Comprehensive Logging of Deep Bedrock Wells in Vermont for Geothermal Purposes

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Outline

- Dept. of Energy Grant
  - 1) digitization of geologic data
  - 2) thermal conductivity and geochemistry of representative lithologies.
  - ***3) Temperature, conductivity, gamma, and caliper logging of deep wells in different tectonic belts.***
    - ***Temperature gradients***
    - ***Hinesburg Thrust well***
    - ***Champlain College well***

Temperature + Conductivity Tool

Gamma Tool

Caliper Tool

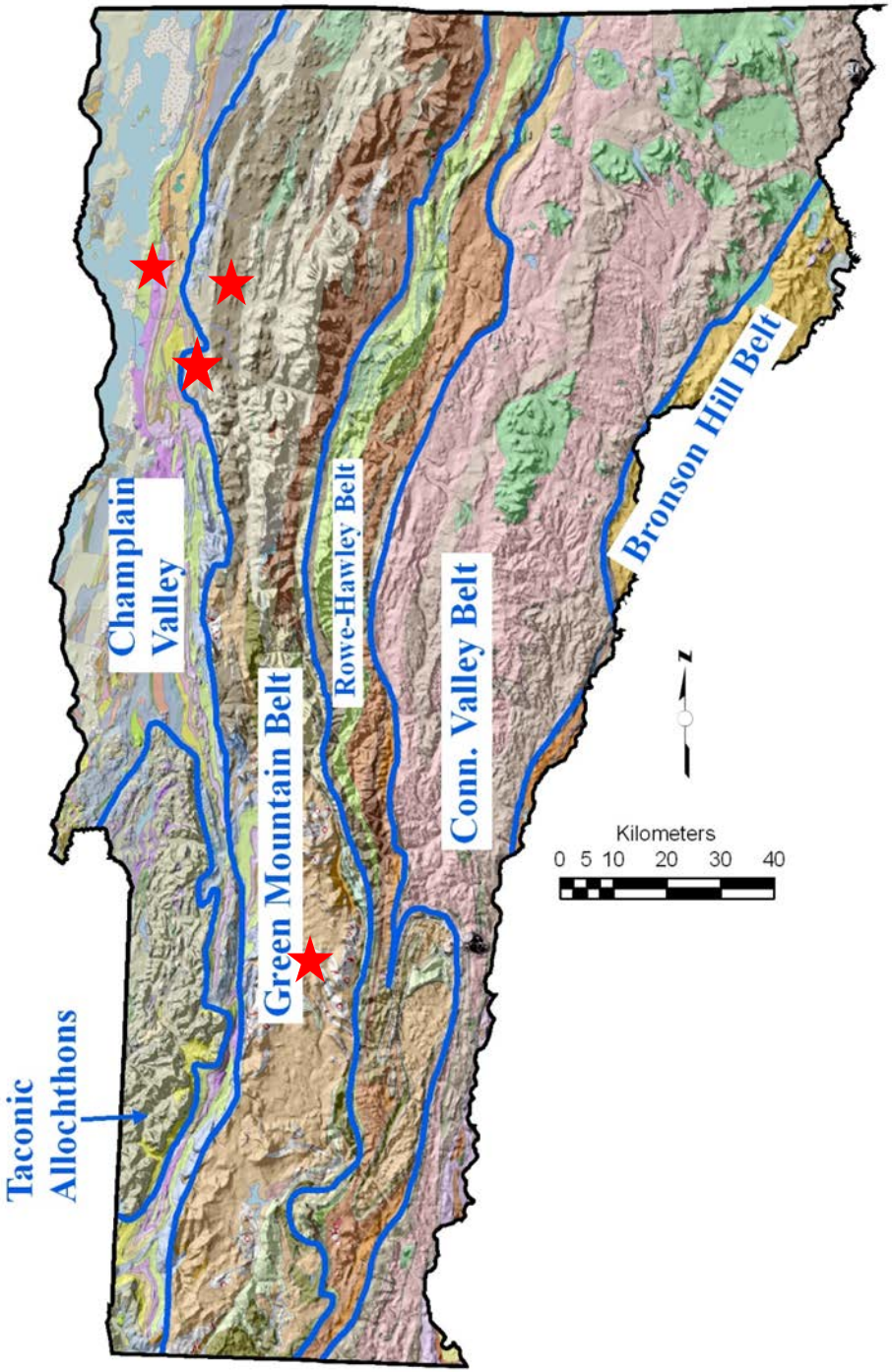
Logging Tools

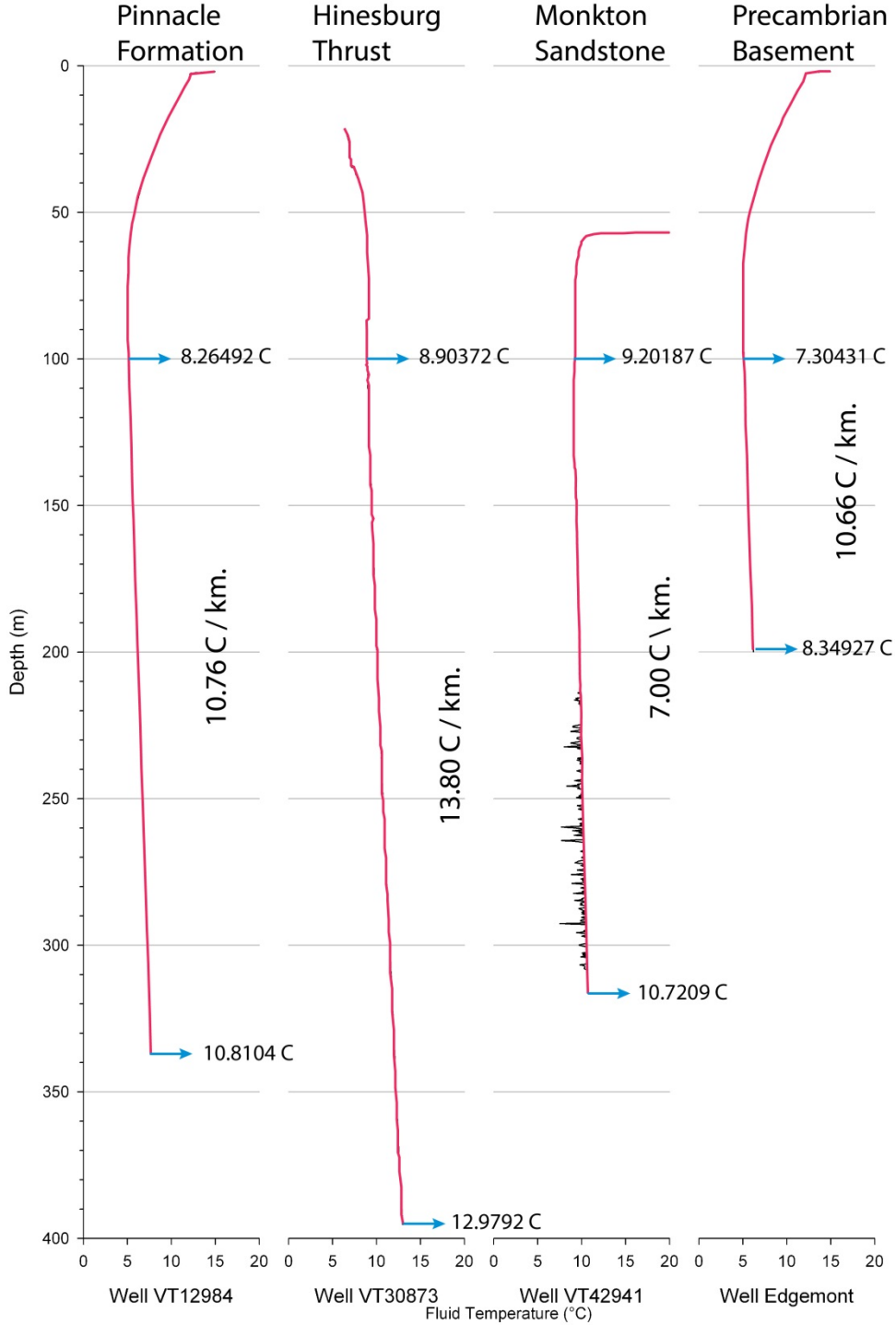
MATRIX
handle with great care!!
FRAGILE

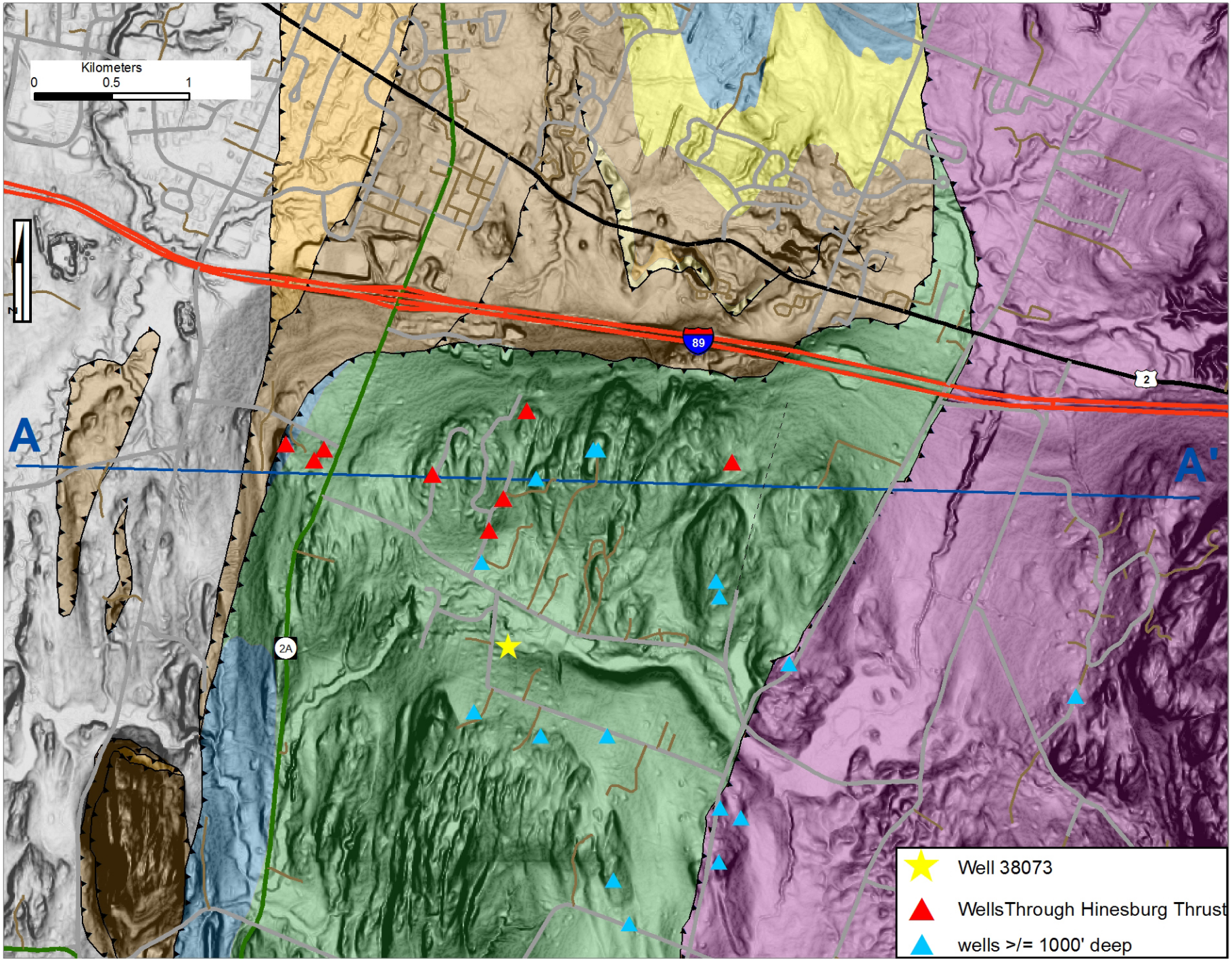
Bedrock Belts in Vermont

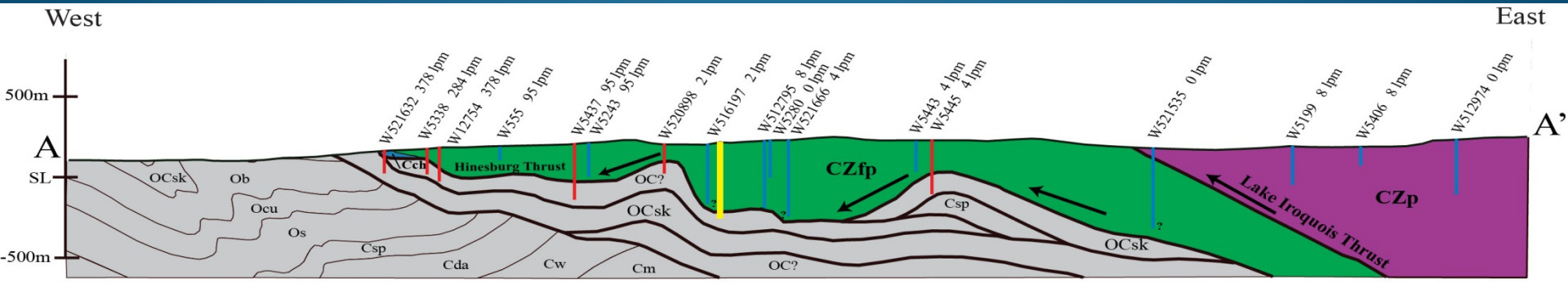
Wells Logged-

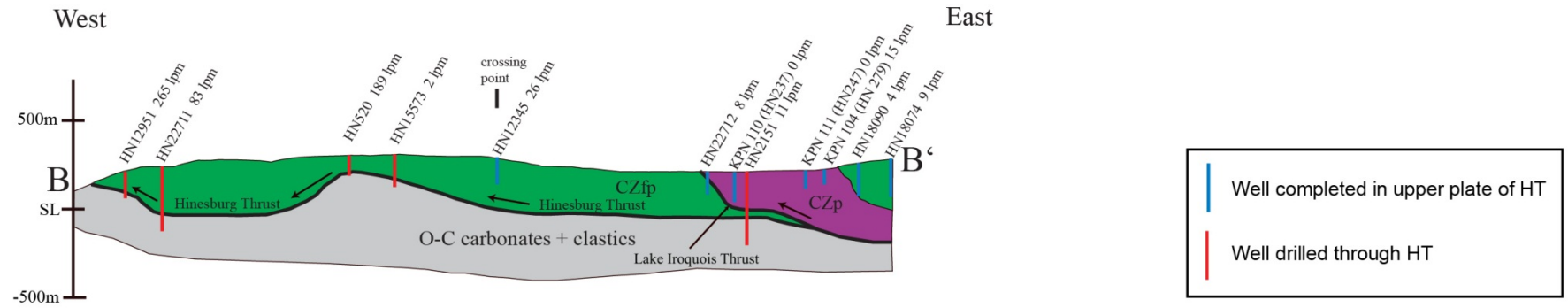
- Champlain College (Burlington)
- Spafford Water Wells (Jericho)
- Edgemont Condominiums (Killington)
- Desarno Road (Williston)

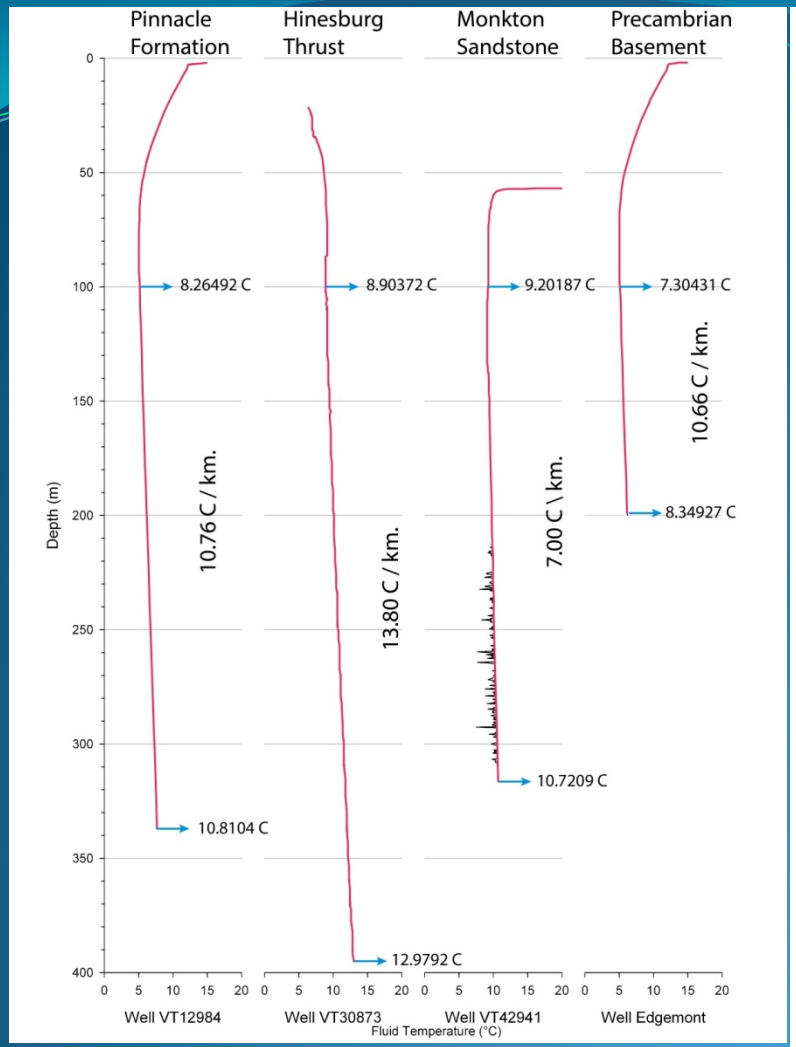


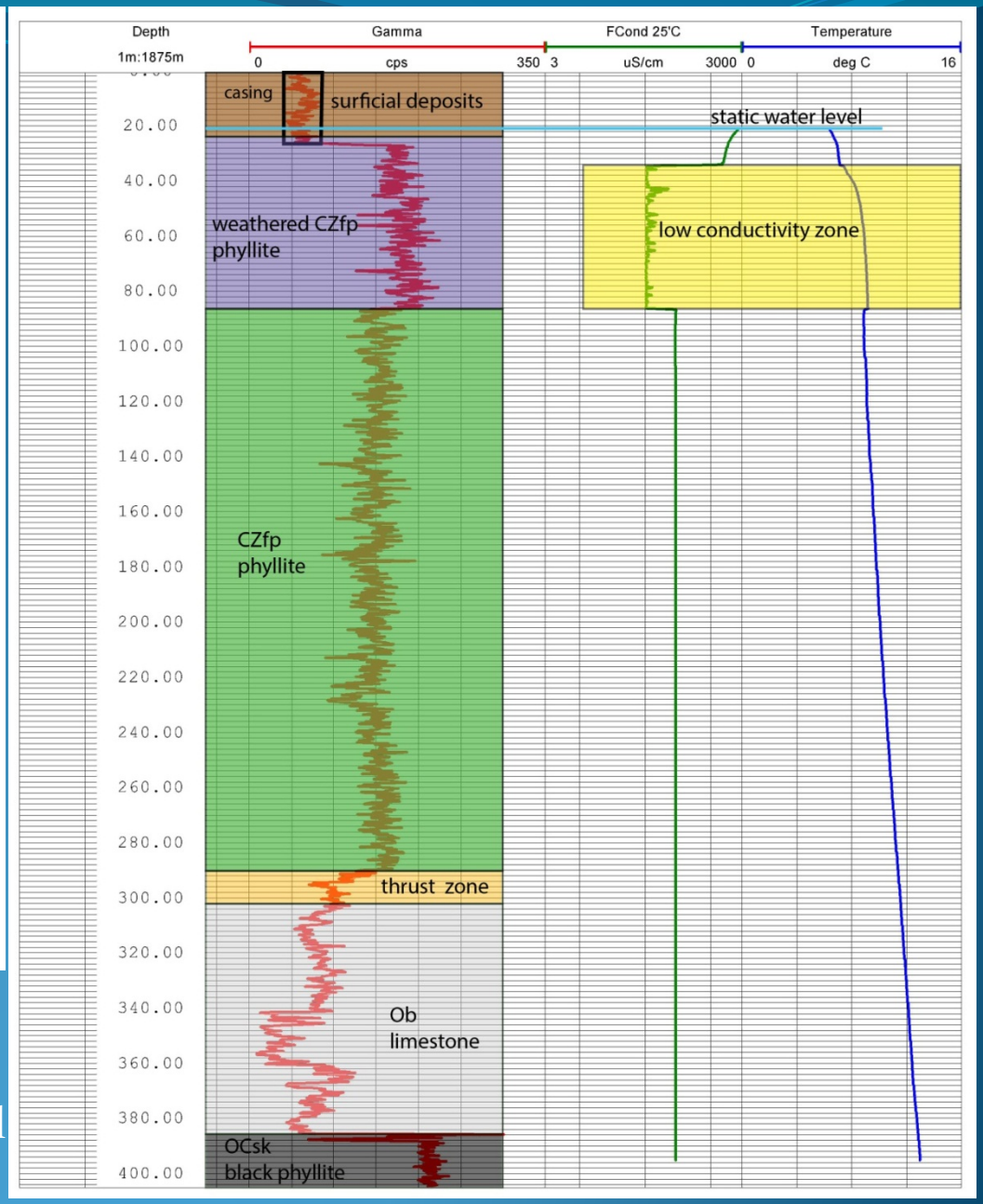

Pinnacle Formation
Hinesburg Thrust
Monkton Sandstone
Precambrian Basement
Depth (m)
0
50
100
150
200
250
300
350
400
8.26492 C
8.90372 C
9.20187 C
7.30431 C
10.66 C / km.
10.76 C / km.
13.80 C / km.
7.00 C \ km.
8.34927 C
10.7209 C
10.8104 C
12.9792 C
0 5 10 15 20
Well VT12984
Well VT30873
Well VT42941
Well Edgemont
Fluid Temperature (°C)


Kilometers
0
0.5
1
N
89
2
2A
A
A'
Well 38073
WellsThrough Hinesburg Thrust
wells >/= 1000' deep

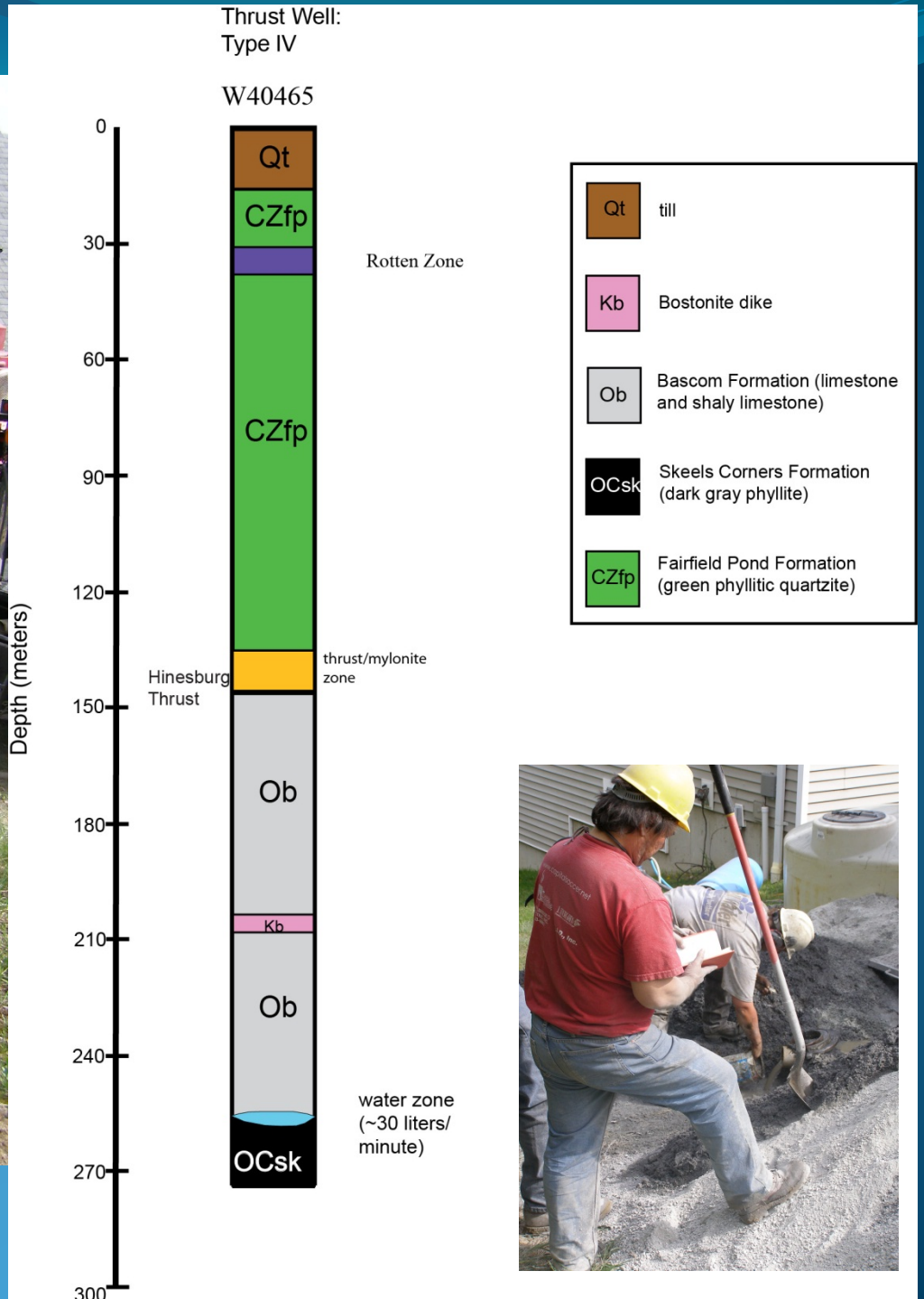

West
East
500m
A
SL
-500m
A'
W521632 378 lpm
W5338 284 lpm
W12754 378 lpm
W555 95 lpm
W5437 95 lpm
W5243 95 lpm
W520898 2 lpm
W516197 2 lpm
W512795 8 lpm
W5280 0 lpm
W521666 4 lpm
W5443 4 lpm
W5445 4 lpm
W521535 0 lpm
W5199 8 lpm
W5406 8 lpm
W512974 0 lpm
OCsk
Ob
Ocu
Os
Csp
Cda
Cw
Cm
OC?
Cch
Hinesburg Thrust
CZfp
OCsk
Csp
OCsk
Lake Iroquois Thrust
CZp


West
East
500m
B
SL
-500m
B'
HN12951 265 lpm
HN22711 83 lpm
HN520 189 lpm
HN15573 2 lpm
crossing point
HN12345 26 lpm
HN22712 8 lpm
KPN 110 (HN237) 0 lpm
HN2151 11 lpm
KPN 111 (HN247) 0 lpm
KPN 104 (HN 279) 15 lpm
HN18090 4 lpm
HN18074 9 lpm
Hinesburg Thrust
CZfp
Hinesburg Thrust
CZp
O-C carbonates + clastics
Lake Iroquois Thrust
Well completed in upper plate of HT
Well drilled through HT



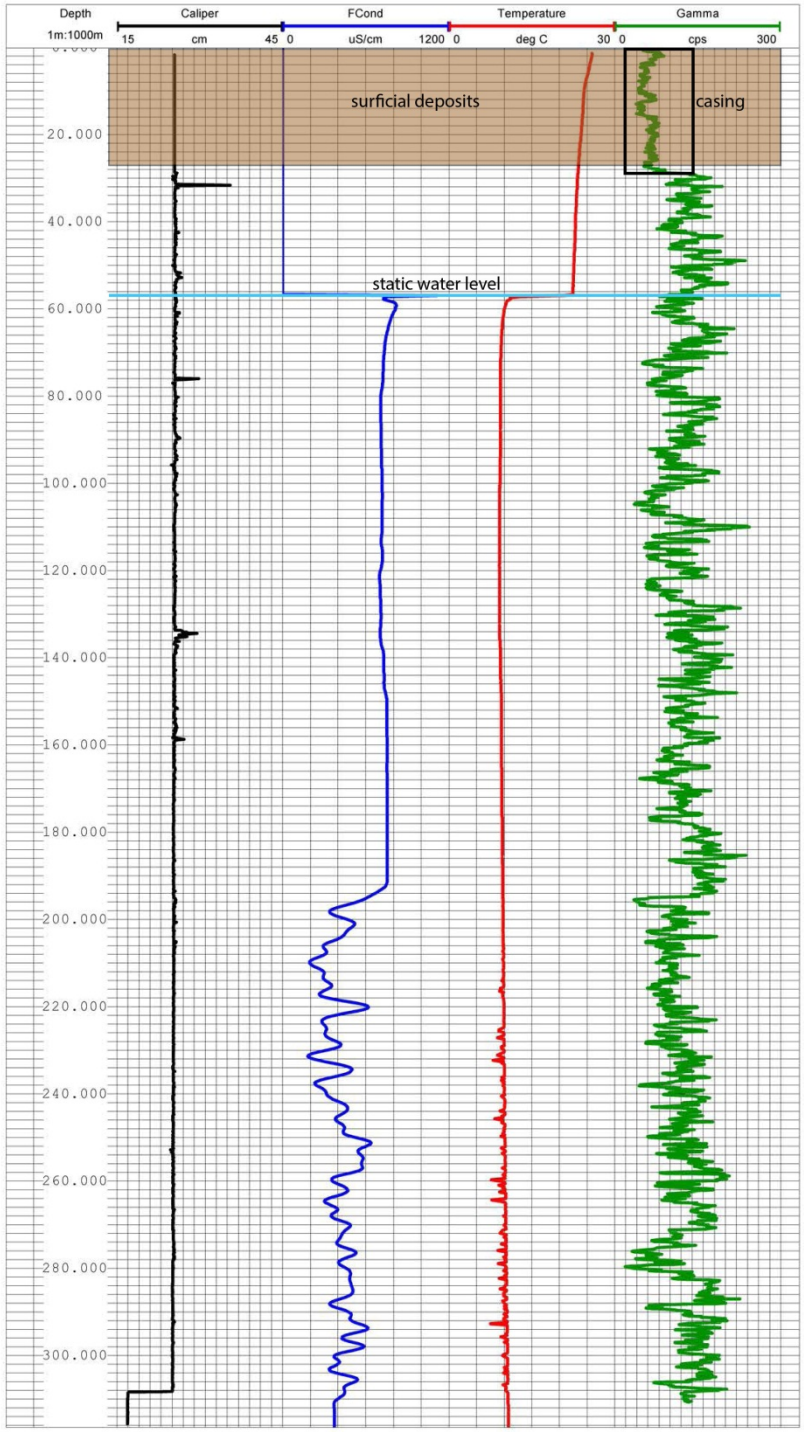


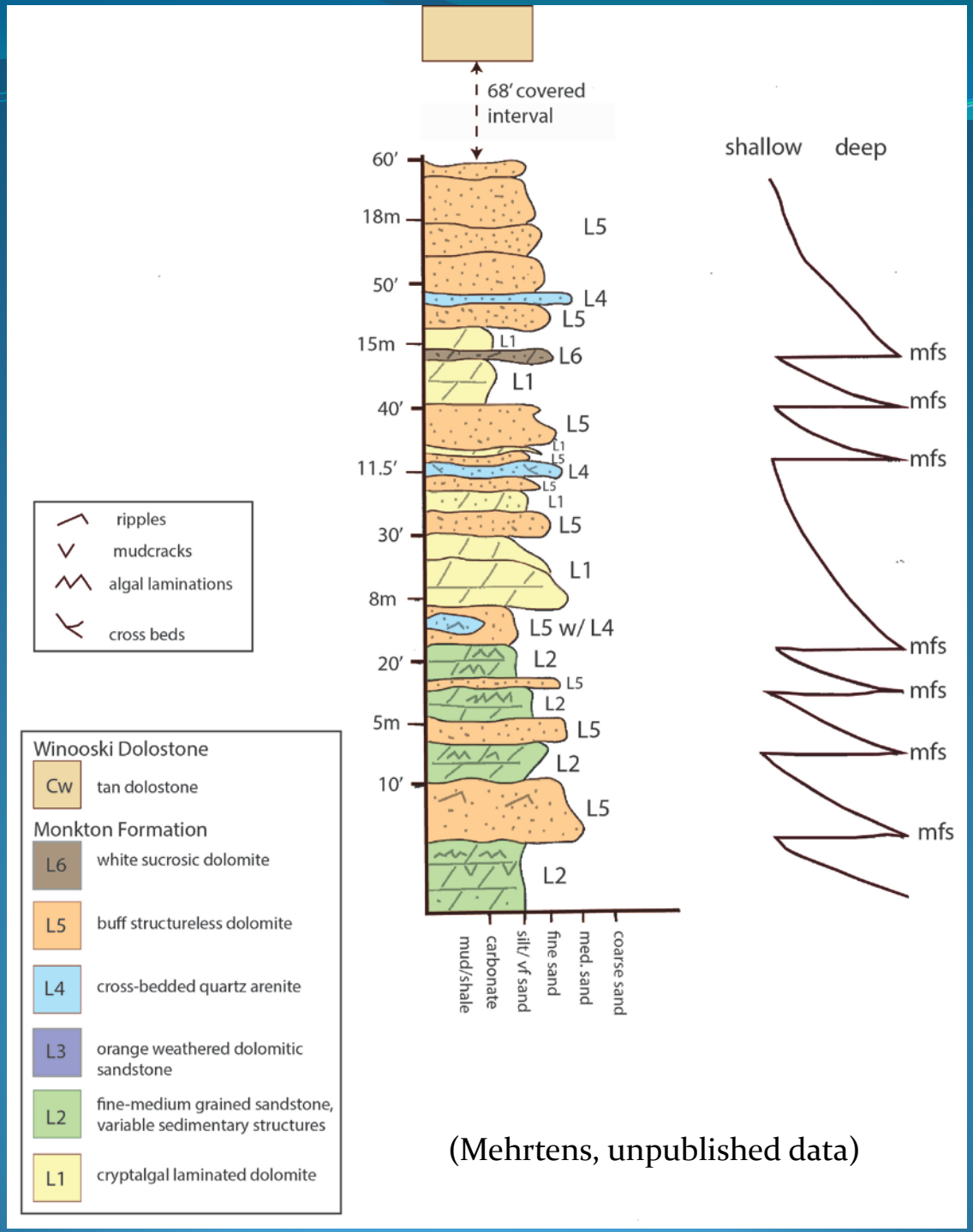
Monkton well: Champlain College
Log at right is Hinesburg thrust well


Thrust Well:
Type IV
W40465
Depth (meters)
0
30
60
90
120
150
180
210
240
270
300
Qt
CZfp
Rotten Zone
CZfp
Hinesburg Thrust
thrust/mylonite zone
Ob
Kb
Ob
water zone (~30 liters/ minute)
OCsk
Qt till
Kb Bostonite dike
Ob Bascom Formation (limestone and shaly limestone)
OCsk Skeels Corners Formation (dark gray phyllite)
CZfp Fairfield Pond Formation (green phyllitic quartzite)

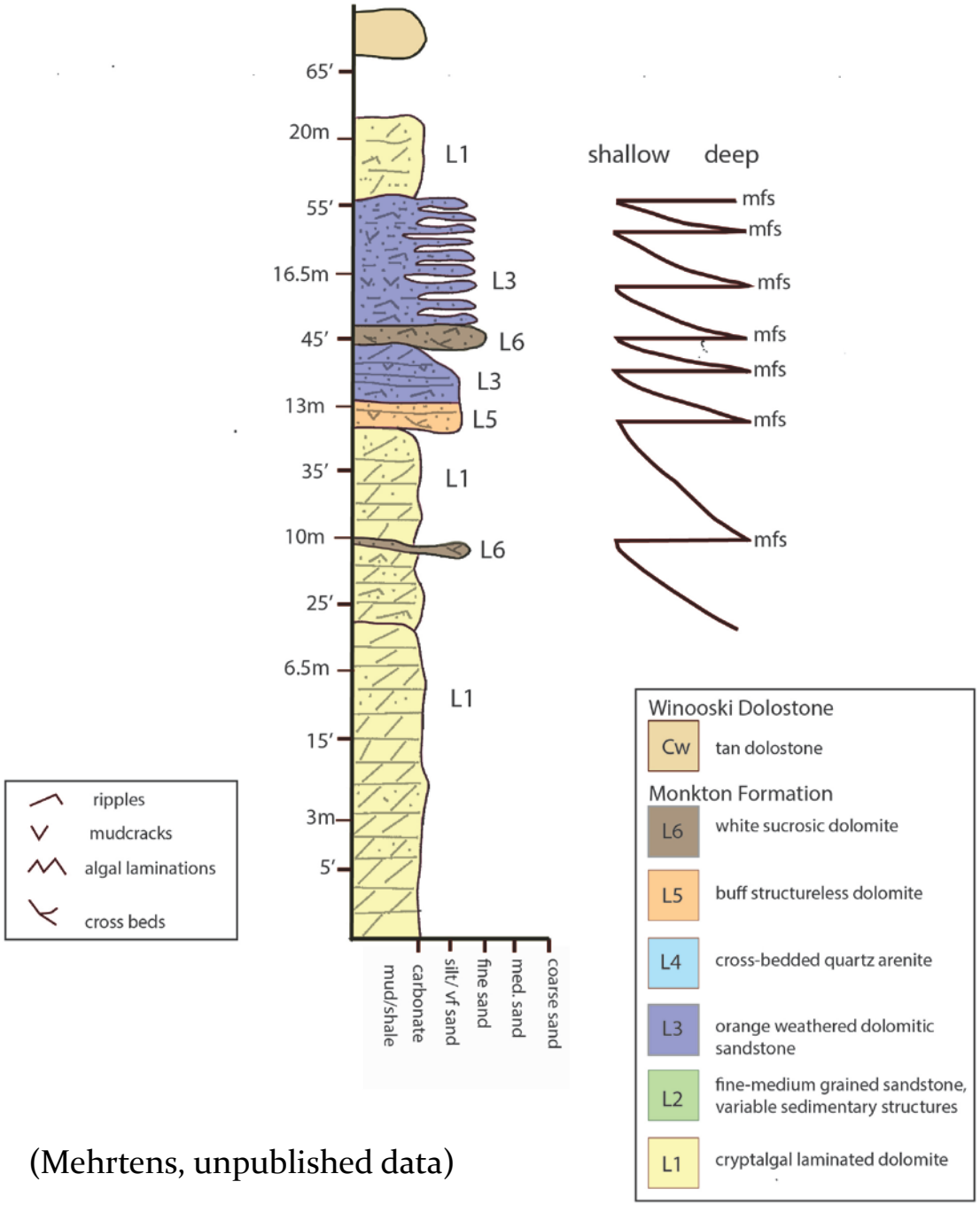
Champlain College Geothermal Well

Champlain College Geothermal Well





(Mehrtens, unpublished data)



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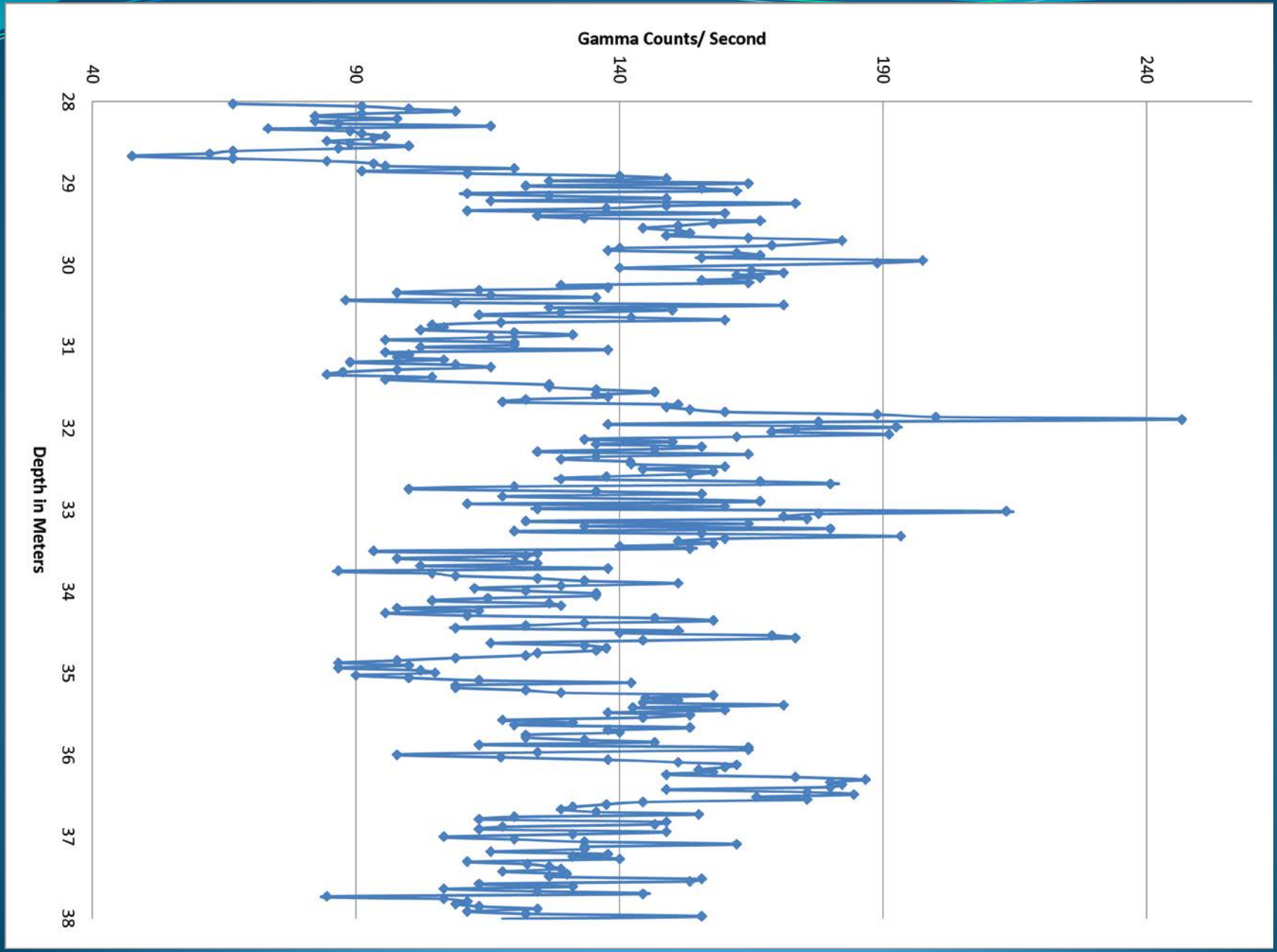
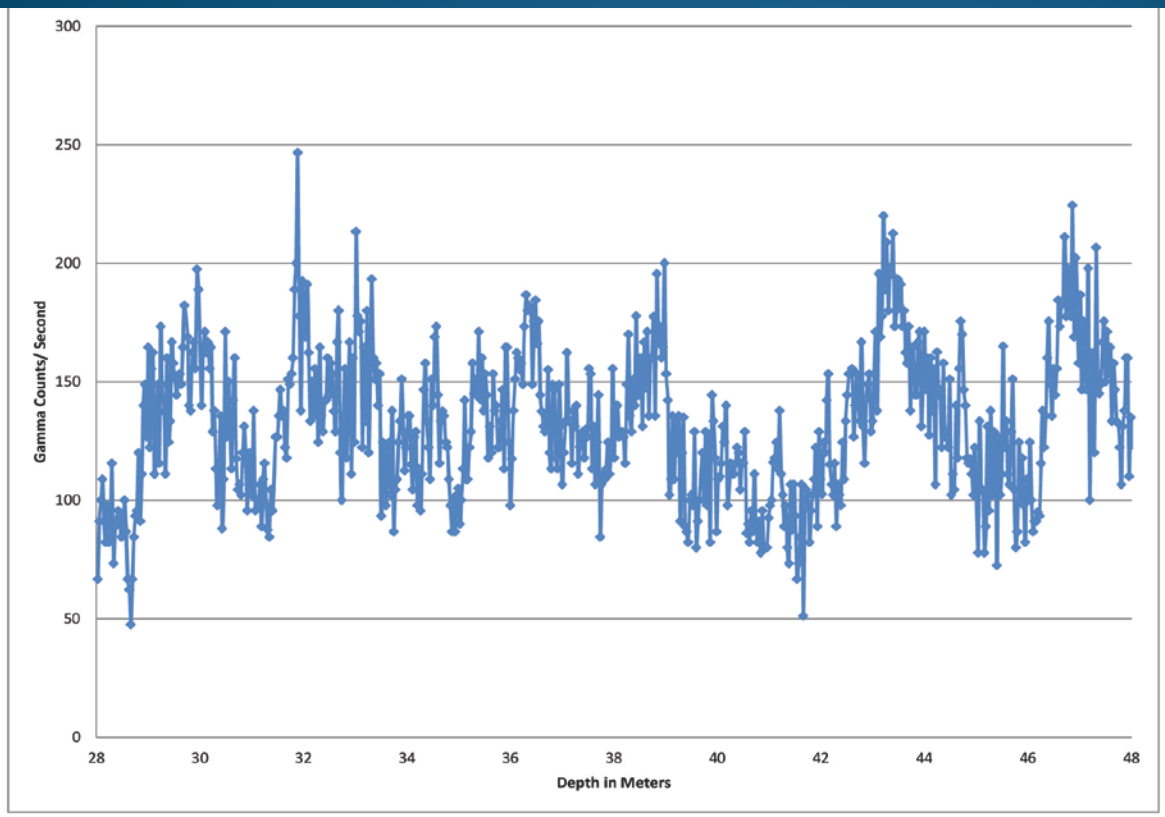
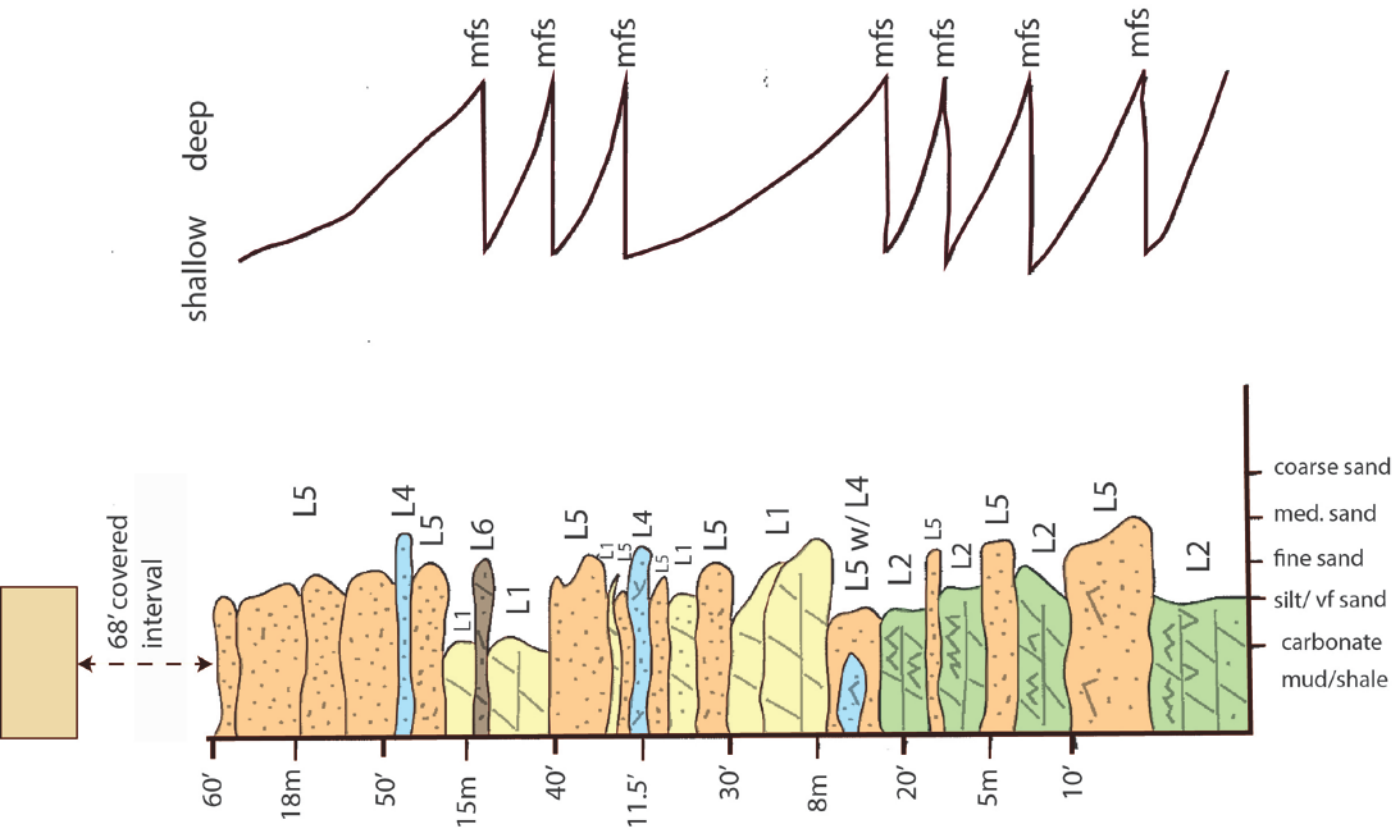
Champlain College Gamma Log (upper 10 m)




Gamma Counts/ Second
Depth in Meters
0
50
100
150
200
250
300
28
30
32
34
36
38
40
42
44
46
48


shallow
deep
mfs
68' covered interval
L5
L4
L6
L1
L2
L5 w/ L4
60'
18m
50'
15m
40'
11.5'
30'
8m
20'
5m
10'
coarse sand
med. sand
fine sand
silt/ vf sand
carbonate mud/shale

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