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PROFILE

Geomorphologist\geologist with extensive research experience in the US and Asia. Current research interests include: 1) the nature of surficial deposits, soils and vegetation – with emphasis on subtropical rainforest ecosystems; 2)Documenting neotectonics, geomorphic evolution and soil chronosequences of northern Thailand; 3) Geophysics and geophysical log expression of lacustrine sedimentary facies and determining continuity and extent of sand bodies important as aquifers and reservoir rocks in the western Snake River Plain; 4) Geologic mapping of southern Idaho using facies mapping, Ar/Ar dating and tephrochronology. Hydrogeology and geothermal resources of southern Idaho.

EDUCATION

1975 California Institute of Technology - Ph.D., Geology
1970 California Institute of Technology - M.S., Geophysics
1964 Colorado School of Mines - Geophysical Engineer

EXPERIENCE

1978- present: Assist., Assoc. ,Full and Emeritus Professor, Geosciences, Boise State University, Idaho
1994-95 and 2005 Visiting Professor: Geological Sciences, Chiang Mai University, Thailand
1978-83 Project Chief. USGS-Engineering Geology/Tectonics Branch (Alaska & Yukon)
1980 Research Geologist, USGS, Mt. St. Helens 0bservatory Vancouver, Washington
1976-77 Research Geologist--National Center for Earthquake Research, USGS-Menlo Park, California
1976 Visiting Assistant Professor, Quaternary geology, University of Oregon.
1974-76 Instructor in geophysics and geology, Occidental College, Los Angeles, California
1968-74 NSF traineeship, teaching assistant, Geological & Planetary Sciences, Caltech, California
1965-68 Geophysicist, Mobil Oil of Canada, Ltd./Gelsenberg, A.G. - Tripoli, Libya
1965 Jr. Geophysicist, Mobil Producing Netherlands, The Hague, Netherlands
1964-65 Seismological Engineer, Mobil Oil Geophysical Services, Dallas, Texas

PEER-REVIEWED JOURNALS AND MONOGRAPHS

Wood, S.H. and Ziegler, A.D. 2007. Floodplain sediment from 30-year-recurrence flood in 2005 of the Ping River in northern Thailand. **Hydrology and Earth System Science – Discussions**, v. 4, p. 3839-3868.

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Meyer, G.A., Pierce, J.L., Wood, S.H., and Jull, A. J. T., 2001, Fire, storms, and erosional events in the Idaho batholith: **Hydrological Processes**, v. 15, p. 3025-3038.

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_____, 1993, Timing of volcanism, sedimentation, and tectonics of the Boise foothills, northeastern margin of the western Snake River Plain, Ada County, Idaho:**Isochron/West**, v.59, p. 3-10.

Wood, S.H., Doukas, M.P., Shipley, S., Waitt, R.B., Jr., Sarna-Wojcicki, A.J., Vallance, J.W.,and Eggers, A., (in press), The July 22, 1980 eruption of Mount St. Helens: Characteristics of the eruption and airfall tephra: **USGS Professional Paper 1251**, 20p.

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Castle, R.O., Elliott, M.R., Church, J.P., and Wood, S.H., 1984,The evolution of the southern California uplift, 1955 through 1976: **USGS Professional Paper 1342**, 136p., 16 plates.

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Wilson, M.E., and Wood, S.H., 1980, Tectonic tilt rates derived from lake level measurements, Salton Sea, California: **Science**, v. 207, p. 183-186.

Wood, S. H., and Elliot, M.R., 1979, Early 20th-Century uplift of the northern Peninsular Ranges province of southern California: **Tectonophysics**, 52, 249-265.

Wood, S.H., 1977, Distribution, correlation, and radiocarbon dating of late Holocene tephra, Mono and Inyo Craters, eastern California: **Geological Society of America Bulletin**, v. 88, p. 89-95.

RECENT ABSTRACTS OF MEETING PRESENTATIONS (last 5 years)

Wood, S.H. and Ziegler, A.D., 2007. Floodplain sediment from a 30-year recurrence flood in 2005 on the Ping River in Northern Thailand: (abs.) American Geophysical Union, Annual Fall Meeting, San Francisco.

Wood, S.H., and Squires, E., 2007. Geology and hydrogeology of Boise, Idaho area (abs). Annual meeting, Pacific Division, American Association for the Advancement of Science.

Wood, S.H., Ziegler, A.D., and Bundarnsin, T., 2005. Riverbank stratigraphy and channel changes, Mekong River, Chiang Saen, Northern Thailand (abs). Abstracts Volume, 6th International Conference on Geomorphology, Zaragoza, Spain, September, 2005. p. 479.

Rothwell, E.L., and Wood, S.H., 2004, Characterization of gravel bars of the Mekong River near the Golden Triangle of northern Thailand: GSA Abstracts with programs,

Forester, C. S., Wood, S.H., and Nash, B.P.,2004, Geologic mapping and tephrochronology of sediments associated with the Miocene Weiser Basalt and Payette Formation in Holland Gulch, northwestern margin of the western Snake River Plain, Idaho. Geological Society of America Abstracts with programs (Cordilleran/Rocky Mountain section).

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Wood, S.H., Liberty, L., and Squires, E., 2000. Geophysical signatures of lacustrine facies: Experiences from Hydrogeologic Studies of temperate Neogene Lake Idaho sediments and aquifers, U.S. A., Abstract of the General Symposium, 3-1, Lacustrine Sedimentation, 31st International Geological Congress, Rio de Janeiro, Brazil, August 6 - 11, 2000.

Wood, S.H., McNamara, J.P., and Childs, D.M.,2000, Channel Morphology and bed Material of the Riffle-pool Reach of Rio Platano Bioreserve, Northeastern Honduras: a Pristine Central-American mountainous rainforest watershed (poster). American Geophysical Union, 2000 Fall Meeting .

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Wood, S.H., and Meyer, G.A., 1999, Contrasting sediment transport events generated by rain on snow and convective storms on burned basins in the Idaho batholith: Geological Society of American Abstracts with programs: Annual Meeting, Denver, Oct. 1999.

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Wood, S.H., Liberty, L.M., Singharajwarapan, F.S., Bundarnsin, T, and Rothwell, E., 2004. Feasibility of gradient magnetometer surveys of buried brick structures at 13th Century (C.E.) Wiang Kum Kam, Chiang Mai Province, Thailand. *in* Rieb, S., Wongpornchai, P., and Chantraprasert, S. (eds.), Proceedings of the International Conference on Applied Geophysics, November, 2004, Chiang Mai, Thailand, p. 22-30.

Wood, S.H., 2004. Geology across and under the western Snake River Plain, Idaho (Chapter 2). *in* Haller, K.M. and Wood, S.H.(eds.), Geological Field trips in southern Idaho, eastern Oregon, and Northern Nevada. U. S. Geological Survey Open-File Report 2004-1222. p. 84-107. Internet http://pubs.usgs.gov/of/2004/1222.

Rothwell, E.L., and Wood, S.H. 2004. Terminal moraine remnants of the Trail Creek glacier northeast of Sun Valley, Idaho (Chapter 6). *in* Haller, K.M. and Wood, S.H. (eds.), Geological Field trips in southern Idaho, eastern Oregon, and Northern Nevada. U. S. Geological Survey Open-File Report 2004-1222. p. 78-83. Internet http://pubs.usgs.gov/of/2004/1222.

Squires, E., and Wood, S.H., 2001, Stratigraphic studies of the Boise (Idaho) aquifer using borehole geophysical logs with an emphasis on facies identification of sand aquifers: Report to the Idaho Department of Water Resources (Treasure Valley Hydrologic Study), 17 p.

Zollweg, J., and Wood, S.H., 1995. Late Cenozoic faulting and maximum credible earthquake assessment: Hells Canyon hydroelectric facilities of Idaho Power Company. Contract report from Boise State University for Idaho Power Company, Boise, Idaho. 71 p.

Wood, S.H. and Stine, S. 1984. Stop 2. Mono Lake County Park at Dechambeau Creek.*in* Bailey, R.A., Harp, E.L., Keefer, D.K., Bennett, M.J., Miller, C.D., Wood, S.H., and Stine, S.: Mono Craters, Long Valley Caldera: Seismicity, volcanism, and engineering geology (Field Trip 11): in Linz, J., Jr. (ed.) Western Geological Excursions, v. 2. ,Department of Geological Sciences, Mackay School of Mines, University of Nevada, Reno. p. 37-42.

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Wood, S.H., and Anderson, J.E., 1981. Chapter 2 – Geology. in Mitchell, J.C. (ed.) Geological, hydrological, geochemical and geophysical investigations of the Nampa-Caldwell and adjacent areas, southwestern Idaho. Geothermal Investigations in Idaho (Part 11). Idaho Department of Water Resources Water Information Bulletin 30. p. 9-31.

RECENT COMMITTEE SERVICE (NON-UNIVERSITY)

National Academy of Sciences, Committee on Superfund Site Assessment and Remediation in the Coeur d'Alene River Basin (National Research Council), 2004-5.

Idaho Department of Water Resources, Technical Committee – Treasure Valley Hydrologic Study 1996-2004.

City of Boise Geothermal Project, Technical Advisory Committee, 1994-96

CURRENT PROJECT PROPOSALS (PENDING)

U.S. Ambassador's Fund for Cultural Preservation: Project title: Artifacts related to the legendary Iron-Age Yonok civilization, Chiang Saen area, northern Thailand: Cataloging, classification, and age-dating of existing collections. (w/ N. Ruangrunsri, proposed project director) Proposal submitted by the Chiang Rai Rajabaht University ($19,890) (submitted February 28, 2006).

Asia-Pacific Network for Global Change Research: Sediment dynamics and down-stream linkages in tropical streams as affected by projected land-cover/land-use and climatic change (Project leader: A. D. Ziegler, University of Hawaii) ($133,425). (pending)

JOURNAL ARTICLE and PROPOSAL REVIEWS

2005 – Forest Ecology and Management
2005 – Geological Society of America Bulletin
2004 – Journal of Paleolimnology
2004 – Geophysical Research Letters
2004 – Proposals – U.S. Civilian Research and Development Foundation

S.H. Wood's Testimony Outline – Nov. 26, 2008
M3 Eagle, LLC Water Right Permit Hearing, week of Jan. 13, 2009

Facts Known

1. We have known for 15 years that a sand-delta system, typically 200 to 600 feet thick, forms a major aquifer in the western Snake River Plain west of Boise, in the Caldwell-Lake Lowell area, and west to the Payette area – published in Wood (1994). At that time it was identified from seismic data near Caldwell and a distinctive funnel-shaped geophysical log using the petroleum-industry standard display of the gamma and the open-hole resistivity logs. This same log pattern is in logs of the Champlin Petroleum well near Lake Lowell, the El Paso Natural Gas well – 7 miles north of Caldwell, and several wells in the Payette area.

2. Correlation of that subsurface delta system to the Pierce Gulch Sand (a coarse-grained sand exposed in the western Boise foothills) is shown in cross-section by Squires and Wood (2001, Figure 10), Wood and Clemens (2002, Figure 16), and Wood (2004, Figure 24).

3. That same geophysical-log character is in a number of United Water Idaho wells and in the M3 Eagle test wells, where the aquifer is at least 200-ft of medium and coarse-grained sand. Farther to east, in the Caldwell area the sand is finer, being farther out in the lake basin.

4. Geophysical logs of the M3-Eagle wells show that Pierce Gulch Sand underlies the southwestern part of the M3-Eagle property. The aquifer dips southwest about 200 feet per mile. The aquifer here is 200-300-ft thick, and composed of medium to coarse permeable sand.

5. Many wells constructed to modern municipal-well standards with 100-ft of screens in the Pierce Gulch Sand Aquifer have high production rates and high specific capacity (up to 3,000 gpm, and 17 gpm/ft). Examples are the UWID Floating Feather well, City of Star Sewer and Water District Supply Well #3, and the Eagle Field Well

6. Surface geology in the M3 Eagle area is poorly exposed, and the sedimentary section lacks any distinctive marker beds. To the north at Freezeout Hill and along Willow Creek are the distinctive oolite beds among sands of the Terteling Springs Formation which underlies the Pierce Gulch Sand. I have examined the exposed sections along the South Side Canal, and believe that the Terteling Springs Formation extends west about 1.5 miles, beyond which is the younger Pierce Gulch Sand, dropped to an elevation below the Terteling Springs Formation, by faulting along a NW-trending fault and by dip. This concept is supported by the occurrence of a thick volcanic ash bed in the sedimentary section exposed in bluffs at 2600-ft elevation between South Slope School and Bramwell, 5 miles west of Freezeout Hill. This same volcanic ash occurs within the younger fluvial

and deltaic sands in the north side bluffs about 22 miles to the northwest, on the bluffs north of New Plymouth.

7. Because geology and faulting are obscure at the surface in the M3 Eagle area, magnetometer profiles were run to identify locations and trends of subsurface faults (Wood, 2007). The technique only detects faulted basalt beneath the sedimentary section, but it should show location of significant shifts in the subsurface strata. The profiles clearly define the location of the north-west trending "West Boise-Eagle fault" originally identified by Wood and Anderson (1981). The profiles also show another down-to-southwest fault near the mouth of Big Gulch that possibly projects NW and is the suspected fault mentioned in item 5 above. It is not know what effect these faults have on the Pierce Gulch Sand Aquifer performance. There may be good continuity across the fault if sand is faulted against sand.

Opinions Held

1. Based on review of available data, the southwestern part of the M3 Eagle property is underlain by a saturated and productive sand aquifer 200-300-ft thick, the top of which is at a depth of 200 to 300 feet. This aquifer is correctly correlated by Hydro Logic, Inc. as the down-faulted and down-dip equivalent of the Pierce Gulch Sand exposed in the western Boise foothills.

2. The geologic framework of the Pierce Gulch Sand Aquifer, and the obvious difference in elevation between the Boise River and the Payette River Valleys indicates that the subsurface groundwater flow should be directed toward the north-northwest beneath the southwestern part of the M3 properties. This flow direction is strongly supported by extensive measurements of the piezometric surface by Hydro Logic, Inc.

3. Available geophysical logs indicate the Pierce Gulch Sand Aquifer dips downward to the southwest beneath the M3 Eagle, City of Eagle, and City of Star area, about 100 ft per mile, thus the aquifer becomes deeper. Therefore productive wells are completed at deeper levels, at sites further southwest into the sedimentary basin. This dip and basin configuration was constructed from sparse data available in 1997 by Wood (1997) for the TVHP, and although the dip was correct, the predicted depths to the base of the aquifer were too shallow. Subsequently, new wells with good geophysical logs by M3 Eagle, City of Eagle, and City of Star have shown the aquifer system is thicker and deeper by about 100 feet over this region.

References

Squires, E., and Wood, S.H., 2001, Stratigraphic studies of the Boise (Idaho) aquifer using borehole geophysical logs with an emphasis on facies identification of sand aquifers: Report to the Idaho Department of Water Resources (**Treasure Valley Hydrologic Study**), 17 p. http://www.idwr.idaho.gov/hydrologic/projects/tvhp-revised/reports.htm

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Wood, S.H., 2004. Geology across and under the western Snake River Plain, Idaho (Chapter 2). *in* Haller, K.M. and Wood, S.H.(eds.), Geological Field trips in southern Idaho, eastern Oregon, and Northern Nevada. **U. S. Geological Survey Open-File Report 2004-1222**. p. 84-107. Internet http://pubs.usgs.gov/of/2004/1222.

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