The researchers used data from the Global Positioning System to track how the land surface moved along the rupture, together with satellite radar data on rock deformation in three dimensions. The fault changes its orientation and type of motion along its course, concludes the team led by Zheng-Kang Shen of the China Earthquake Administration in Beijing. Maximum slip — where destruction was worst — occurred at the intersections of different fault segments.

CLIMATE CHANGE

Looming locusts

J. Geophys. Res. doi:10.1029/2009JD011833 (2009)

Climate change may cause increasingly frequent plagues of crop-destroying locusts (pictured) in China. Ge Yu and her colleagues at the Chinese Academy of Sciences in Nanjing looked at records of locust outbreaks throughout more than 1,000 years and compared them to climate data, using annual records from the past 150 years and decadal information going back a millennium.

NEWSCOM

In northern China, locust numbers tended to explode in years with warm, wet winters and warm, dry springs and summers. In the south, the insects swarmed in years with warm and wet springs. Because higher temperatures were consistently associated with outbreaks, the authors suggest that a warming China may be one with more locusts.

NEUROSCIENCE

Wake up to dementia

Science doi:10.1126/science.1180962 (2009)

Sleep in mice affects the formation of amyloid-β plaques — the protein clumps found in the brain in Alzheimer's disease.

David Holtzman from Washington University in St Louis, Missouri, and his colleagues measured amyloid-β levels every hour in the brains of mice engineered to express a mutant form of the human *APP* gene, which codes for the amyloid-β precursor. They found that amyloid-β levels rose when the animals were awake and fell when they slept. Normal mice and humans showed similar patterns.

When the authors deprived the mice of sleep, amyloid-β levels increased by 20–25%. When they blocked a neurotransmitter that induces wakefulness, they saw lower amyloid-β levels and fewer plaques.

ATMOSPHERIC SCIENCE

Menacing methane

Geophys. Res. Lett. doi:10.1029/2009GL039780 (2009)

The atmospheric concentration of methane — a potent greenhouse gas — has been climbing over the past two years after remaining flat for nearly a decade. This shift has prompted concern that frozen carbon deposits in the Arctic are starting to melt, which could greatly accelerate climate change.

But Ed Dlugokencky of the National Oceanic and Atmospheric Administration and James White of the University of Colorado, both in Boulder, and their colleagues report that sustained melting of these frozen stores has yet to begin. Their analysis of air samples from around the world indicates that in 2007 the extra methane emissions came from northern wetlands, and that in 2008 they came from tropical wetlands.

ECOLOGY

Survival tips

Proc. R. Soc. B doi:10.1098/rspb.2009.1153 (2009)

The risk of a population becoming extinct is influenced more by environmental factors than by migration between subpopulations, according to Blaine Griffen, now at the University of South Carolina in Columbia, and John Drake of the University of Georgia in Athens.

To monitor extinction effects, they studied populations of the zooplankton *Daphnia magna* in small water tanks, each divided by a partition with holes of varying number and size to control the migration rate between the two chambers. The aquaria were stacked up in a lab, with higher tanks receiving more light. Migration had little effect on the length of time to extinction, but higher tanks receiving more light harboured larger populations that took longer to become extinct, the researchers found.

JOURNAL CLUB

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A geneticist wonders why we need to sleep.

Scientists can have a love–hate relationship with sleep. We know that it is vital for our health, but not the reasons why. We celebrate dreams that provide inspiration, but often dismiss sleep as a chore.

Yet deep sleep can provide insight into vexing problems. In 1920, pharmacologist Otto Loewi famously had a recurring dream that suggested how he could demonstrate neurotransmission in the lab. The key experimental details escaped him until he captured the dream in a bedside notebook. Later that day, he performed his Nobel-prizewinning experiments with the aid of a few frog hearts and a water bath.

Now, a team led by Ying-Hui Fu reports that a single mutation in a gene called *DEC2* can cause people to sleep for only about six hours per night instead of the usual eight (Y. He *et al. Science* **325,** 866–870; 2009). This mutation seems to be exceedingly rare, with only two carriers found so far. Only by introducing this mutation into transgenic mice and fruitflies could the researchers show compelling evidence of the mutation's effect. These two additional waking hours each day are quite remarkable when you consider that, over 80 years, this would add up to more than 8 years of extra productivity!

Why are extreme short sleepers so rare? Surely evolutionary pressures should favour less sleep? In prehistoric times, short sleepers would have had more time to hunt, gather food and guard against predators. In modern society, we must constantly balance home, work and other demands. Sleep is often sacrificed, so a drug that could provide hours of extra productivity would be hugely popular.

A better understanding of the reasons for sleep could provide a rationale for getting more of it. In the meantime, I will keep a notebook by my bedside as a dream catcher.

Discuss this paper at **http://blogs.nature.com/nature/journalclub**