"Intractable & Unsolved..."

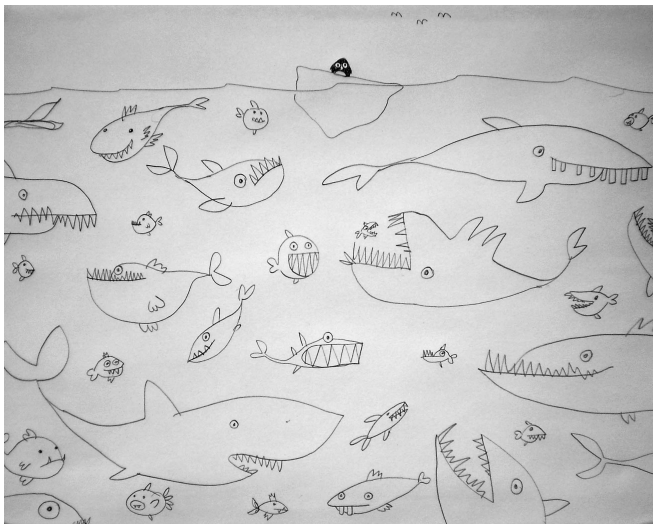Jonty Rougier,
Dept. Maths,
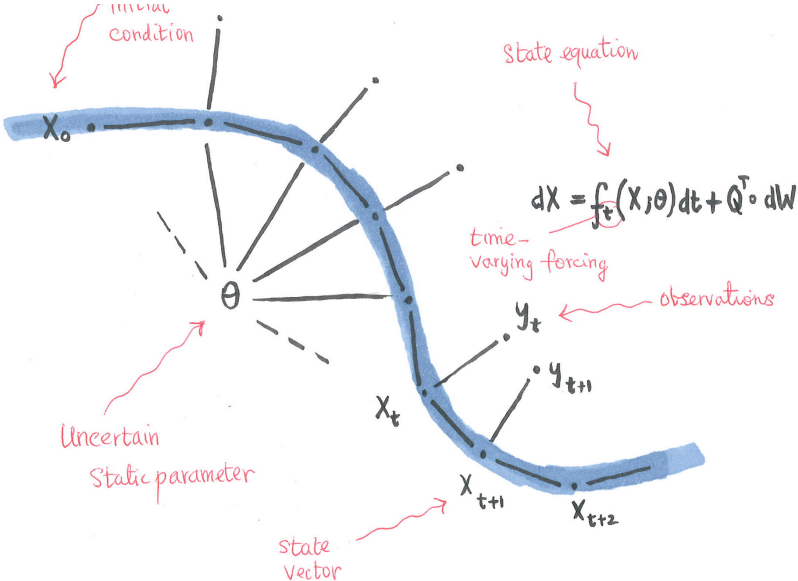Univ. Bristol

17 April 2012

Bristol.

SuWTaIn

.co.uk to find out more information about the Universities Superannuation
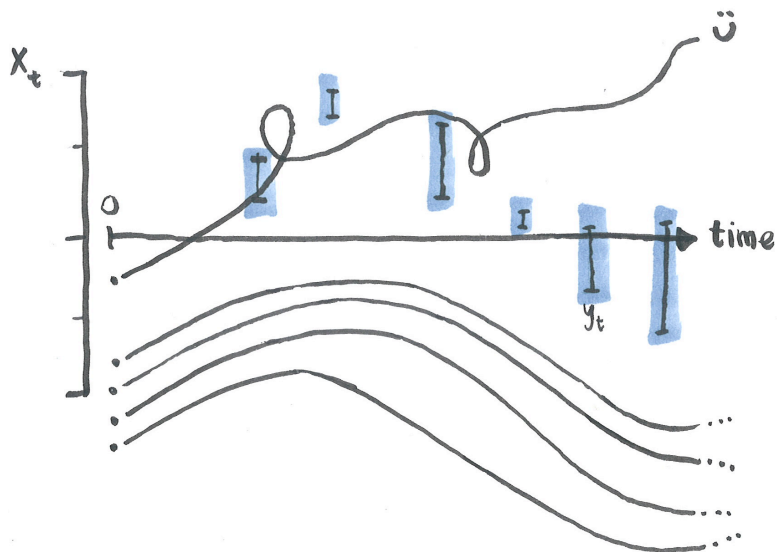
Caroline Hamann, *Intractable and unsolved: The challenge of data assimilation with uncertain static parameters*, Ink and paper, 2012

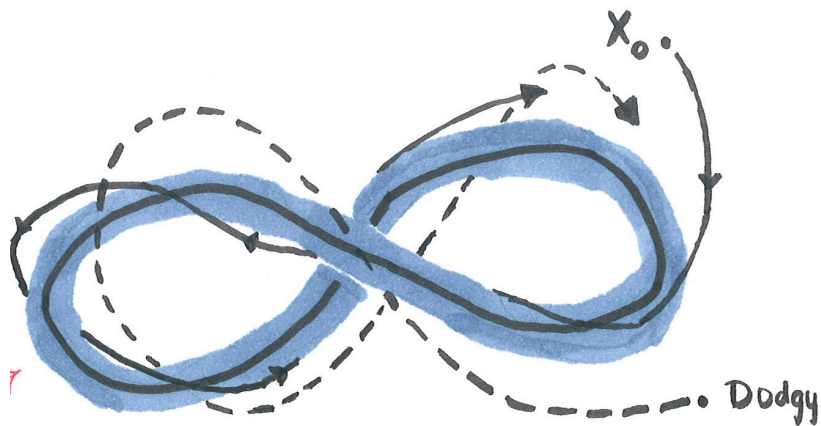# Environmental models

initial condition

state equation

$dX = f_t(X, \theta)\,dt + Q^{\top} \circ dW$

time-varying forcing

observations

y_t

y_{t+1}

X_t

Uncertain Static parameter

θ

X_0

state vector

X_{t+1}

X_{t+2}

Sensitive dependence on initial conditions

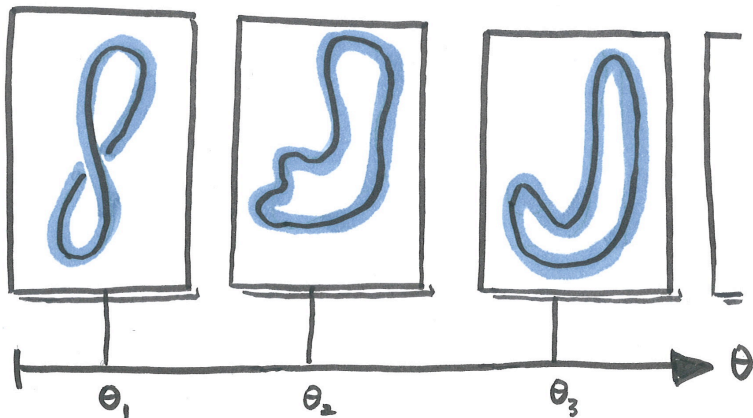
[X_0 is not a location parameter.]

Dissipative systems and attractors

[Millions of local maxima in the likelihood function.]

The effect of static parameters

[Why state vector augmentation only works in theory.]

Real environmental inference

1. Measurement times not precisely known,

2. Uncertain parameters in the likelihood functions,

3. Uncertain forcing,

4. Measurements that integrate over time.

With many thanks to Caroline, http://www.linlen.com/