ALASKA GEOLOGY
Newsletter of the
Alaska Geological Society

Focusing of Pliocene and Younger Deformation in the Cook Inlet basin, Alaska
Caused by Mantle Dynamics Related to Subduction and Collision of the Yakutat Microplate

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Note: AGS meetings will be at the BP Energy Center for 2010-2011.
Please check the website (www.alaskageology.org) and issues of the AGS newsletter for updates.
This newsletter promotes the October luncheon talk of the Alaska Geological Society,
to be held Thursday, October 21st, at the BP Energy Center.

The Cook Inlet basin is a forearc basin above the southern Alaska subduction zone, and has been for roughly 200 million years. We present a new compilation of faults and folds in the Cook Inlet basin, which shows that young deformation is focused in the northern part of the basin. Data sources are previously published maps, well locations, published and proprietary seismic reflection and aeromagnetic data. Some structures are remarkably well displayed on frequency-filtered aeromagnetic maps, which are a useful tool for constraining the length of some structures. Most anticlines in the basin have at least shows of oil or gas, and some are considered to be seismically active. The new map better displays the pattern of faulting and folding. Shortening in Pliocene to recent time is greatest in upper Cook Inlet, where structures are oriented slightly counterclockwise of the major basin bounding faults. Also, the north end of these structures bend to the northeast, which gives a pattern consistent with right-transpressional deformation.

Subduction and collision of the buoyant Yakutat microplate likely caused deformation to be preferentially focused in upper Cook Inlet due to both crustal shortening and mantle dynamics. The upper Cook Inlet region has the highest degree of shortening

AGS Luncheon

Date & Time: **October 21st, 11:30 am – 1:00 pm**

Program: **Pliocene Deformation in Cook Inlet**

Speaker: **Peter Haeussler, USGS**

Place: **BP Energy Center**

Reservations: **Please make your reservation before noon Tuesday Oct. 21st, 2010.**

Cost: **Seminar only, no meal: Free**

Reserve a box lunch: $15

Reserve a hot lunch: $20

Lunch with no reservation:
On an "as-available" basis only

E-mail reservations: **vp@alaskageology.org**
Or phone (907) 269-8673
(Ken Helmold, AGS VP)

For more information: visit the AGS website:

www.alaskageology.org

and the deepest part of the Neogene basin. This forearc region has a long wavelength magnetic high, a large isostatic gravity low, high conductivity in the lower mantle, and low p-wave velocity (Vp) and high p-wave to shear-wave velocity ratio (Vp/Vs). These data indicate fluids in the mantle wedge caused serpentinization of mafic rocks, which may, at least in part, contribute to the long-wavelength magnetic anomaly. This area lies adjacent to the subducting and buoyant Yakutat microplate slab. We suggest the buoyant Yakutat slab acts as a squeegee to focus mantle wedge fluid flow at the margins of the buoyant slab. Such lateral flow is consistent with observed mantle shear-wave splitting directions recent numerical modeling. The additional fluid in the adjacent hydrated mantle wedge then reduces its viscosity and allows greater corner flow. The result is focused subsidence, deformation, and gravity anomalies in the Cook Inlet forearc region.

About the Speaker:

Peter Haeussler is a research geologist for the USGS in Anchorage Alaska. He completed his undergraduate degree in geology in 1984 from Michigan State University and his Ph.D. from UC Santa Cruz in 1991. He's worked for the USGS in Alaska for the last 19 years on subjects as diverse as the tectonics of lode gold deposits in the Chugach-Kenai Mountains, the structural geology of neoproterozoic rocks in southeastern Alaska, earthquake-induced submarine landslides, and the geology of the Cook Inlet region. He is currently the USGS project chief of the Alaska Earthquake Hazards Project and the Western Alaska Range Project. This is his 5th talk for the AGS.