

# Survey looks for fault lines beneath Cascades

Emily Gwinn, Yakima (Wash.) Herald-Republic, 7-2-10

YAKIMA, Wash. -- The Cascade Range splits Washington into two distinct sides. Wet and dry. Liberal and conservative. Huskies and Cougars.

But a twin-engine Piper Navajo packed with sophisticated monitoring equipment is helping determine whether the two sides are more connected than generally believed.

Do fault lines deep beneath Puget Sound extend southeast below the Cascades and beyond the Tri-Cities? If so, what does that mean for residents on both sides of the mountains?

A U.S. Geological Survey team is using the plane in an attempt to unlock those and other mysteries.

For the next five weeks, the plane will be flying out of Yakima's McAllister Field and skimming the earth at low altitudes.

On board is equipment capable of looking more than 12 miles deep into the earth's crust to learn more about plate tectonics, geologic history and what that all means for earthquake hazards.

To do so, the plane will typically fly 500 to 1,000 feet above ground and potentially as low as 250 feet. Operated by Goldak Airborne Surveys of Saskatoon, Saskatchewan, Canada, the aircraft's pilot and co-pilot are specially trained for low-level flying.

"We are flying this year's surveys as close to the ground as safely possible," said Richard Blakely, research geophysicist for the USGS. "They know exactly where they need to go and how high they need to be."

"We'll be low, but I'm not sure anyone will notice us," said Blakely, who spoke by phone from his office in Menlo Park, Calif.

Flights will cover the rolling wheatlands of the Palouse to dense Cascade forests, with a focus on two areas. One is a swath over the Columbia River, from east of Walla Walla to Mount Adams, and the other is a smaller patch north of Hyak, near Snoqualmie Pass.

The data will be merged with earlier surveys from 2008 and 2009. Data for the project is collected as funding is available from both the USGS Earthquake Hazards Program and The U.S. Department of Energy. The current survey will cost about \$460,000.

The first step is searching for fault lines, but Blakely is quick to emphasize that the Yakima area faces no immediate dangers from a major earthquake.

The aircraft carries a cesium-vapor magnetometer that measures magnetic fields to determine underground properties, all of which are used to create maps of subsurface formations.

Those maps may help geologists understand the earthquake hazards in and around Puget Sound, such as those below Seattle and Whidbey Island.

"Most of what we are trying to do here is prove some theories," Blakely said.

One theory Blakely and his team are exploring is the existence of the Olympic-Wallowa lineament, a mega-fault first theorized in 1945 and suspected of stretching 250 to 300 miles from Puget Sound, beneath the Cascades and deep into Central Washington.

Proving its existence would help understand Central Washington's fault lines and their seismic potential, which in turn would help in designing dams, buildings, roads or methods of disposing of radioactive materials at Hanford.

Small quakes occur in the Yakima area periodically, although residents usually don't notice.

As recently as June 17, for example, two small earthquakes were recorded about 19 miles south of White Swan. The Pacific Northwest Seismic Network recorded a 4.7 quake at 7:23 a.m. and another 2.1 quake at 7:50 a.m.

Clearly, the seismic hazard in Yakima just isn't as great as in downtown Seattle, said Blakely.

The study could also help determine how much of Central Washington's landscape is being formed by forces far away. Geologists long ago noticed that the ridges that define the region, such as Saddle Mountain and Ahtanum Ridge, are formed by tectonic action.

Tectonic plates pushing north crush Central Washington against formations to the north that aren't giving way.

"It is like the wrinkling of the rug," said Ray Wells, USGS research geologist. "The (region) begins to get squished in between. That's how you get the hills around you."

These surrounding folds and faults seem to point toward Puget Sound.

"We're trying to figure out how they link together," Wells said.

"It's about piecing together the puzzle," Blakely said.

Yakima residents who want to spot the seismic-recording plane will need to set their alarms. According to Glenn Carson, supervisor of the Goldak project, daily flights start around 6 a.m.

"It all depends on weather conditions, but we're usually in the air early," Carson said.