

AURORAE AND  $^{10}\text{Be}$  IN THE MAUNDER MINIMUM

L. Křivský, B. Růžičková-Popelová  
Astronomical Institute, Czechoslovak Academy of Sciences,  
251 65 Ondřejov, Czechoslovakia

ABSTRACT. Short-term fluctuations of polar aurorae and of isotope  $^{10}\text{Be}$  abundance in polar glaciers cores are compared for the secular minimum of solar activity in the years 1600 - 1725.

ПОЛЯРНЫЕ СИЯНИЯ И  $^{10}\text{Be}$  В МИНИМУМЕ МАУНДЕРА. Колебания появления сияний и тоже овотопа  $^{10}\text{Be}$  из полярных ледниковых скважин были изучены во время веково минимума солнечной активности в интервале лет 1600 - 1725.

POLÁRNÍ ZÁŘE A  $^{10}\text{Be}$  V MINIMĚ MAUNDERA. Byla sledována kolísání v množství polárních září a isotopu  $^{10}\text{Be}$ , získaného z polárních ledovcových vrtů, v době sekulárního minima sluneční aktivity v letech 1600 - 1725.

The radio isotope  $^{10}\text{Be}$  is one of the cosmogenic isotopes which is created in the Earth's atmosphere by collisions of cosmic ray particles with mostly nitrogen nuclei. This Be nuclide sinks and is washed out by precipitation from the atmosphere to settle finally on the earth's surface. In France a method has been developed of determining  $^{10}\text{Be}$  from polar glacier cores (Raisbeck et al., 1981). This proved an increased content of  $^{10}\text{Be}$  at the time of Maunder's minimum of secular solar activity. The cosmic ray intensity is modulated by products of solar activity and consequently the production of  $^{10}\text{Be}$  varies in a similar way. In view of the very long disintegration half-time of  $^{10}\text{Be}$ , the variations can be studied far into the past.

Kocharov et al. (1984) and also Beer et al. (1983) have analysed the measured amount of  $^{10}\text{Be}$  in glaciers cores in the years of the Maunder minimum and found an indication of periodicity corresponding to solar cycles.

Our purpose was to compare the amount of  $^{10}\text{Be}$  found in polar glaciers (Beer et al., 1983) with the occurrence of aurorae (as a product of solar activity) in detail during the Maunder minimum. Fig. 1 shows smoothed data

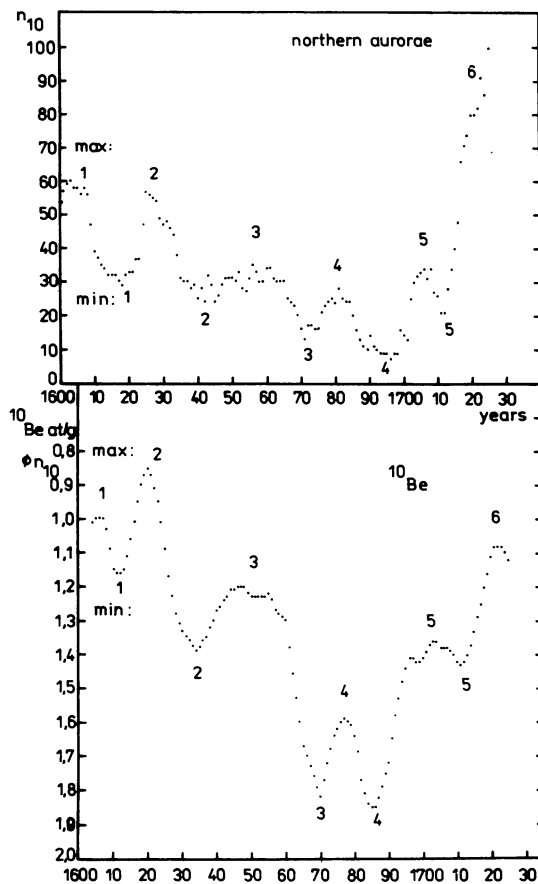


Fig. 1. Ten years number of northern aurorae (smoothed sums) and mean count of  $^{10}\text{Be}$  (atoms at gram) in ten years smoothed values. Extremes are numbered.

(ten-year averages) of  $^{10}\text{Be}$  in comparison with smoothed ten-year sums of aurorae occurrence (Křivský and Pejml, 1986); the last 15 years were homogenized. The  $^{10}\text{Be}$  deposition lags about 5 years behind the primary index of solar activity (=aurorae). The very good coincidence of single extremes on both curves provides arguments in favour of the representativeness of both quantities for describing the past solar activity variations.

#### REFERENCES

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