for regulating gene expression. With advances in computational strategies for locating conserved RNA folds in sequence databases, high-throughput methods for monitoring alternative splicing and other steps in gene expression, and prior knowledge of the function of genes involved in small-molecule metabolism, finding other examples of such regulatory modules in eukaryotes seems possible. In any case, we can be almost certain that new forms of RNA-based regulation will continue to emerge and amaze. ■

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SUPERNOVAE

Answers and questions

David Branch and Ken'ichi Nomoto

Do we understand the violent and cosmologically significant stellar explosions known as type-Ia supernovae? Yes and no, as astronomers participating in a conference in California agreed.

In mid-March, more than 100 astronomers converged on the Kavli Institute for Theoretical Physics in Santa Barbara, California, for an international conference* on so-called type-Ia supernovae (SNe Ia). Understanding these stellar explosions has a high priority: measurements of their brightness in the late 1990s revealed the existence of a mysterious 'dark energy' permeating space and accelerating the Universe's expansion. This conference was not primarily about exploiting SNe Ia for cosmology, but about assessing our current state of knowledge of where they come from, what exactly their stellar progenitors are, how they work, and how they explode.

A good idea lasts

In 1960, Fred Hoyle and William Fowler[1] concluded that SNe Ia are the result of thermonuclear instability following the ignition of nuclear fuel in 'electron-degenerate' matter. Such matter is formed when a star contracts and the electrons of its matter are compressed to fill every energy level available to them by the quantum-mechanical Pauli exclusion principle. Since then, astronomers have fleshed out the idea. Unlike other supernovae — types Ib, Ic and II, collectively known as core-collapse supernovae and produced only by short-lived, massive stars — SNe Ia are seen in both young and old stellar populations. They are even found in elliptical galaxies, meaning that some of them are produced by long-lived, low-mass stars found in these galaxies.

Most low-mass stars end their lives as electron-degenerate carbon–oxygen white dwarfs, without exploding. A more dramatic fate comes if the white dwarf accretes non-degenerate matter from a companion in a binary system (the single-degenerate scenario) or merges with

*Paths to Exploding Stars: Accretion and Explosion, Santa Barbara, California, 19–23 March 2007; http://online.kitp.ucsb.edu/online/snovae_c07

HYDROLOGY

Flood of data

P. BATES

If you need more precise measurements of natural events on Earth's surface, get into space. Researchers studying glaciers and earthquakes have for some time followed this principle, exploiting the power of satellite interferometric imaging to map surface displacements down to the centimetre scale. Doug Alsdorf and his colleagues have taken the same approach in their investigations of the periodic floods that occur in the Amazon basin (D. Alsdorf *et al. Geophys. Res. Lett.* **34,** doi:10.1029/2007GL029447; 2007).

The Amazon river has an intimate relationship with its vast floodplain, with an estimated 25% of its average annual discharge flowing and ebbing across it. But very little is known about the behaviour of these floods: not least, gauges of water level are placed only along the main channels, and then only sparsely. There are technical difficulties in taking interferometric measurements of water surfaces with satellite-borne synthetic-aperture radar. But flooded vegetation (pictured) does reflect an adequate signal.

Using data provided by instruments aboard the Japanese Earth Resources Satellite, Alsdorf *et al.* have been able to map the spatial and temporal complexity of floodplain inundation. Their study of floods from three different years takes in an area of the central Amazon basin that includes flows from the Purus river, as well as the Amazon itself.

Water levels in the floods, it turns out, do not take on the pattern that might be expected from a simple correspondence with the levels in the main channel of the river. Rather, there is a complicated interplay in which flow paths and water levels are influenced not only by the main channel and floodplain topography, but also by local and far-reaching hydraulic factors created by the flood itself.

These are proof-of-principle findings, with a practical edge. Modelling of floods is bedevilled by a lack of relevant measurements to test them. Satellite data can help redress that lack, with the ultimate aim of guiding engineering or other solutions to the inundation of areas inhabited by human populations. Furthermore, periodic flooding, and the associated delivery of sediments and nutrients, is a natural feature of wetland ecosystems not only in the Amazon but throughout the world. Some wetlands are under threat and, in some, restoration projects are in hand. Clarification of the relevant networks of water flow in different circumstances would offer another approach to ensuring the long-term success of such projects.
Tim Lincoln