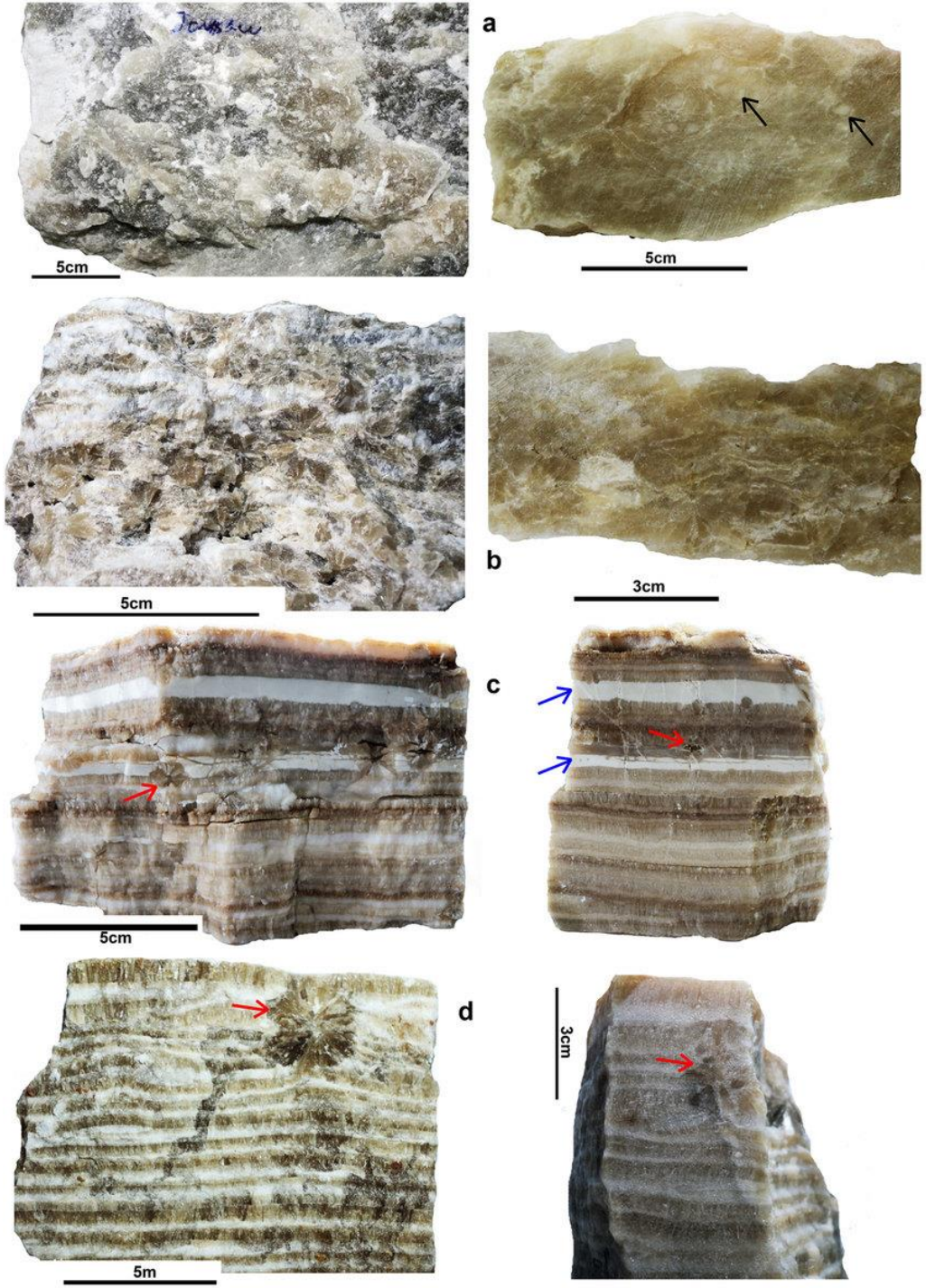
Evaporitos

GSA0252-Sedimentologia

- Terrígeno
- Detrítico
- Biogênico
- Orgânico
- Autigênico

Evaporitos



Fabin et al. (2018)

Mineral	Formula	Mineral	Formula
Anhydrite	$CaSO_4$	Leonhardtite	$MgSO_4.4H_2O$
Antarcticite	$CaCl_2.6H_2O$	Leonite	$MgSO_4.K_2SO_4.4H_2O$
Aphthitalite (glaserite)	$K_2SO_4.(Na,K)SO_4$	Loewite	$2MgSO_4.2Na_2SO4.5H_2O$
Aragonite **	$CaCO_3$	Ludwigite	$(FeMg)_4Fe_2B_2O_7$
Bassanite	$CaSO_4.1/2H_2O$	Mg-calcite **	$(Mg_xCa_{1-x})CO_3$
Bischofite	$MgCl_2.6H_2O$	Magnesite**	$MgCO_3$
Bloedite (astrakanite)	$Na_2SO_4.MgSO_4.4H_2O$	Meyerhoffite	$Ca_2B_5O_{11}.7H_2O$
Borax (tincal)	$Na_2B_4O_7.10H_2O$	Mirabilite	$Na_2SO_4.10H_2O$
Boracite	$Mg_3B_7O_{13}.Cl$	Nahcolite	$NaHCO_3$
Burkeite	$Na_2CO_3.2Na_2SO_4$	Natron	$Na_2CO_3.10H_2O$
Calcite**	$CaCO_3$	Nitratite (soda nitre)	$NaNO_3$
Carnallite	$MgCl_2.KCl.6H_2O$	Nitre (salt petre)	KNO_3
Colemanite	$Ca_2B_5O_{11}.5H_2O$	Northupite	$Na_2C0_3.MgCO_3.NaCl$
Danburite	$CaO.B_2O_3.2SiO_2$	Pentahydrite	$MgSO_4.5H_2O$
Datolite	$Ca_2B_2Si_20_9.H_20$	Pinnoite	$MgB_20_4.3H_20$
Darapskite	$NaSO_4.NaNO_3.H_2O$	Pirssonite	$CaCO_3.Na_2CO_3.2H_2O$
Dawsonite	$NaAlCO_3(OH)_2$	Polyhalite	$2CaSO_4.MgSO_4.K_2SO_4.H_2O$
Dolomite**	$Ca_{(1+x)}Mg_{(1-x)}(CO_3)_2$	Proberite	$NaCaB_5O_9.5H_2O$
Eitelite	$Na_2CO_3.MgCO_3$	Priceite (pandermite)	$CaB_4O_{10}.7H_2O$
Epsomite	$MgSO_4.7H_2O$	Rinneite	$FeCl_2.NaCl.3KCl$
Ferronatrite	$3NaSO_4.Fe_2(SO_4)_3.6H_2O$	Sanderite	$MgSO_4.2H_2O$
Gaylussite	$CaCO_3.Na_2CO_3.5H_2O$	Schoenite (picromerite)	$MgSO_4.K_2SO_4.6H_2O$

Mineral	Formula	Mineral	Formula
Glauberite	$CaSO_4.Na_2SO_4$	Shortite	$2CaCO_3.Na_2CO_3$
Gypsum	$CaSO_4.2H_2O$	Suanite	$Mg_2B_2O_3$
Halite	$NaCl$	Sylvite	KCl
Hanksite	$9Na_2SO_4.2Na_2CO_3.KCl$	Syngenite	$CaSO_4.K_2SO_4.H_2O$
Hectorite	$[Na_{0.33}(Mg,Li)_3Si_4O_{10}(F,OH)_2$	Szaibelyite (ascharite)	$Mg_2B_2O_5.H_2O$
Hexahydrite	$MgSO_4.6H_2O$	Tachyhydrite	$CaCl_2.2MgCl_2.12H_2O$
Howlite	$H_5Ca_2SiB_5O_{14}$	Thernadite	Na_2SO_4
Hydroboracite	$CaMgB_6O_{11}.6H_20$	Thermonatrite	$NaCO_3.H_2O$
Ikaite**	$CaCO_3.6H_2O$	Tincalconite	$Na_2B_4O_7.5H_2O$
Inderite	$MgB_3O_3(OH)_5.5H_2O$	Trona	$NaHCO_3.Na_2CO_3$
Inyoite	$Ca_2B_6O_{11}.13H_2O$	Tunellite	$SrB_6O_9(OH)_2.3H_2O$
Kainite	$4MgSO_4.4KCl.11H_2O$	Tychite	$2MgCO_3.2NaCO_3.Na_2SO_4$
Kernite	$Na_2B_4O_7.4H_2O$	Ulexite	$NaCaB_5O_9.5H_2O$
Kieserite	$MgSO_4.H_2O$	Van'thoffite	$MgSO_4.3Na_2SO_4$
Langbeinite	$2MgSO_4.K_2SO_4$	Wegscheiderite	$Na_2CO_3.3NaHCO_3$

Warren (2010)

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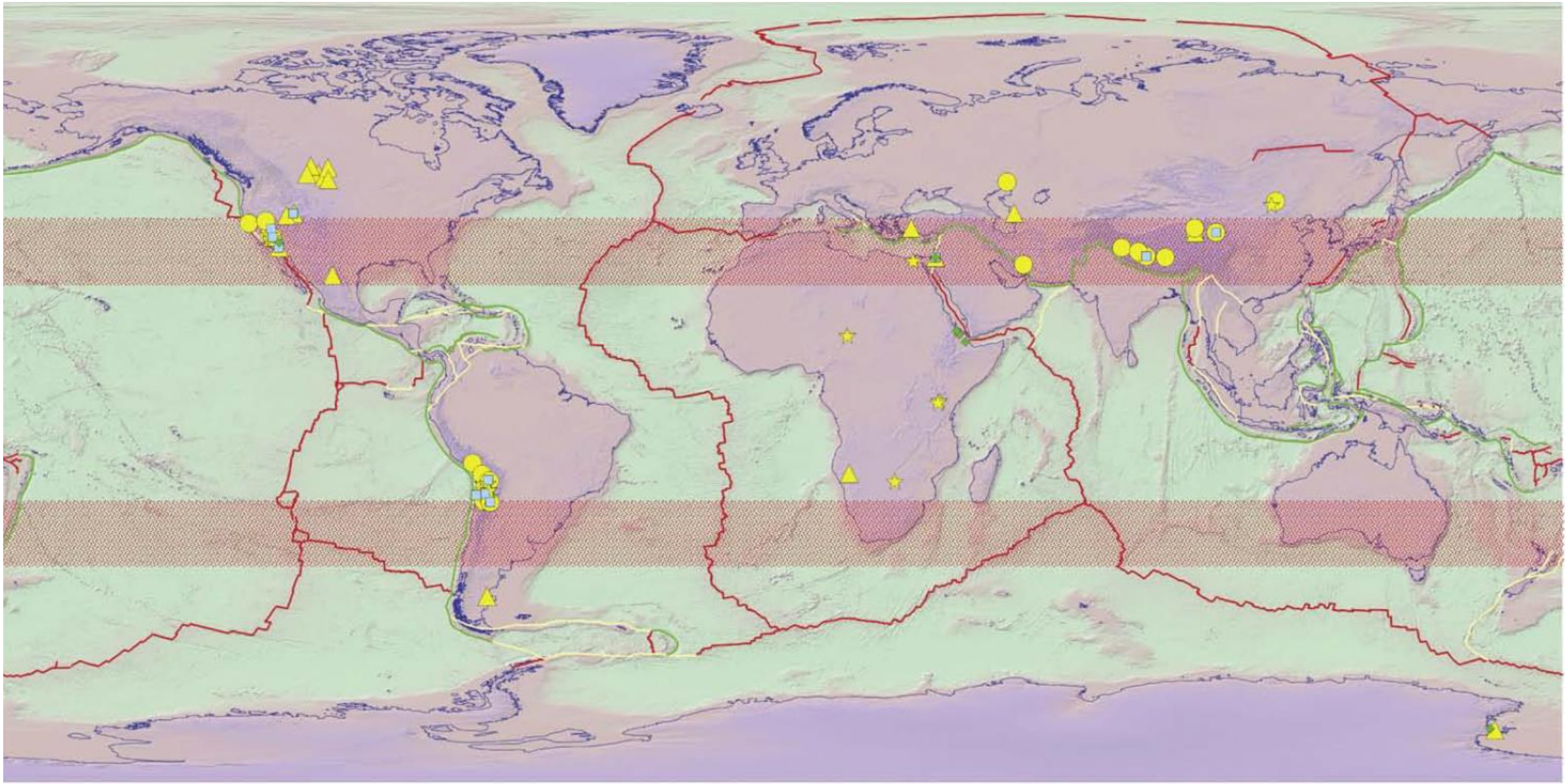
Kernite	$Na_2B_4O_7.4H_2O$	Ulexite	$NaCaB_5O_9.5H_2O$
Kieserite	$MgSO_4.H_2O$	Van'thoffite	$MgSO_4.3Na_2SO_4$
Langbeinite	$2MgSO_4.K_2SO_4$	Wegscheiderite	$Na_2CO_3.3NaHCO_3$

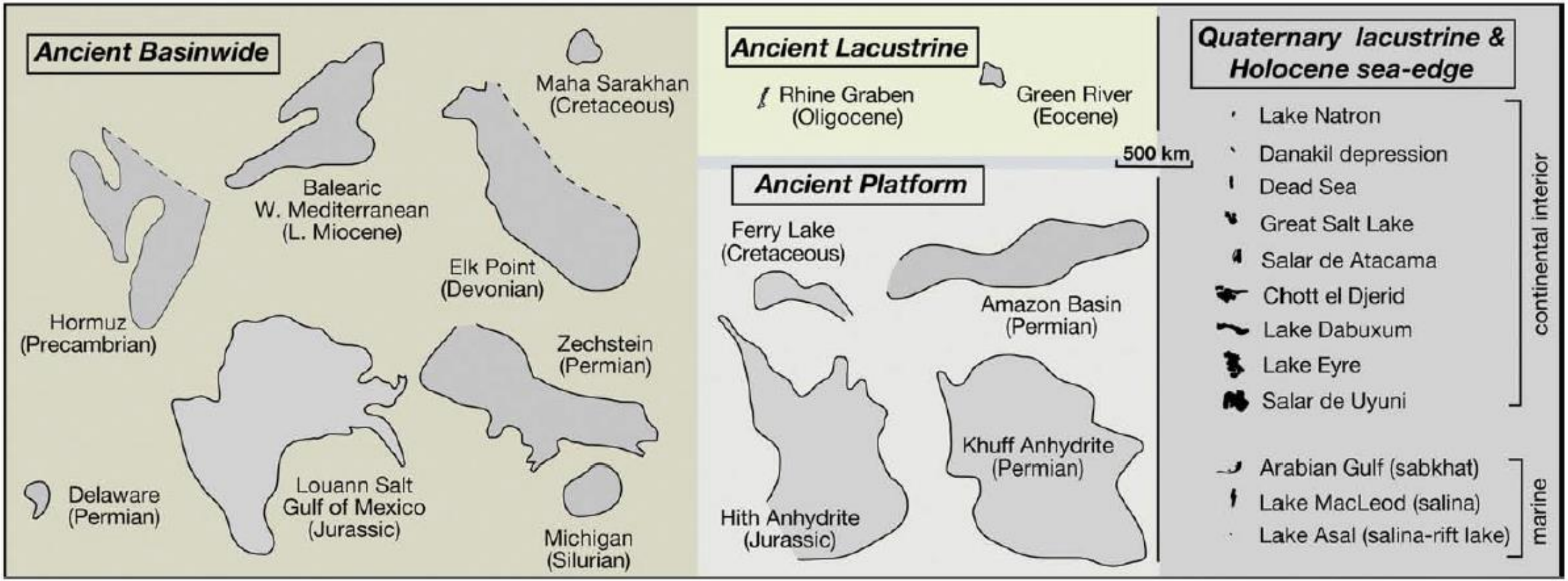
Warren (2010)

Distribuição dos evaporitos continentais quaternários

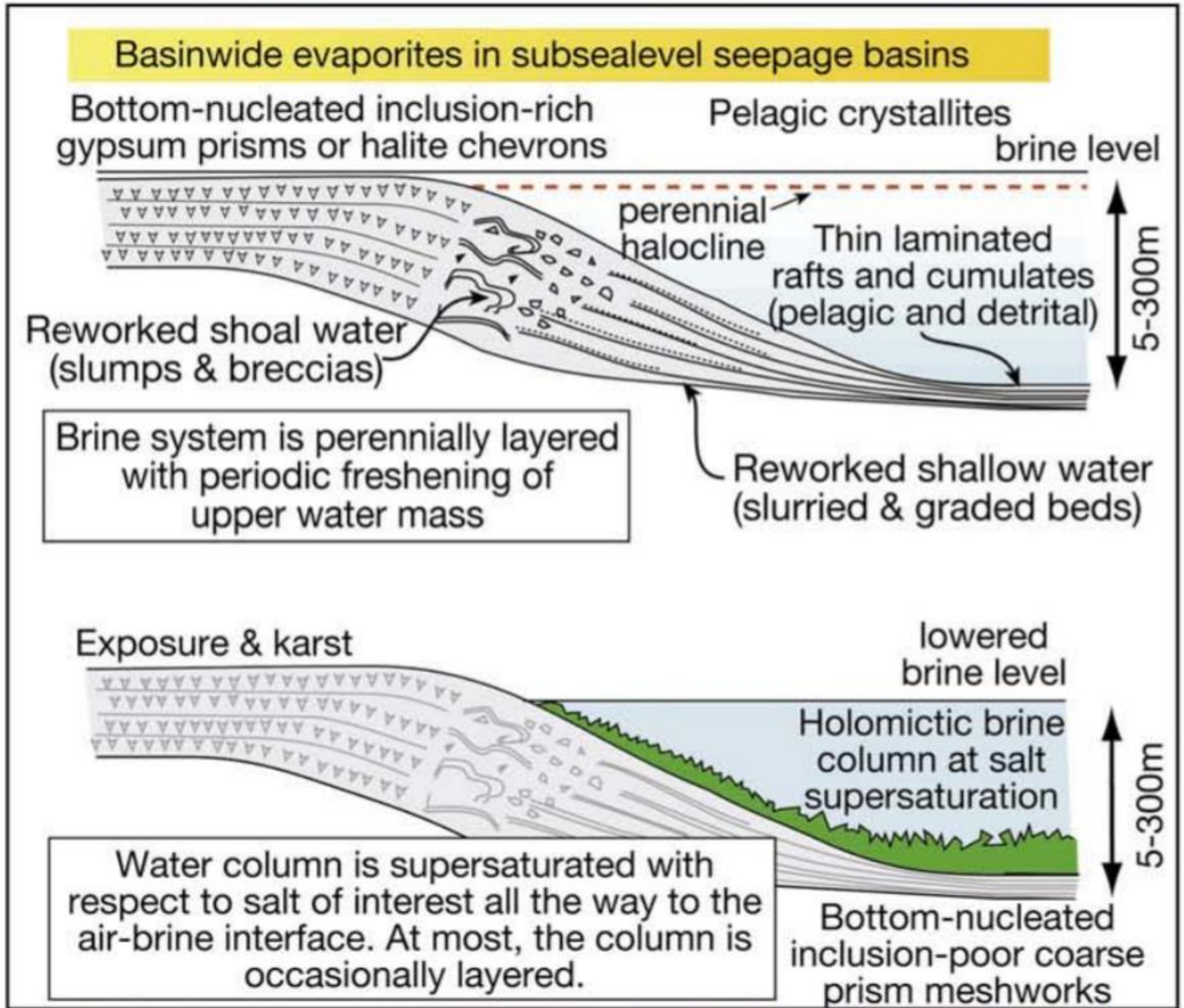


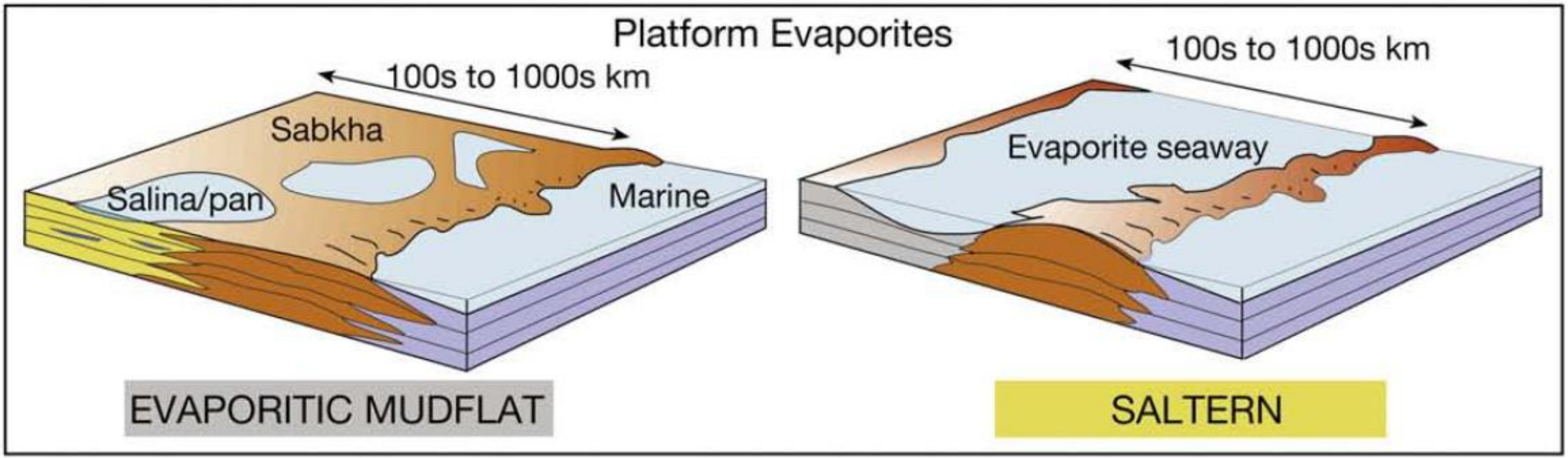
Warren (2010)

Bacias evaporíticas do passado e do presente



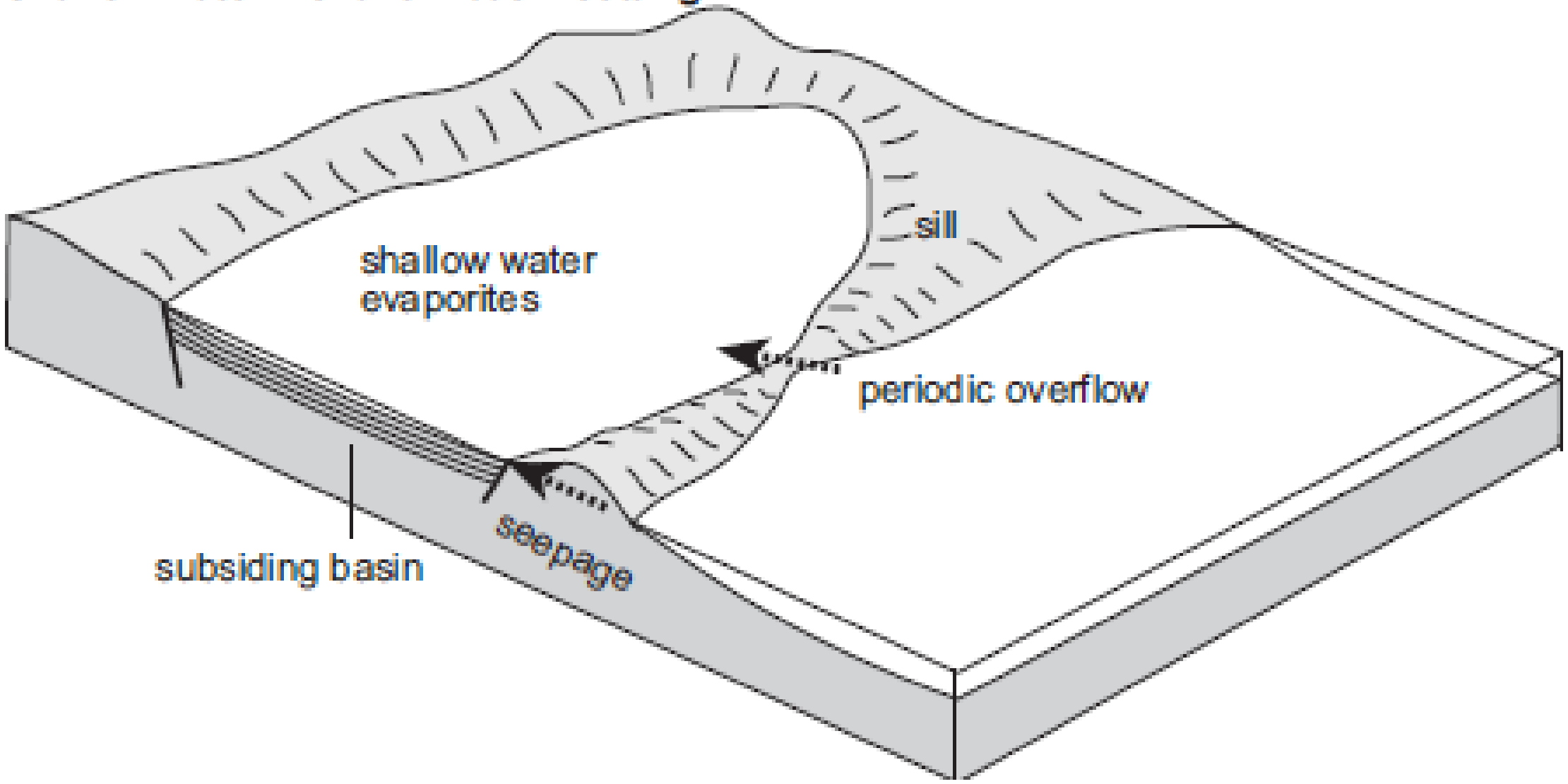
Warren (2010)


Basinwide evaporites in subsealevel seepage basins
Bottom-nucleated inclusion-rich gypsum prisms or halite chevrons
Pelagic crystallites
brine level
perennial halocline
Thin laminated rafts and cumulates (pelagic and detrital)
5-300m
Reworked shoal water (slumps & breccias)
Brine system is perennially layered with periodic freshening of upper water mass
Reworked shallow water (slurried & graded beds)
Exposure & karst
lowered brine level
Holomictic brine column at salt supersaturation
5-300m
Water column is supersaturated with respect to salt of interest all the way to the air-brine interface. At most, the column is occasionally layered.
Bottom-nucleated inclusion-poor coarse prism meshworks

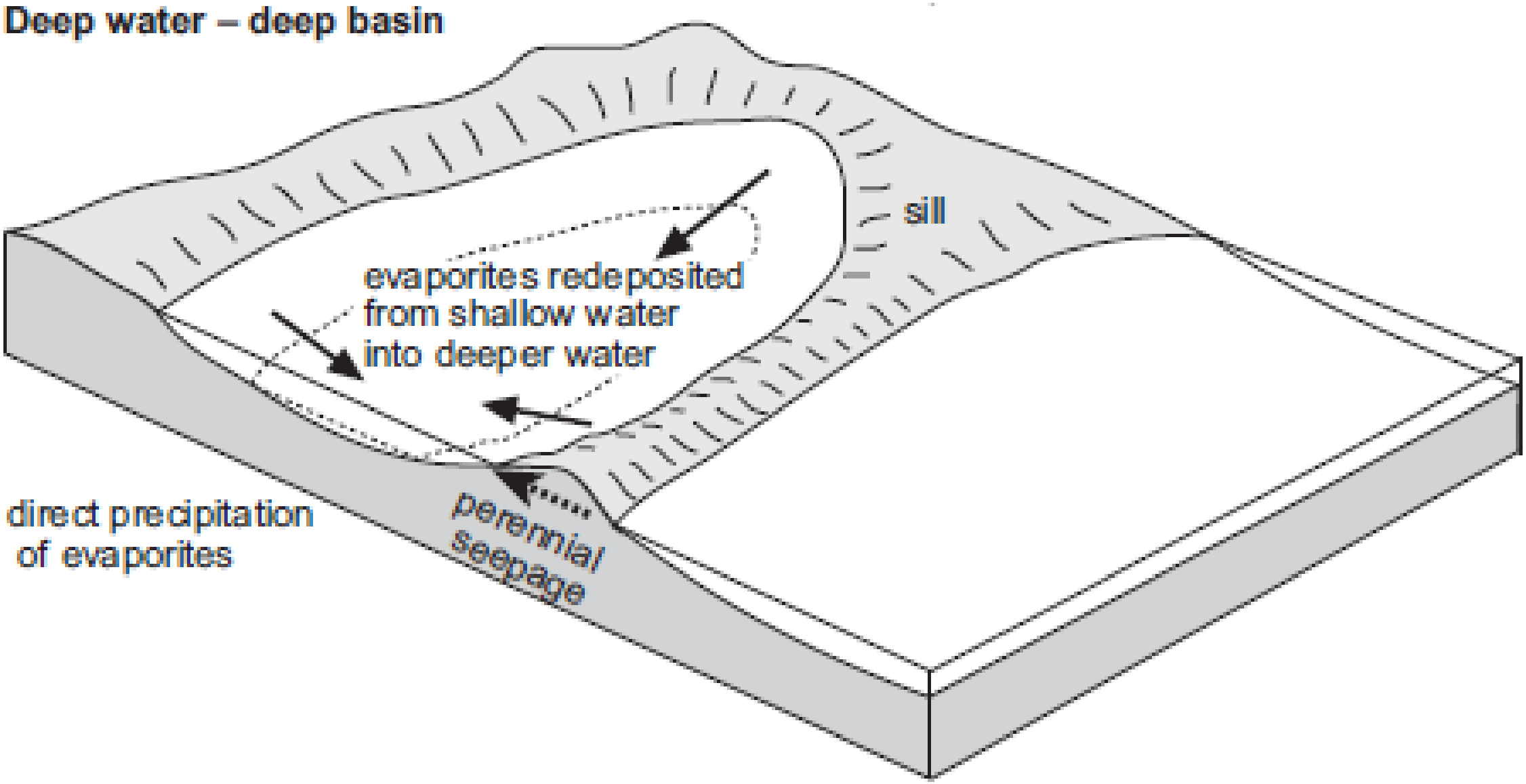

Platform Evaporites
100s to 1000s km
Sabkha
Salina/pan
Marine
EVAPORITIC MUDFLAT
100s to 1000s km
Evaporite seaway
SALTERN

Warren (2010)

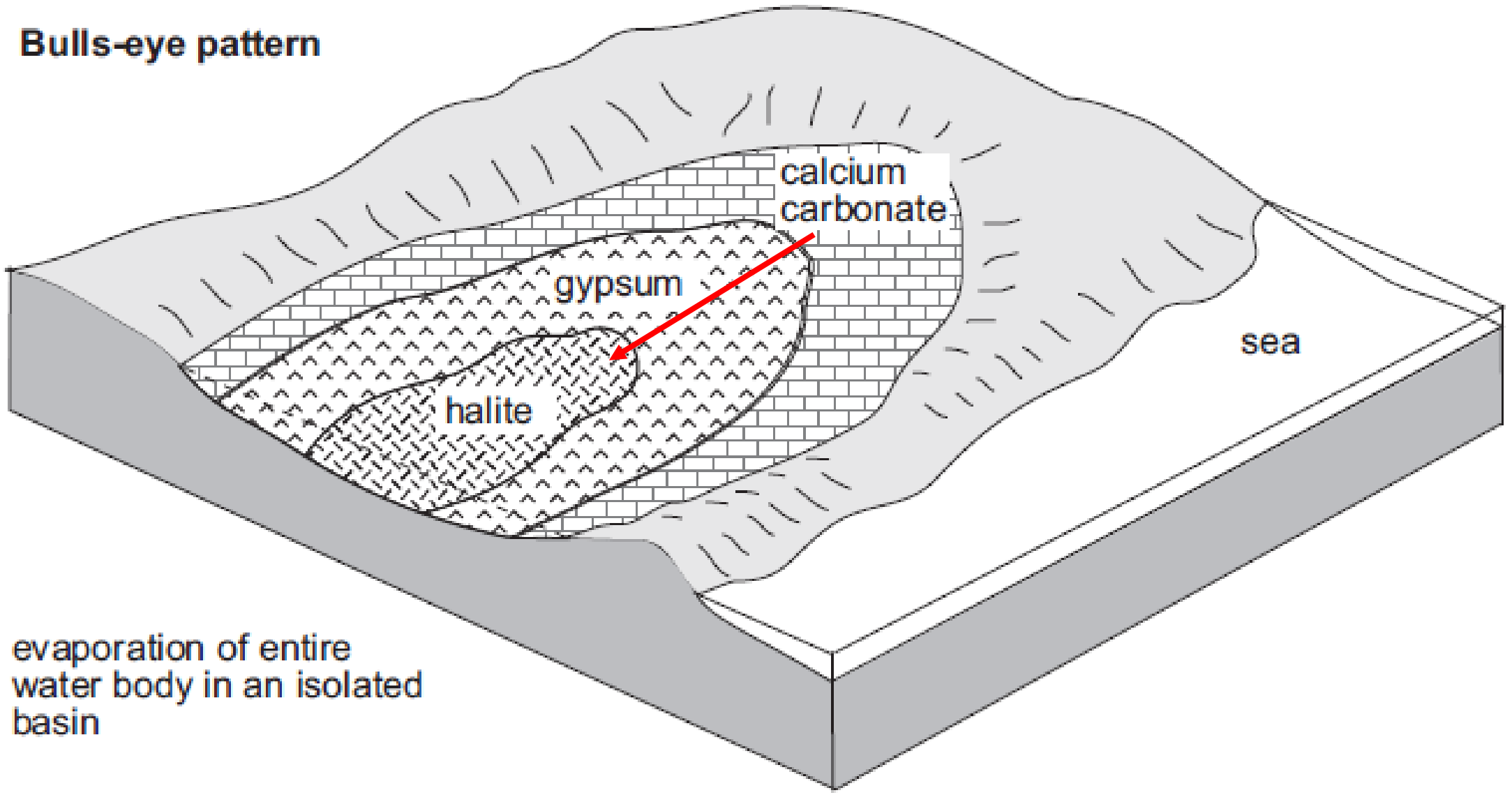
Shallow water – shallow basin setting



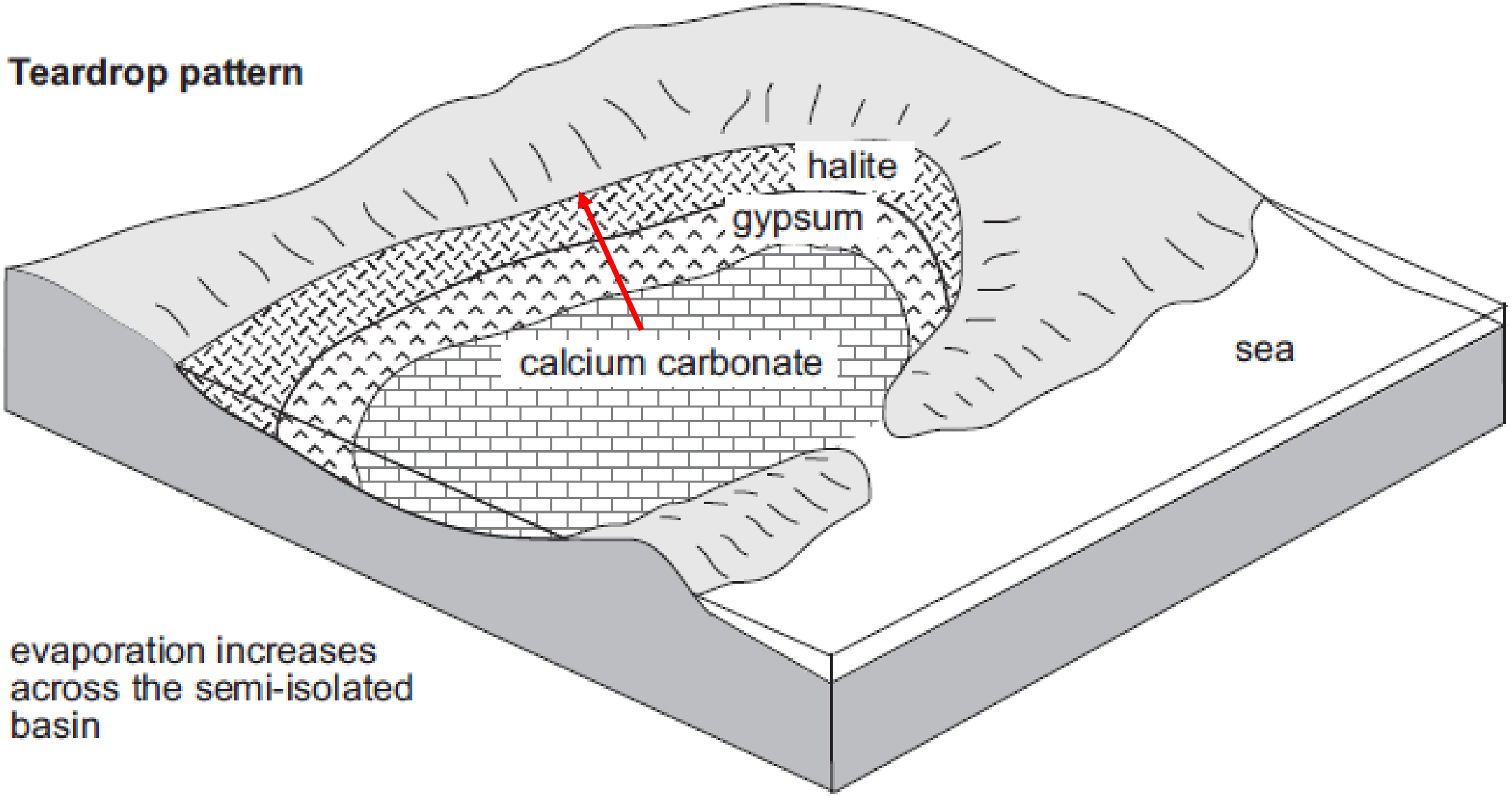
Nichols (2009)



Nichols (2009)

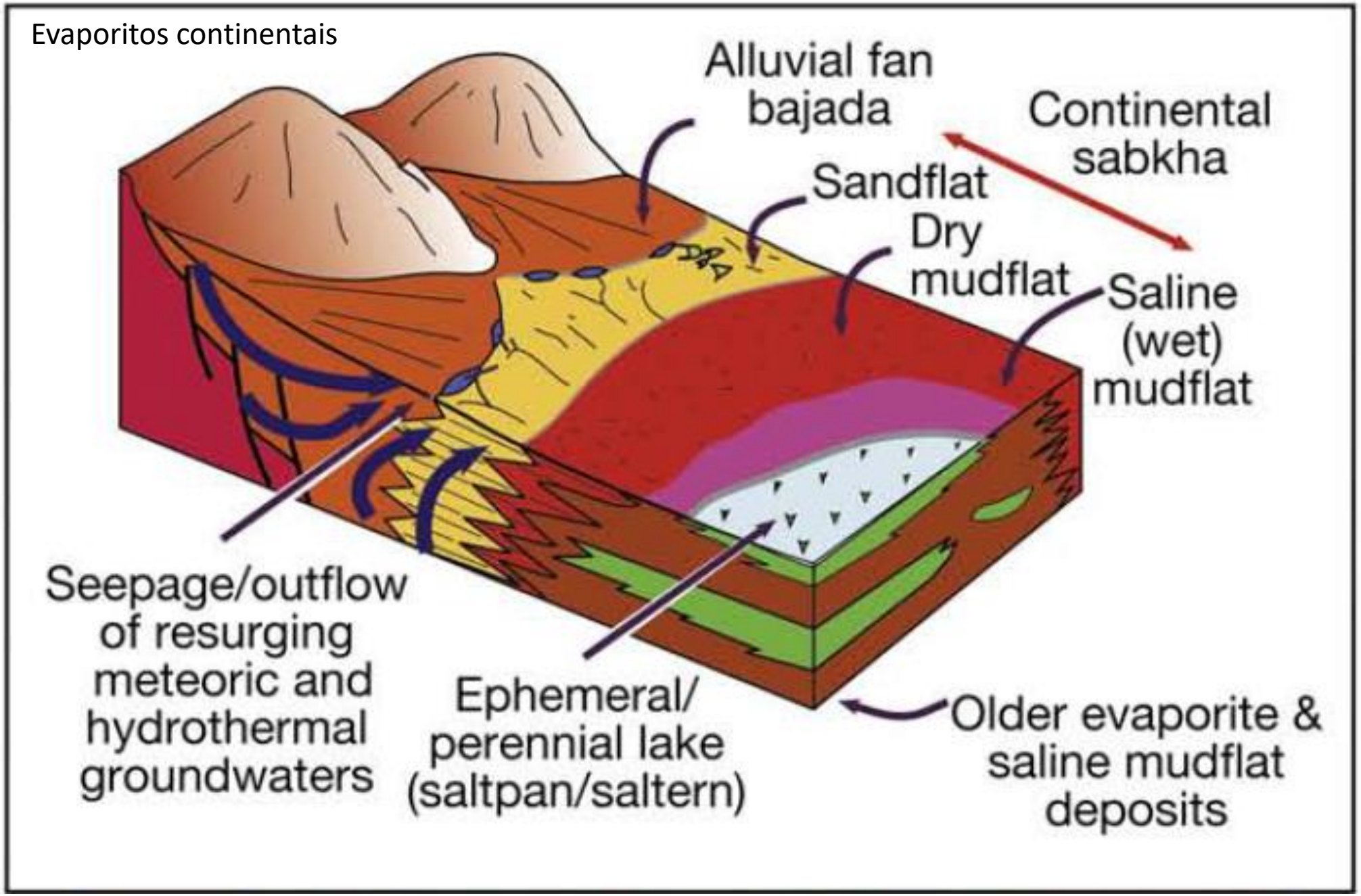


Nichols (2009)



Nichols (2009)

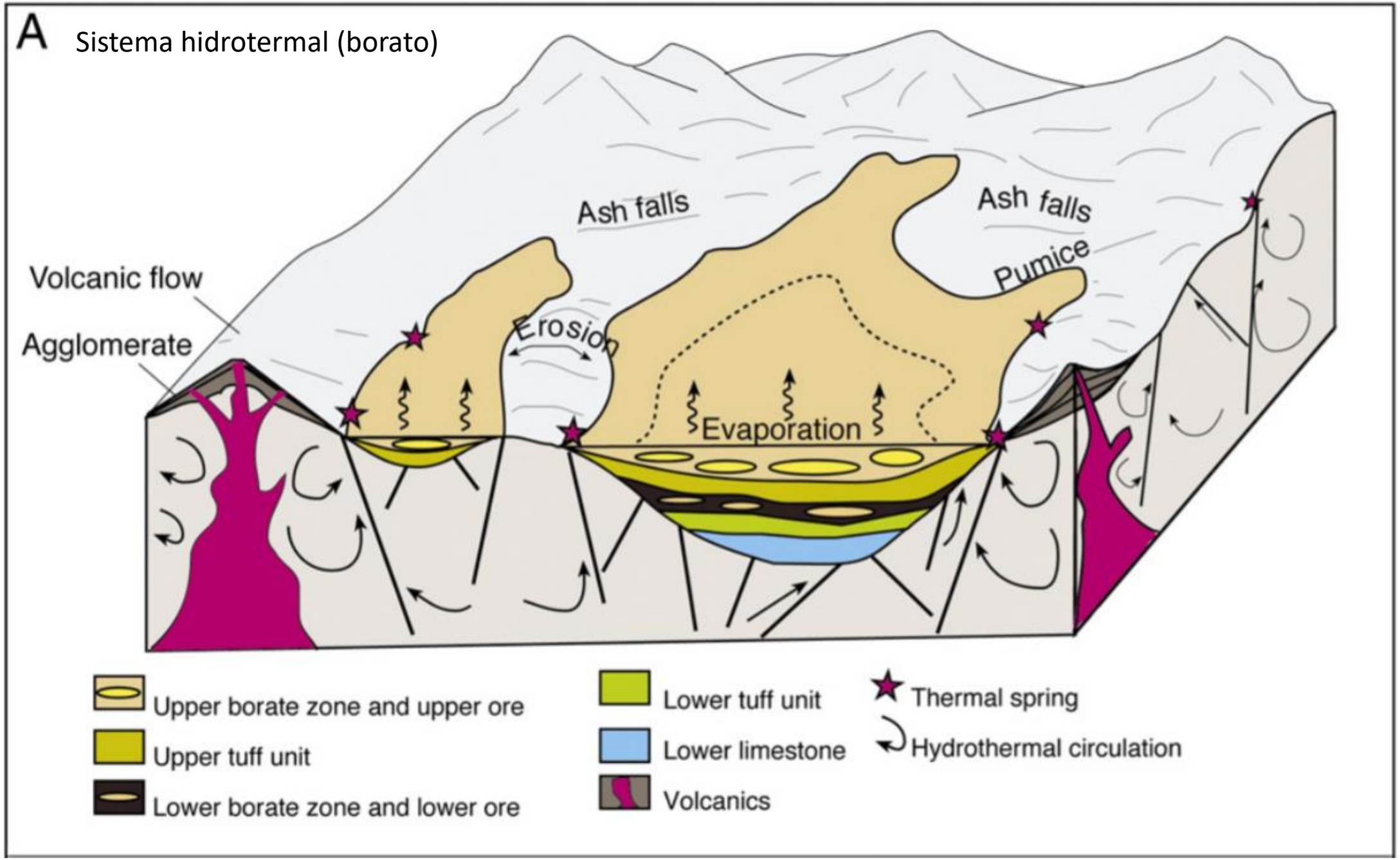
Evaporitos continentais



Warren (2010)

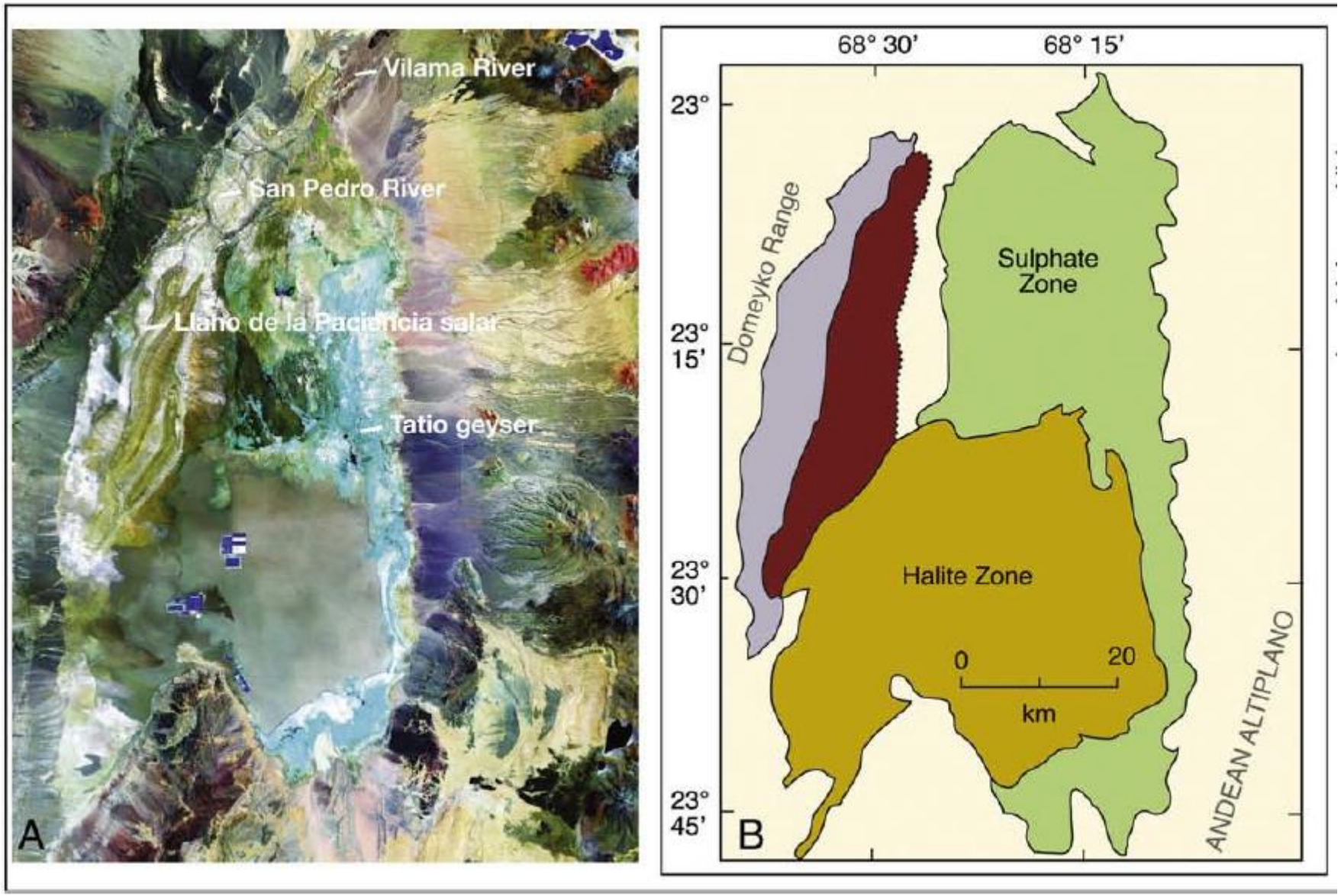
Badwater basin – Death Valley (Alex Grichenko)

A Sistema hidrotermal (borato)



Warren (2010)

Salar del Atacama



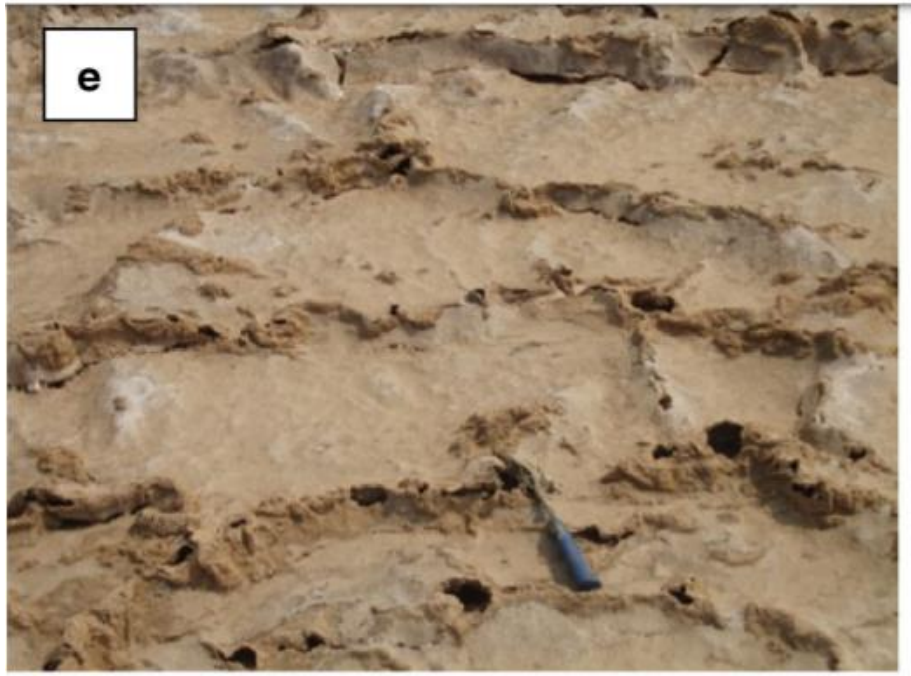
Warren (2010)

Estruturas sedimentares

Domos em gipsita

Aref et al. (2014)

“Tepee” (crosta fragmentada)

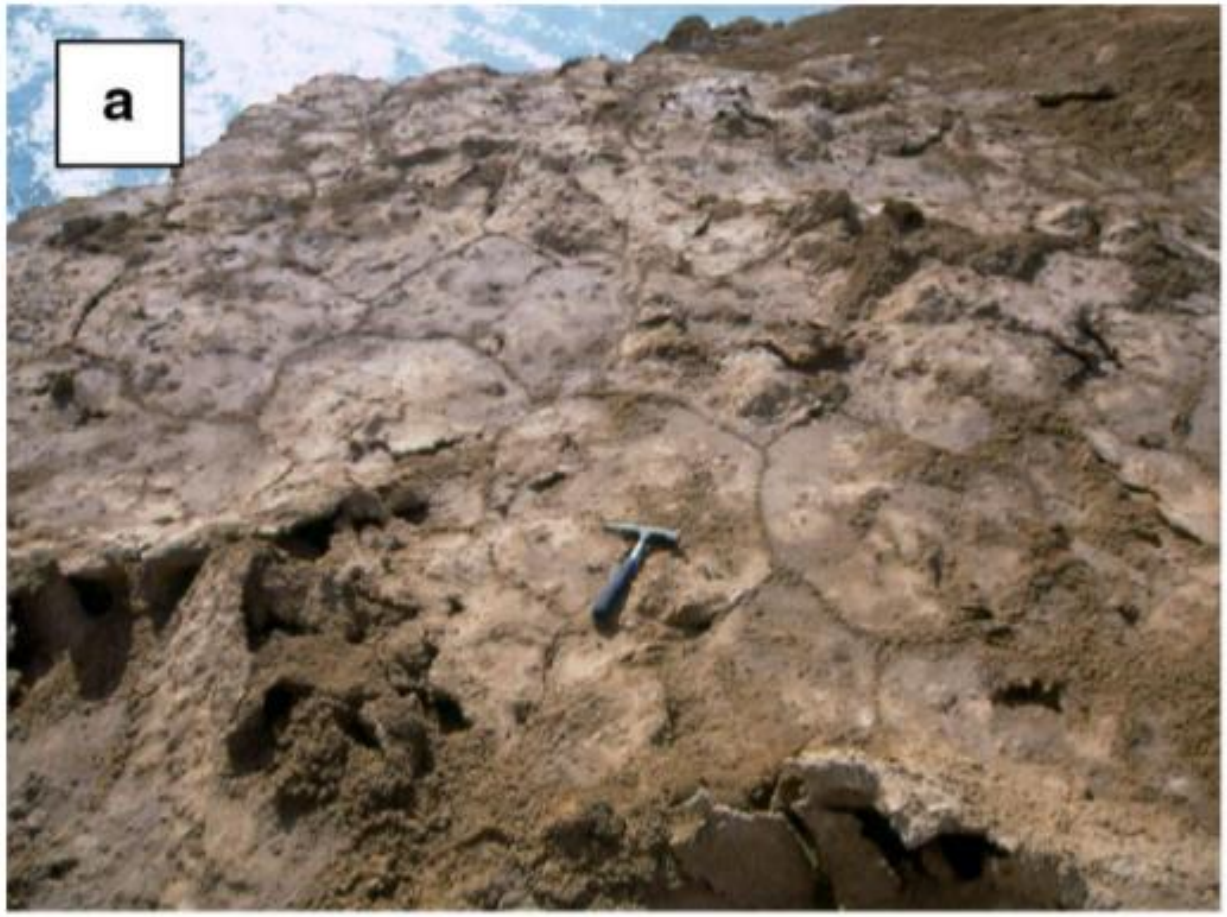


Aref et al. (2014)

Crostas com dobras poligonais – “Petee”

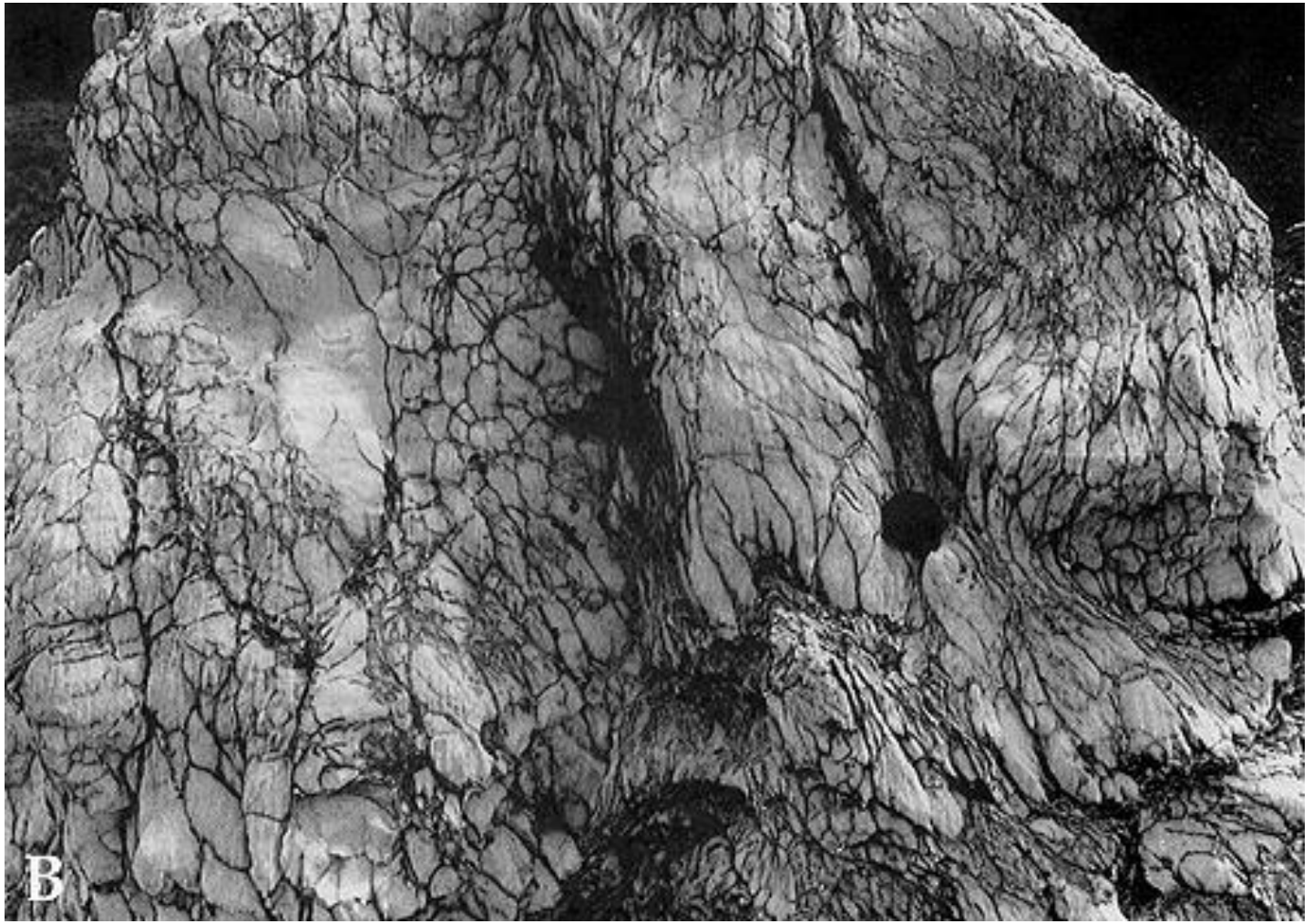
Aref et al. (2014)

Gretas poligonais



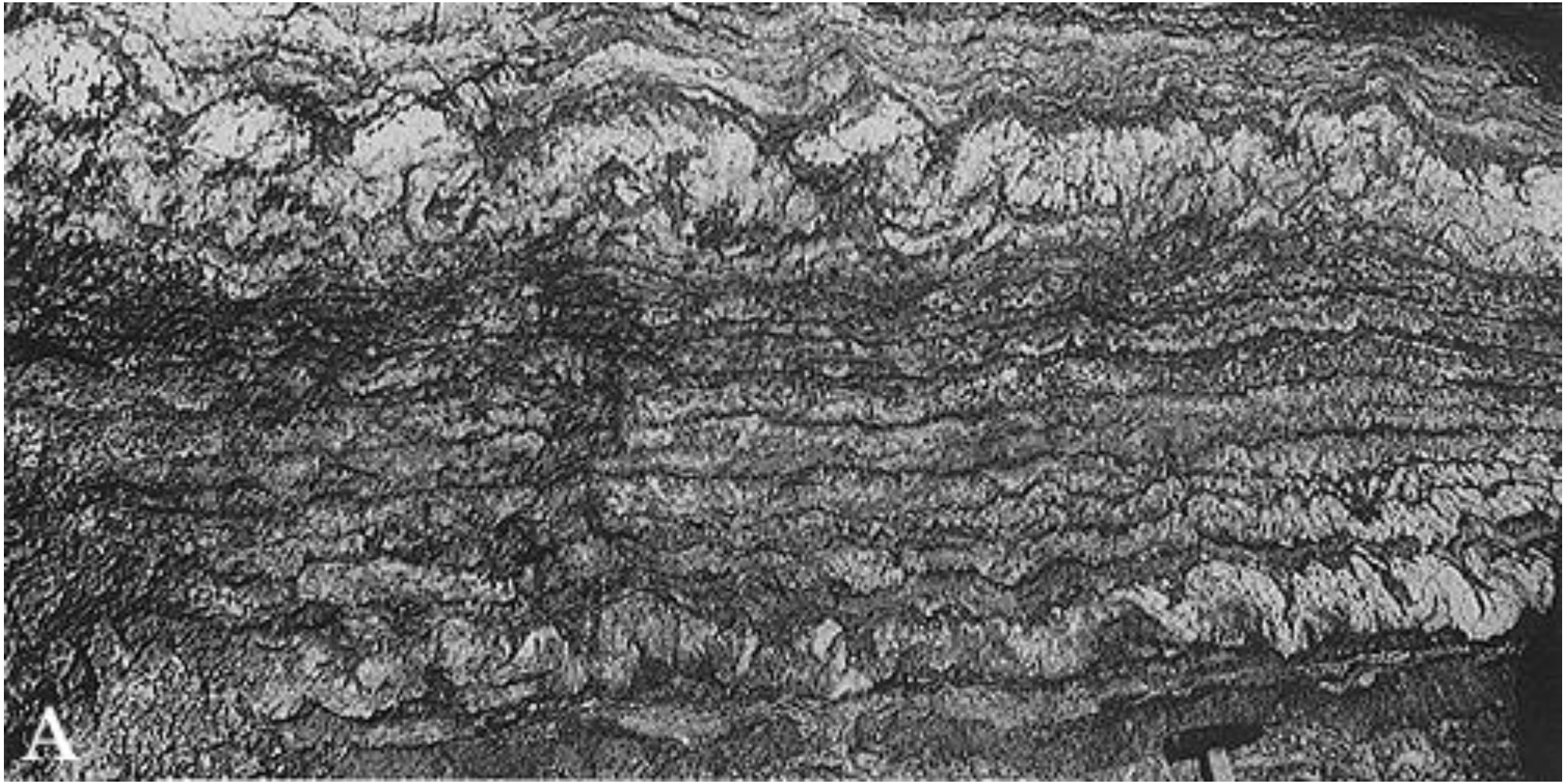
Aref et al. (2014)

Gipsita “chicken wire” (nodular)



Sedimentographica – Franco Richi Lucci (Columbia.edu)

Dobras enterolíticas (gipsita ou anidrita)



Sedimentographica – Franco Richi Lucci (Columbia.edu)

Dobras enterolíticas (anidrita)

http://www.southampton.ac.uk/~imw/sabkha-Offline.htm

Glauberita: $Na_2Ca(SO_4)_2$

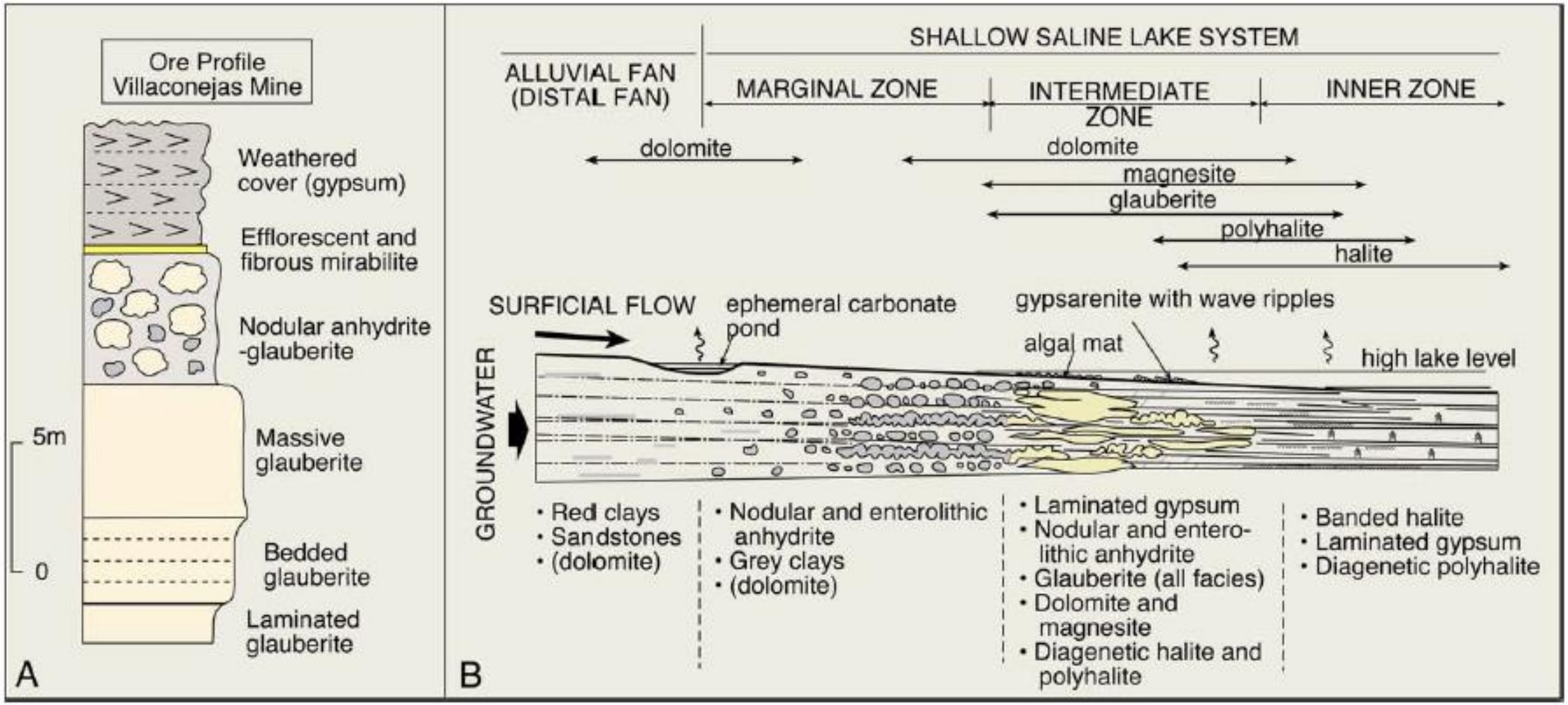
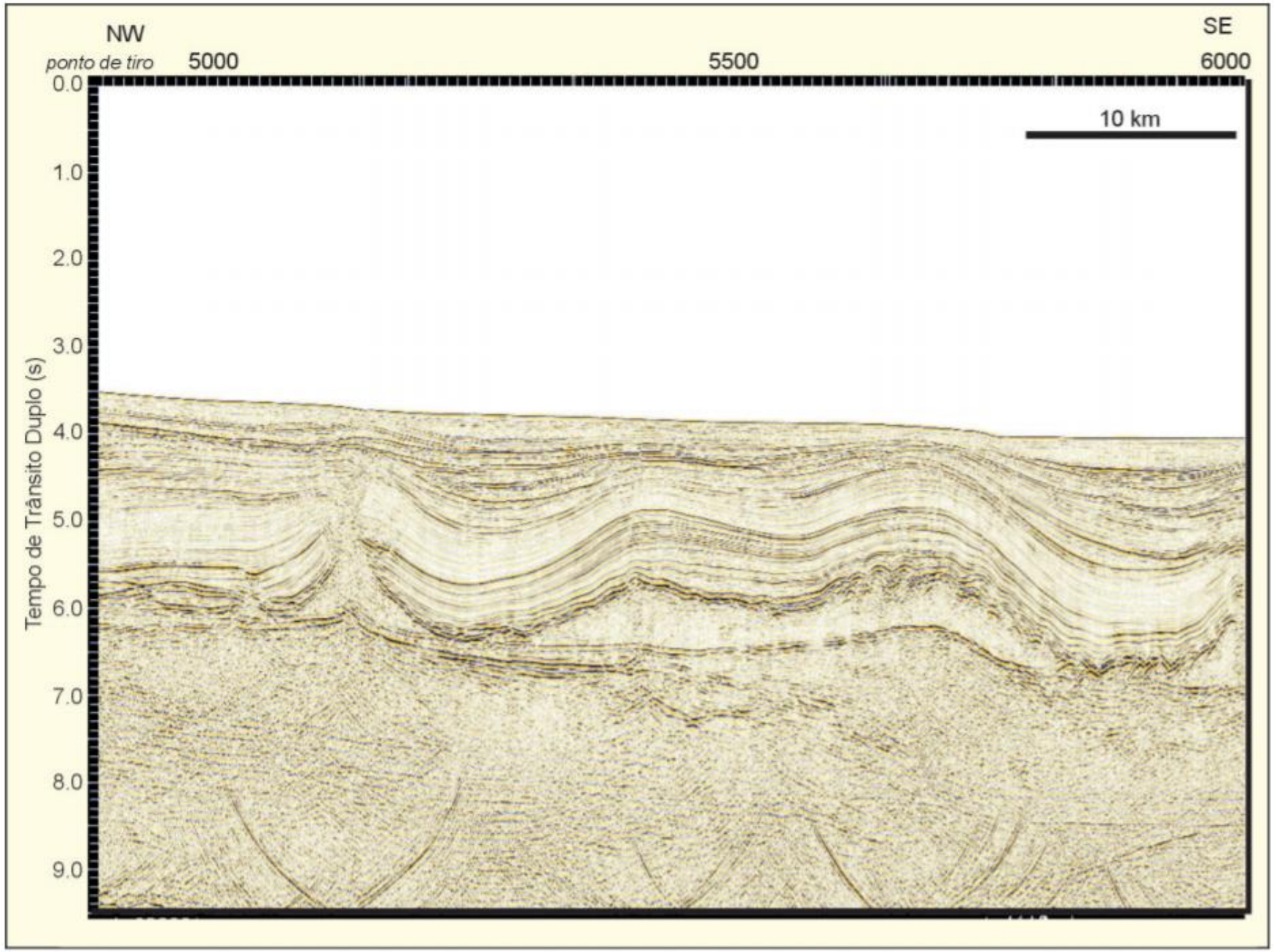


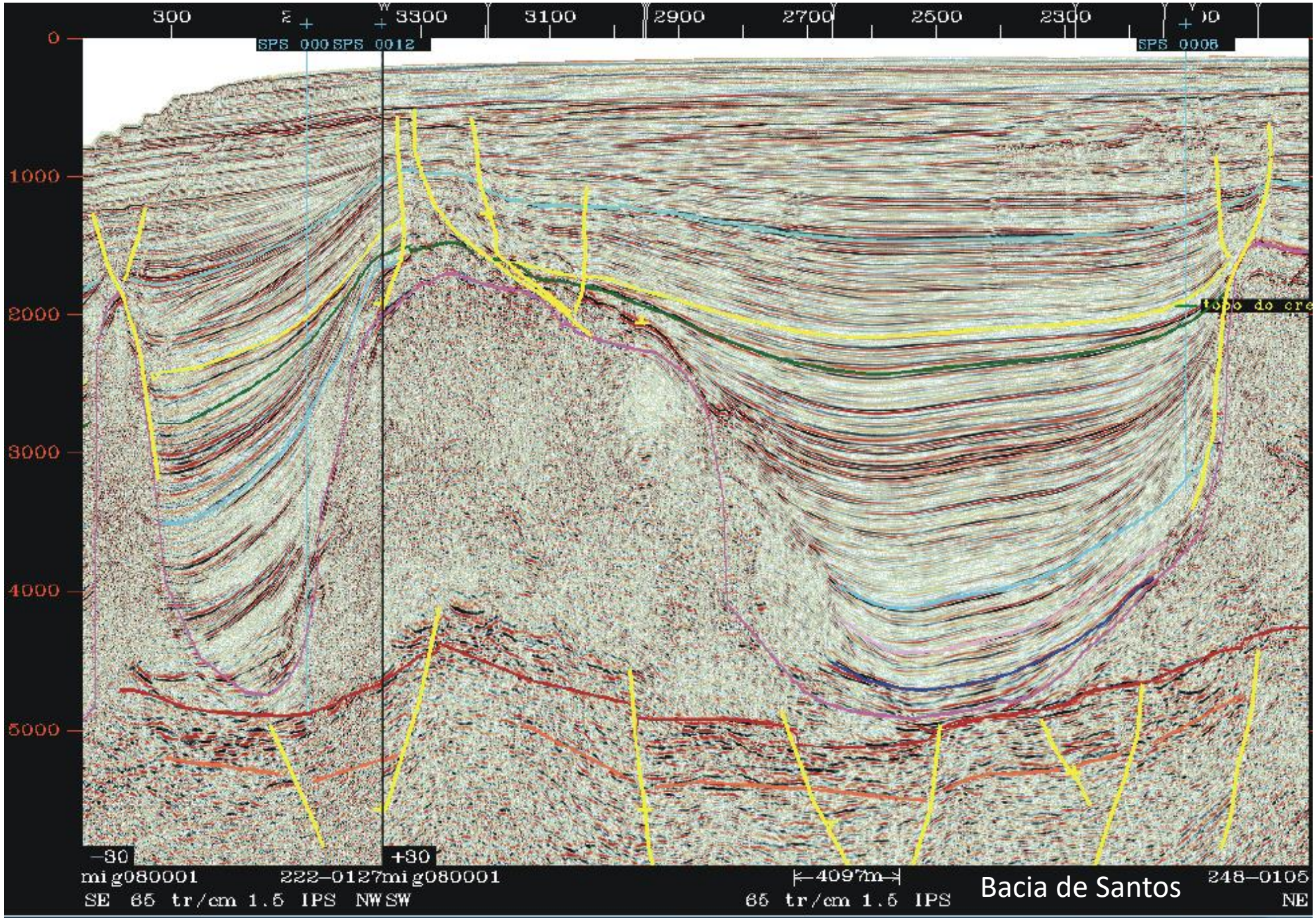
Fig. 14. Miocene glauberite in Spain. A) Profile of the ore zone in the Villaconejas Mine, Spain. B) Sedimentological model for deposition of Spanish glauberite deposits (after Salvany and Orti, 1994).

Warren (2010)

Deformação pós-deposicional (tectônica do sal)



Bacia de Campos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2700
2500
2300
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SPS 0012
0
1000
2000
3000
4000
5000
topo do cre
-30
+30
mig080001
222-0127mig080001
4097m
248-0105
SE 65 tr/cm 1.5 IPS NWSW
65 tr/cm 1.5 IPS
NE
Bacia de Santos

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Evaporites through time: Tectonic, climatic and eustatic controls in marine and nonmarine deposits

John K. Warren

Petroleum Geoscience Program, Department of Geology, Chulalongkorn University, 254 Phayathai Road, Pathumwan, Bangkok 10330, Thailand

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ORIGINAL ARTICLE

Microbial and physical sedimentary structures in modern evaporitic coastal environments of Saudi Arabia and Egypt

Mahmoud A. M. Aref · Mohammed H. Basyoni · Gerhard H. Bachmann