G422/522 Alluvial Fans Final Study Guide

Key Words / Concepts

<u>Appalachian / Humid Fans</u>

(Source Notes ("what I mean is look at the following class material to help you study the following terms and concepts"): Taylor Geological Sciences Seminar; Web Site Figures to Accompany Discussion on Appalachian Fans; Taylor in-class lectures on Appalachian Fans; Readings: Kochel, 1990; Mills, 2000; Taylor, 1999)

fan accommodation model
pediment-erosion
valley erosion / tributary junctions
karst solution / karst elevator
tectonic accommodation model
fluvial-dominated fan
debris-flow-dominated fan
Blue Ridge fans
Blue Ridge
Valley and Ridge
Appalachian Plateau
Shenandoah Valley
fan-scale relationships
intensity-duration relationships for debris-flow events
1949 Little River debris flow
Large-scale fans vs. small-scale fans
fan shape vs. accommodation
fan size vs. accommodation
master stream
tributary stream
post-depositional erosion
fan pediments
pediment
fan incision patterns
fan mapping criteria
fan terrace
inset fan terrace
drainage area vs. fan area
simple vs. compound fan
strahler stream order
tributary junction type
vegetative recovery
hillslope recovery
geomorphic recovery
hollow
first-order tributary
second-ordeer tributary
debris-flow recurrence interval
meteorological conditions conducive to debris flow
erosional accommodation
fan mapping criteria
relative age criteria
"shot-gun" hollow model

<u>Fault Recurrence Intervals / Neotectonics</u>

(Source Notes: Kate Scharer class presentation and handouts, Fumal et al., 1993 reading; Keller and Rockwell, 1984 reading)

recurrence interval
ground motion
ground velocity
ground acceleration
magnitude
frequency
San Andreas fault system
fault trenching tectonics
peat interbeds
debris flow facies
structural deformation
syntectonic deformation
fault scarp
radiocarbon dating
fault-fold stratigraphy
buried fault zone
fault-zone colluvium
paleoseismology

<u>Climatic and Tectonic Controls on Alluvial Fans</u>

**(Source Notes: Taylor class notes: Notes: Climate / Tectonic Influences on Alluvial Fans, Readings: Bull and Schick (1979) Climate Impacts on Fans
Dorn (1996), Climate Hypotheses on Death Valley Fans)**

Fan Aggradation
Fan Incision
stream power vs. aggradation
stream power vs. degradataion
tectonic accommodation mechanism
base level change
hillslope-vegetation response
climate change
regional vs. local fan response
Pleistocene climate change in US
watershed weathering response
geomorphic surfaces
sediment yield vs. aggradation
sediment yield vs. degradation

precipitation vs. vegetative cover vs. sediment yield vs. fan response

fan chronology
high resolution dating

Hazards / Resource Management in Fan Environments

(Source Notes: Taylor class notes: Hazards and Resource Management in Alluvial Fan Environments; Summary of the 1996-97 Oregon Debris Flow Events Readings:
Field and Pearthree, 1997,
Kellerhals and Church, 1990)
aquifer resource
sand and gravel deposits
porosity / permeability
characteristics of fans
fans in the ancient rock record
flood hazards
debris flow hazards
avulsion hazards
hazards mapping
debris flow evidence
debris flow mapping
active vs. inactive fan surfaces
landuse classification

Key Concepts / Ideas

-Be able to compare styles of fan accommodation space and the effects on fan morphometry.
- How are debris flows initiated in humid climates, how do this initiation process compare to arid climates, as discus prior to the mid-term?
- Given the "Appalachian fan models" and "arid-tectonic fan models", how do these apply to the state of Oregon?
-How has the Pleistocene-Holocene climate cycle influenced fan processes in: arid SW, humid Appalachians?
-What are the landforms and depositional products that are possible in the alluvial fan environment, as related to tectonic and climatic factors?
-What types of data and analyses are employed in paleoseismic investigations?
-How are pre-historic earthquake recurrence intervals determined?
- What is GIS and what can it be used for with respect to geomorphology, surficial geology, and alluvial fan analysis
- What types of data are derived in a GIS environment?
- What approaches are necessary to decipher climatic vs. tectonic signals recorded in alluvial fans.
-How do fans record climatic and tectonic signals?
- What are the two basic responses of fans to external and internal controls?
-How does one definitively support a climate signal hypothesis? (see Dorn, 1996)
- Why are fans an important natural resource?
- What are the hazards / landuse issues associated with alluvial fans?
- How can GIS be used to analyze and evaluate hazards in alluvial fan environments?

Lab Exercise Summary / Concepts and Skills

Appalachian fan analysis

Key question: what are the key morphometric parameters that distinguish Appalachian (humid-mountainous fans) fr classic arid-tectonic fans?

How does watershed morphometry affect the size, nature and extent of tributary-junction fans in the Appalachians? How do these relationships compare to class arid-tectonic fans?

Another question: how is the Appalachian model applicable to Oregon?