



**NOAA Teacher at Sea  
Barney Peterson  
Onboard NOAA Ship RAINIER  
August 12 – September 1, 2006**

**NOAA Teacher at Sea: Barney Peterson**

NOAA Ship RAINIER

Mission: Hydrographic Survey

Wednesday, August 30, 2006

**Weather Data from Bridge**

Visibility: 10 nm

Wind : light airs

Seawater temperature: 10.5°C

Sea level pressure: 1002.2 mb

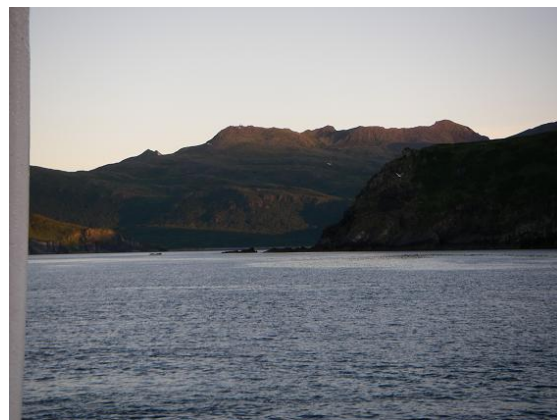
Cloud cover: Cloudy

**Science and Technology Log**

The Aleutian Range is a chain of mountains extending 1600 miles west from Mt Spurr, opposite Anchorage on Cook Inlet, to Attu Island at the northern edge of the Pacific Ocean. There is something like 80 active volcanoes in the range which forms the northern part of the Pacific Ring of Fire. That would be exciting enough if it was the whole story of the land here, but there is even more. Earthquake activity in the last 100 years has proven that movement along the tectonic plates of the earth's crust continues to shape the land.

As we sailed out of Seward on Resurrection Bay for a brief stop near the entrance to Prince William Sound, islands rose steeply out of the ocean, covered with thick evergreen trees from shoreline to summit. The exposed shoreline was mainly cliffs and the beaches were slim and rocky. The landscape looked like little chunks of the Pacific Northwest that I am used to seeing.

That all changed as we turned west and moved out through the Shelikof Strait on our way to our survey site at Nagai Island. Suddenly the only familiar feature was the color of the rocks! The islands pointed straight up from the water's edge. Most cliffs were rocky and broken with folds and bends in the bands of color. Some rocks were cross-hatched with breaks and gouges that showed how hard the sea and the weather have worked to break them down. The crowns of these islands looked smooth and green with no tall evergreen trees in



**Nagai Island cliffs rising steeply from the water**



**White sand beach and dunes on Nagai Island.**

were rocks on the bottom, they were big, chunks that had broken off from the cliffs above and tumbled out as far as their weight could carry them. Our bottom surveys showed areas of thick black mud and shell, made from weathering and erosion of the cliffs at the water's edge.

Farther out the chain we stopped at Dolgoi Island in the Pavlof Islands group. Here the islands were even more barren looking. Not even scrub alder shrubs seemed able to survive on the slopes and few flowers bloomed in the thick mat of mosses and



**TAS Peterson exploring the shoreline of Mitrofanina Island by kayak.**

sight. Just when I had adjusted to seeing cobbled beaches and abrupt cliffs, we discovered a beautiful white sand beach backed by wind-formed dunes and covered with driftwood. At this point the weather cleared, the skies turned blue, and the beach was reflected in clear aquamarine blue waters that reminded me of the Caribbean.

We worked our way around Nagai Island, surveying water depths and noting how the cliffs that rose above the water seemed to plunge downward below the surface at the same angles we saw above it. When there



**Olga Island rising abruptly from the sea.**

heath that covered the crowns of the peaks. These islands were more rounded at the tops with some softer contours, but just as abrupt as they poked above the sea. The beaches at Dolgoi and Olga Islands were mostly large boulders covering just a few meters before sea grasses and then thick low brush took over.

We sailed east again, back to Mitrofanina Island; a place that looks like it hasn't changed since dinosaurs roamed the earth! Here the cliffs were abrupt, high, and split by deep cuts. Every possible surface was covered by bright green brush. The waters around the island were full of shoals and the cliff bases were laced with caves and cracks. Sudden breaks in the sharp cliffs showed where larger streams have worn away softer rocks to form

valleys as they plunged to the sea. These gentler slopes allow pools and drops in the stream that are perfect for spawning salmon and developing juveniles before they head into the ocean. Small bays at the mouths of streams have captured coarse black sand to form narrow beaches. Beaches that didn't have the protection of bays were long strips of rounded rock, driftwood, and sea grasses.

So what have I learned about the geologic processes that formed this area? Well I know that we saw fossils in some of the rocks. Fossils are not something one would expect to find in volcanic rock. Much of the rock in the exposed cliffs shows thick bands of color in strange folds and twists. The soil on the islands is not deep and rich. Excepting for the one white sand beach that we saw, most sand was coarse and black echoing the color of the rocks around it.

I did a little research in the ship's library to clarify the geology for my own understanding. According to Introductory Geography & Geology of Alaska, a textbook published in 1976 and written by L.M. Anthony and A.T. Tunley, this is the scoop:\*

*Flanking the igneous cones of the Aleutian Range are uplifted sediments, mostly marine, dating back to Paleozoic time...rich in fossils and petroleum bearing shale....the Aleutian Range area consists of many high and active volcanoes of Cenozoic age that have uplifted adjacent sedimentary rock of relatively older age.*

And as for the soil and vegetation, Anthony and Tunley write: *Lithosolic soil is characterized by recent and imperfect weathering...rocky soils with thin, irregular coverings of soil material. Some support only lichens and mosses. Better-developed lithosols have heath shrubs and dwarf trees growing on them...These soils are also common to fresh moraines, beach sands, windblown dunes, and volcanic ash deposits. In Alaska, lithosols are found in the Alaska Range, Brooks Range, Coastal Range, and on Kodiak Island and the Aleutian Islands. Elsewhere they are found in the Andes, Alps, and in the mountains of Asia.*

To me, all of that means that the volcanoes in the Aleutian Range represent relatively young features on the surface that have forced their way up through the older layers of rock. Those older layers can be seen clearly in the folded and bent sides of the island cliffs. Earthquakes continue as the tectonic plates slip over and under each other and the volcanoes that rumble to life along the edges of those active plates release pent up heat and pressure from deep within the earth.

**Credits:**

- Introductory Geography and Geology of Alaska, Anthony, Leo Mark, and Tunley, Arthur "Tom", Polar Publishing, Anchorage, 1976

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