Rumsey Hills looking N from 1700’
Rumsey Hills looking N from 1700’

Criss
Cottonwood Spring
Salt Creek

$S = 24\%_o$ \hspace{1cm} $\delta^{18}O = +3.0$

Davisson et al 1994
Schaal et al., 1994
Murphy Canyon
Murphy Canyon

RH 17

$S = 17\%o$

$\delta^{18}O + 4.7\%o$
Hayes Canyon
Hayes Canyon
1420 ft.
20‰ salinity
Rumsey Hills, California

Davisson et al, 1994
BACKGROUND:

Lithostatic gradient $\sim 1.06$ psi/ft $(\rho = 2.45$ g/cc$)$

Hydrostatic gradient = 0.43 to 0.47 psi/ft

Analogies: Cave diver; Bucket of marbles
What happens w/ smaller & smaller grains?

AHP’s: WORLDWIDE GEOLOGIC OCCURRENCE
CA  WY  TX  LA
North Sea, NW Germany, Alps
USSR
Iran
Mostly found in Tertiary sediments
RUMSEY HILLS SEISMICITY
1910 to 1994

Hatched area represents the zone of saline fluid expulsion.

EXPLANATION:
- Spring
- Anticline
- Overturned anticline
- Thrust fault

Large dots represent epicenters. Epicenter data courtesy of the United States Geological Survey. Epicenters from modern data base (1968 to 1994, > 0.0 magn.) and historical data base (1910 to 1968, > 1.0 magn.).

base map: Schaal et al. 1994
Old BLOWOUT
Rumsey Hills, California

SC 1
3 Lpm
21°C
25 g/l
δ¹⁸O = -1.8‰
δD = -16‰
Rumsey Hills

$\delta D$

$\delta^{18}O$

$\text{SMOW}$

$\text{slope}=3.3$

Davisson et al. 1994
Rumsey Hills

Na (mg/L) vs Cl (mg/L)

Davisson et al. 1994
Rumsey Hills

Ca (mg/L) vs Cl (mg/L) graph showing calcium excess.

Davisson et al. 1994
\[ Na_{defcit} = \frac{1}{22.99} \left( \left( \frac{Na}{Cl} \right)_{sw} [Cl]_{meas} - [Na]_{meas} \right) \]

\[ Ca_{excess} = \frac{2}{40.08} \left( [Ca]_{meas} - \left( \frac{Ca}{Cl} \right)_{sw} [Cl]_{meas} \right) \]

Davisson et al 1994
Rumsey Hills

Ca Excess (meq/L) vs. Na Deficit (meq/L)

Regression equation: 

\[ y = 1.10x + 16.3 \]

\[ r^2 = 0.92 \]

Davisson et al 1994
halite dissolution

CaSO₄ and Dolomitization

CaCO₃ ppt

1Ca for 1Na Exchange

1Ca for 2Na Exchange

Mixing

Evaporating Seawater

Ca Excess (meq/L)

Na Deficit (meq/L)
\[ y = 140.34 + 0.96726x \quad R = 0.98119 \]

Basinal Fluids

Davisson & Criss 1996
Basinal Fluids
Kansas Brines
Halite Fluid Inclusions
Evaporated Seawater

Ca Excess (meq/L) vs Na Deficit (meq/L)

Davisson & Criss 1996
Mt Diablo
Melchiorre et al. 1999
end