Revealing ruptures

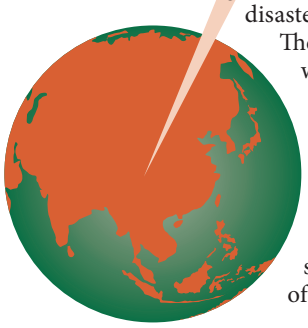
Zheng-Kang Shen and colleagues discovered an unusual cure for car-sickness while trying to understand the mechanics of fault deformation during the Wenchuan earthquake.

What was the objective of the work?
We wanted to understand the mechanics of the fault rupture of the 2008 Wenchuan earthquake in China, which killed more than 80,000 people. The earthquake took place along the Longmen Shan fault. The rupturing of this fault reflects ongoing tectonic stress build-up that results from the eastward movement of the Tibetan plateau thrusting over the relatively stable Sichuan basin. We hoped that by measuring crustal deformation during and after the Wenchuan earthquake, we could better understand the geometry and extent of the fault rupture, as well as the mechanism of the earthquake and its associated tectonic processes.

Why did you choose this particular location for the fieldwork?
The earthquake chose the location for us, providing an exceptionally rare opportunity for study. Scientifically, few (if any) Earth scientists anticipated an event of this magnitude in this locality, even though the steep western margin of the Sichuan basin is known to be seismically active.

What sorts of data were you after?
We collected GPS data, together with radar data obtained from satellites. We used this data to measure crustal deformation resulting from the earthquake, and to determine fault geometry and slip distribution during the earthquake.

Did you encounter any difficulties?
We encountered most of our difficulties during the early phase of our fieldwork, which was carried out immediately after the quake. We came across roads that had been buried by landslides, collapsed bridges, vehicles hit by fallen rocks and a traffic accident in a congested road lined up with disaster-relief trucks. The living conditions were poor, with a lack of adequate food and water supplies at some camping grounds, and no power supply. Several of us suffered from altitude sickness while climbing mountains to survey sites. And there was the psychological trauma of seeing so much destruction.



DR YANZHAO WANG

A crew member setting up GPS survey instruments at a mountain-top site after an hour-long hike. He is being watched by a local villager who helped carry survey equipment to the site.

Did you have any encounters with dangerous animals?
One of our team members was stung by a hornet when working at a survey site. He had to run down a half-hour-long trail before being rushed to hospital.

Any low points?
On many occasions we were shocked by the scale of the devastation that the quake had caused. Among all the emotional lows, the one that stood out the most was when we had just finished a day of work and sought lodging assistance at a local government office. A lady in her thirties quietly arranged tents and meals for us. Afterwards, she asked, with a gentle and quiet voice: "Didn't you know such a big one was coming?" We learnt later on that she had lost her husband in the earthquake.

What was the highlight of the expedition?
Having overcome all sorts of difficulties and hazards, we were elated when — two weeks after the quake — we had our instruments up and running at the first field site.

Did you learn anything new about yourself or your team members?
One of our crew members got car-sick while sitting in the back seat of a four-wheel-drive Toyota Land Cruiser, following a long drive along a treacherous rural road. With no other cure available, we put him in the front seat of a small and shaky pick-up truck, with tiny wheels and thin body parts. Bumping up and down, he sat in the car for the next several days, and never got car-sick again. We learnt that expensive and comfortable vehicles can still offer great discomfort, and that cheap uncomfortable vehicles are sometimes the best cure.

This is the Backstory to the work by Zheng-Kang Shen and colleagues, published on page 718 of this issue.