laminated, or composed of finer layers. These layers alternate with nonlaminated ones. He believes that contrary to scientists' expectations, the laminated sediments were deposited during glacial periods, when sea levels were low and the winds that blow westward from Peru intensified, displacing surface water and resulting in a period of enhanced upwelling. With more upwelling, algae and diatoms flourished. When these organisms sank to the bottom, they consumed the oxygen that sustains bottom-dwelling animals, which normally churn up laminated sediments. Previously, says Suess, scientists had correlated laminated sediments with high sea level.

The most surprising find of Leg 112 was the discovery of water in the sediments that was twice as salty as normal seawater. Suess suspects that about 10 million years ago the outer shelf was lifted and isolated from the oceans, leaving a salty layer of evaporites — sedimentary rocks that formed when seawater evaporated from a basin — that is now buried deep in the margin. While ODP scientists were able to detect the salt that is now seeping upward from a salt deposit, they did not encounter the salt source itself.

With summer now under way in the Southern Hemisphere, the *JOIDES Resolution*, on Leg 113, is in the Weddell Sea, in the Antarctic, studying the past ocean circulation around Antarctica as well as the tectonic processes that separated Antarctica from Australia and South America millions of years ago.

On future cruises, it's possible that ODP scientists will be joined by their Soviet colleagues. Both the U.S. National Science Foundation (NSF) and the Soviet Union have indicated a desire for the Soviets to pay the $2.5 million annual fee and become ODP's seventh member. But according to an official at NSF in Washington, D.C., there is some opposition in the Reagan administration to Soviet membership. In fact, an NSF delegation's scheduled trip to the Soviet Union to sign the ODP membership agreement has been postponed, he says, apparently because of "administration infighting."

— S. Weisburd

Earth's most abundant mineral

When the earth formed 4.7 billion years ago, it was an unsorted conglomeration of cosmic material. Through heating and chemical differentiation, the compounds making up the planet sorted themselves into three main layers: the core, mantle and crust. By studying the compositions and temperatures of these layers today, scientists can begin to reconstruct the evolution of the earth as it has cooled.

One significant step toward that end is taken in a Feb. 6 SCIENCE paper by graduate student Elise Knittle and geophysicist Raymond Jeanloz, both at the University of California at Berkeley. With high-pressure experiments, Knittle and Jeanloz have shown that a mineral called magnesium silicate perovskite makes up most of the lower mantle. And since this region accounts for about two-thirds the bulk of the earth, the researchers believe that magnesium silicate perovskite is the "most abundant building block of the whole planet."

Magnesium silicate perovskite was discovered about 10 years ago by L.-G. Liu at the Australian National University in Canberra. He showed that many upper-mantle minerals convert to the perovskite under the pressure of a diamond anvil press and the heating of a laser. But at that time the technology had not advanced far enough for Liu to easily subject the perovskite to the very high pressures found in the lower mantle.

Now Jeanloz and Knittle are able to synthesize the perovskite samples at pressures of the lower mantle: from 240,000 to 1.3 million atmospheres, which is more than four times greater than what had been available to Liu. What's more, Jeanloz and Knittle became the first to study directly the crystal structure of the perovskite using X-ray diffraction while their samples were under these high pressures.

"The guts of our discovery are that once this perovskite is made in the mantle, there's no new high-pressure phase that forms at greater depths [or pressures] as far as we can tell, because we've covered the entire pressure range . . . of the mantle," says Jeanloz. In other words, the perovskite retains its composition and structure under mantle pressures.

The researchers characterized some of the mineral's properties — including its density, compressibility and melting temperature — under mantle conditions. "This gives us a real handle for the first time on the long-term behavior of the deep earth," notes Jeanloz.

Since the lower mantle is a solid, the melting temperature of the perovskite gives the researchers an idea of the highest possible temperature of the lower mantle. Jeanloz says they hope to obtain a more exact estimate of the temperature by comparing the seismologically determined densities of the mantle with additional laboratory studies of the perovskite density as a function of pressure and temperature.

Jeanloz says perovskite crystals with the same structure, but with compositions different from the mantle material, have been of intense interest to scientists studying superconductivity (SN: 1/10/87, p.23). Now, in addition to the technological significance of perovskites, he notes, "we're saying they have a geologic importance as well."

— S. Weisburd

Mir: Has full-time occupancy begun?

Permanent human occupancy in space, with crews continually present aboard earth-orbiting stations, is a goal that has been cited in the past by both U.S. and Soviet officials. Now, some Western observers suggest, that process may have begun, with a pair of cosmonauts who boarded the Soviet Mir space station on Feb. 8.

Mir — the name is the Russian word for "peace" — was launched just over a year ago, and was described in Soviet accounts at the time as "a base module for assembling a multipurpose, permanently operating complex" (SN: 3/1/86, p.136). One cosmonaut duo boarded the station the following month and stayed for 50 days, after which they moved to the older Salyut 7 station for 50 more and then came back to Mir for 25, finally returning to earth. But officials had already announced that the mission would be primarily a checkout period, to be followed by a period of unmanned operation. Subsequent crews, it was said, might then take up residence there on a rotating basis.

Now aboard is the first team to arrive since then, cosmonauts Yuri Romanenko, on his third space mission, and rookie Aleksandr Laveikin. They arrived in the latest version of the Soviet Soyuz spacecraft, identified as Soyuz TM-2. According to Soviet space-program specialist James Oberg, an engineer at NASA's Johnson Space Center in Houston, TM-2 is characterized in part by reduced structural weight, enabling 440 pounds of additional cargo to be carried into orbit, and by the ability to dock with Mir without requiring the station to use extra fuel by reorienting itself in space.

According to Oberg, a number of cosmonauts have said in private conversations that full-time occupancy of Mir would begin with this mission. As for the planned length of the present crew's stay, Soviet press accounts have identified it only as "many months." It was reported in January, however, that the duo is to be joined by another in July, and Oberg and others say Romanenko and Laveikin could be there 10 months.

Also due to be docking with Mir in a few months for scientific research will be an "astrophysics module," one of several that are said to be forthcoming. Not that everything is going flawlessly; the astrophysics module was expected early in 1986, Oberg says. Other modules are said to be planned for medical and biological studies, materials processing research and earth observations.

Meanwhile, uncertainties continue about the future of the proposed U.S. space station, permanently occupied or not.

— J. Eberhart