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Geomorphologic Systems -- Interaction Between All Elements

Image courtesy of Prof. Kelin Whipple. Used with permission.
orographic precipitation
  topography -> climate

hillslope transport:
creep, sheetwash, gullies, landslides, debris flows
runoff hydrology

weathering/
soil production
debris-flow incision/deposition; glacial erosion

"bedrock" channel incision, aggradation

alluvial fans: fluvial and debris flow deposition
channelization, avulsion, segmentation

UPLIFT

SUBSIDENCE

alluvial rchannelization, aggradation, incision
sediment transport, flooding
lateral migration, avulsion

isostacy, flexure, deformation
erosion -> tectonics

Image courtesy of Prof. Kelin Whipple. Used with permission.
oographic precipitation
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alluvial rchannelization, aggradation, incision
  sediment transport, flooding
  lateral migration, avulsion

isostacy, flexure, deformation
  erosion -> tectonics

=> hillslope form, gradient, length
drainage density
sediment supply (rate / size)

Image courtesy of Prof. Kelin Whipple. Used with permission.
Orographic precipitation

Topography -> Climate

Hillslope transport:
- Creep
- Sheetwash
- Gullies
- Landslides
- Debris flows
- Runoff hydrology

Weathering/sol production

Debris-flow incision/deposition; Glacial erosion

"Bedrock" channel incision, aggradation

Alluvial fans: Fluvial and debris flow deposition
- Channelization, avulsion, segmentation

Uplift

Subsidence

Isostacy, flexure, deformation

Erosion -> Tectonics

=> Hillslope form, gradient, length
- Drainage density
- Sediment supply (rate/size)

=> River profiles, topographic skeleton
- Valley form, channel morphology
- Fill and strath terraces

Image courtesy of Prof. Kelin Whipple. Used with permission.
Orographic precipitation

topography -> climate

Hillslope transport:
creep, sheetwash, gullies, landslides, debris flows
runoff hydrology

Weathering/
soil production

debris-flow incision/deposition; glacial erosion

"Bedrock" channel incision, aggradation

Alluvial fans: fluvial and debris flow deposition
channelization, avulsion, segmentation

Alluvial rechannelization, aggradation, incision
sediment transport, flooding
lateral migration, avulsion

Uplift

Subsidence

Isostacy, flexure, deformation

Erosion -> tectonics

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lateral migration, avulsion

UPLIFT

SUBSIDENCE

isostacy, flexure, deformation

erosion -> tectonics

=> hillslope form, gradient, length
drainage density
sediment supply (rate/size)

=> river profiles, topographic skeleton
valley form, channel morphology
fill and strath terraces

=> fan size, slope, texture
hazard, sediment facies

=> channel slope, width,
form, floodplain
hazard, facies

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