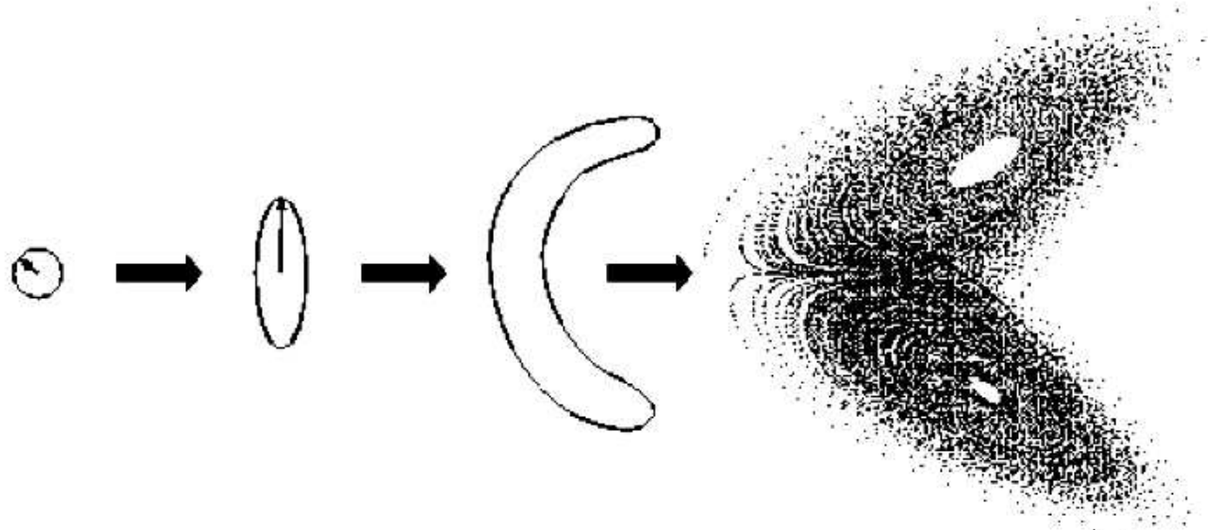
Ensembles and stochasticity

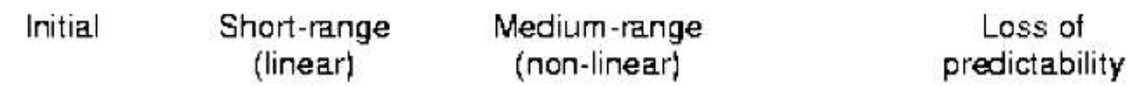
Problem

- Weather forecasting attempts to predict a highly chaotic dynamical system.
- Initial condition errors will grow exponentially.

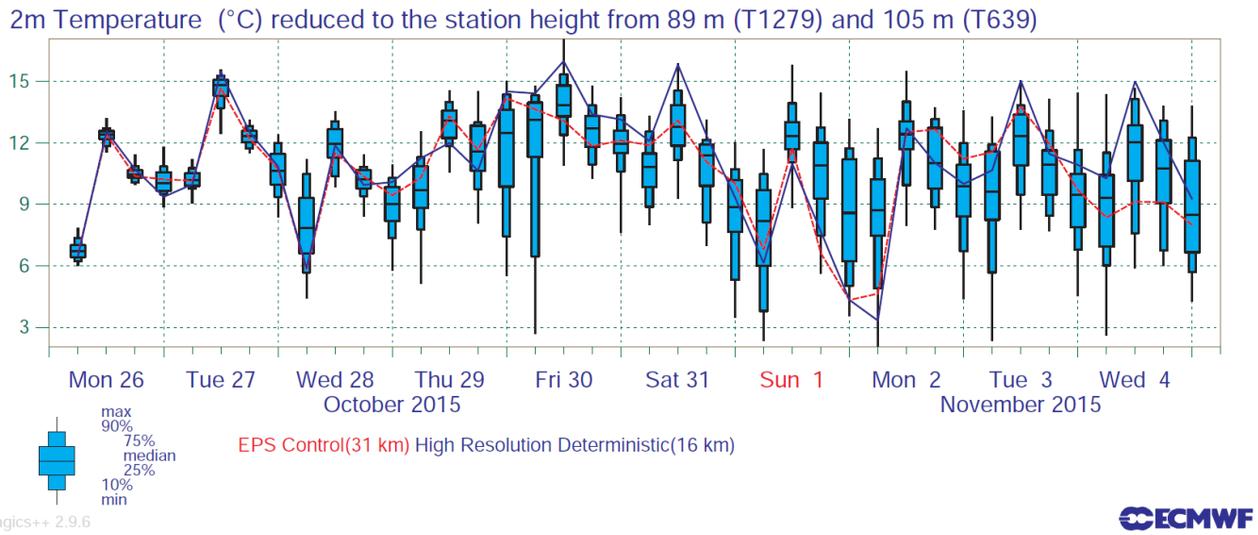


Solution

- Propagate an ensemble of initial conditions forward to (hopefully) include the truth in the distribution of possible answers.
- Random elements are added to the model to increase spread. e.g. SPPT, SKEBS, SPT.

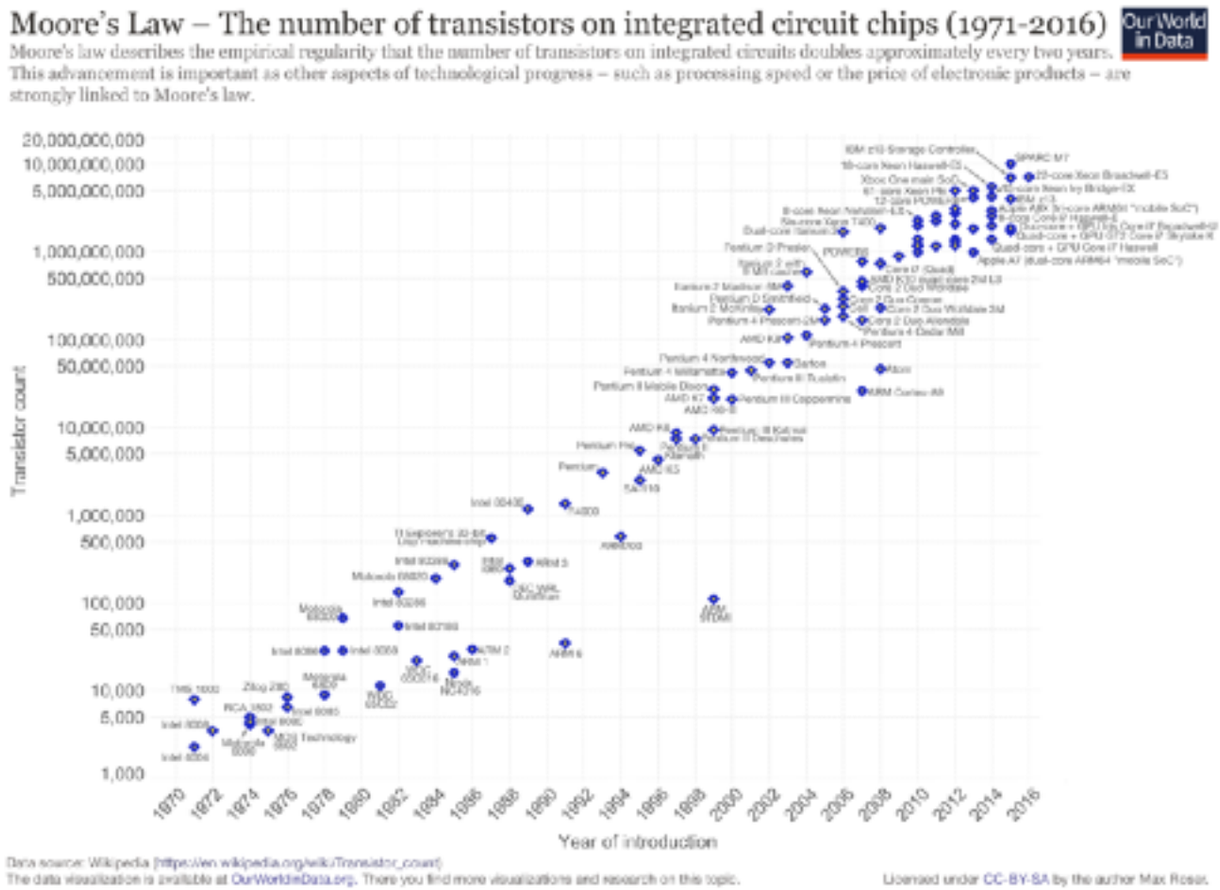


Source: ECMWF IFS documentation



ECMWF

Why care about precision?



Moore's "law":
twice as many transistors per chip every 2 years

New computers are bigger but not faster.

- Reaching physical limits of transistor size.
- Parallel computing is the main route to higher grid resolution.

Energy consumption

- MetOffice supercomputer: 2.7 MW of electricity.

Looking for any possible paths to faster/more efficient code.