The Azimuth Project: an open-access educational resource

John Baez
Department of Mathematics
U. C. Riverside

http://azimuthproject.org

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Many scientists know there's a crisis and want to help. How?

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3. A wiki for storing information, a forum for talking to each other, and a blog for publicizing our work, which gets about 100 hits per hour.

A stochastic energy balance model

Michael Knap

To read about how this model works, go here!

Value of noise coefficient σ 9.6400

Value of insolation Q_{base} 420.9009

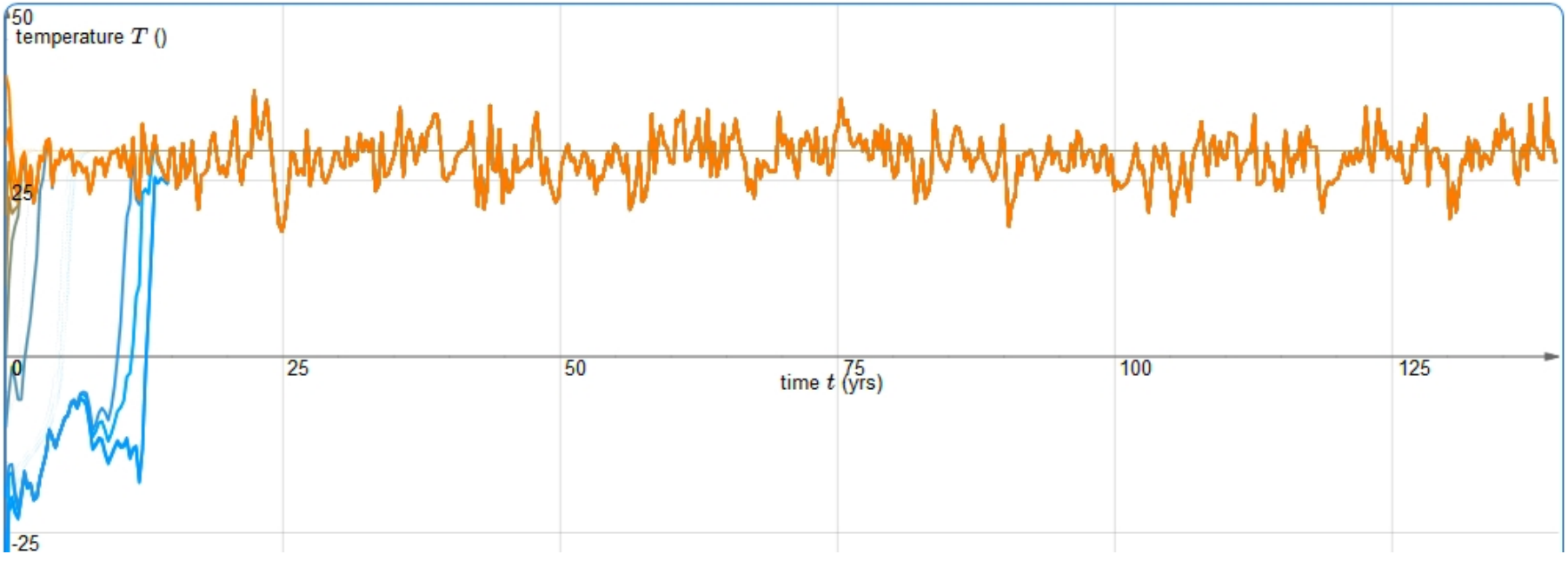
Coalbedo transition rate γ $\gamma = 0.0298$

$$Q(t) = Q_{base} + X \sin(\tfrac{t}{\tau})$$

Value of insolation bump X 0.0000

End value of time interval $[0, \tau]$ over which bump X is applied 1.0000

- Select coalbedo interpolationg function : 1+tanh(γT)
- Select insolation function $Q(t)$: sinusoidal
- Fix current noise :



Bayesian prediction of the next glacial inception

Idea

This page is about this paper:

- Michel Crucifix and Jonathan Rougier, On the use of simple dynamical systems for climate predictions: A Bayesian prediction of the next glacial inception, *The European Physical Journal* **174** (2009), 11-31.

This paper tries to predict the next glacial cycle with a stochastic model, using a stochastic differential equation derived from a deterministic model from this paper:

- B. Saltzman and Kirk Allen Maasch, A first-order global model of late Cenozoic climatic change II: further analysis based on a simplification of CO2 dynamics, *Clim. Dyn.* **5** (1991), 201-210.

Details

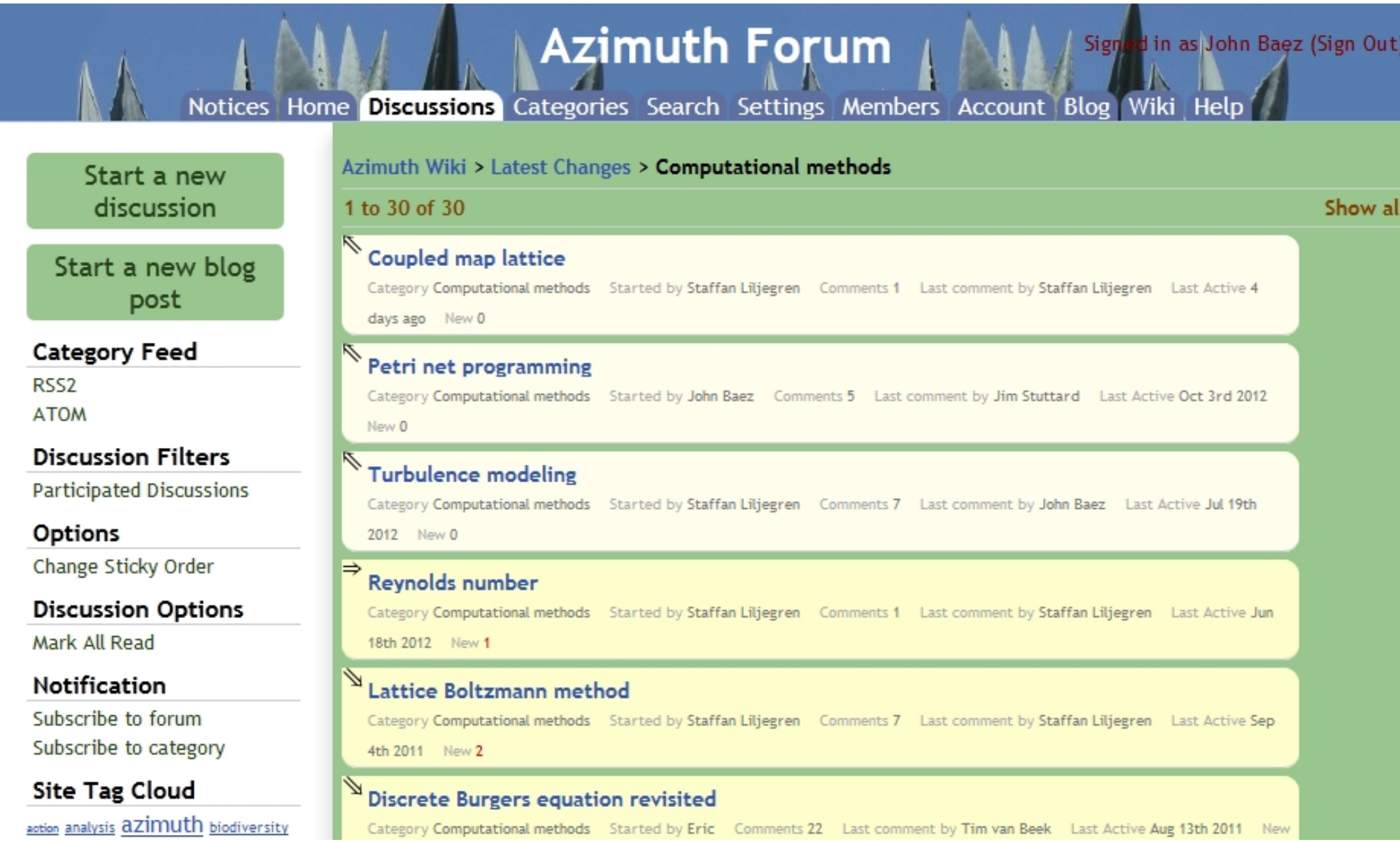
The authors investigate a three-dimensional dynamical system where the variables are

- ice volume I
- atmospheric CO_2 concentration μ
- deep-ocean temperature θ

Saltzman and Mosch considered a deterministic system of this sort obeying the equations

$$\frac{d}{dt}I(t) = -a_1\big(k_\mu \mu(t) + k_\theta \theta(t) - K_I I(t)\big) + k_R R(t)$$

$$\frac{d}{dt}\mu(t) = b_1\mu(t) - b_2\mu(t)^2 - b_3\mu(t)^3 - b_\theta\theta(t)$$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Category Computational methods Started by Eric Comments 22 Last comment by Tim van Beek Last Active Aug 13th 2011 New

Mathematics of the Environment (Part 7)

Last time we saw how the ice albedo effect could, in theory, make the Earth's climate have two stable states. In a very simple model, we saw that a hot Earth might stay hot since it's dark and absorbs lots of sunlight, while a cold Earth might stay cold—since it's icy and white and reflects most of the sunlight.

If you haven't tried it yet, make sure to play around with this program pioneered by Lesley de Cruz and then implemented in Java by Allan Erskine:

• Temperature dynamics.

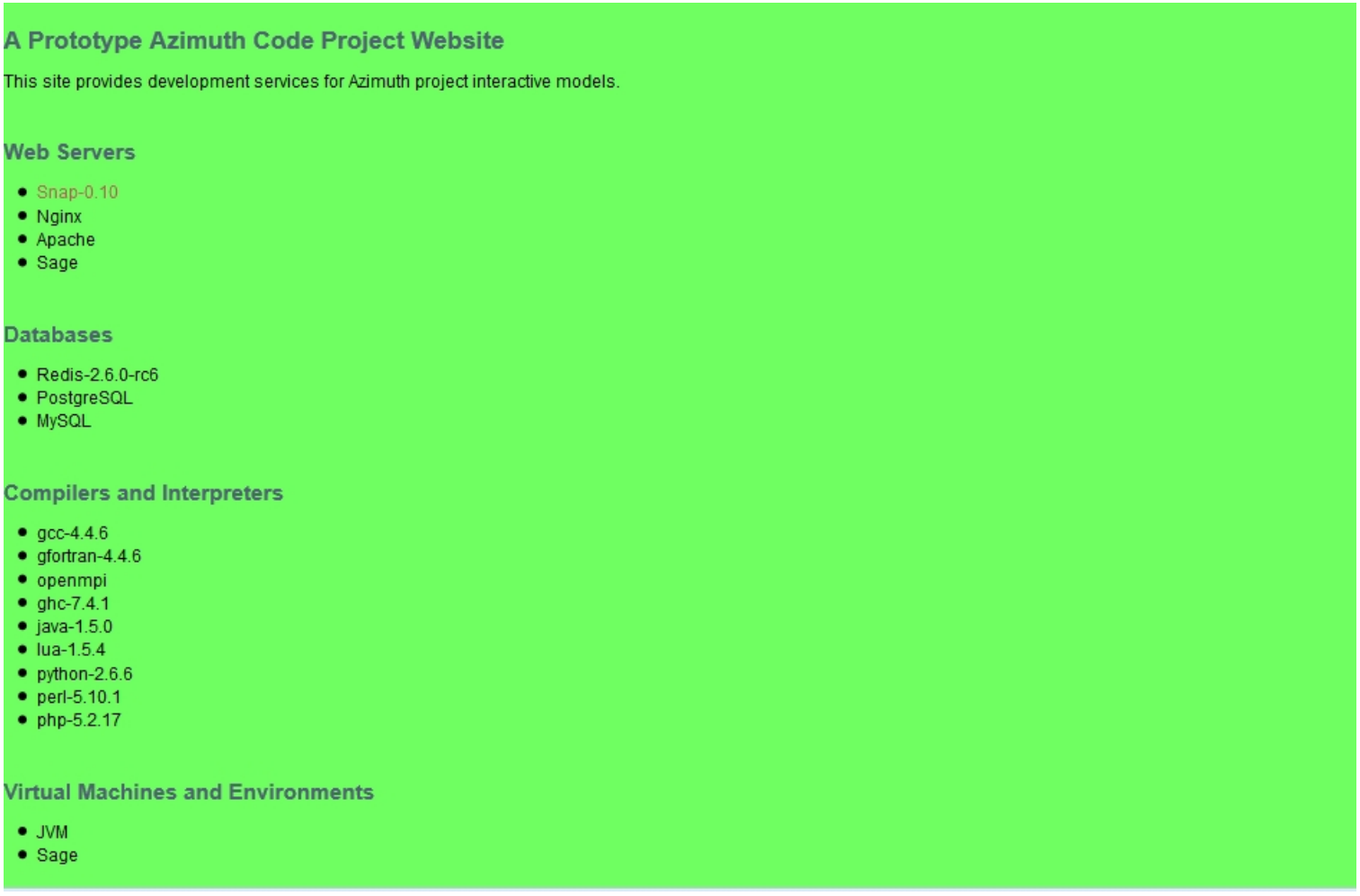
The explanations were all given in Part 6 so I won't repeat them here!

This week, we'll see how *noise* affects this simple climate model.

LATEST POSTS:

o Symmetry and the Fourth Dimension (Part 8)
o Mathematics of the Environment (Part 9)
o Mathematics for Sustainability (Part 2)
o Mathematics of the Environment (Part 8)
o Talk at Berkeley
o Mathematics of the Environment (Part 7)
o Wind and Water on Mars
o Mathematics of the Environment (Part 6)
o Graduate Program in Biostatistics
o Mathematics of the

In progress: a server for running interactive software online, etc.



A Prototype Azimuth Code Project Website

This site provides development services for Azimuth project interactive models.

Web Servers

- Snap-0.10
- Nginx
- Apache
- Sage

Databases

- Redis-2.6.0-rc6
- PostgreSQL
- MySQL

Compilers and Interpreters

- gcc-4.4.6
- gfortran-4.4.6
- openmpi
- ghc-7.4.1
- java-1.5.0
- lua-1.5.4
- python-2.6.6
- perl-5.10.1
- php-5.2.17

Virtual Machines and Environments

- JVM
- Sage

Issues:

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1. Focusing the effort is a challenge. Emphasizing *education* rather than *research* makes it easier to invent bite-sized programming projects. Focusing on a *technically literate audience* may give us a niche that's not yet filled.

2. The scholarly literature on climate change is largely hidden behind paywalls which only academics can penetrate.

3. Smart mathematicians, physicists and programmers are willing to get involved and work hard, but so far not many climate scientists. We need help.

You can find it all starting here:

http://azimuthproject.org