Geologists are no strangers to meeting the logistical challenges of doing fieldwork in remote parts of the world. But when John Garver, professor of geology, and Sarah Johnston ’02 visited the Kamchatka Peninsula in Russia’s Far East last summer, the challenges included grizzly bears, vodka, and an aging tank.

The final frontier was barely audible over the drone of the tank and through my earplugs. Almost 100 meters to the right, a huge brown-red grizzly sow rears up to check out our oncoming tank, which has nine geologists hanging onto the roof and two in the cab. After a brief deliberation, she turns, drops to all fours, and scurries up the hillside. Two small cubs emerge from the tall grass and race after their mother. Our destination is the Srendiny Range in the southern part of the Kamchatka Peninsula in the Russian Far East, and we’re getting there on an ancient—and very noisy—Russian tank.

Kamchatka is one of the last great wild frontiers in the world. Nearly the size of California, it has about 300,000 residents, most of whom live in the city of Petropavlovsk-Kamchatski (PPK) on the southeastern part of the peninsula. Most of the landmass is uninhabited, and there are fewer than 1,000 kilometers of roads on the entire peninsula (compared to more than 600,000 kilometers in California). Kamchatka is still one of the nerve centers for the Russian military machine, and before the breakup of the Soviet Union in 1991, Soviet citizens needed a visa to visit the region, despite the fact that it was part of the motherland. For Americans, of course, a visit was virtually impossible. This started to change after 1991, and Kamchatka is now partly open to scientific inquiry.

Why do we choose to work in Kamchatka? A simple answer, really. Due to its prominent position in the northwest Pacific, it’s a geological wonderland, full, for example, of many active volcanoes that are featured in so many televised nature specials. And there is incredible scientific opportunity in a land that had been closed to Westerners for so long.

At times, it seems we are the only geologists in Kamchatka not studying one of the volcanoes. Instead, our quarry is the deeper and older bedrock.

*Russian for “bear”
Sarah Johnston ’02, Alexie Solovie, and Abby Speiler (Yale student), on Baraba mountain to collect rocks.
Funded by a grant from the National Science Foundation’s Office of Polar Programs, we are trying to unravel the scar, or “suture zone,” from a collision of oceanic plates some 45 million years ago. The timing of this event is revealed in the sedimentary strata that accumulated at the time and by tiny radioactive minerals that had their atomic clocks reset by the punch of that collision. Our job is to get to the suture zone and collect rocks that tell this story.

While this objective might seem relatively simple, in Kamchatka it is not. Geological fieldwork commonly involves complicated field logistics, of course, but geological fieldwork in Kamchatka always involves complicated logistics. Our field sites are remote, and the infrastructure in Kamchatka needs work. Generally, the only access to remote areas is by helicopters, boats, and tanks. But over the years I have learned that logistical challenges spawn interesting solutions, and last summer we found our field party of eleven loading gear onto a surplus Russian military tank for a fourteen-day excursion to the mountains.

As an aside, let me describe how just getting to Kamchatka these days is exhausting. Russia has either purposefully or accidentally shut off most air traffic from the east (mainly from Anchorage, but also from Seattle and San Francisco). Apparently the Russian authorities don’t want you leaning out the plane windows taking pictures. So the only reliable way of getting to Petropavlovsk-Kamchatski is from Moscow, a nine-hour flight that crosses nine time zones entirely within Russian airspace. The flight from New York City to Moscow takes about eight hours and crosses eight time zones. So, just to land in PPK from New York, we travel for two days and cross seventeen of the twenty-four time zones on the planet. This redefines jet lag!

The Russian-American Connection
Our Russian colleagues work at the Institute of the Lithosphere of Marginal Seas, which is part of the Russian Academy of Sciences (dryly known as ILMS-RAS) located in Moscow. The Russian team is headed up by Galina Ledneva and Alexie Soloviev, both regular visitors to the Geology Department at Union since 1993. Their early visits, and the entire collaboration, were based on a Union-alumnus funded program to facilitate exchange between FSU (Former Soviet Union) scientists and Union faculty and students between 1991-1995.
Galina and Alexie are the bright lights of the future of Russian science. They survived the 1990s Russian brain drain—a mass exodus of perhaps as many as half of the scientists in the FSU—largely because at that time they were young, early in their careers, and therefore relatively immobile. Now, less than ten years from receiving their Ph.D.s, they have rocketed upwards in the world of Russian science, and they have found themselves in leadership roles while still young. This is the New Russia.

Galina is an igneous geochemist, which means she works on the origin of melted rocks such as granite and basalts. Using analytical equipment at Union with Professor Kurt Hollocher of the Geology Department, she figures out where melted rock comes from simply looking at distinctive geochemical fingerprints. Like Sherlock Holmes, her job is to figure out whose fingerprints are on the goods, and in this case, the goods are volcanic rocks from plate collisions.

Alexie specializes in structural geology and tectonics, which means that he worries about how faults and folds are related to tectonic smash-ups. In this sense, he is a bit like an insurance investigator trying to sort things out after a car accident. Alexie’s job is a little more challenging, though, because the accident was millions of years ago, there were no witnesses, and the tectonic plates have had time to hide evidence. Over the last five years, Alexie has spent a number of visits at Union in the fission-track lab, dating the timing of rock cooling that was driven by these tectonic nudges.

**Getting started**

Well, we make it to PPK, and then we negotiate a six-hour bus ride north to the small town of Milkova, near the salmon-laden Kamchatka River in the vast flats of the central Kamchatka region. Our target is the high mountainous region of the Srendiny Range to the west. The first task is to find transportation—reliable transportation—and we make our first stop at a well-used lumber yard just outside town. Sitting among the piles of fresh lumber, dirty logs, and angry dogs is an interesting collection of tracked vehicles and trucks. Our choice was a real tribute to the creative hands of our new hosts. It was an eleven-ton, 1960s-era, personnel carrier modified especially for “off road” use in the mountains.

The style was clearly made for utility and not for comfort, and more than once I wondered what it must be like to be a soldier in the Russian military and was thankful for my cushy job as a college professor. Riding on the tank was deafening. The engine whined, and thick black diesel exhaust belched out the side. In the cab, the constant loud metal-on-metal clanking from the treads left one wondering how the thing stayed together as the kilometers ticked by. Both on the roof and in the cab, earplugs were handy.

As one would expect, the tank was painted army green. It had two huge sprockets in the front that turned the tread, which was made of interlocking steel plates. Inside, it could seat the driver plus two or three in a pinch. The most obvious improvement to the tank was that part of the back end was sheared off and replaced with a six foot by ten foot steel box with small windows on either side. This cargo box held our gear and four fifty-gallon drums of diesel. Another modification included gun removal; perhaps that’s always done before these units are made surplus by the army.

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Loaded and tanking
It sometimes seems that Russians in Kamchatka will drain a bottle of vodka on even the smallest of occasions. On the morning of our third day we set out for the Platonich River, our farthest destination, which was easily a full day of tanking away. At this point, we were well over 300 kilometers from civilization. At about 11 a.m. we were startled by the sight of another tank passing us on the left through the bush. Then things got really bizarre. Five camouflage-clad fellows from Milkova brandished guns and signaled us to stop. Although technically we were on a tank ourselves, stopping seemed the prudent thing to do. Within seconds out came vodka bottles, beer, cucumber slices, and bread. I am certain that their earlier breakfast resembled this early lunch. It turns out that the co-owner of our tank was driving the other tank and was taking some Russian guys out to look for gold. I have never seen prospectors on a tank, carrying loaded guns and vodka, but hey, you never know what it takes to strike it rich. Later it dawned on me that if I were looking for gold and I came upon a tank with eleven geologists, I might ask a question or two about promising areas. I doubt it even crossed their minds.

Grizzly Mom
Brown bears and grizzly bears pose one of the biggest dangers to geological field parties in Kamchatka, and a sow with two cubs is about as dangerous as it gets. The Kamchatka brown bear (with the appropriate Latin name: Ursus arctos horribilis) is a relative of the North American grizzly bear and is one of the largest of the species in the world. Full-grown males are generally nine feet tall and can weigh up to a ton, while females are six feet tall and weigh 700 to 800 pounds when full grown. Kamchatka has the an estimated 12,000 to 14,000 brown bears—about ten percent of the total world population. We geologists tend to have great respect for these animals because we share a common interest in remote regions with rocks and rivers. A good rule for fieldwork—steer wide and clear of this potential fireball.

Our Tank Driver
Leova is, basically, a professional tank driver. As far as I could tell this was his only real profession. He was trained in the Russian army near the town of Khabarovsk, which is in the Russian Far East near the border with China. He looks the way I suppose a tank driver should look: he has a full head of graying brown hair, a tanned ruddy face with a thick mustache, and a two-week growth of stubble. He has short stubby fingers and hands made for turning nuts and bolts. He sports several tattoos on his hands, including a skull and bones “ring” on one finger and a barely legible name scrawled across the base of his thumb that was quite clearly the result of a vodka-
hazed night some time ago. He lives in the town of Milkova, where we rented the tank and his services.

On the road, Leova is amazing. He is keenly focused on keeping both the tank and the passengers safe during the course of a ride, a true professional. Most travel is on fairly obvious dirt tracks remaining from previous excursions. Despite this, one of the biggest dangers of riding on the roof of the tank is branches from trees. Leova deftly works the foot pedals and the hand levers so that the roof-riders stay nearly branch-free. Off road, he concentrates on the additional natural hazards that make tanking so interesting: negotiating boulders, steep embankments, river crossings, and trees are all in a day's work. When we cross poorly-traveled valley bottoms, the tank makes easy work of most trees in our path; eight-inch diameter trees were felled smoothly in first gear.

In the bush, Leova is comfortable and relaxed. Evenings he crouches in camouflage duds by the campfire and quietly sips sugar-rich tea in a small enamelled cup with bright red flowers. He listens to the mixed Russian and English banter, only getting half of it. When we finish for the evening, we pile into our REI dome tents and he climbs into the back of the tank and settles in for the night among the gear and diesel drums. Before we left, we arranged to pay $100 (U.S.) per day for the tank services. My guess is that of that total, Leova takes home about $20 per day (the owners get the rest), so for a fourteen-day trip he probably takes in just under $300. This kind of money will go a long way in his hometown, where a pack of Russian cigarettes goes for three rubles (ten cents), a bottle of vodka is about thirty to ninety rubles (one to three dollars), and a loaf of bread costs fifteen rubles (fifty cents).

“Home” at Last

As we ride back into town, 600 kilometers behind us, the road gets better and better and the tank goes faster and faster. I'm riding up front in the cab with Leova, and I can sense that he is getting tense in anticipation of our arrival in town. It will probably be a long night of celebration and a rapid acclimatization back to “civilization.” I think back over the past fourteen days and realize that he was the modern Russian cowboy of the post Cold-War era, tanking away on the Kamchatkan frontier.

Russian for “Bear!”

Sarah Johnston, a senior geology major, was aware of the pitfalls of doing research in Russia's remote Kamchatka Peninsula.

The drawbacks include iffy weather, no communication with the outside world, the legendary Russian bureaucracy, and grizzly bears.

The reward was a chance to do scientific research where few Westerners—let alone college students—have ever been.

So Sarah had no hesitation about joining Professor of Geology John Garver and nine other researchers who spent part of last summer deep in the middle of nowhere. Was it worth it? “It was great,” she says. “I'd go back in an instant.”

The summer's visit was a good one, according to Garver, who had been to Kamchatka on four previous occasions. The weather was beautiful (he remembers one trip where he was trapped in a tent for ten straight days by pounding rain). Although Russian officials vetoed their original research plan at the last minute, they still were able to go to a part of the peninsula they were planning to visit eventually. And the grizzly bears—more abundant here than anywhere else in the world—left them alone.

Kamchatka has long fascinated geologists, and when the area was opened to Western scientists in 1992 after the breakup of the Soviet Union, Garver and long-time colleague Mark Brandon of Yale University were eager to visit. Having done extensive fieldwork on Mesozoic and Cenozoic tectonics in British Columbia and Washington, they were intrigued by the chance to establish a similar program on the other side of the Pacific. At about the same time, the support of an anonymous donor enabled the College to bring Russian scientists to campus for extended visits. One of the visitors, Nikolai Sobolev, used his Russian contacts to assist Garver and Brandon, who obtained a National Science Foundation grant in 1993 and promptly made their first visit.

"It's an area where the continental plates are grinding against each other," Garver says. "We think that understanding the active tectonic process might help us with things like oil and mineral exploration. If you're exploring for oil, it would be real handy to have a blueprint of how it came about."

Despite the initial enthusiasm by Western scientists, few have persisted like Garver and Brandon. Obtaining the proper permits, for example, is a laborious process involving several levels of the Russian bureaucracy. Garver says he does encounter other non-Russian scientists on his trips, but, "Basically, you could put all the Westerners in one room."

Sarah Johnston can attest to the bureaucratic difficulties. When Russian officials told the team that it couldn’t go to its planned research area on the coast this summer, her research idea went out the window. The team hastily put together an alternative plan, and Sarah is back on track to do a thesis that examines when a certain set of conglomerates was deposited.