

ON SOME CONSEQUENCES OF GLOBAL WARMING

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By the use of Mauna Loa, Schauinsland and Monte Cimone CO₂ atmospheric concentration time series it is proposed a way to estimate a ecological CO₂ responsibility for the region of the measurement station. For example this model can be useful for a better scientific definition of the source contribution of the measurement station region for CO₂ and other greenhouse gases. On the basis of station related and global CO₂ data a model for the mean year temperature is presented which can predict the next year temperature with an accuracy of about 0.2 degrees Celsius. Such technique has been tested with the data of Schauinsland and Monte Cimone station. In short it is described a proposal for a project for the estimation of the anthropogenic contribution to global warming. Some results about consequences of global warming will be presented.

1. HISTORY

Complex researching

Publications and codes about used nonlinear inverse problem method.
Alexandrov L., Regularized Computational Process of Newton- Kantorovich Type, J. Comp. Math. and Math. Phys., 11, Vol. 1, 36-43, 1971
Alexandrov L., Autoregularized Iteration Processes of Newton- Kantorovich Type, Comm. JINR, P5-5515, Dubna, 1970
Alexandrov L., Program REGN, RSIK-ORNL, PSR 165, Oak Ridge, Tennessee, USA, 1983
Alexandrov L., Analyze of $F_x = y$ (personal communication)

1.1. V. I. Vernadsky

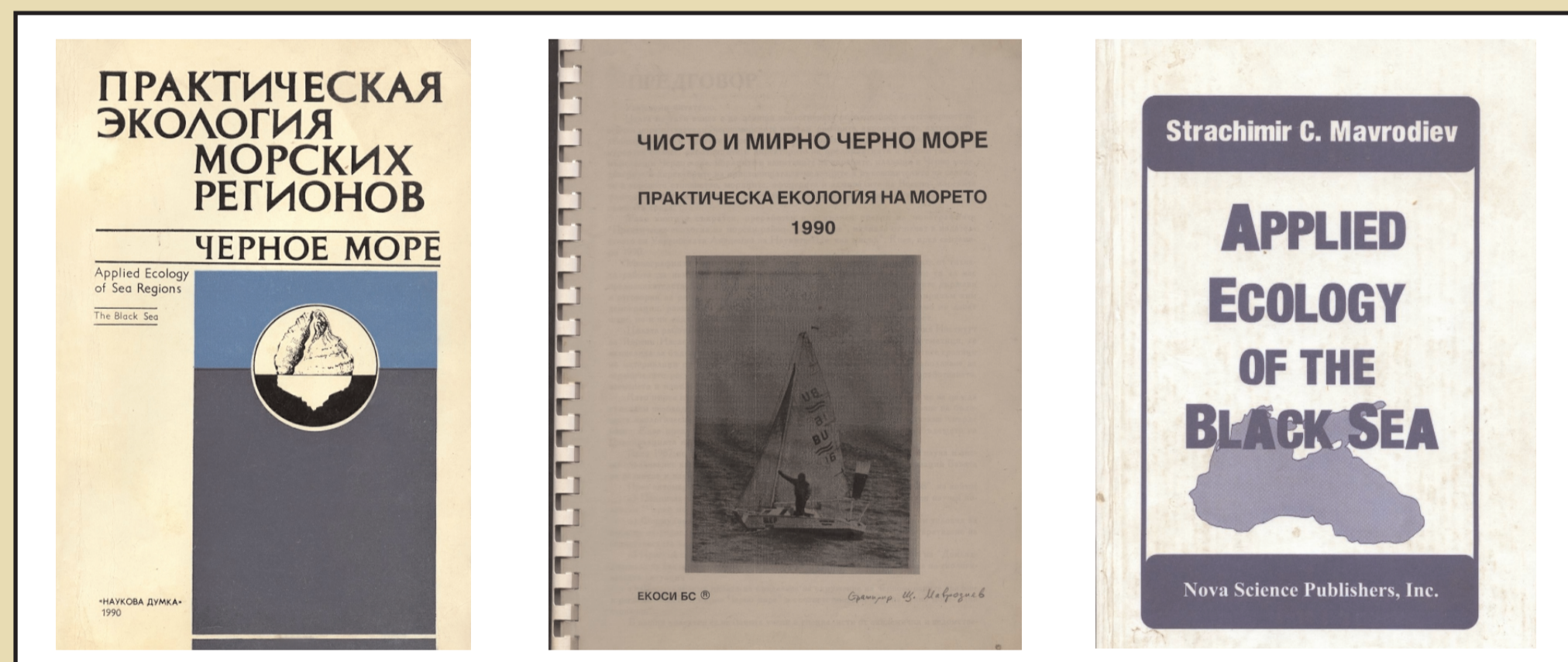
In the first years of the 20th century Vladimir Ivanovich Vernadsky (1863-1945) [Vernadsky, V. I. 1926. Biosfera. Leningrad: Scientific Chemo- Technical Publishing. Reprint in English, The biosphere, 1998.] discovered the first evidence that our civilisation is going to be a "geological" power.

1.2. "Nuclear winter" model

The "Nuclear winter" model was the next evidence in this direction. One has to note that it's acception started the nuclear disarmament process and the consequent end of the cold war. This is one of the first cases in the history of our civilization, when a scientific recommendation was followed in practice.

1.3. Black Sea ecology

Using the "Nuclear winter" lesson we tried to repeat it in the 1980'ties in the scale of the Black Sea region and to prevent the incoming ecological catastrophe by applying the "complex research" of the ecosystem by regularly publishing the "report for ecological conditions with scientific, business and management recommendation" for achievement the harmonic existence (stable development) of the region.

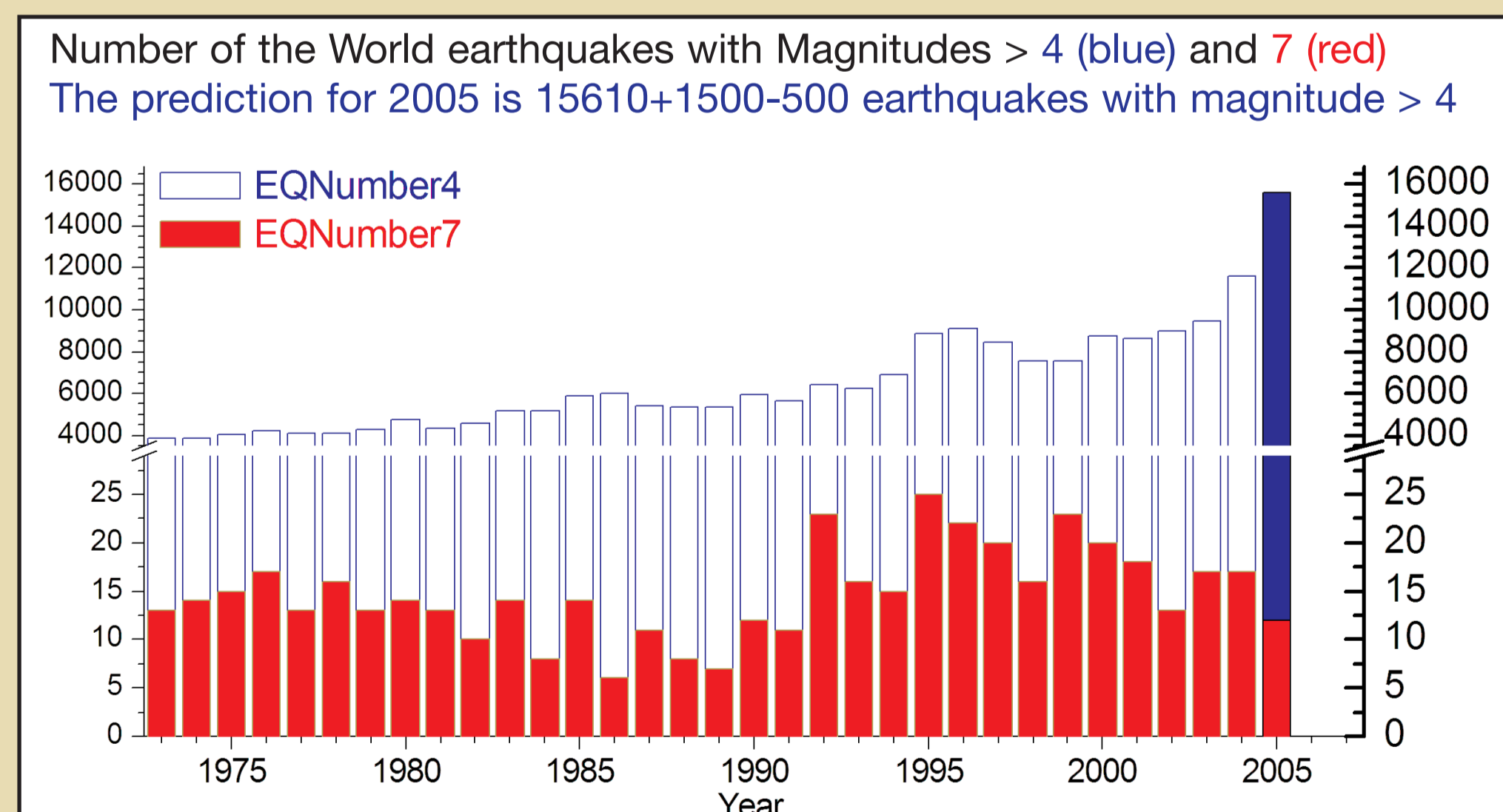


Among many 1990'ties results:

The Black Sea level is increasing with 1.5 +/-0.5 mm per year for the 1956-1990 period. This fact can be interpreted as preliminary evidence of anthropogenic global warming.

In the time of the preparation of the Black Sea data base it was recognized a possible connection between earthquake processes and electromagnetic effects (August 1928, Crime earthquake). Our 1989-2001 research proved that a "geomagnetic quake" is a reliable precursor for incoming earthquakes. The approximate time period is defined from the next tidal extremum in the region (<http://theo.inrne.bas.bg/~mavrodi/>).

Analyzing the number of world earthquakes with magnitude greater than 4 for the period 1972- 2004 there was a predicted dramatic increase for 2005:



The increase of the earthquake's number after 1994 can be explained with global warming. The continuation of stochastic character of the eq's number with magnitude greater than 7 gives hope that we have some time for measures to stop the warming, to learn how to predict time, place and power of big earthquakes and to organize regional civil hazard defence
Source: U.S. Geological Survey, <http://earthquake.usgs.gov/activity/past.html>

The explanation is based on the connection between global warming, ocean level increase and the nonlinear increase of the ocean tidal amplitude which catalyzes effects for the Vegener continental drift and increases the global seismic activity. The good news is that this influence is not so big to support the increase the number of earthquakes with magnitude greater than 7 (August 2004).

1.4. Kyoto protocol and Stern report

In the estimation of the economic costs caused by climate change also the costs of the increase of the earth seismic activity have to be included. The ecological compatible existence of civilization needs to use yesterday energy resources but not energy which has been accumulated in the earth core for millions (oil, gas coal) and milliards of years (radioactive materials, for example uranium isotopes). This is possible for todays closed technologies of using water, resources and energy but needs long and hard educational and management efforts.

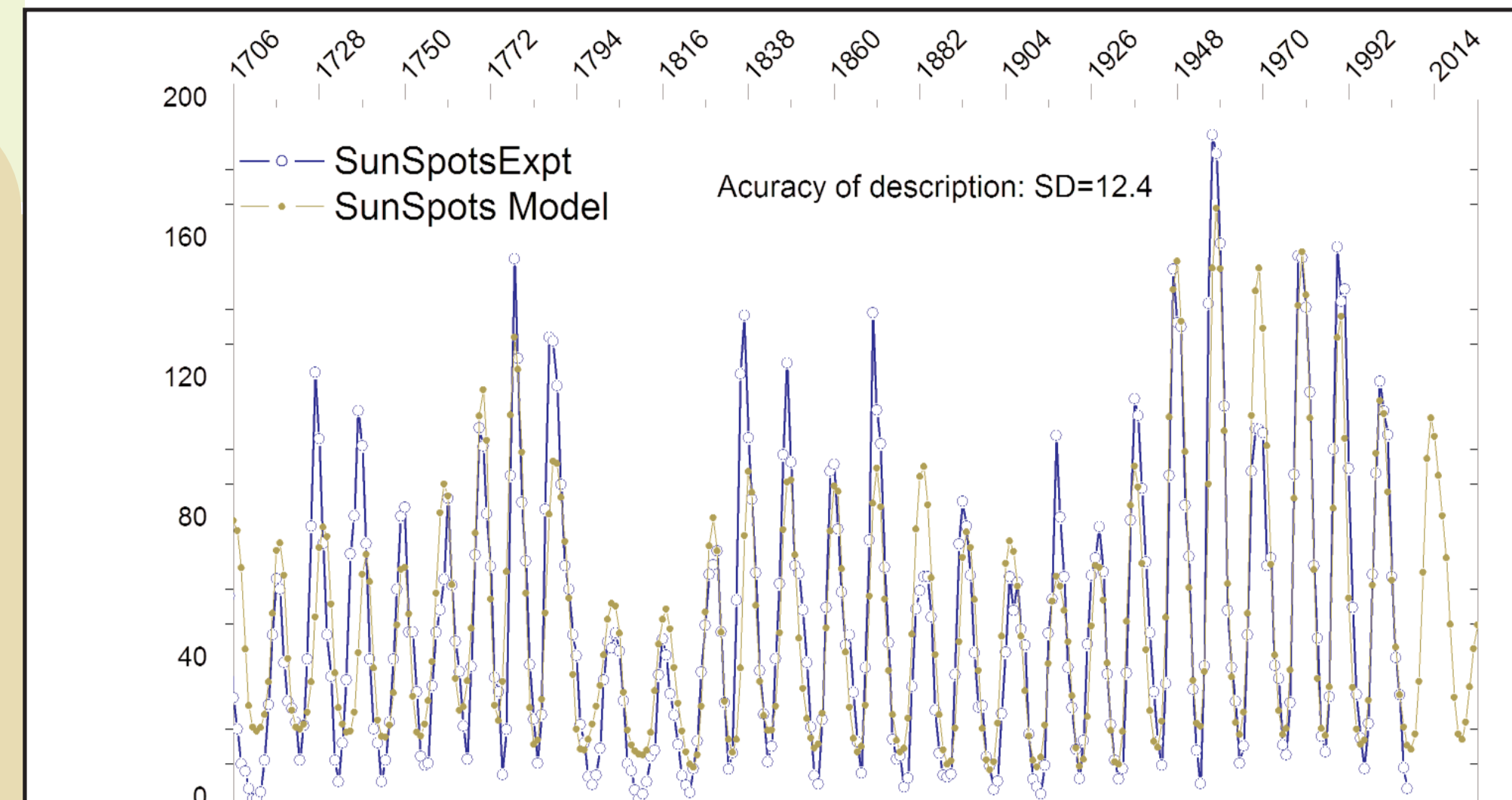
2. CLIMATE CHANGE

The "Hockey Stick" debate.

It is proposed an example of model independent analysis of meteorological and chemical data of the atmosphere and a way to estimate it's consequences as well to improve the reliability of predictions and to control the accuracy of proposals for "ruling" the development of global warming and its consequences for the world economics in the sense of a stable development.

2.1. Sun spots

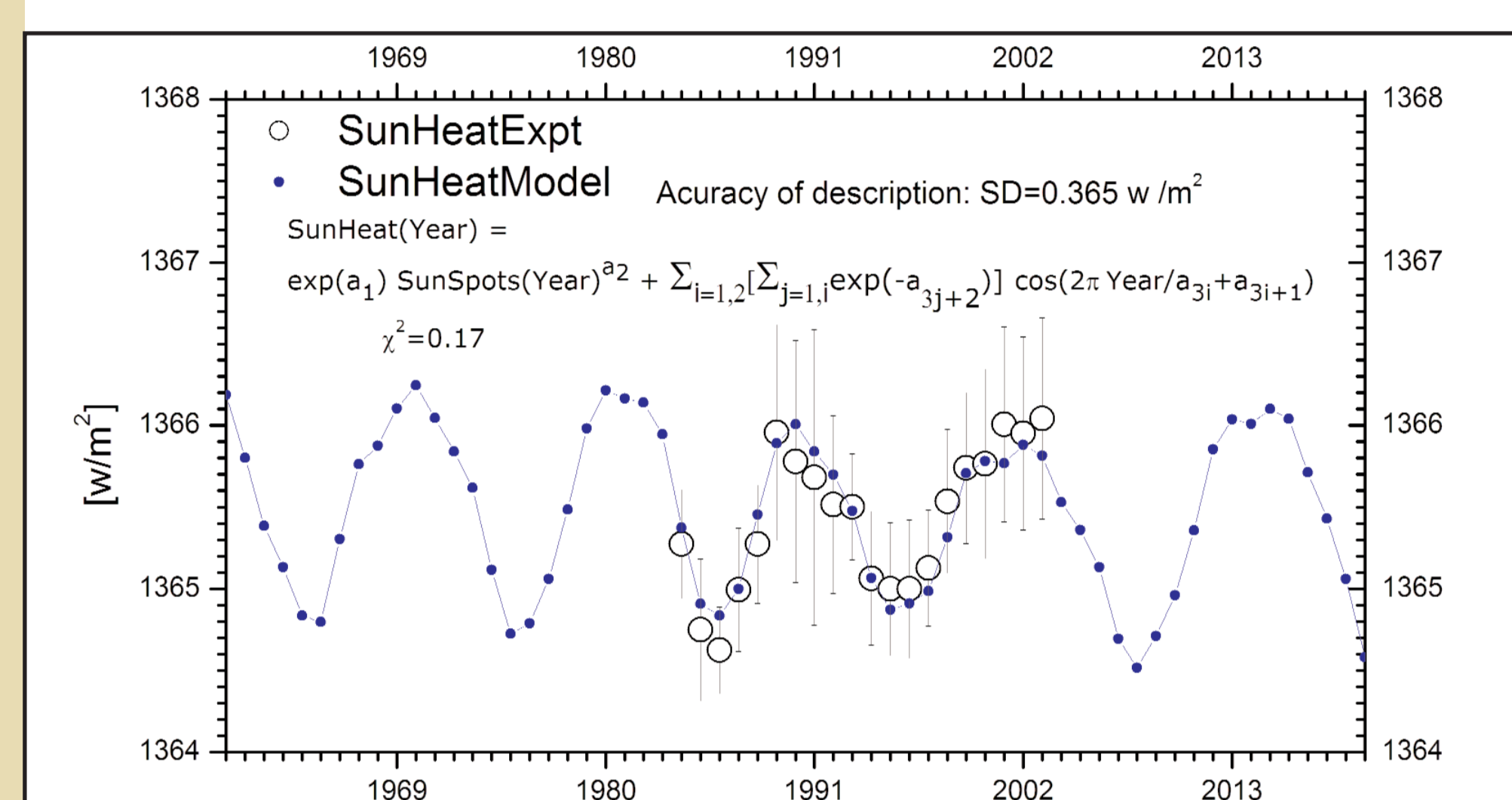
The number of sun spots is described by an analytical function



Experiment and model of sun spot numbers

DataSource: Solar influences Data Analysis Center <http://sidc.oma.be/>, <http://www.ngdc.noaa.gov/stp/SOLAR/SSN/ssn.html>

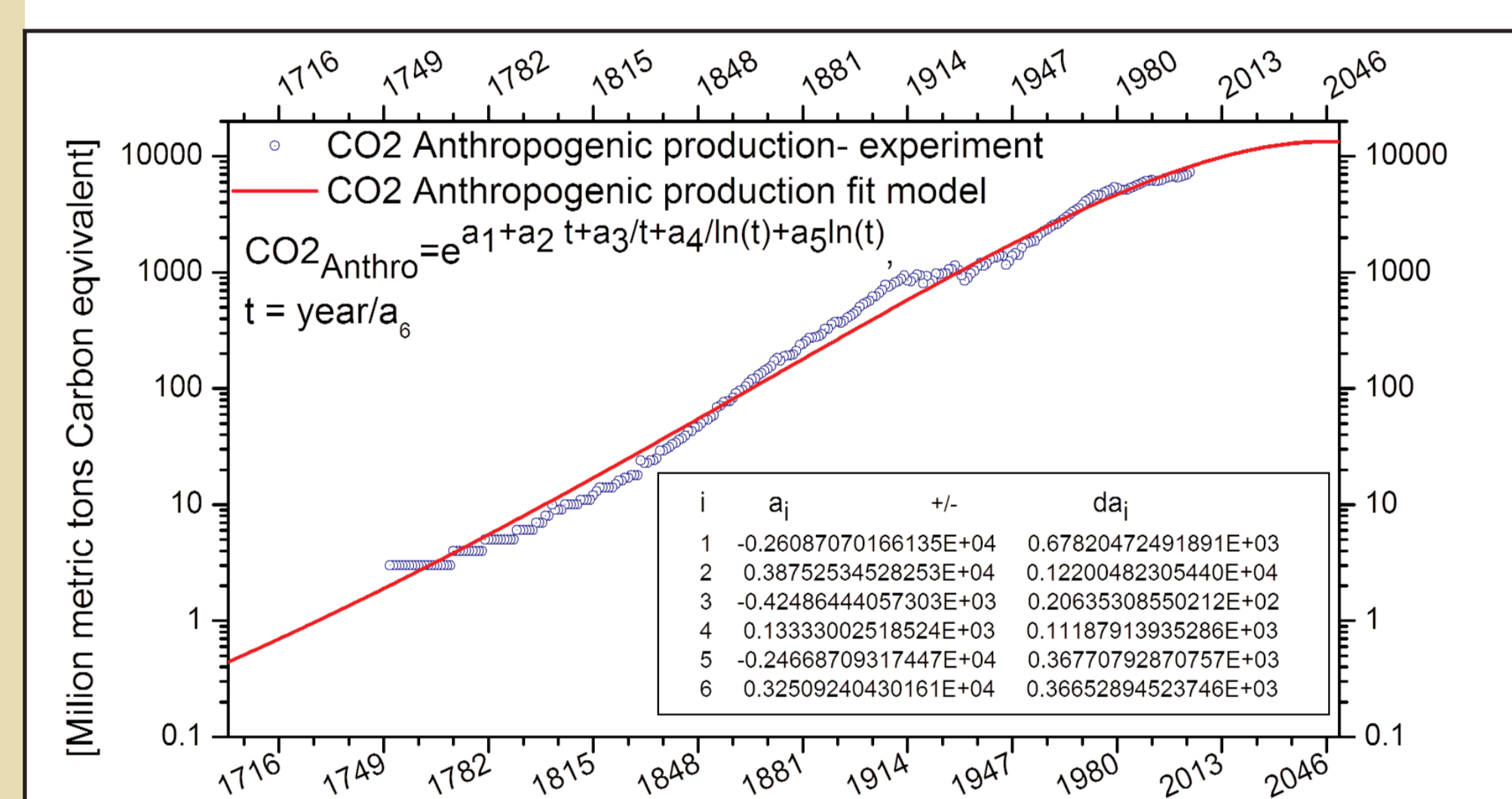
2.2. Sun irradiation



The Sun heat (irradiation) as function of Sun spots

Data: <http://www.ngdc.noaa.gov/stp/SOLAR/IRRADIANCE/irrad.html>

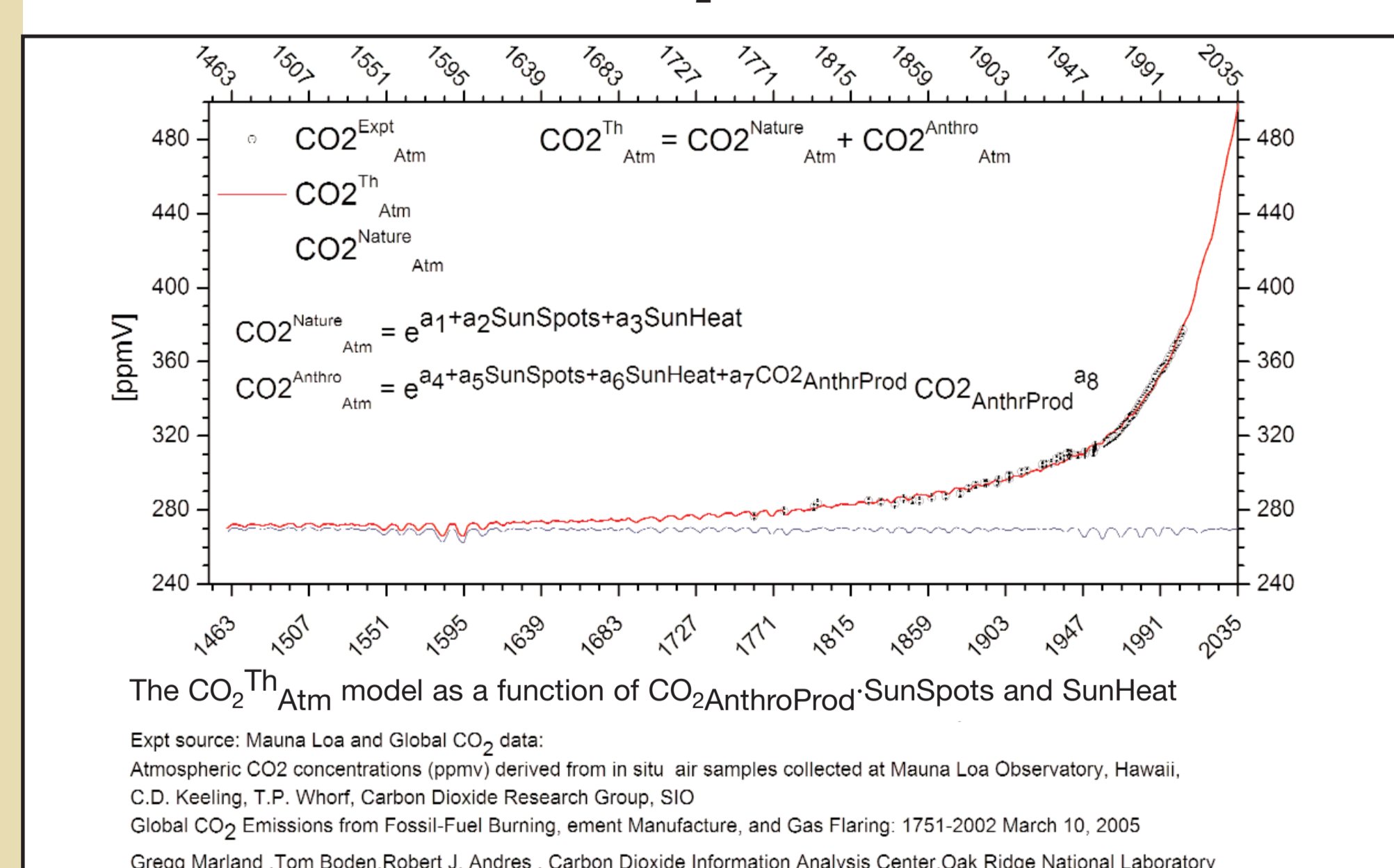
2.3. Anthropogenic production of CO₂



The smooth fit model of annual total CO₂ emission Oak Ridge National Laboratory estimates in million metric tons of Carbon

Source: Global CO₂ Emissions from Fossil-Fuel Burning, Cement Manufacture, and Gas Flaring: 1751-2003, Gregg Marland, Bob Andres, Tom Boden, Carbon Dioxide Information Analysis Center, Oak Ridge National Laboratory, May 2006, http://cdiac.esd.ornl.gov/trends/emis/tre_glob.htm

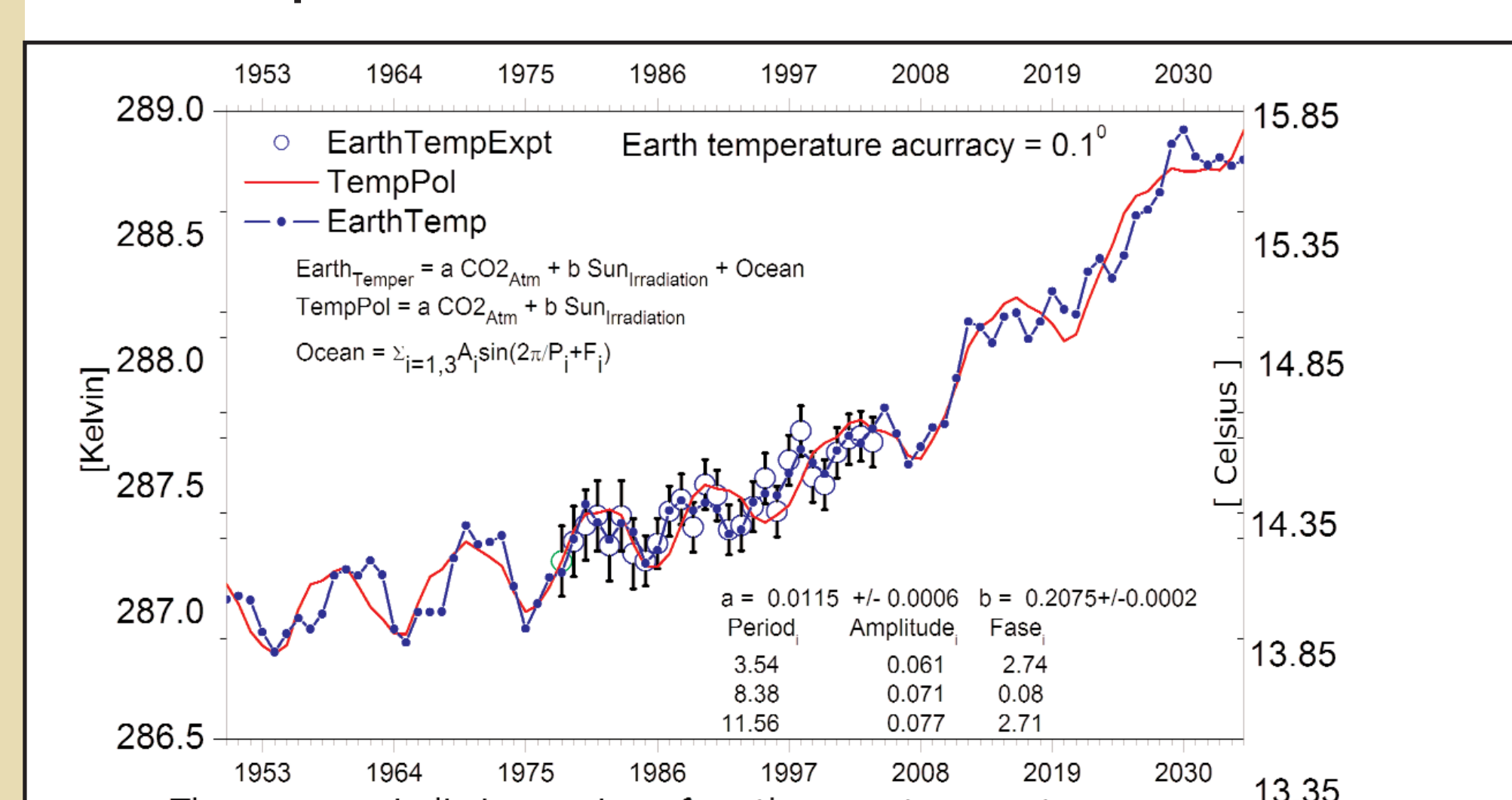
2.4. Atmospheric concentration of CO₂



The CO₂ThAtm model as a function of CO₂AnthroProd, SunSpots and SunHeat

Expt source: Mauna Loa and Global CO₂ data.
Atmospheric CO₂ concentrations (ppm) derived from in situ air samples collected at Mauna Loa Observatory, Hawaii, C.D. Keeling, T.P. Whorf, Carbon Dioxide Research Group, SIO
Global CO₂ Emissions from Fossil-Fuel Burning, cement Manufacture, and Gas Flaring: 1751-2002 March 10, 2005
Gregg Marland, Tom Boden, Robert J. Andres, Carbon Dioxide Information Analysis Center, Oak Ridge National Laboratory

2.5. Earth temperature

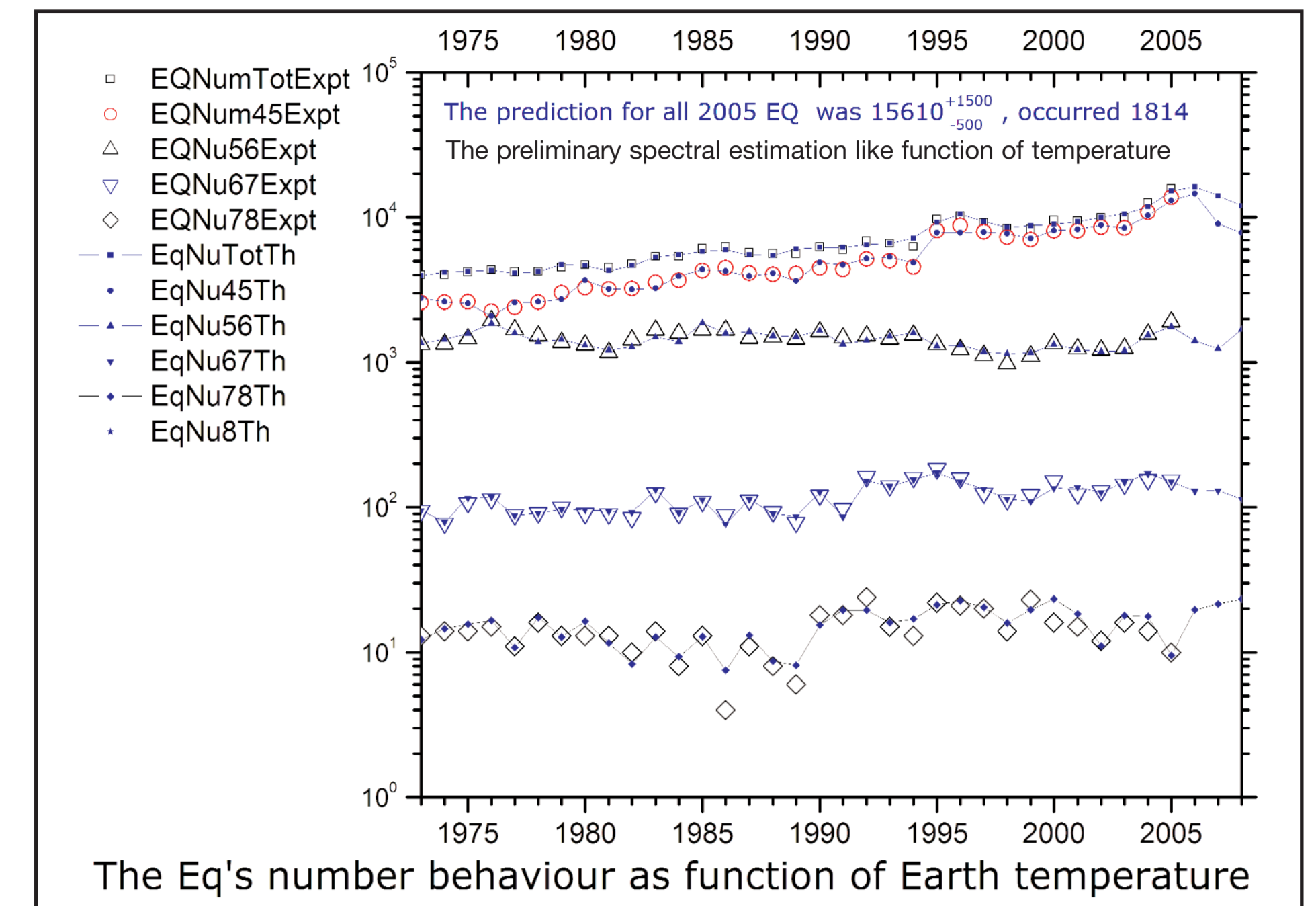


The quasyperiodic increasing of earth mean temperature as function of CO₂ anthropogenic production, sun spots, sun heat and ocean response

EarthTemp = a CO₂Atm + b SunIrradiation + Ocean
TempPol = a CO₂Atm + b SunIrradiation
Ocean = $\sum_{i=1,3} A_i \sin(2\pi F_i t + \phi_i)$

a = 0.0115 +/- 0.0006 b = 0.2075 +/- 0.0002
Period Amplitude Phase
3.54 0.061 2.74
8.38 0.071 0.08
11.56 0.077 2.71

2.6. Total and spectral number of world earthquakes and an preliminary prediction of the earth seismic activity.

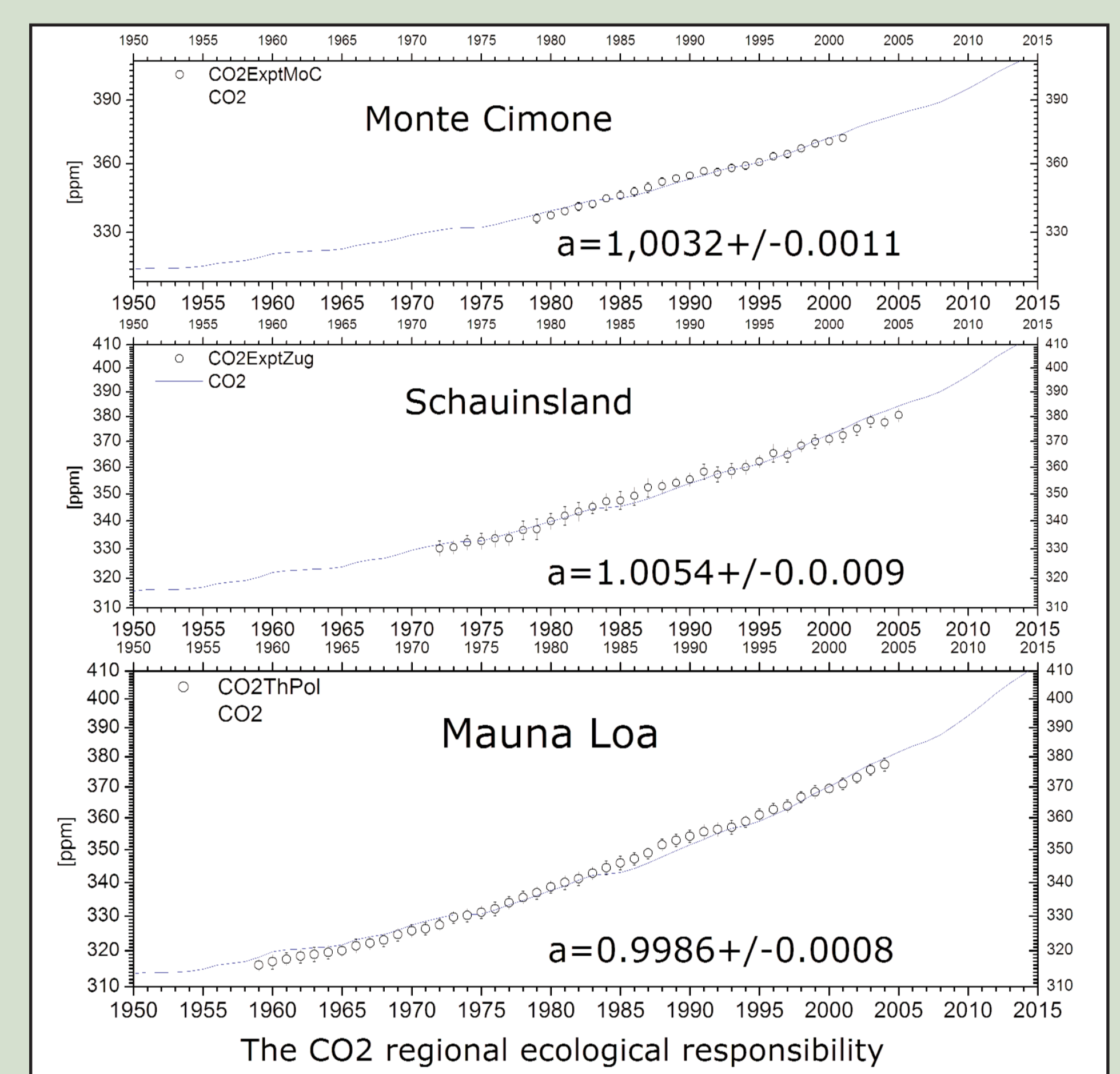


The Eq's number behaviour as function of Earth temperature

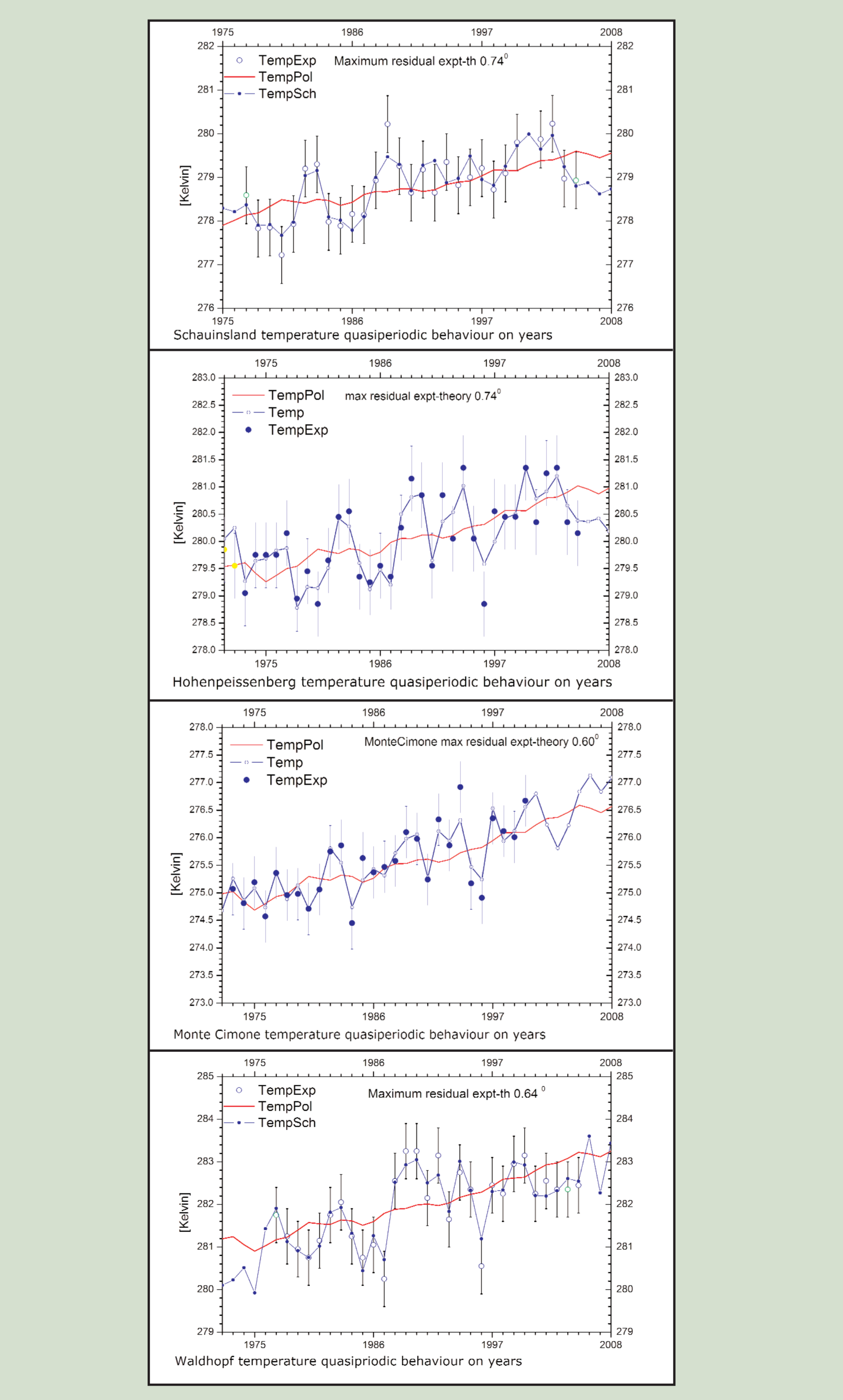
2.7. Relations between ocean levels and the amplitude of ocean tide in shelf seas, hurricanes, tsunamis, el Nino and continental plate dynamics. Proposal: models have to be created.

3. APPLICATIONS

3.1. Estimation of the CO₂ regional responsibility



3.2. Prediction of local next year mean temperature.



3.3. Proposal: To create a system for realtime analysis of data, to perform different time scale predictions with aims to improve the climate models by comparing their solutions with discovered model independent solutions.