The past and future of El Niño
Sandy Tuthope and Mat Collins

A new study of past variations in El Niño behaviour provides a much improved record from pre-instrumental times. It will be a valuable resource for testing the models used in climate prediction.

El Niño events occur every three to seven years, and arise naturally through the strong interaction between the ocean and atmosphere in the tropical Pacific. The effects are felt worldwide because the tropical Pacific is a powerful source of heat for driving atmospheric circulation. Even small changes in the sea-surface temperature in this region might change in the future.

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Global change

100 YEARS AGO
Rutherford and Soddy pointed out that the almost invariable presence of helium in minerals containing uranium indicated that that gas might be one of the ultimate products of the disintegration of the radio-elements. Rutherford, moreover, determined the mass of the projected particle which constitutes the “α-ray” of radium to be approximately twice as great as that of the hydrogen atom, an observation that points in the same direction... We have been engaged for some months in examining the spectrum of the “radio-active emanation” from radium... We have found that after removing hydrogen and oxygen from the gases evolved from 20 mgs. of radium bromide, the spectrum showed the presence of carbon dioxide. On freezing out the carbon dioxide, and with it, a large proportion of the radium “emanation,” the residue gave unmistakably the D line of helium.

Also...
It has been stated that the radium rays have been successfully applied in the treatment of a case of cancer by Prof. Gussenbauer, of Vienna. The tumour completely disappeared as a result of the application, radium bromide being made use of as a source of the rays. The early publication of these details in the public Press before there has been time to test the method effectually is much to be deprecated.

From Nature 16 July 1903.

50 YEARS AGO
Personality Development. By J. S. Slocin. The author, who is a social anthropologist, begins by saying that he has tried to work out a systematic theory of personality development, from the hypotheses and evidence of various relevant sciences. The material is, however, systematic only in so far as it has been distributed under four major headings: inheritance, socialization, cultivation and individualization. Within each of the fields the approach is mainly descriptive and anecdotal, and is adorned by a wealth of quotations from ancient and modern writers. It may well be that in the meantime this kind of approach is repaying. Certainly it does not suffer from the aridity of some recent statistical work in the same field. But perhaps we can only be scientific about people if we are content to be dull.

From Nature 18 July 1953.
(seventeenth to nineteenth centuries) or the Medieval Warm Period (eleventh to fourteenth centuries). Nor do they seem to tie in with reconstructions of volcanic and solar behaviour that might drive climate change. The authors conclude, quite reasonably, that much of the variability seen in ENSO strength over the past millennium was probably not driven by external factors.

So, where does this leave us in attempting to predict future ENSO activity? Cobb et al. show that, as ENSO varies significantly on its own — that is, even without greenhouse warming — we might expect changes beyond those experienced in the twentieth century. Looking to other periods in the past there is increasing evidence that the ENSO cycle may have been weak, or even absent, between about 14,000 and 5,000 years ago. The most likely explanations involve the sensitivity of ENSO to changes in the length and timing of the seasons resulting from the precession cycle in the Earth’s orbit. ENSO may also have been generally weaker during the last glacial period and the present interglacial.

Cobb et al. looked at ENSO during a period of relatively little global climate change. The future is almost certainly going to be radically different, with predictions of a 1.5–6.0 °C rise in global mean temperature within the next 100 years — potentially as much as change as that between the last glacial period and the present interglacial. The only realistic hope for predicting the response of ENSO to this warming lies in the use of coupled ocean–atmosphere climate models. Some of the best of these models now generate a realistic ENSO cycle but produce a wide range of predicted outcomes.

**Quantum physics**

**Uncertain future**

Miles Blencowe

The uncertainty principle limits the accuracy of measurement at the quantum level. A device sensitive to subatomic-scale displacement has come close to revealing that principle in action in the macroscopic world.

In 1927, Werner Heisenberg introduced his famous quantum principle, which states that the uncertainties in the position and the velocity of a particle are inversely proportional to each other: a particle’s position or its velocity can be known precisely, but not both at once. This principle is one of the cornerstones of quantum mechanics, and is traditionally relevant to the domain of subatomic particles. But what about more familiar macroscopic objects, comprising many atoms, that we think of as possessing simultaneously well-defined positions and velocities of their centre-of-mass? If we could be sufficiently precise in our measurements on such objects, would we encounter the quantum uncertainty principle at work?

On page 291 of this issue, Knobel and Cieliebak address this question. They describe an exquisitely engineered device — a vibrating crystal beam, only a thousandth of a millimetre long, and an extremely sensitive motion detector — that is capable of detecting displacements as small as a one-thousandth of a nanometre, or one-hundredth of the size of a single atom. The beam may seem tiny by everyday standards, but its mass is equivalent to that of about ten billion atoms. A demonstration of the