

# CHARACTERISTIC FEATURES OF CYCLIC CHANGE OF SOLAR ACTIVITY AFTER 1610

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**Abstract.** The most characteristic feature of the solar activity is its cyclic change in the course of time. The basic cycle is the 11-year one.

The law discovered by Hale and Nicholson (1925) concerning the change of sign of magnetic polarity of the bipolar groups of solar spots proved the existence of the 22-year cycle. Gnevyshev and Ol' (1948) point out that this cycle consists of two consistent 11-year cycles with an even and an odd number (according to the Zürich numeration).

Taking into consideration that the growth ( $t$ ) of the 11-year cycle is a parameter closely connected with the characteristics of the 11-year cycle (Waldmeier, 1935), we calculate for all 22-year cycles after 1610 the relation

$$S = \frac{(t_{2n} + t_{2n+1})'}{(t_{2n} + t_{2n+1})''}$$

The change of  $S$  shows some interesting characteristics of the cyclic recurrence of solar activity after 1610:

- (1) A 44-year cycle is clearly delineated;
- (2) The consistent 44-year cycles are grouped together two by two in one secular cycle with a mean duration of 88 yr.
- (3) After 1610 the activity of the Sun is presented by two supersecular cycles (a supersecular 180-year cycle, as we conditionally call it.
- (4) At the end of a 180-year cycle and at the beginning of the next one there is a 'catastrophical' decrease of solar activity. This fact as well as other ones obtained on the basis of some other investigations lead us to the conclusion that up to the end of the 20th century the activity of the Sun will be considerably weaker in comparison with its level in the 22-year cycle (18, 19);
- (5) It is pointed out that the 180-year cycle is a part of a quite longer cycle of solar activity.