

Information brought by inverse methods : a thermodynamic analogy

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Thermodynamic analogy

S : information gain or entropy reduction
obtained from the inversion system

E : energy used by the system

Temperature of the system :

$$\frac{1}{T} = \frac{dS}{dE}$$

How much information do we gain
if we increase the energy supply

→ Optimize the system by flowing energy
from « warm » components to « cool » components

A « global warming » of science ?

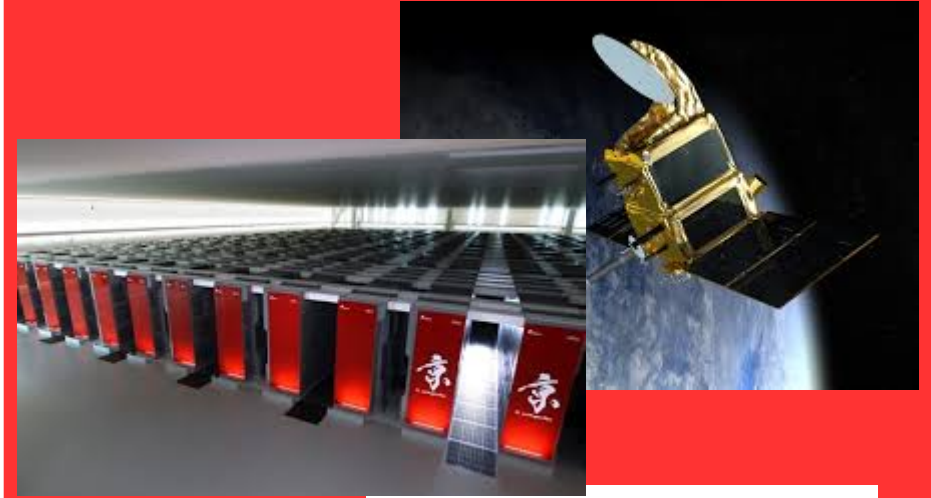
lowest T ever ?



→ mind inversion →

$$F = m a$$

highest T ever ?



I ♥ BIG DATA

→ More and more energy is needed
to keep gaining information about nature

Which inversion method to keep the « temperature » of the system as low as possible ?

- what balance between model resolution and ensemble size ?
- what balance between « first principles » and « data driven » approaches ?
 - what balance between resolving processes and parameterizing uncertainties ?
 - what balance between high-energy exact processors and low-energy inexact computation ?
 - what balance between brute-force and creative solutions ?
- what balance between human minds and artificial intelligence ?