



Bowen's signal is not present in Czech fog series

L. Hejkrlik and R. Tolasz

Czech Hydrometeorological Institute, Prague, Czech Republic (hejkrlik@chmi.cz, +420 47 2706024)

In the 1960's it was demonstrated that extreme precipitation events occur more frequently on the third to fifth day after syzygies. The effect is sometimes called Bowen's signal and similar lunar or semi-lunar modulation of meteorological parameters was later found also in ozone concentrations, sunshine, thunderstorm frequencies and in global temperatures observed by polar orbiting satellites. The original explanation suggested by Bowen was the variation of ice nuclei of meteoric origin, leading to variation of precipitation. Since that time alternative mechanisms have been proposed like rotation of the Earth around Earth-Moon barycentre or light reflected by the Moon (both effects small in magnitude), tidal influence on heat redistribution on the Earth or on the waves in the atmosphere. Possible source of variation of condensations nuclei in troposphere are also galactic cosmic rays affected by solar activity and the variability of their capture efficiency as a result of lunar distortion of the Earth's magnetosphere.

Recently we tried to study the possibility that also formation of fog, which depends on the number of effective condensations nuclei, may exhibit kind of lunar variation. We examined daily data about fog occurrence at two different meteorological stations in the Czech Republic in period 1961-2008. Mountain station Lysá hora (1322 m asl) is located in North-eastern Moravia and the lowland station Doksany (158 m asl) represents the lowest parts of Bohemia. The data were analysed by method of superposition of epochs with synodic month as epoch and the date of new moon as the null day. The resulting binary matrix consisting of 595 rows and 29 columns was then sub-divided by various criteria in order to uncover possible temporal or seasonal relations. The sums of individual columns (numbers of days with fog) were the signal we examined.

No quasi-periodical semi-lunar variation was registered at both stations neither in the whole series nor in any of sub-intervals 1961-1979, 1980-2008, winter, summer, DJF, MAM, JJA, SON. This is no surprise at Lysá hora, where fog was registered even in summer in 64% of studied days (during winter it was as high as 79%) and variation coefficient of signal was merely 2.16%. Similar picture was observed at Doksany station, even though the occurrence of fog was much less, 23% in winter, 14% in summer with =18.68%. The possible conclusion is that synoptic and microclimatic effects dominate the formation of fog in so far that they mask any other physical causes.