MUD RIPPLES from a playa lake in Eastern California

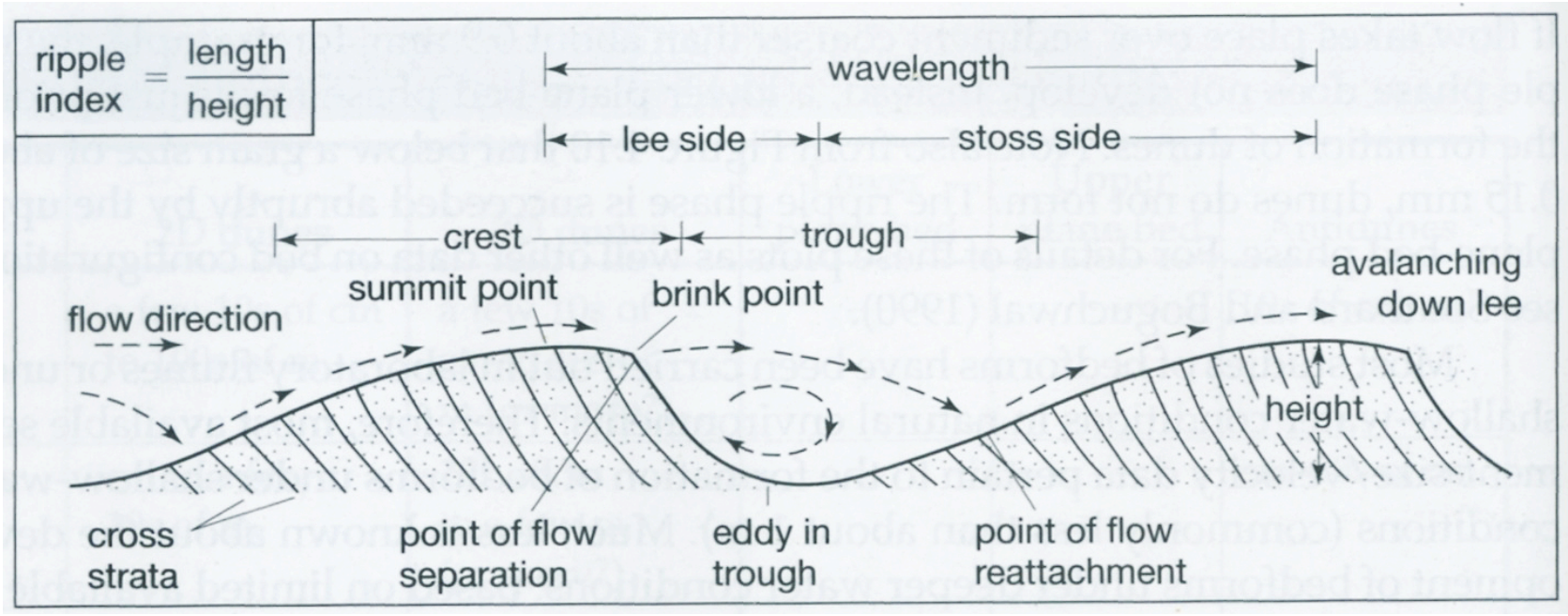
Alessandro Grippo, Santa Monica College, Santa Monica CA 90405, U.S.A.

CURRENT RIPPLES

small (5 to 20 cm) sedimentary structures

in sediment ranging from silt to coarse sand

in response to a unidirectional current (Boggs, 2006)



RIPPLES IN MUD? YES!

Albeit not very common, ripples have been reported also in fresh mud and in shales

Examples:

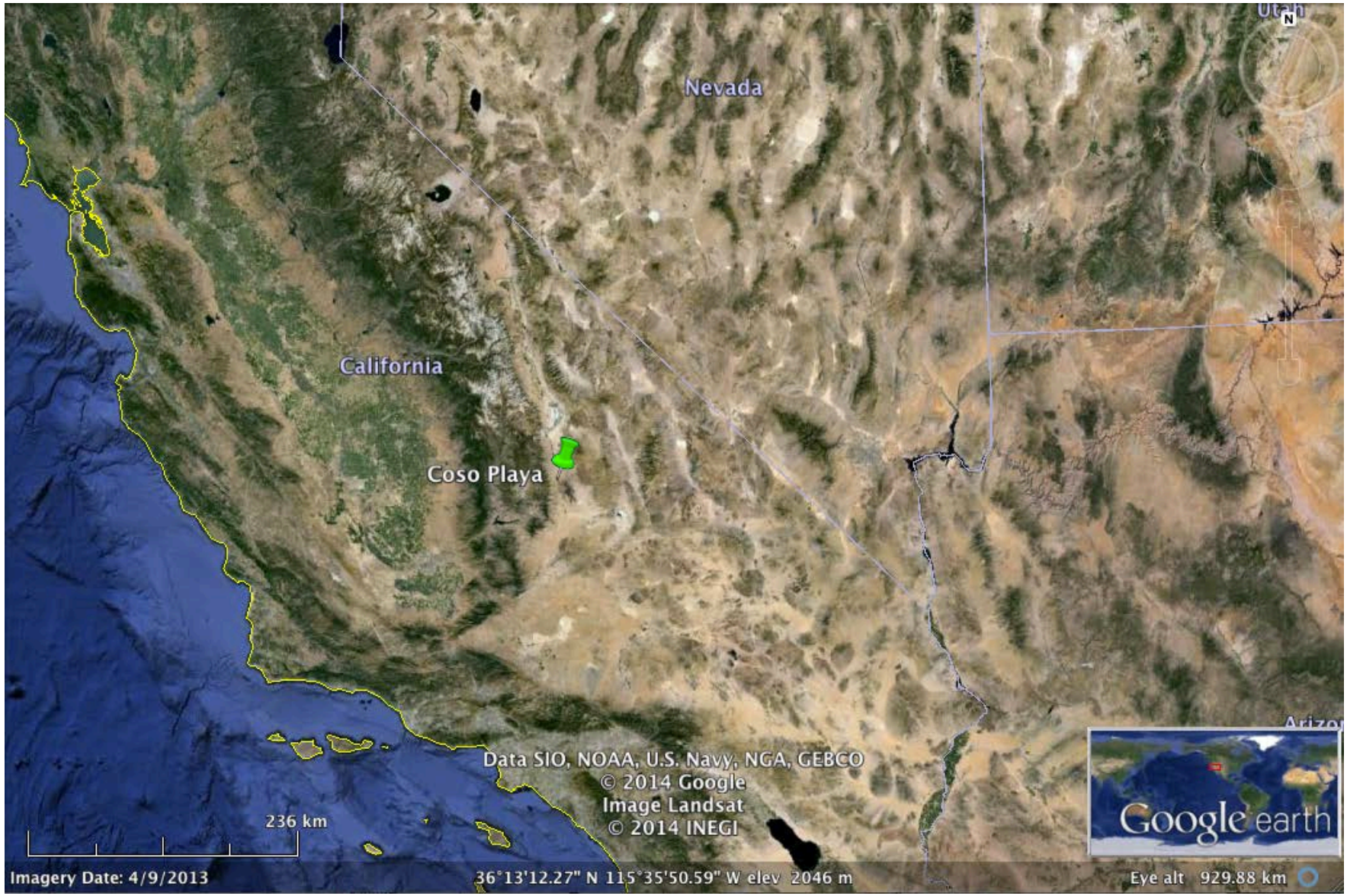
- tidal environments (intertidal flats, dunes, mudflats, tidal channels)
- flysch deposits
- deep marine waters

- Silurian and Triassic shales

(summary in Chang and Flemming, 2013)

MUD RIPPLES in a playa lake?

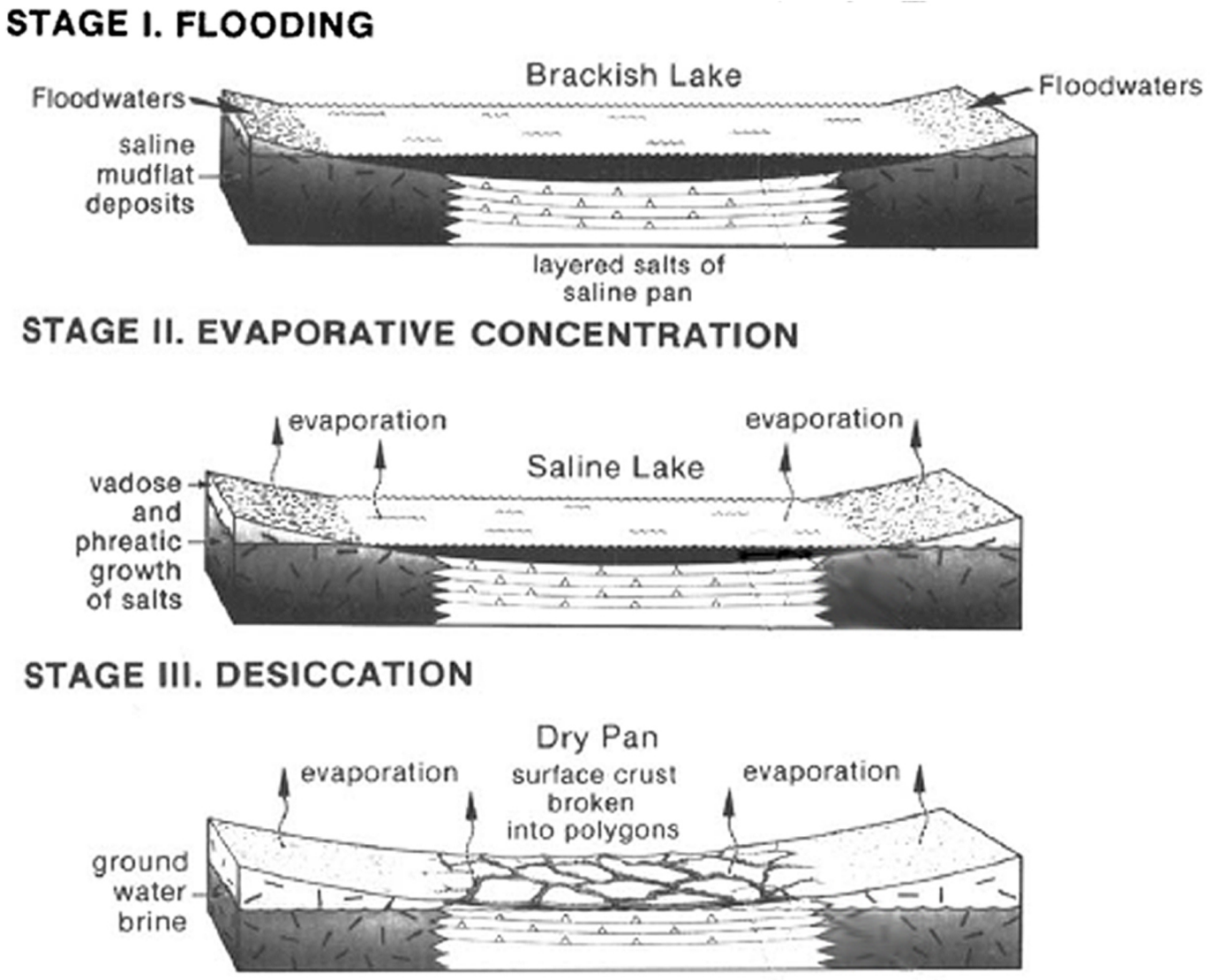
COSO PLAYA: edge of Basin and Range



COSO PLAYA

a small basin on the side of a cinder cone

SALINE PAN CYCLE [Lowenstein and Hardie, 1985)



COSO PLAYA has few or no evaporites but it does have a mudflat edge

MUD RIPPLES AT COSO PLAYA

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The playa shows mud cracks that coincide with the troughs between the ripples

Smaller scale cracks formed on the stoss side of the ripples

How can ripples form in mud?

- Individual clay particles move in suspension
- Clay particles have cohesive properties
- Clay particles can join to form aggregates
- Aggregates (flocs) can grow to sand size
- Sand-size flocs can be subject to traction

- Role of sand/silt/clay mixtures
- Role of cohesive biocoating

Chang and Flemming, 2013; Manning et al., 2013
Schieber and Southard, 2009; Schieber and Yawar, 2009; Schieber et al. 2007

Flocs sedimentation

Flocs need a water current to form ripples

There is no drainage at Coso: water ponds

Flocs sedimentation

- Wind is the only possible source for water motion
- Wind on dry playa
- Wind on wet playa
- Wind on very shallow water-filled playa

Flocs sedimentation

- A shallow body of water could be set in motion by strong winds
- Sand-size flocs will slide and roll as bed load
- Under proper conditions, these flocs would form current (unidirectional) ripples
- Very low preservation potential
- Ripples were not observed again on subsequent visits

“Normal” dry Coso playa: no ripples

CONCLUSIONS

- Mud ripples can form if the conditions are right
- Mud ripples do not form only in tidal and submarine environments, but also in lacustrine (playa) environments
- Further investigation required

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