Detection of Rieger-type periodicity in the Earth's surface air temperature data

Mariam Elizbarashvili[1], Bidzina Shergelashvili[2,3]

e-mail: mariam.elibarashvili@tsu.ge

[1]Department of Geography, Faculty of Exact and Natural Sciences,

Iv.Javakhishvili Tbilisi State University,

0179, Tbilisi, I.Chavchavadze #3

[2]Space Research InstituteAustrian Academy Of Sciences, Graz, Schmiedelstrasse 6, 8042, Austria

[3]Abastumani Astrophysical observatory of Ilia State University, KakutsaCholokashvili Str. 5a, 0162 Tbilisi Georgia

The near 155 days solar periodicity, so called Rieger periodicity, was first detected in solar flares data and later confirmed with other important solar indices. We try to detect the Rieger-type periodicity in the Earth's surface temperature data.

For this we used daily data from two meteorological stations situated in places on the Earth with different coordinates and different physical geographical conditions: Abastumani (Georgia) and Beechy (Canada) as well as SA and CR data.

All data were processed and converted in the necessary format. In order to detect the Riegertype periodicity in the Earth surface temperature data, Matlab codes were created for Fourier and wavelet Analysis. The meteorological data were analyzed separately for the time periods so as to cover each Solar cycle that have an average duration of about 11 years. Abastumani temperature data allowed to analyze Rieger periodicity for 20, 21, 22 activity cycles while Beechy - 20, 21, 22, 23, 24 activity cycles. Annual and semiannual cycles in temperature data were eliminated by choosing different parameters in Matlab codes. Rieger periodicity was detected in Abastumani and Beechy temperature data, this periodicity is changing from one activity cycle to another.