Earth Syst. Dynam. Discuss., 6, C531–C535, 2015
www.earth-syst-dynam-discuss.net/6/C531/2015/

Earth System Dynamics Discussions
Open Access

Interactive comment on "Multi-millennial-scale solar activity and its influences on continental tropical climate: empirical evidence of recurrent cosmic and terrestrial patterns" *by* J. Sánchez-Sesma

J. Sánchez-Sesma

jsanchez@tlaloc.imta.mx

Received and published: 9 September 2015

Comment 1: Qualitative verification of the total solar irradiance (TSI) ∼9.5Ky recurrent patterns with a bivalve population (BVpop) reconstructed from the late Miocene (∼10.5Mya) data

In a recent paper Harzhauser et al. (2013; H13 hereafter) analyze the explosive demographic expansion by dreissenid bivalves as a possible result of astronomical forcing. These authors: a) reconstruct the extinct bivalve species Sinucongeria primiformis in

a lacustrine system of Lake Pannon during the Tortonian (∼10.5 Mya; late Miocene), with 600 samples that cover about eight millennia of late Miocene time with a decadal resolution; and b) detect bivalve population regular fluctuations possible linked to solar activity. H13 have pointed out: "Our data indicate that the settlement by bivalves in the off-shore environment was limited mainly by bottom water oxygenation, which follows predictable and repetitive patterns through time. These population fluctuations might be related to solar cycles: successful dreissenid settlement is recurring in a frequency known as the lower and upper Gleissberg cycles with 50–80 and 90–120 yr periods. These cycles appear to control regional wind patterns, which are directly linked to water mixing of the lake. This is modulated by the even more prominent 500 yr cycle, which seems to be the most important pacemaker for Lake Pannon hydrology."

In this comment, we extend the H13 detected solar-terrestrial connections (TSI-BVpop) to the complete reconstructed ∼8Kyr BV record, comparing the reconstructed record with the average of the S04, S09 and S12 TSI records extrapolated forward in time (Fig 4.).

A first comparison, shown in Figure C1.1, demonstrate the existence of millennia and multi-millennia scale oscillation in TSI and BV series of anomalies

However, when an adjustment (a linear transformation) of TSI is applied the comparison, shown in Figure C1.2, better demonstrate the existence of millennia and multi-millennia scale similar oscillation in TSI and BVpop series of anomalies.

This simple trend adjustment of the TSI could be justified by the orbital phenomena of eccentricity and obliquity that can modulate solar influences in periods of 100 and 40 Kyr, respectively.

Additional adjustments in the BVpop timing could improve the match.

REFERENCES

Harzhauser, M., Mandic, O., Kern, A.K., Piller, W.E., Neubauer, T.A., Albrecht, C.,

ESDD

6, C531–C535, 2015

Wilke, T. 2013. Explosive demographic expansion by dreissenid bivalves as a possible result of astronomical forcing. Biogeosciences, 10, 8423-8431.

Interactive comment on Earth Syst. Dynam. Discuss., 6, 1237, 2015.

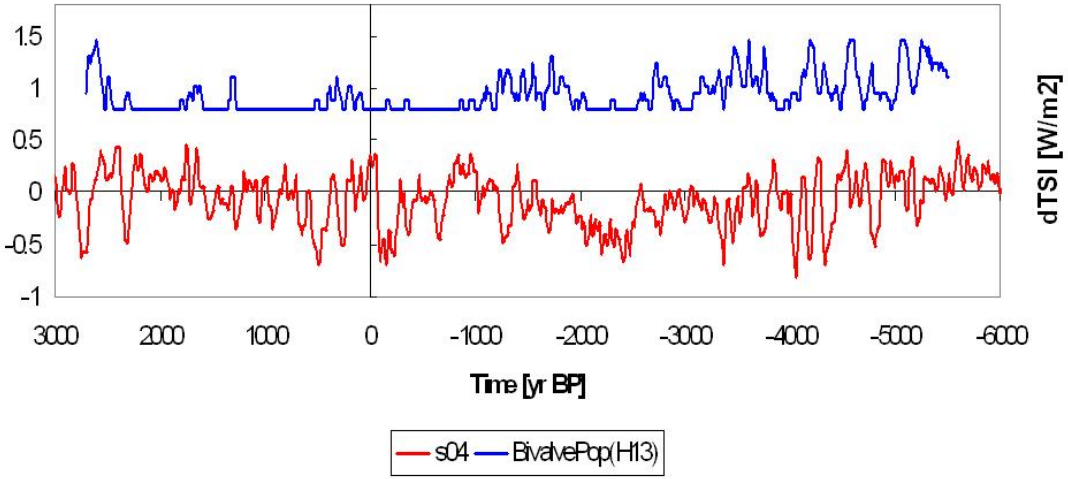

Fig. 1. Figure C1.1. Comparison of bivalve population (BVpop) and TSI. A linear transformation [BVpop(H13)=aBVpop(H13)+b] with a factor a=0.22 , and a bias b=0.8.

Full Screen / Esc
Printer-friendly Version
Interactive Discussion
Discussion Paper

ESDD
6, C531–C535, 2015

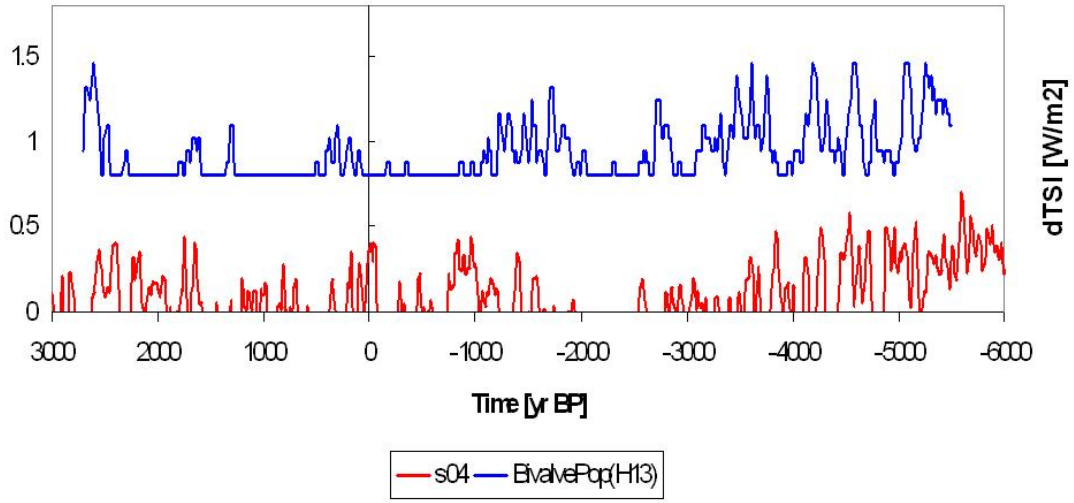

Fig. 2. Figure C1.2. Comparison of bivalve population (BVpop) and TSI adjusted with a linear transformation [TSIadj=TSI+a(t-t1)+b] with a=.03 [W/m2]/1000[yr], and. b=-0.3 [W/m2]. Only positive TSI adjusted a

Full Screen / Esc
Printer-friendly Version
Interactive Discussion
Discussion Paper