

# Use of Sedimentary Structures to Infer Geomorphic and Hydrologic History of Channel-Margin Deposits

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No shortcuts!



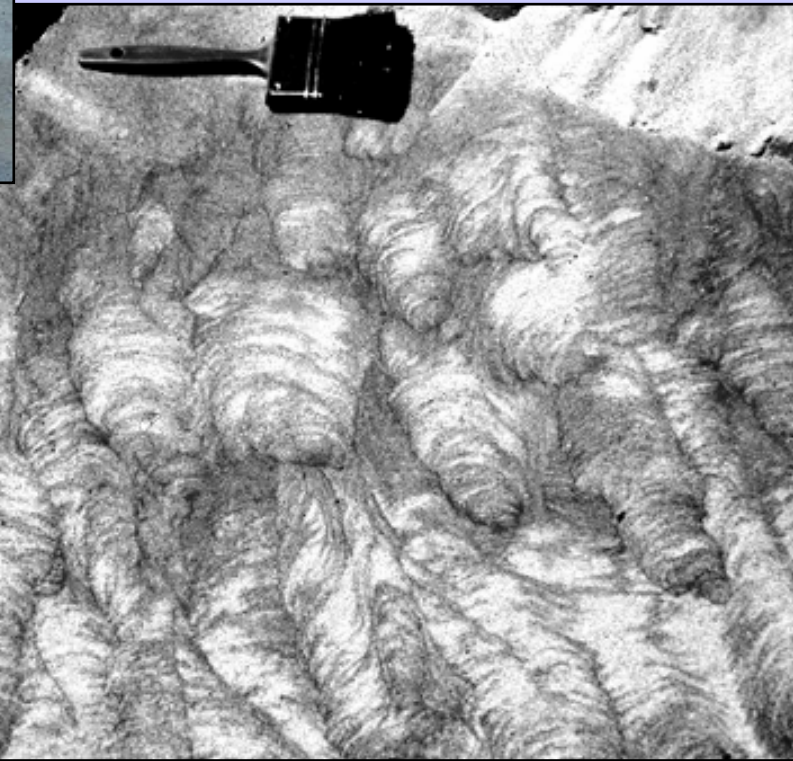
# Depositional processes



Dune-migration movie



Climbing-ripple movie

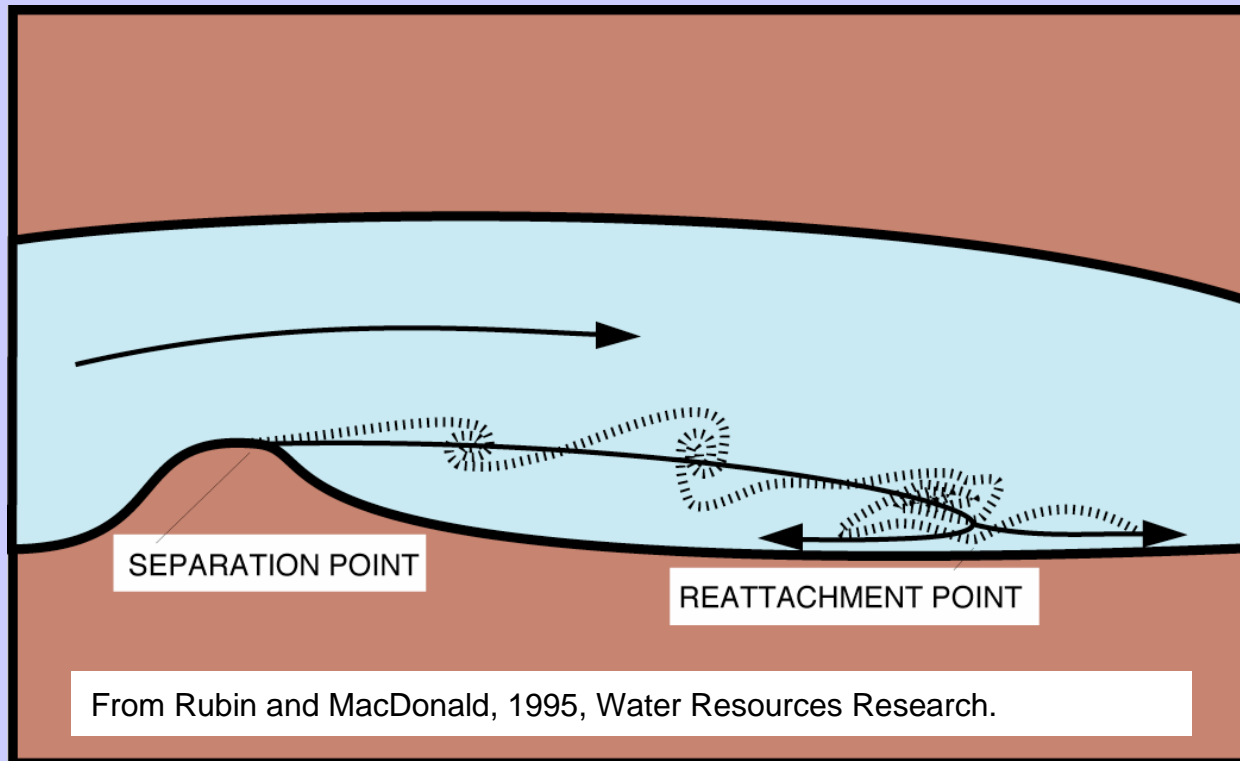
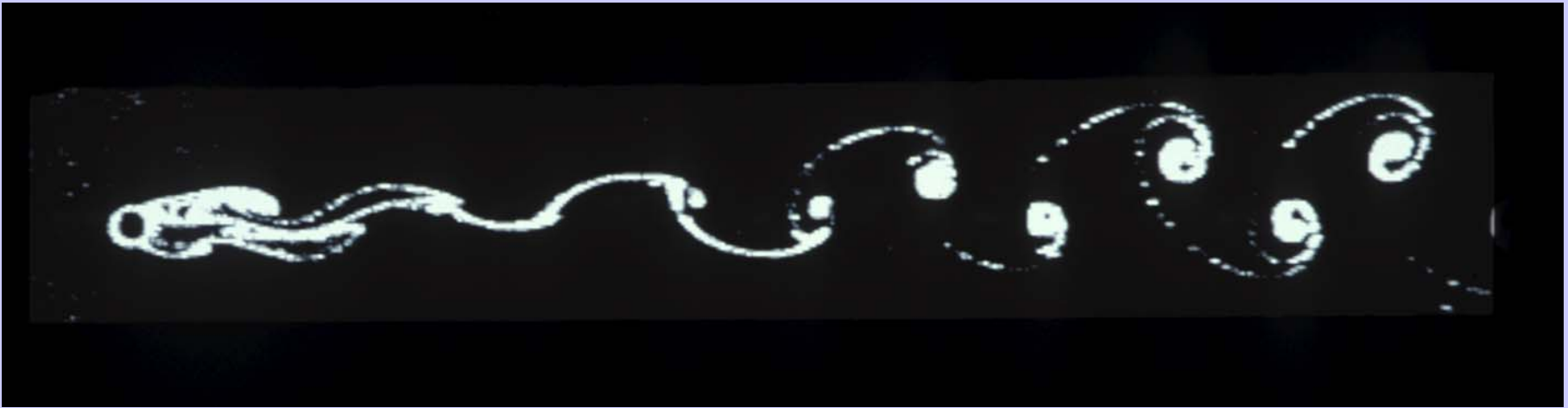


Movie: Migrating fluvial dune  
with superimposed ripples

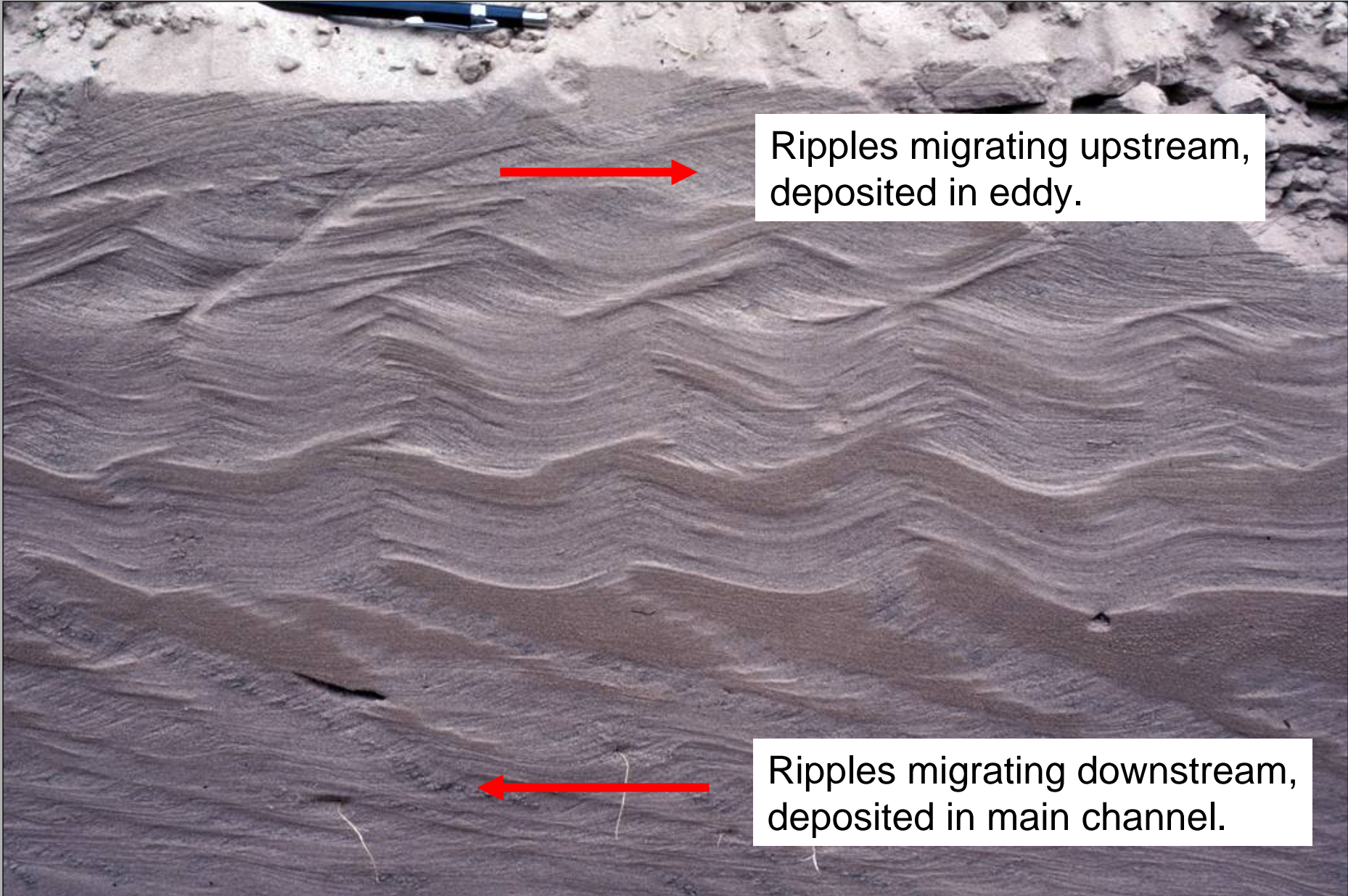






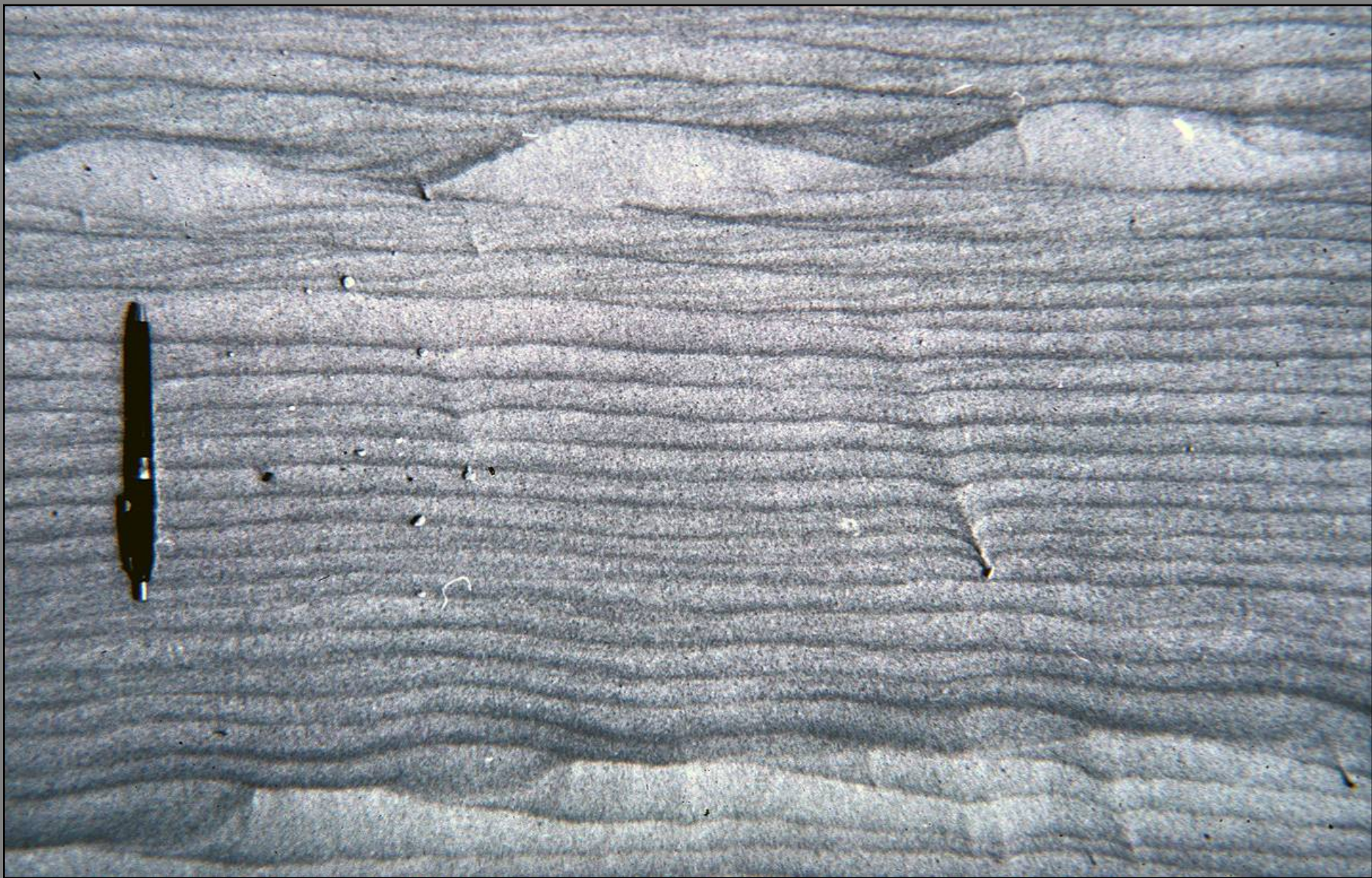






Ripples migrating upstream,  
deposited in eddy.

Ripples migrating downstream,  
deposited in main channel.



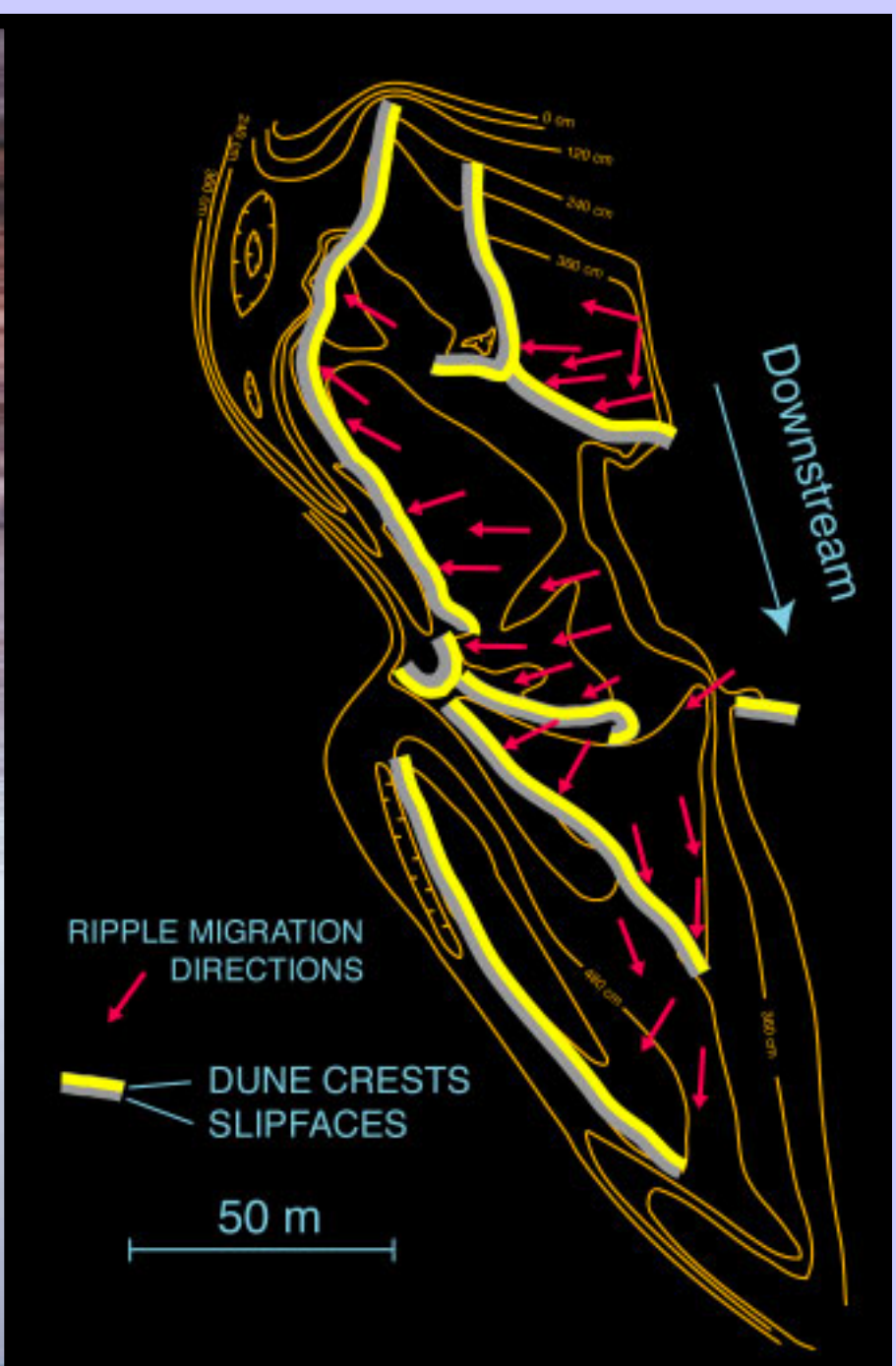


FINE

COARSE

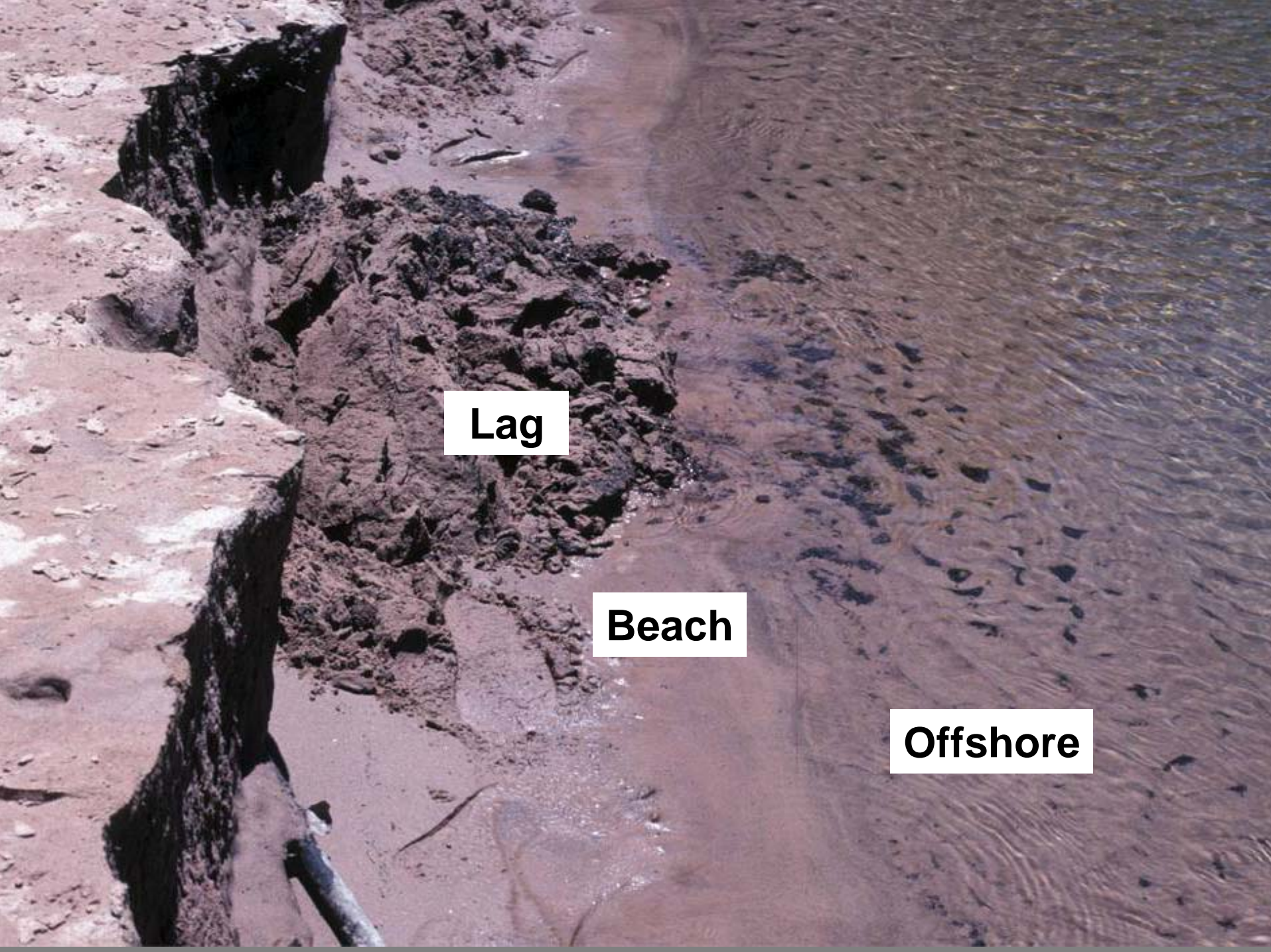
# Flow direction







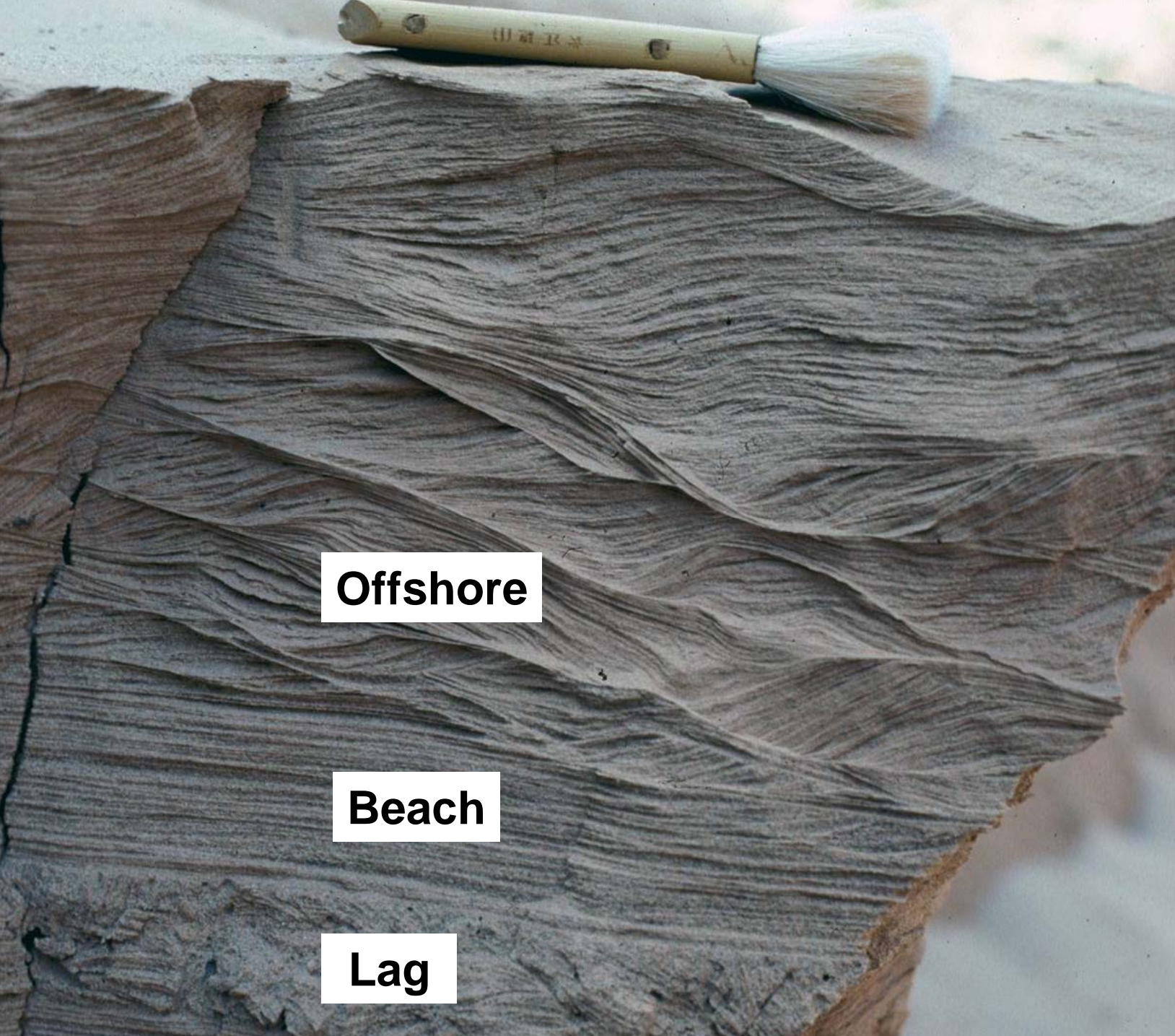
# River stage



**Lag**

**Beach**

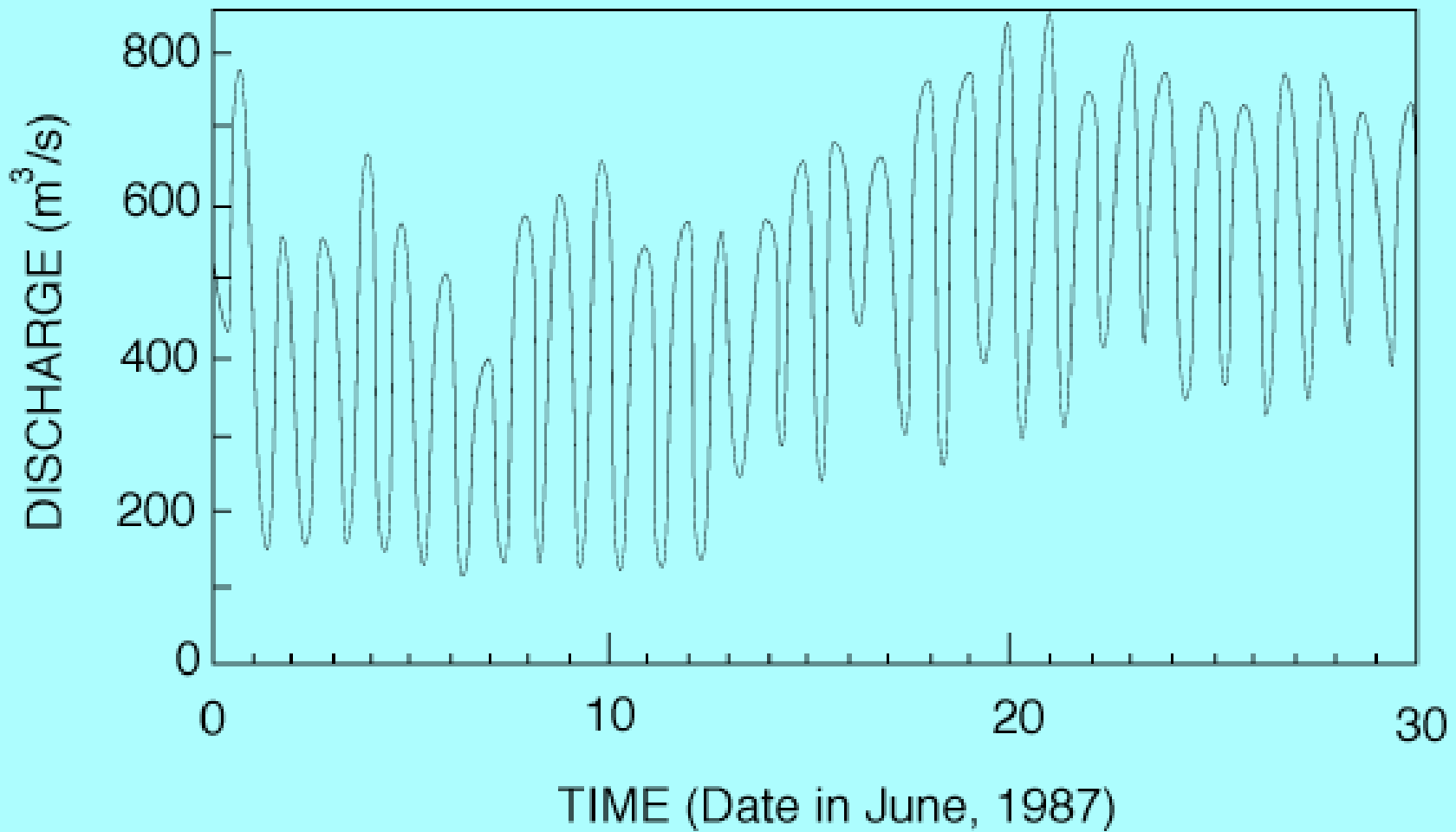
**Offshore**



**Offshore**

**Beach**

**Lag**







# Rate of deposition









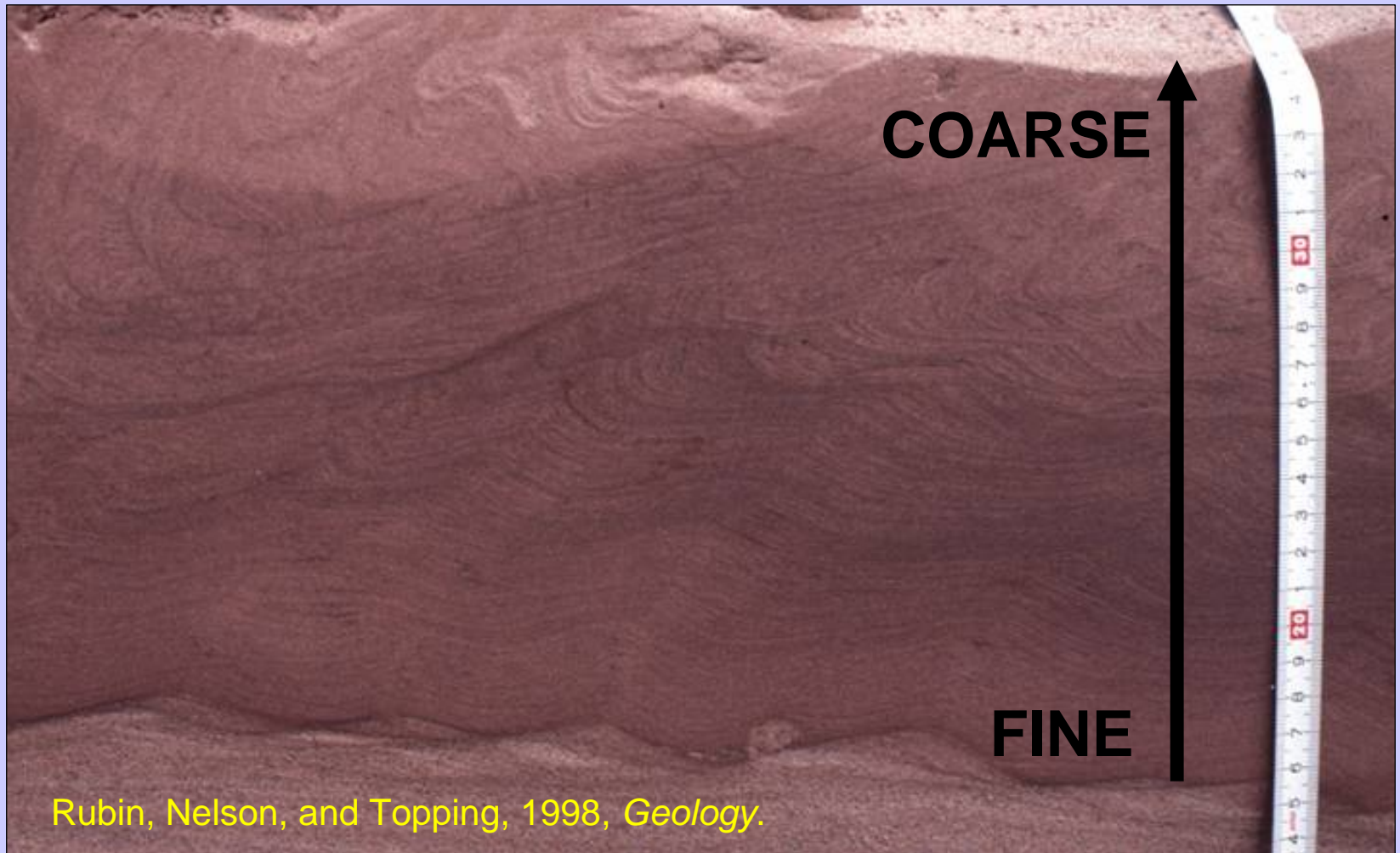




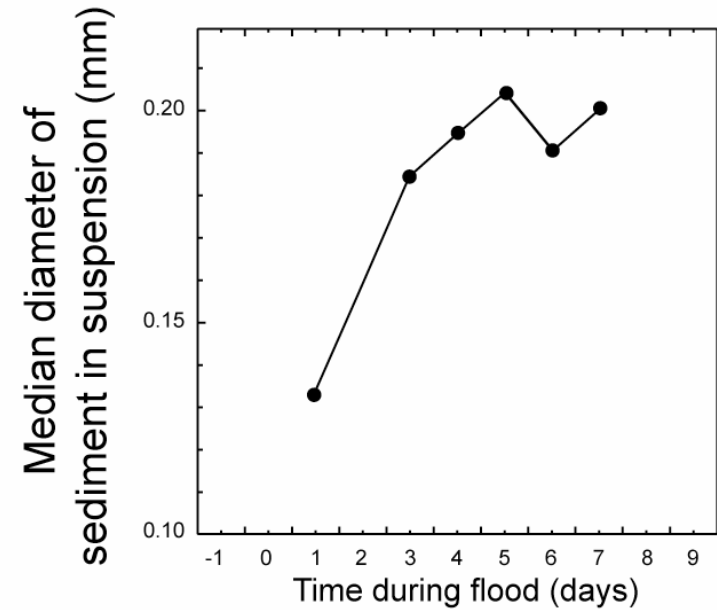
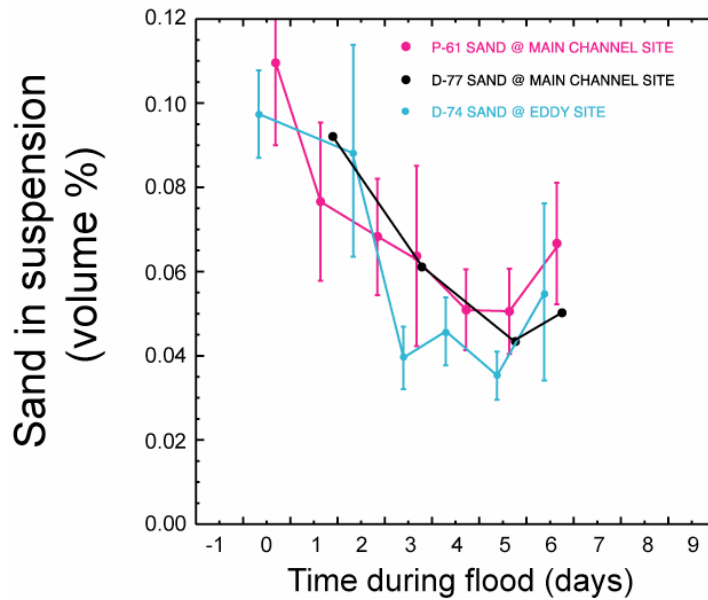
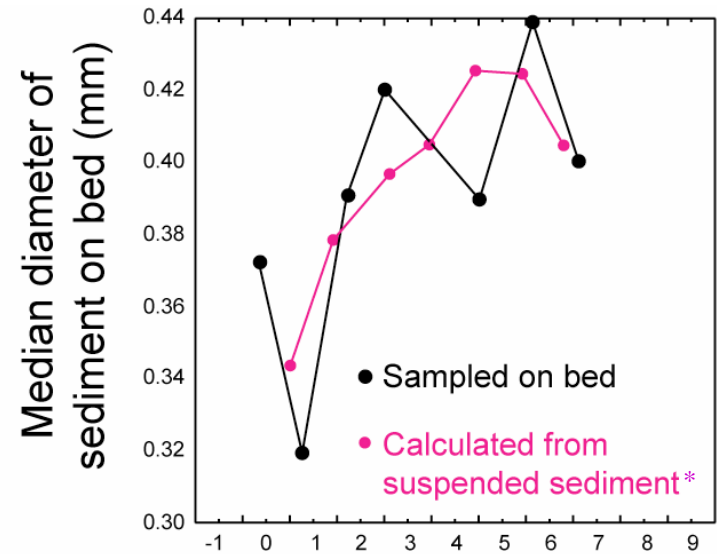
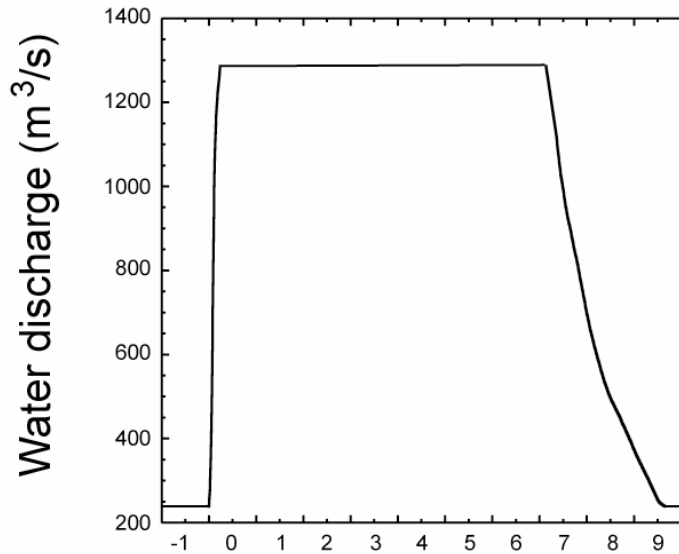
# Sediment supply

# 1996 Flood

During the flood, winnowing of sand on the bed in source areas resulted in coarsening of sediment in suspension, which produced coarsening-upward flood deposits.



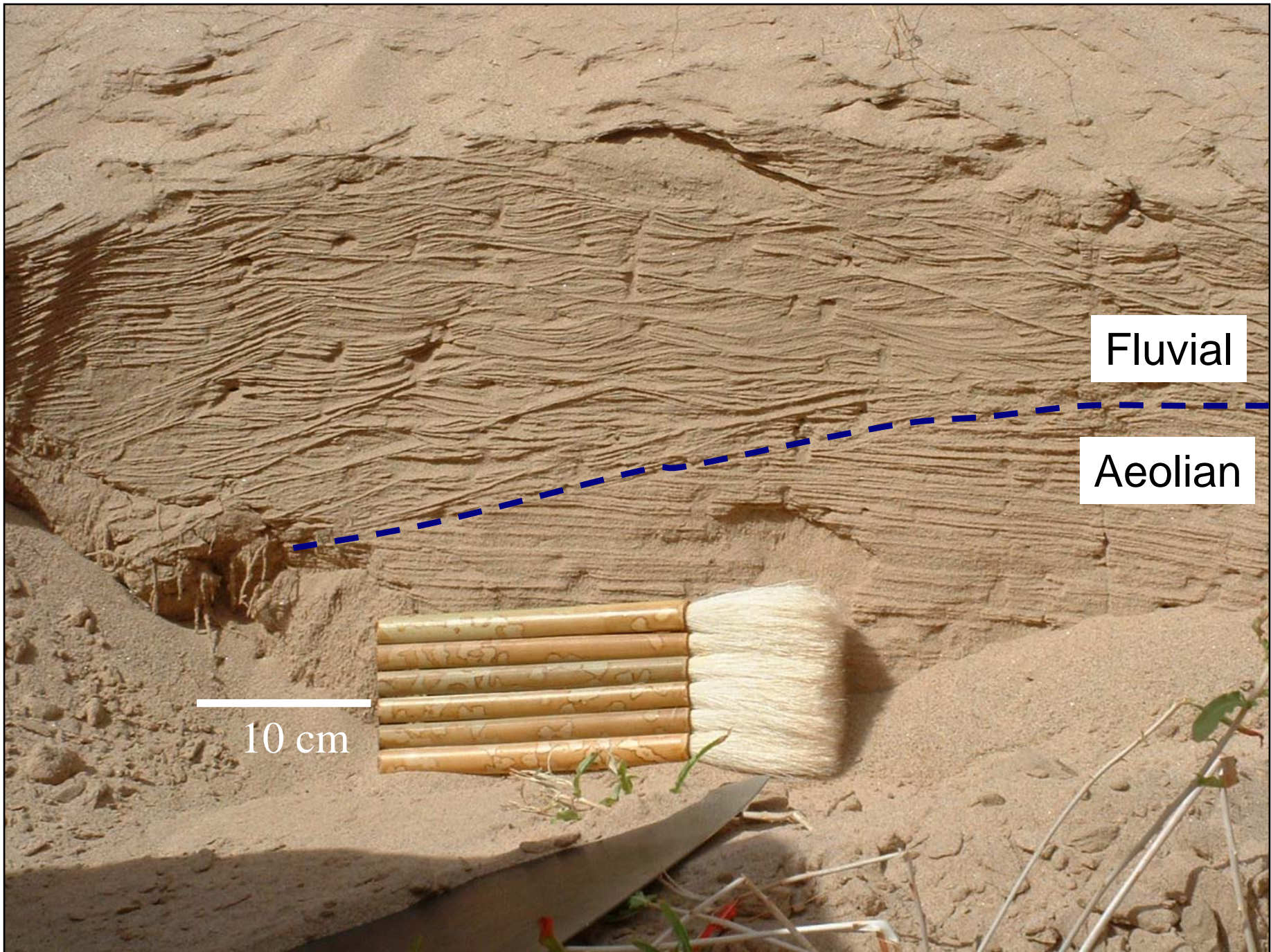
# 1996 Flood



\* Rubin and Topping, 2001, *Water Resources Research*.

# Assembling the pieces

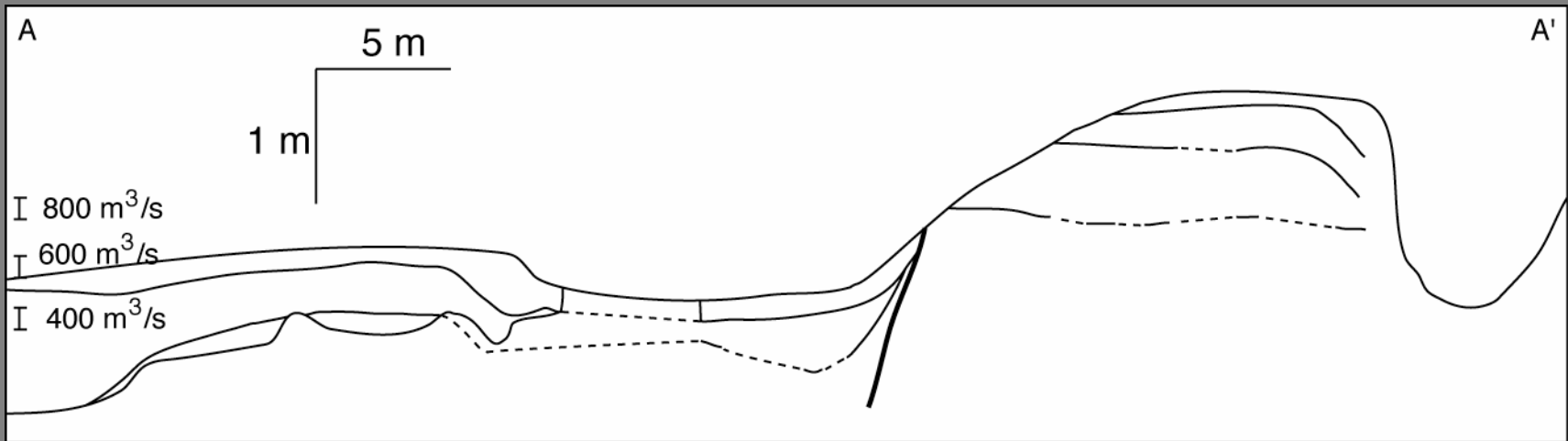




Fluvial

Aeolian

10 cm



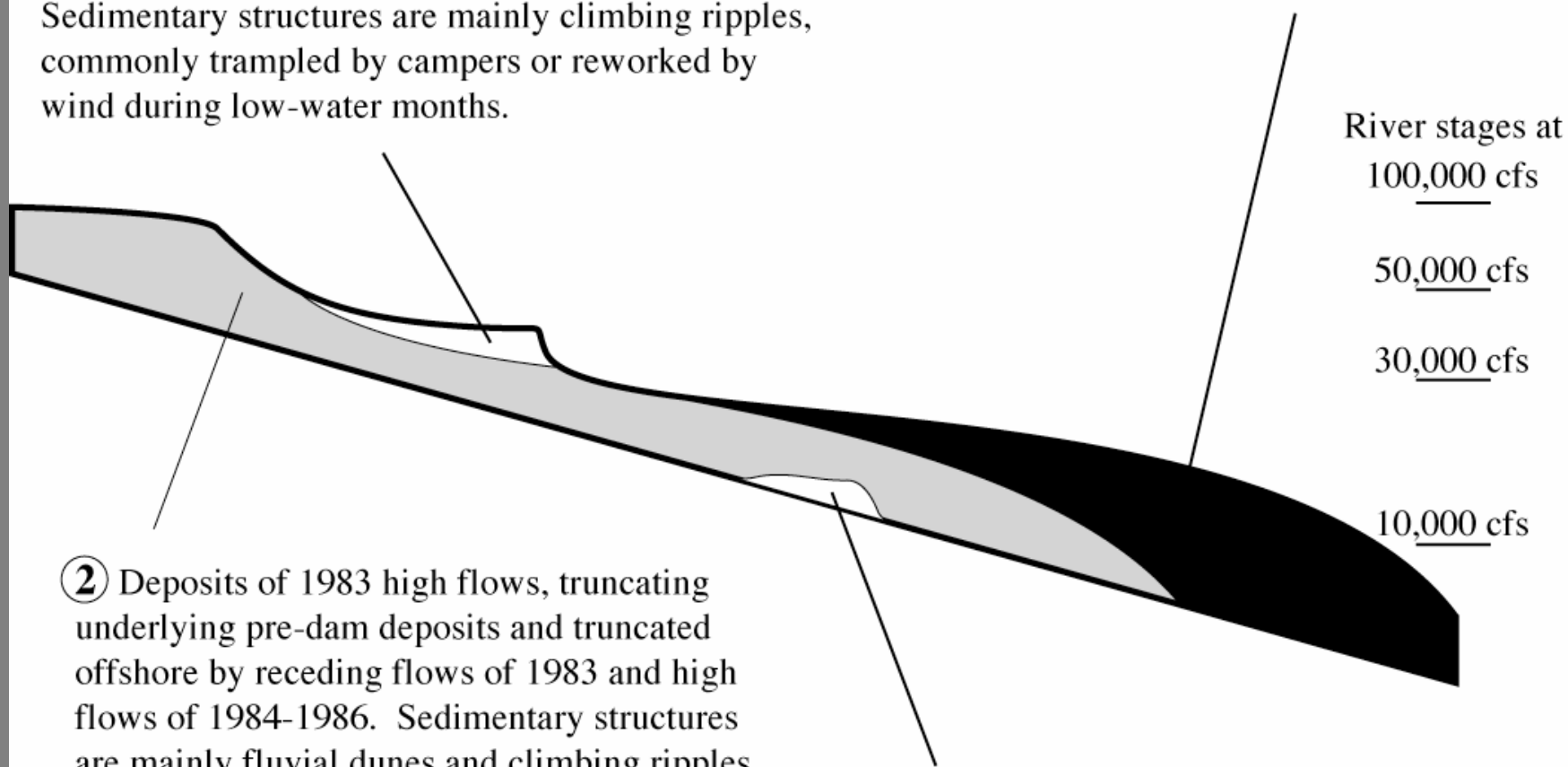
Stratigraphic section of 55 Mile bar. Most beds at high elevations were deposited by floods in 1983-1986. The exceptions are thin eolian beds deposited between floods and after 1986.

From Rubin, Schmidt, and Moore, 1990, *Journal of Sedimentary Research*.

③ Thin deposits of high flows of 1984-1986.

These deposits eroded the 1983 flood deposits and have limited areal extent (bounded onshore by the 1983 deposits, and truncated offshore by more recent flows of non-flood dam operations). Sedimentary structures are mainly climbing ripples, commonly trampled by campers or reworked by wind during low-water months.

④ Deposits of recent non-flood flows (discharges less than approximately 30,000 cfs). Sedimentary structures are primarily climbing ripples.



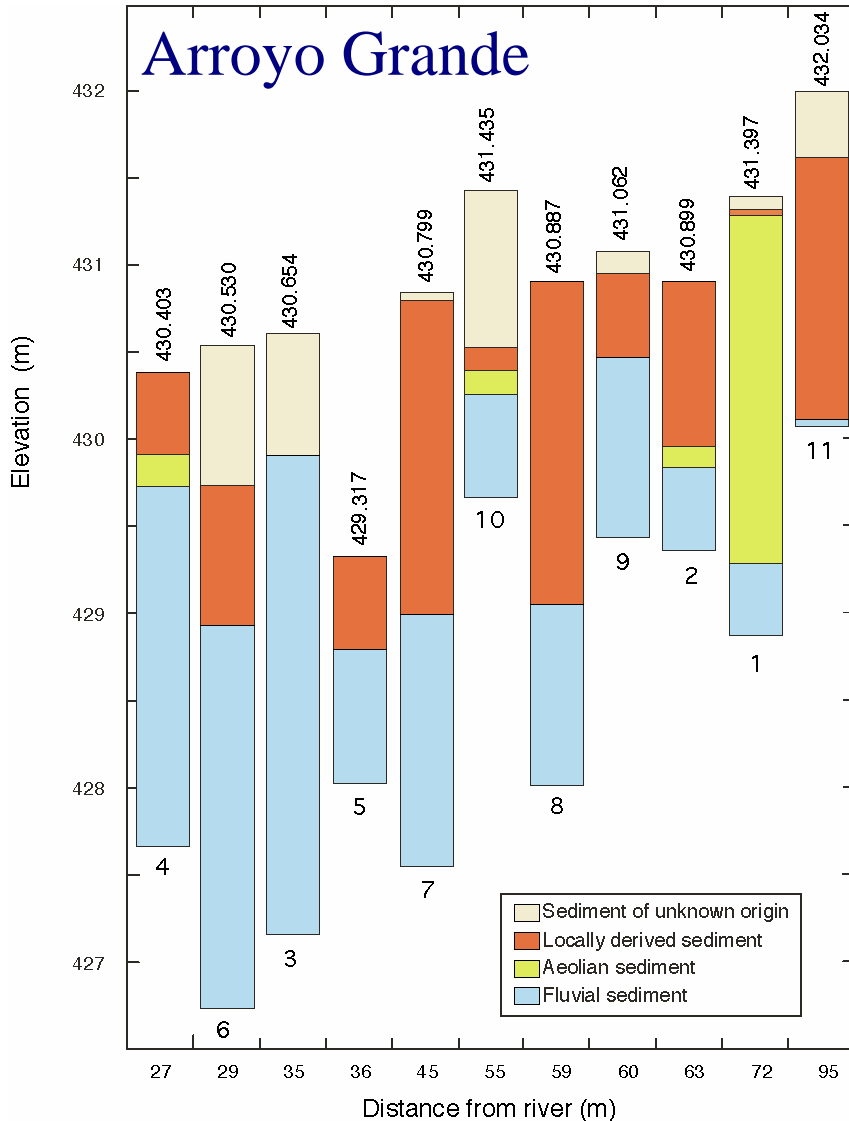
② Deposits of 1983 high flows, truncating underlying pre-dam deposits and truncated offshore by receding flows of 1983 and high flows of 1984-1986. Sedimentary structures are mainly fluvial dunes and climbing ripples deposited within recirculation zones.

① Pre-dam deposits, eroded by floods of 1983.





# Pre-dam depositional environments



- Thick Holocene fluvial terraces form substrate for many arch. sites
- Aeolian reworking of sediment on terrace surfaces
- Locally derived (slope-wash, debris-flow) sediment



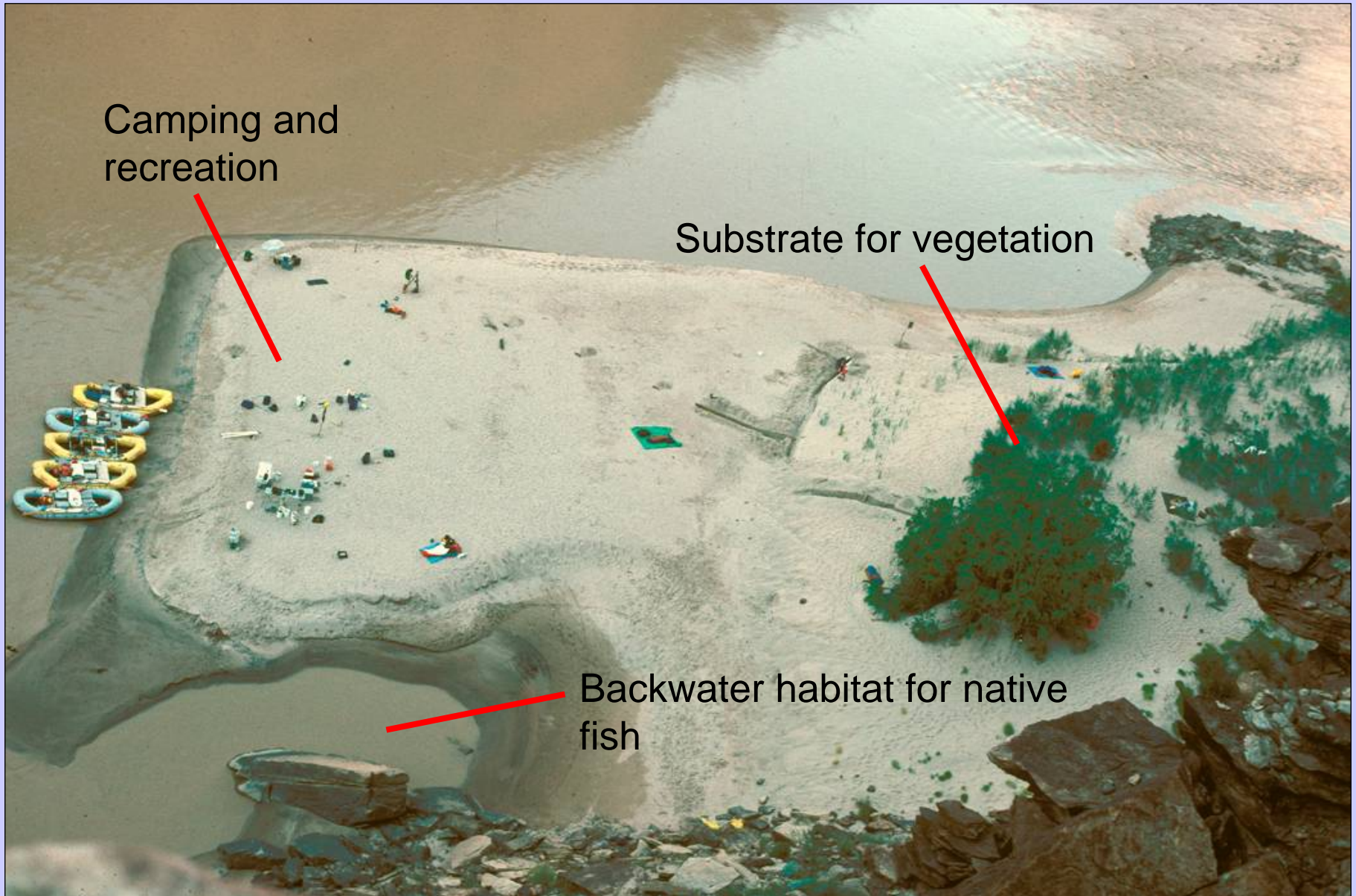




5 mm



# Importance of sand-bars



Camping and recreation

Substrate for vegetation

Backwater habitat for native fish