

*Routine predictions of climate swings related to El Niño will soon become a reality.*

designed to represent, in terms of equations, processes that occur in nature). Such models are fed information, mostly in the form of sets of numbers, [E] describing the present state of the atmosphere-ocean system (for example, observations of wind speeds, ocean currents, sea level, and the depth of the thermocline along the equator). Updated sets of numbers, which the models produce, indicate how the atmosphere-ocean system might evolve over the next few seasons or years.

Such models allow scientists to test their understanding of how complex systems operate. One such test is to see whether the models are able to replicate past El Niños. If the models are realistic enough, researchers can even use them to make predictions of what will happen in the future.

Similar numerical models based on the laws of physics have been used since the 1960s to forecast weather. In the early years, these forecasts were no better than those made by skilled meteorologists relying on their own experience in watching weather systems evolve. But thanks to advances in our understanding of weather systems and in the numerical models that are used to represent them, today's weather prediction models consistently outperform even the most seasoned forecasters.

Numerical models of El Niño are not as reliable as those used in weather forecasting, but they have advanced to the point where they can reproduce the characteristics of a typical event. In recent years several research groups have pioneered the use of models [E] to predict the comings and goings

Reliable data on existing conditions and realistic numerical models that project this picture forward in time are at the crux of researchers' continuing efforts: not only to understand El Niño, but also to predict when future events will arise and what their impacts will be.

