operates on a three-year cycle. It produces winter wheat the first year, then a crop of spring pea the following year. Both crops are harvested. In the third year, Austrian winter pea is planted. The mature plants are plowed under to provide "green manure" for the fields. In contrast, the conventional farm alternates between crops of winter wheat and spring pea. Although the crop yields are similar for both farming systems, the organic farm produces a cash crop on a given field in only two out of three years of the cycle.

It took a long time to find the right sites for a comparison of soil properties, says Reganold. "We picked a spot where the farms touch each other." Even the slopes and the direction in which the slopes face were identical for both sets of test sites. "In that small area, all environmental conditions were the same except for management," he says.

Earlier studies had already shown that the organically farmed soil had higher levels of organic matter and a larger mass of microorganisms and soil enzymes. The most dramatic difference revealed by the new study was that the organic farm's topsoil was on the average 6 inches thicker than its neighbor's. In addition, the organically farmed soil held more moisture and had a softer surface crust. Says Reganold, "All that change has taken place since 1948."

The greater erosion rate shown for conventionally farmed soil indicates that a typical farm with similar soil and slopes could lose all of its topsoil within 50 years, exposing a denser, less fertile, clay subsoil. Wheat yields go down substantially in this harder soil.

If conventional farming systems are not modified, the loss of valuable topsoil will continue, and in the long term, productivity will decline, says Reganold. Unfortunately, many farmers can't afford to put in a legume-based, green-manure crop and periodically leave fields out of production. *— I. Peterson*

Tense moments between two quakes

Two earthquakes and a swarm of aftershocks struck California's Imperial Valley last week in a bout of crustal rearrangements that caused some scientists to worry that the so-called "big one" might follow on the heels of these smaller quakes. And this week, a quake registering at least 7.4 on the Richter scale of magnitude occurred in the Gulf of Alaska.

The larger of the California quakes, measuring 6.3 on the Richter scale, was centered on the Superstition Hills fault about 90 miles east of San Diego. The first earthquake, a 6.0 in magnitude, hit 11 hours earlier and 6 miles to the east, along an unnamed fault that trends northeast from the Salton Sea toward the southern branch of the San Andreas fault.

Scientists believe that the first quake triggered the second one. While this pattern is unusual, it is not unprecedented in the Imperial Valley.

These and most other earthquakes in the region result from the movement of two great crustal blocks that slowly slip past one another. As the northwest-moving Pacific plate slides against the North American plate, this motion is absorbed by the intricate faults in California and off its coast. Most of the strain from this plate motion is stored in the well-known San Andreas fault.

Though the earthquakes occurred on faults that lie 20 miles west of the San Andreas, scientists who monitored the aftershocks of the first quake became concerned when the cluster of temblors began to head toward the San Andreas. "We were definitely worried about the possibility of it going north and we were keeping a very close watch," says Lucile Jones, a seismologist with the U.S. Geological Survey (USGS) in Pasadena.

By all estimates the southern section of the San Andreas fault is just waiting to break. Instead of sliding peacefully past one another, the two sides of the fault have spent 300 years locked together, storing up the potential energy equivalent to a magnitude 8 earthquake. Seismologists estimate a 50 percent probability that the fault will break in the next 20 years.

While Jones and others watched the aftershocks to see if they would unlock the San Andreas, the northeast-moving aftershocks turned around and headed back toward the southwest. "Then the [magnitude] 6.3 [earthquake] occurred on the Superstition Hills, and we had aftershocks in the Superstition Hills, and we sort of breathed a sigh of relief and said, 'It looks like it's going south,'" Jones told SCIENCE NEWS.

The second California quake did not catch seismologists totally by surprise. Last year, Robert Wesson and Craig Nicholson of the USGS headquarters in Reston, Va., reported that this section of the Superstition Hills fault had remained noticeably quiescent in the last 20 years. "In a sense we predicted the position of the earthquake," says Nicholson. "But we had no indication of how soon or how late such an earthquake might occur."

The Alaska quake shook the ground for a full minute and sent thousands of people fleeing from low coastal areas. It did not trigger a major tsunami, or giant sea wave, as had been feared at first. *— R. Monastersky*

Hamster jet lag: Running it off

Scientists have noted that people who become "jet lagged" after long trips adjust more quickly to their new sleep-and-wake schedule if, upon arrival, they engage in outdoor activity such as walking or running. But it is unclear whether this resetting of daily biological and behavioral rhythms is a result of the activity itself, exposure to light, the traveler's conviction that exercise is beneficial or some combination of these factors.

Researchers at the University of Toronto now report that hamsters with simulated jet lag quickly adjust to their new timetable with the help of exercise alone. The finding, say Nicholas Mrosovsky and Peggy A. Salmon in the Nov. 26 NATURE, suggests that it may be possible to design exercise schedules that diminish jet lag among humans.

The investigators housed 20 male hamsters in a room with a cycle of 14 hours of light and 10 hours of darkness. During the dark period, a dim red light was kept on. After the hamsters became accustomed to the light-dark cycle and to running wheels in their cages, their day was suddenly shifted forward by 8 hours so that darkness arrived prematurely. Half were left undisturbed, while the others were removed from their cages 1 hour after the new onset of darkness and placed on unfamiliar running wheels. Three hours later they were returned to their home cages.

The simple experimental procedure resulted in a rapid adjustment to the new light-dark cycle. Hamsters, which are nocturnal creatures, began normal wheel-running following the onset of darkness after an average of only 1.6 days when they had the initial 3-hour running session. Undisturbed animals took an average of 5.4 days to adjust.

When the experiment was repeated without a dim red light during the dark period, undisturbed hamsters required an average of 11.6 days to adjust, compared with 1.5 days for those forced into activity.

The results suggest that, at least among people who are physically fit, appropriately scheduled jogging might be a good way to fight off jet lag, according to the researchers. Other research has indicated that drugs such as melatonin and the tranquilizer triazolam reduce jet lag.

The observed effects of exercise on "jet lagged" hamsters is surprising, writes ecologist Arthur T. Winfree of the University of Arizona in Tucson, in an accompanying editorial. But he says it is not yet possible to make specific exercise suggestions for similarly afflicted humans. He notes that the hamster data "dramatize our ignorance" of daily biological rhythms. *— B. Bower*