

## ***Interactive comment on “Pattern dynamics, pattern hierarchies, and forecasting in complex multi-scale earth systems” by J. B. Rundle et al.***

### **Anonymous Referee #3**

Received and published: 7 July 2006

The paper appears to be an introduction to how complex earth systems may be modeled. It is written at a level that should be accessible to scientists in many fields, while still dealing with its subject matter in some detail.

The paper may be summarized as follows. Catastrophic disasters are often triggered by complex, multi-scale earth systems, such as earthquakes and weather events. These systems are difficult to forecast because the fundamental dynamics are partially or completely unobservable; also, they are generally complex, chaotic, and threshold-dependent.

Prediction of El Nino events is considered as a recent instance of considerable progress in forecasting complex, multi-scale earth systems. The modeling methods

Full Screen / Esc

Printer-friendly Version

Interactive Discussion

Discussion Paper

applied to El Nino are briefly reviewed.

The general properties of threshold systems are discussed. Threshold systems are characterized by sudden events that result from generally unobservable underlying dynamics. The sudden events usually have a much shorter characteristic timescale than the underlying dynamics. A mathematical formalism for threshold systems is presented.

The remainder of the paper concerns the use of such a formalism to simulate faulting in California. The simulation model is discussed in some detail. Patterns that emerge during the simulation are considered. The paper was generally well written, with effective organization. My only concern was that some of the mathematics might need slightly more explanation. At the level of a general reading, I was unable to follow parts of the more advanced equations.

I recommend publication with clarification of some of the math if space permits.

---

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 3, 1045, 2006.

**HESSD**

3, S388–S389, 2006

---

Interactive  
Comment

Full Screen / Esc

Printer-friendly Version

Interactive Discussion

Discussion Paper