

Second Catalogue of Aurora Australis Displays, 1939.

By M. GEDDES.

[*Read before the Wellington Branch, May 28, 1941; received by the Editor, May 29, 1941; issued separately, December, 1941.*]

SUMMARY.

Particulars of 142 aurorae observed in New Zealand during 1939 are given, in continuation of the catalogue previously published.

The list of aurorae given here is a continuation of that published previously* for the period 1931 to 1938 (inclusive). Since the beginning of 1940 auroral data have been published monthly in the *Astronomical Bulletins of the Carter Observatory*. The present catalogue, therefore, fills in a gap in the published information.

The arrangement of the table is the same as in the previous catalogue, except that the column giving the times of minima has been omitted, as there are very few displays in which these times can be determined with any accuracy. The numbering of the displays is a continuation of that in the previous list. Times marked with an asterisk are approximate only.

AURORAE OBSERVED IN NEW ZEALAND. 1939.

| Ref. No. | Date U.T. | U.T. of First Obs. | U.T. of Last Obs. | U.T. of Maxima. | Main Types. | Intensity. | Remarks. |
|----------|-----------|--------------------|-------------------|-----------------|-------------|------------|-----------------|
| | 1940. | h. m. | h. m. | h. m. | | | |
| 349 | Feb. 6 | 16 05 | 16 20 | | R | 2 | Note 1 Cloud |
| 350 | 8 | 09 00 | 12 30 | | G | 1 | |
| 351 | 16 | 09 30 | 10 15 | | G | 1 | |
| 352 | 21 | 11 00 | 11 00 | | G | 1 | Cloud |
| 353 | 22 | Evening | | | G | 1 | Cloud |
| 354 | 24 | 09 30 | 16 00 | 16 00* | RA | 3 | Note 2 |
| 355 | 25 | 08 50 | 14 00 | 09 33p | RA, D, C, F | 4 | P. Note 2 |
| | | | | 11 37 | RA | 3 | |
| 356 | 26 | 09 15 | 10 45 | | G, R | 1 | |
| 357 | Mar. 1 | 09 00 | 10 45 | 09 00 | HA | 1 | |
| 358 | 6 | 10 00 | 10 00 | | G | 1 | |
| 359 | 11 | 08 45 | 11 00 | 10 00 | HA | 1 | |
| 360 | 13 | 09 30 | 11 45 | 10 28 | RA | 2 | P |
| 361 | 14. | 11 00 | 11 00 | | — | — | Cloud |
| 362 | 19 | 10 55 | 10 55 | | G | 1 | |
| 363 | 21 | 07 45 | 12 45 | 09 54 | HA, RA | 2+ | P. Note 3 |
| 364 | 22 | 08 15 | 14 30 | 10 20 | RA | 2+ | |
| 365 | 25 | 09 30 | 09 30 | | G | 1 | |
| 366 | 27 | 09 30 | 11 30 | | — | 2? | Cloud |
| 367 | 28 | 08 15 | 17 30 | | RA | 2 | |
| 368 | 29 | 11 45 | 11 45 | | R | 1 | |
| 369 | 30 | Evening | | | G | 1 | |
| 370 | Apr. 1 | 08 30 | 14 30 | | G | 1 | |
| 371 | 5 | 08 30 | 08 30 | | R | 1-2 | |
| 372 | 8 | 08 15 | 11 00 | | — | 2-3 | Cloud |
| 373 | 10 | 08 00 | 11 00 | | G | 1 | |
| 374 | 11 | 08 00 | 10 15 | | HA | 1-2 | |
| 375 | 12 | 08 00 | 11 00 | 08 30* | RA | 2-3 | |
| 376 | 15 | 10 50 | 10 50 | | — | — | Cloud |

* *Trans. Roy. Soc. N.Z.*, vol. 69, part 4, March, 1940; also *Carter Observatory Reprint*, no. 1.

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|----------|-----------|--------------------|-------------------|-----------------|--------------|------------|----------|
| | 1940. | h. m. | h. m. | h. m. | | | |
| 377 | 17 | 07 15 | 14 20 | 08 05 | RA, F, DS | 4 | Note 4 |
| | | | | 10 50 | RA, F, D, PS | 4 | Red |
| | | | | 13 00 | D | 4 | |
| 378 | 18 | 07 15 | 13 00 | | G | 1 | Cloud |
| 379 | 20 | 07 20 | 09 00 | 07 20 | G, PS | 1 | |
| 380 | 21 | 06 45 | 12 00 | 07 20 | R | 2 | |
| 381 | 23 | 07 00 | 18 26 | 07 31 | HA | 3 | Note 5 |
| | | | | 07 40 | F, RA | 3 | P, Red |
| | | | | 09 30 | F, RA | 3 | |
| | | | | 10 50 | D, F | 4 | |
| | | | | 13 50 | RB | 3 | |
| | | | | 15 15 | F, RA, D | 4 | |
| 382 | 24 | 08 40 | 08 40 | | — | — | |
| 383 | 29 | Evening | | | G | 1 | |
| 384 | May 1 | 08 30 | 11 00 | | RA | 2 | |
| 385 | 4 | 07 50 | 07 50 | | R | 2 | |
| 386 | 5 | 09 30 | 11 00 | | G | 1 | Cloud |
| 387 | 7 | 06 40 | 07 50 | 07 00 | R | 2 | |
| 388 | 8 | 07 30 | 14 50 | 09 00 | RA | 2-3 | |
| 389 | 12 | 06 00 | 06 20 | | — | — | Cloud |
| 390 | 15 | 07 00 | 11 30 | | G, R | 1 | |
| 391 | 16 | 07 10 | 12 00 | 07 45* | RA | 2 | P |
| 392 | 17 | 09 30 | 10 30 | | G | 1 | |
| 393 | 20 | 07 30 | 08 30 | | HA | 2 | |
| 394 | 21 | 08 30 | 13 10 | 10 00 | G, R | 1 | |
| 395 | 22 | 07 00 | 12 43 | 07 00* | HA | 2 | P |
| | | | | 08 30* | HA | 2 | |
| | | | | 09 49p | RA, F, DS | 3 | |
| 396 | 25 | Evening | | | G | 1 | |
| 397 | 28 | 07 30 | 10 30 | | G | 1 | |
| 398 | 29 | 06 45 | 10 30 | | G | 1 | |
| 399 | 30 | 08 00 | | 08 00 | G, R | 2 | Cloud |
| 400 | June 2 | Evening | | | R | 2? | Note 6 |
| 401 | 3 | Evening | | | — | 2? | Note 6 |
| 402 | 5 | 09 00 | 11 00 | | G | 1 | |
| 403 | 11 | Evening | | | G | 1 | |
| 404 | 13 | 13 45 | 13 45 | | G | 1 | |
| 405 | 14 | 07 00 | 13 00 | 09 55 | R | 2 | Note 7 |
| | | | | 10 53 | R | 2 | P |
| 406 | 15 | Evening | 08 40 | | HA | 1 | |
| 407 | 16 | 07 00 | 16 30 | 07 00 | RA | 2 | |
| | | | | 09 15 | G | 1 | |
| 408 | 17 | 07 05 | 11 30 | 07 05 | R | 2 | |
| | | | | 09 30* | R | 2 | |
| 409 | 18 | 07 30 | 10 47 | 07 30* | RA | 2 | |
| | | | | 09 58p | RA, DS | 2+ | |
| 410 | 19 | 07 05 | 18 00 | 07 10 | RA | 2 | |
| 411 | 20 | 07 30 | 09 30 | | G | 1 | Cloud |
| 412 | 21 | Evening | 12 00 | | G | 1 | Cloud |
| 413 | 25 | Evening | | | G | 1 | |
| 414 | 28 | Evening | | | G | 1 | |
| 415 | 30 | Evening | | | R | — | Cloud |
| 416 | July 2 | 09 30 | 10 30 | | G | 1 | Cloud |
| 417 | 3 | 09 30 | 11 30 | | RA | 2 | P |
| 418 | 4 | 08 30 | 13 30 | | RA | 2 | Cloud |
| 419 | 5 | 06 45 | 09 41 | 07 08p | D | 3+ | P, Red |
| | | | | 09 00 | RA | 3 | |
| 420 | 14 | 07 00 | 11 00 | 07 30 | G | 1 | Cloud |
| 421 | 15 | Early Evening | | | G | 1 | |
| 422 | 16 | 06 30 | 13 30 | | RA | 2 | Cloud |

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| | 1940. | h. m. | h. m. | h. m. | | | |
| 423 | 20 | 08 00 | 15 00 | 11 53 13 26 14 00 | RA RA F | 3 3 2 | P |
| 424 | 21 | 08 45 | 14 00 | 11 40 | D, F | 3 | P. Note 8 |
| 425 | Aug. 3 | 15 30 | 15 30 | | — | — | Cloud |
| 426 | 12 | 06 30 | 12 50 | 07 55 08 15p 10 45 12 30* | RB, D RB, D, C RA, D RA | 4 4 3+ 3 | P, Red Note 9 |
| 427 | 13 | | 08 05 | | G | 1 | |
| 428 | 17 | 12 22 | 12 30 | | — | — | Cloud |
| 429 | 22 | 07 30 | 18 15 | 14 14 16 30 | DS, RA, F DS, RA, F | 4 4 | Red, P Note 10 |
| 430 | 23 | Evening | | | — | — | Cloud |
| 431 | 24 | 07 30 | 11 00 | | G | 1 | |
| 432 | Sep. 3 | 08 00 | 11 00 | | G | 1 | Cloud |
| 433 | 9 | 08 30 | 12 30 | 10 26 | RA | 2 | Red |
| 434 | 10 | 08 30 | 11 20 | | G | 1 | |
| 435 | 11 | Evening | | | G | 1 | |
| 436 | 16 | 10 00 | 10 00 | | RA | 2 | |
| 437 | 18 | 08 35 | 11 00 | | — | — | Cloud |
| 438 | 19 | 08 00 | 18 02 | 09 52 15 00 | RA RA | 2 2 | |
| 439 | 22 | 11 00 | 11 00 | | — | — | Cloud |
| 440 | 23 | 11 30 | 13 15 | | — | — | Cloud |
| 441 | 24 | 07 00 | 12 30 | | G | 1 | |
| 442 | 26 | 10 30 | 10 30 | | G | 1 | |
| 443 | 27 | 11 30 | 11 30 | | G | 1 | |
| 444 | 28 | 08 15 | 11 00 | | G | 1 | |
| 445 | 29 | 07 30 | 09 30 | 08 00 | RA | 2 | |
| 446 | Oct. 2 | 07 30 | 16 20 | 08 00 | RA | 1 | |
| 447 | 3 | 07 30 | 16 30 | 13 55 | DS, RA | 3 | P, Red |
| 448 | 4 | 07 30 | 12 30 | | HA | 1 | |
| 449 | 5 | 07 30 | 10 00 | 10 00 | RA | 2 | |
| 450 | 6 | 07 45 | 13 30 | 08 56 | RA | 2+ | Red |
| 451 | 7 | 07 15 | 10 10 | 08 00 | RA | 2 | |
| 452 | 8 | 08 15 | 10 00 | | G | 1 | |
| 453 | 9 | 08 10 | 15 00 | 13 00* | RA, DS | 2 | P |
| 454 | 10 | 08 40 | 08 40 | | G | 1 | |
| 455 | 11 | 08 30 | 11 00 | | HA | 1+ | Cloud |
| 456 | 12 | 08 45 | 08 45 | | — | — | Cloud |
| 457 | 13 | 08 00 | 16 50 | 08 14 08 36p 11 13 16 40 | DS, RA, D RA, D PA, RA RA | 3 3-4 2 2 | Red, P, Note 11 |
| 458 | 14 | 08 00 | 16 30 | 08 20 09 00 09 42 12 00 16 00* | RA, D HA RA, D, F RA, D, F RA, D | 3-4 3 4 4 3-4 | Red, P, Note 11 |
| 459 | 15 | 08 00 | 16 00 | | RA | 1 | |
| 460 | 17 | 09 30 | 11 45 | | — | — | Cloud |
| 461 | 19 | 09 00 | 09 00 | | — | — | Cloud |
| 462 | 20 | 08 55 | 11 00 | | G | 1 | |
| 463 | 28 | 08 30 | 08 30 | | — | — | Cloud |
| 464 | 29 | 09 00 | 10 30 | | G | 1 | |
| 465 | 30 | 08 00 | 09 15 | | G | 1 | |
| 466 | Nov. 1 | 09 00 | 09 00 | | G | 1 | |
| 467 | 2 | Evening | | | G | 1 | |
| 468 | 5 | 08 10 | 10 00 | | RA | 2 | |

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|----------|-----------|--------------------|-------------------|-----------------|-------------|------------|----------|
| | 1940. | h. m. | h. m. | h. m. | | | |
| 469 | 6 | 08 10 | 09 10 | | RA | 2 | |
| 470 | 7 | 08 30 | 10 40 | | G | 1 | |
| 471 | 9 | 10 00 | 10 00 | | G | 1 | |
| 472 | 10 | 09 15 | 12 00 | | G | 1 | |
| 473 | 11 | 09 00 | 10 00 | | G | 1 | |
| 474 | 12 | 09 00 | 11 00 | 11 00 | RA | 1+ | |
| 475 | 13 | 09 00 | 12 00 | 09 40 | RA | 2+ | |
| 476 | 14 | 09 00 | 10 30 | | G | 1 | |
| 477 | 24 | 11 00 | 11 00 | | G | 1 | |
| 478 | 27 | 10 30 | 12 00 | | — | — | Cloud |
| 479 | Dec. 1 | 09 30 | 10 30 | | G | 1 | |
| 480 | 3 | 10 30 | 10 30 | | G | 1 | |
| 481 | 4 | 10 30 | 11 00 | | G | 1 | |
| 482 | 8 | 11 30 | 11 30 | | G | 1 | Cloud |
| 483 | 9 | 10 50 | 10 50 | | G | 1 | Cloud |
| 484 | 10 | 09 15 | 11 00 | | G | 1 | |
| 485 | 11 | 10 15 | 11 00 | | G | 1 | Cloud |
| 486 | 13 | 10 00 | 14 30 | | G | 1 | Cloud |
| 487 | 15 | 11 00 | 11 00 | | G | 1 | |
| 488 | 20 | 09 15 | 10 15 | | G | 1 | |
| 489 | 27 | Evening | | | G | 1 | |
| 490 | 31 | 10 00 | 10 30 | | G | 1 | |

NOTE 1—Observed from the s.s. *Maunganui*, Bluff.

NOTE 2—Nos. 24 and 25, February 24, 25. Between these two displays a large aurora was recorded in Europe. During the same period the Awarua Radio Station experienced considerable interference on both high and low frequencies. Medium frequencies were not affected, however.

NOTE 3—No. 363, March 21. A remarkably steady display, practically all the changes occurring in the main arc. Rays were conspicuously absent during most stages.

NOTE 4—No. 377, April 17. Seen over the whole of New Zealand except Southland, where heavy rain was falling. All the maxima appear to have been of about equal intensity. Very strong radio fade-outs are reported to have occurred during the afternoon, at about 04 h. 30 m. U.T.

NOTE 5—No. 381, April 23. It is impossible to trace with certainty the various maximum periods. The primary maxima appear to have been at 10 h. 50 m. and 13 h. 15 m. U.T., but the aurora was remarkable for its sustained intensity during the whole night.

NOTE 6—No. 400, June 2, and No. 401, June 3. Only very casual observations of both these displays are available.

NOTE 7—No. 405, June 14. Seen also from m.v. *Karitane*, in Latitude 37° 07' S. and Longitude 153° E.

NOTE 8—No. 424, July 21. The rare (for New Zealand displays) phenomenon of a reddish lower border to an arc was seen at 11 h. 57 m. U.T.

NOTE 9—No. 426, August 12. One of the features of this aurora was a band which appeared near the zenith at 08 h. 30 m. U.T. This was in the form of a slowly-turning spiral. Another feature was the number of detached RB formations which were visible during and after the first two maxima.

NOTE 10—No. 429, August 22. The P. and T. Department experienced earth-currents on various South Island circuits on August 22 at 03 h. 38 m. U.T., 11 h. 50 m. U.T., and on August 23 at 03 h. 45 m. U.T. The red lower border to an arc was visible at various times, particularly at 14 h. 09 m. U.T.

NOTE 11—Nos. 457, 458, October 13 and 14. The P. and T. Department reported earth-currents on various South Island circuits on October 13, 03 h. 15 m. U.T., 20 h. 20 m. U.T., and on October 14 07 h. 50 m. U.T. The October 13 display was of normal type, but on October 14 the flaming effects were very vivid, consisting of a bodily movement of the whole arc upwards as on 1938, April 16.