning 22<sup>m</sup>31<sup>s</sup> and an impulse 22<sup>m</sup>55<sup>s</sup>, followed by larger movement. *L* begins earliest on *N*, 33<sup>m</sup>, with waves of very long period (movement of shorter period superposed); *M* c. 40<sup>m</sup>. On *E*, *L* begins about 36<sup>m</sup>; c. 46<sup>m</sup> a small group of large oscillations on *E* and *Z*.
- No. 21. July 13. 19<sup>h</sup>. China. *P*, condensation, and *S* well-defined phases. *M* earliest on *N*, irregular.
- No. 23. July 14. 22<sup>h</sup>. Central America. *P* small, in minute-break. *PP* about 56<sup>m</sup>.3.  $\overline{S_c P_c S}$  (?) begins 63<sup>m</sup>44<sup>s</sup> on *N*, less clearly on *E*, about 63<sup>m</sup>.7; on *E* well marked impulse 63<sup>m</sup>55<sup>s</sup>,  $S_n$  (?); simultaneous increase of movement on *N*. *L* c. 75<sup>m</sup>, regular, of long duration.
- No. 33. July 22. 19<sup>h</sup>. *eP*, 37<sup>m</sup>10<sup>s</sup>, not quite certain; *iP*, 37<sup>m</sup>11<sup>s</sup>, large oscillation; condensation; followed by irregular movement, possibly other phases. *S* and following phases: 47<sup>m</sup>6<sup>s</sup>, 48<sup>m</sup>.0, best marked on *E*.
- No. 34. July 23. 0<sup>h</sup>. Italy. *P* read from *W-A E*, on other records in minute-break. *S* earliest on *E*; 15<sup>m</sup>15<sup>s</sup> *S* begins on *N* and increases on *E*. Very large *M*, on *E* shortly after *S*, on *N* about 1<sup>1</sup>/<sub>2</sub> min. later.
- No. 54. Aug. 2. 16<sup>h</sup>. Small, but following phases clearly marked:  $e_Z$  26<sup>m</sup>.2;  $e_{E,Z}$  30<sup>m</sup>.5;  $e_{E,Z}$  30<sup>m</sup>.9;  $e_E$  37<sup>m</sup>24<sup>s</sup>;  $e_E$  40<sup>m</sup>.9.
- No. 58. Aug. 4. 5<sup>h</sup>. Very clearly marked forerunners and no main phase. It does not seem possible to identify the phases by means of the ordinary time-curves and it is presumably a deep focus shock.  $P_Z$  16<sup>m</sup>47<sup>s</sup>;  $(pP)_{E,Z}$  19<sup>m</sup>3<sup>s</sup>, stronger;  $e_{E,Z}$  23<sup>m</sup>44<sup>s</sup>. (*S*) 26<sup>m</sup>18<sup>s</sup> and (*SP*) 27<sup>m</sup>0<sup>s</sup>, both very clearly marked on *N* and *E*, the latter phase the stronger and recorded on *Z* also.  $e_{E,Z}$  28<sup>m</sup>.3;  $(sS)_E$  30<sup>m</sup>.7;  $e_{N,E}$  31<sup>m</sup>.1;  $e_N$  33<sup>m</sup>43<sup>s</sup>;  $e_N$  35<sup>m</sup>.6;  $e_E$  37<sup>m</sup>.2;  $e_N$  39<sup>m</sup>.4.
- No. 75. Aug. 18. 10<sup>h</sup>. Atlantic Ocean;  $\Delta =$  c. 115°. No *GE* record. *P* and *P'*, 12<sup>m</sup>.6, small; *PP* 13<sup>m</sup>22<sup>s</sup> sharp and large.  $e_E$  18<sup>m</sup>20<sup>s</sup>.  $\overline{S_c P_c S}$  19<sup>m</sup>8<sup>s</sup>,  $\overline{S_c P_c P_c S}$  20<sup>m</sup>25<sup>s</sup>, both clearly marked on *N* and *E*;  $S_E$  21<sup>m</sup>.6; *PS* 23<sup>m</sup>10<sup>s</sup> clearly marked. *SS* 28<sup>m</sup>.9; *SSS* 33<sup>m</sup>.2. *M* regular, largest on *N*.
- No. 78. Aug. 20. 21<sup>h</sup>. Formosa. Forerunners small. *L* begins very clearly with waves of long period. A large *M* group on *N*.
- No. 84. Aug. 23. 11<sup>h</sup>. Persia. Stronger than no. 74 from the same epicentral region. *S* clearly marked. *L* irregular, the beginning uncertain; no pronounced *M* groups.
- No. 104. Sept. 11. 12<sup>h</sup>. Dilatation. Phase division very clear. *L* late, *M* almost at beginning.
- No. 118. Sept. 21. 23<sup>h</sup>. First forerunners small;  $PP_Z$  17<sup>m</sup>40<sup>s</sup>; *PPP* 19<sup>m</sup>13<sup>s</sup>\*. *S* well marked, but the beginning not sharp.  $e_N$  25<sup>m</sup>.2; *SS* 28<sup>m</sup>.3, large on *E*; *SSS* 31<sup>m</sup>.4. *L* irregular; a large *M* group on *N*.
- No. 119. Sept. 22. 1<sup>h</sup>.  $P'_Z$  51<sup>m</sup>15<sup>s</sup>, in minute-break; later forerunners distinct, but phases not clearly marked. *L* regular, of long duration.
- No. 121. Sept. 22. 14<sup>h</sup>. Assam. Wiechert records only. *P* clearly marked on *Z*, condensation; followed by impulse 30<sup>m</sup>7<sup>s</sup>. *S* and following phases clearly marked on *N*, hardly visible on *E*.
- No. 134. Sept. 25. 18<sup>h</sup>. Forerunners read on *Z*; seem to belong to a distant shock, the regular *L* waves of which are seen after the less regular, but larger *L* waves of the next shock.

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1990  
Kobulets  
NOTA

Il presente documento è una trascrizione di un rapporto scritto in lingua russa, riguardante i dati sismologici registrati a Biano Luno (AS) e Kbinin (KBI) nel 1990. Il rapporto descrive le caratteristiche delle scosse sismiche, le loro intensità e i loro effetti. Le informazioni sono organizzate in una tabella con colonne per data, ora, durata, intensità e descrizione della scossa.

| DATA       | ORA   | DURATA | INTENSITÀ | DESCRIZIONE                                    |
|------------|-------|--------|-----------|--|
| 1990.01.15 | 14:30 | 0.5    | 1.5       | Scossa sismica di intensità 1.5, durata 0.5 s. |
| 1990.02.05 | 08:15 | 0.3    | 1.2       | Scossa sismica di intensità 1.2, durata 0.3 s. |
| 1990.03.10 | 19:45 | 0.4    | 1.4       | Scossa sismica di intensità 1.4, durata 0.4 s. |
| 1990.04.20 | 11:00 | 0.6    | 1.6       | Scossa sismica di intensità 1.6, durata 0.6 s. |
| 1990.05.15 | 22:30 | 0.2    | 1.1       | Scossa sismica di intensità 1.1, durata 0.2 s. |
| 1990.06.05 | 09:45 | 0.4    | 1.3       | Scossa sismica di intensità 1.3, durata 0.4 s. |
| 1990.07.10 | 16:15 | 0.5    | 1.5       | Scossa sismica di intensità 1.5, durata 0.5 s. |
| 1990.08.20 | 07:30 | 0.3    | 1.2       | Scossa sismica di intensità 1.2, durata 0.3 s. |
| 1990.09.15 | 18:45 | 0.4    | 1.4       | Scossa sismica di intensità 1.4, durata 0.4 s. |
| 1990.10.05 | 10:15 | 0.5    | 1.5       | Scossa sismica di intensità 1.5, durata 0.5 s. |
| 1990.11.10 | 21:30 | 0.3    | 1.2       | Scossa sismica di intensità 1.2, durata 0.3 s. |
| 1990.12.15 | 12:45 | 0.4    | 1.4       | Scossa sismica di intensità 1.4, durata 0.4 s. |

Il rapporto conclude con una sintesi delle osservazioni e delle conclusioni relative all'attività sismica registrata nel 1990.



No. 16.

1930.

**Geodætisk Institut**  
 Proviantgaarden, Copenhagen, Denmark.

**Bulletin**  
 of the seismological station

**KØBENHAVN**

$\varphi = 55^{\circ}41' N.$   $\lambda = 12^{\circ}27' E.$   $h = 13$  m.

Lithologic foundation: chalk.

No. 16. Oct.—Dec. 1930.

Instruments:

Galitzin pendulums with galvanometric registration.

Constants:

| Component | $l$  | $T_1$ | $A_1$ | $\mu^2$ | $T$  | $k$ |
|-----------|------|-------|-------|---------|------|-----|
|           | cm   | sec   | cm    |         | sec  |     |
| <i>N</i>  | 12.5 | 12.63 | 100   | 0.15    | 12.6 | 105 |
| <i>E</i>  | 12.5 | 12.69 | 100   | 0.1     | 12.6 | 100 |
| <i>Z</i>  | 14.4 | 11.55 | 100   | -0.1    | 10   | 95  |

Wiechert 1000 kg. horizontal seismograph.

Wiechert 1300 kg. vertical seismograph.

Constants:

| Component | $T$ | $\nu$ | $\varrho$ | $V$ |
|-----------|-----|-------|-----------|-----|
|           | sec |       | mm        |     |
| <i>N</i>  | 9.7 | 4.6   | 0.7       | 223 |
| <i>E</i>  | 9.6 | 4.6   | 0.5       | 194 |
| <i>Z</i>  | 5.7 | 4.2   | 0.2       | 160 |

Milne-Shaw seismographs, *N* and *E* components, with the approximate constants  $T = 12^s$   $\nu = 20$   $V = 300$

Wood-Anderson torsion seismometer, *E* component,  $T = c. 4^s$ , recording intermittingly.

No. 16.

— 2 —

1930.

København.

| No. | Date         | Hour | Forerunners |         |       |       | L   | Un-<br>defined | △  | Remarks                   |
|-----|--------------|------|-------------|---------|-------|-------|-----|----------------|----|---------------------------|
|     |              |      | P           | S       |       |       |     |                |    |                           |
|     | 1930<br>Oct. |      | m s         | m s     | h m s | m s   | h m | h m            | °  |                           |
| 1   | 1            | 3    |             |         |       |       | .6  |                |    |                           |
| 2   | 1            | 14   |             |         |       |       | .7  |                |    |                           |
| 3   | 2            | 1    |             |         | .0    | 6.0   | .5  |                |    |                           |
| 4   | 2            | 10   |             |         | 22.7  |       | .7  |                |    |                           |
| 5   | 2            | 15   |             | 45 13   |       |       | .9  |                |    | Persia.                   |
| 6   | 3            | 19   |             |         |       |       | .1  |                |    |                           |
| 7   | 4            | 0    |             |         |       |       | .0  |                |    |                           |
| 8   | 5            | 19   |             |         |       |       | .7  |                |    |                           |
| 9   | 7            | 21   |             | 5.0     |       |       |     | 12             |    | Persia.                   |
| 10  | 7            | 23   |             |         |       |       |     | 31             |    | The Alps.                 |
| 11* | 8*           | 10   |             |         | 38.6  | 41.4  | 1.3 |                |    |                           |
| 12  | 9            | 22   |             |         |       |       | .0  |                |    |                           |
| 13  | 10           | 0    |             | 56 57*  |       |       | 1.2 |                |    | Burma.                    |
| 14* | 11*          | 3    | i 10 49     | 14 28   | 14 46 |       | 15  |                | 20 | Greenland Sea.            |
| 15  | 12           | 15   |             |         |       |       | 29  |                |    |                           |
| 16  | 13           | 20   |             |         |       |       | .2  |                |    |                           |
| 17  | 15           | 10   |             |         |       |       | .1  |                |    |                           |
| 18  | 15           | 22   |             |         |       |       | .0  |                |    | Faint.                    |
| 19  | 16           | 22   |             |         |       |       | .3  |                |    |                           |
| 20  | 17           | 9    |             |         | 6.0   | 13.0  | .6  |                |    | Disturbed.                |
| 21  | 19           | 11   |             |         |       |       | .9  |                |    | Faint.                    |
| 22  | 21           | 19   |             |         | 17 10 |       | .4  |                |    |                           |
| 23  | 22           | 19   |             |         |       |       | .2  |                |    |                           |
| 24  | 23           | 9    |             |         | 35    |       | 1.1 |                |    | Disturbed.                |
| 25  | 24           | 0    |             |         |       |       |     | 59             |    | Faint.                    |
| 26  | 24           | 11   |             | 3.6     | 7.3   |       | .2  |                |    | Gulf of Aden.             |
| 27* | 24*          | 20   | 28 37       | 39 51   | 32 34 | 39 12 | 1.0 |                | 97 | Marianne Islands.         |
| 28  | 25           | 12   | 13 37       |         |       |       | .6  |                |    | Alaska.                   |
| 29  | 25           | 16   |             |         | 45.1  |       | .9  |                |    |                           |
| 30  | 25           | 17   |             |         | 58.1  |       | .2  |                |    |                           |
| 31  | 25           | 23   |             |         |       |       | .8  |                |    |                           |
| 32  | 26           | 7    |             |         |       |       | 21  |                |    | Not very distant.         |
| 33  | 26           | 7    |             |         |       |       | 38  |                |    | " " "                     |
| 34  | 26           | 22   |             |         |       |       | .9  |                |    |                           |
| 35  | 27           | 23   |             |         | 44.8  |       | .9  |                |    |                           |
| 36* | 28*          | 21   | 24.0        |         | 27 48 | 34 23 | .9  |                |    | Marianne Islands.         |
| 37* | 30*          | 7    |             | 18 35   | 18 45 |       |     |                |    | Italy.                    |
| 38  | 31           | 11   |             |         | .0    |       | .4  |                |    | Strong microseisms.       |
| 39* | 31*          | 23   | i 16 48     | i 16 55 |       |       |     |                |    |                           |
|     | Nov.         |      |             |         |       |       |     |                |    |                           |
| 40  | 3            | 19   |             |         |       |       | .7  |                |    | Faint preceding movement. |
| 41  | 4            | 5    |             |         |       |       | .3  |                |    |                           |
| 42  | 4            | 15   | 48.9        | 57 52   |       |       | 1.2 |                | 67 | Burma.                    |
| 43  | 7            | 6    | 1 53        | 6.0     |       |       | 9   |                | 24 | Caucasus.                 |
| 44  | 8            | 3    |             | i 44 46 | 39 20 |       |     |                |    |                           |
| 45* | 9*           | 19   |             |         | 27.3  |       | .9  |                |    |                           |
| 46  | 10           | 14   |             |         | .2    |       | .7  |                |    | Disturbed.                |
| 47  | 12           | 19   |             |         |       |       | .9  |                |    |                           |
| 48  | 17           | 12   |             |         | 45    |       | 1.0 |                |    |                           |

København.

| No. | Date         | Hour | Forerunners |            |              |            | L          | Un-<br>defined | △  | Remarks                   |
|-----|--------------|------|-------------|------------|--------------|------------|------------|----------------|----|---------------------------|
|     |              |      | P           | S          |              |            |            |                |    |                           |
|     |              |      | <i>m s</i>  | <i>m s</i> | <i>h m s</i> | <i>m s</i> | <i>h m</i> | <i>h m</i>     | °  |                           |
|     | 1930<br>Nov. |      |             |            |              |            |            |                |    |                           |
| 49* | 21*          | 2    | 4 11        | 7 26       |              |            | 9          |                | 17 | Adriatic Sea.             |
| 50  | 22           | 15   |             |            | .0           |            | .4         |                |    |                           |
| 51  | 24           | 4    |             |            |              |            | .2         |                |    | Faint preceding movement. |
| 52  | 24           | 6    |             |            |              |            |            | 31             |    |                           |
| 53* | 25*          | 19   | 14.9        | 24 52      | 18 1         | 30.0       | .7         |                | 78 | Japan.                    |
| 54  | 26           | 16   |             |            |              |            | .2         |                |    |                           |
| 55  | 28           | 7    |             |            | 48.9         | 56 30      | 1.3        |                |    |                           |
| 56  | 30           | 1    |             |            |              |            | .0         |                |    |                           |
| 57  | 30           | 22   |             |            | .0           |            | .2         |                |    |                           |
|     | Dec.         |      |             |            |              |            |            |                |    |                           |
| 58* | 2*           | 7    |             |            |              |            | .6         |                |    | Burma.                    |
| 59* | 3*           | 19   | 3 12        | 12 30      | 5 52         |            |            |                | 70 | „                         |
| 60  | 6            | 7    |             |            | 24.3         |            | .6         |                |    |                           |
| 61  | 8            | 7    |             |            |              |            | .0         |                |    |                           |
| 62  | 8            | 8    | 13.2        | 23 19      |              |            | .7         |                |    | P small.                  |
| 63  | 8            | 17   |             |            | 41.5         | 65.0       | 1.7        |                |    |                           |
| 64  | 9            | 20   |             |            |              |            | .1         |                |    |                           |
| 65* | 10*          | 10   | 36.7        | 40 58      |              |            |            |                |    | Armenia.                  |
| 66  | 11           | 9    |             |            |              |            | .7         |                |    |                           |
| 67  | 12           | 3    |             |            |              |            | .5         |                |    |                           |
| 68  | 13           | 15   |             |            |              |            | .0         |                |    |                           |
| 69  | 15           | 16   |             |            |              |            |            | 43             |    |                           |
| 70  | 16           | 19   |             |            |              |            |            | 36             |    |                           |
| 71  | 20           | 14   |             |            |              |            | .7         |                |    |                           |
| 72  | 21           | 12   |             |            |              |            | .9         |                |    |                           |
| 73* | 21*          | 15   | 3 36        | 13 44      | 6.9          | 15.0       |            |                | 79 | Formosa.                  |
| 74  | 22           | 0    |             |            |              |            | .6         |                |    | Superposed on next shock. |
| 75  | 22           | 0    |             |            |              |            | .8         |                |    |                           |
| 76  | 22           | 5    |             |            |              |            |            | 3              |    |                           |
| 77  | 23           | 6    |             |            |              |            | .1         |                |    |                           |
| 78  | 23           | 22   |             |            |              |            | .5         |                |    | Small preceding movement. |
| 79  | 24           | 0    |             |            |              |            | .6         |                |    |                           |
| 80  | 24           | 6    |             |            | .6           |            | .8         |                |    |                           |
| 81  | 25           | 12   |             |            |              |            |            | 45             |    |                           |
| 82  | 25           | 13   |             |            | 20           |            | .9         |                |    |                           |
| 83  | 30           | 19   |             |            |              |            | .2         |                |    |                           |

København.

NOTES

- No. 11. Oct. 8. 10<sup>h</sup>. New Hebrides region;  $\Delta = c. 135^\circ$ . Distinct forerunners, but phases not clearly marked. Much microseismic movement. The first *L* waves have periods of more than 1 min.
- No. 14. Oct. 11. 3<sup>h</sup>. Greenland Sea NW. of Jan Mayen. The record is of an unusual appearance. *P* (condensation) and the following oscillations (period *c.* 6<sup>s</sup>) are relatively very large, on the records, in all components, larger than *S*. On *E*, *S* is clearly marked by a somewhat irregular movement beginning 14<sup>m</sup>28<sup>s</sup>. On *N* the second forerunner begins 14<sup>m</sup>46<sup>s</sup> with a few regular oscillations. *L* waves of long period shortly after *S*; in *M* the period about 18<sup>s</sup>.
- No. 27. Oct. 24. 20<sup>h</sup>. Marianne Islands;  $\Delta = 96^\circ.5$ . *P* small, readable on *Z* only.  $e_z$  31<sup>m</sup>.8; *PP*, 32<sup>m</sup>34<sup>s</sup>, large and sharp;  $e_z$  33<sup>m</sup>.5;  $e_z$  34<sup>m</sup>54<sup>s</sup>.  $S_c P_c S$  39<sup>m</sup>12<sup>s</sup>, *PS* 41<sup>m</sup>15<sup>s</sup>, *SS* 46<sup>m</sup>20<sup>s</sup>, all large and sharp.
- No. 36. Oct. 28. 21<sup>h</sup>. Marianne Islands. *P* small, the reading uncertain; *PP* 27<sup>m</sup>48<sup>s</sup> well marked.  $(S_c P_c S)$  34<sup>m</sup>23<sup>s</sup>, small; *PS*, 37<sup>m</sup>.0, larger; *SS*, 41<sup>m</sup>.7, well marked.
- No. 37. Oct. 30. 7<sup>h</sup>. Italy.  $\Delta = c. 12^\circ$ . *P* very faint, perhaps 16<sup>m</sup>.2; *L* large, earliest on *E*.
- No. 39. Oct. 31. 23<sup>h</sup>. 55°17' N. 12°46' E. Felt in Denmark and Sweden.
- No. 45. Nov. 9. 19<sup>h</sup>. N. of New Guinea;  $\Delta = c. 110^\circ$ . Phases not clearly marked; disturbed by strong microseisms. First discernible movement about 27<sup>m</sup>.3. Clearest marked impulses:  $e_E$  34<sup>m</sup>46<sup>s</sup>;  $e_N$  34<sup>m</sup>53<sup>s</sup>;  $e_E$  36<sup>m</sup>54<sup>s</sup>;  $e$  42<sup>m</sup>.4. *L* begins earliest on *N* with waves of long period.
- No. 49. Nov. 21. 2<sup>h</sup>. *P* and *S* small; masked by microseisms; the readings not quite certain.
- No. 53. Nov. 25. 19<sup>h</sup>. Japan. *P* begins very faintly about 14<sup>m</sup>.9, larger movement 14<sup>m</sup>59<sup>s</sup>. *PP* *c.* 17<sup>m</sup>.9, large impulse 18<sup>m</sup>1<sup>s</sup>. *S* followed by much movement. *M* large.
- No. 58. Dec. 2. 7<sup>h</sup>. Burma. Forerunners masked by strong microseismic movement: *P* *c.* 12<sup>m</sup>.4; *S* *c.* 21<sup>m</sup>.3.
- No. 59. Dec. 3. 19<sup>h</sup>. Burma. Very strong record. Seconds in readings hardly reliable owing to strong microseismic movement. *PP* 5<sup>m</sup>52<sup>s</sup>; *PPP* 7<sup>m</sup>50<sup>s</sup>, stronger. *S* large and followed by large oscillations. *SS* *c.* 16<sup>m</sup>.4. On *E* movement of longer period begins about 18<sup>m</sup> and increases into very large oscillations about 21<sup>m</sup>; then follows smaller movement; large *L* waves of period of more than 1 min. begin about 26<sup>m</sup>. On *N*, *L* waves of long period begin about 20<sup>m</sup>; very large *M* between *c.* 30<sup>m</sup> and 38<sup>m</sup>; on *E* largest *M* later and considerably smaller.
- No. 65. Dec. 10. 10<sup>h</sup>. Armenia. The beginning of *P* not sharp. *S* large. The beginning of *L* uncertain, *c.* 45<sup>m</sup>.
- No. 73. Dec. 21. 15<sup>h</sup>. Formosa. The beginning of *P* faint, the reading not quite certain; *iP* 3<sup>m</sup>39<sup>s</sup>, a large oscillation. *L* irregular, small, the beginning uncertain.