



OBSIDIAN

VOLCANO CAMP

APRIL 2024



MOUNT ETNA, ITALY



AZORES, PORTUGAL



SOMLO, HUNGARY



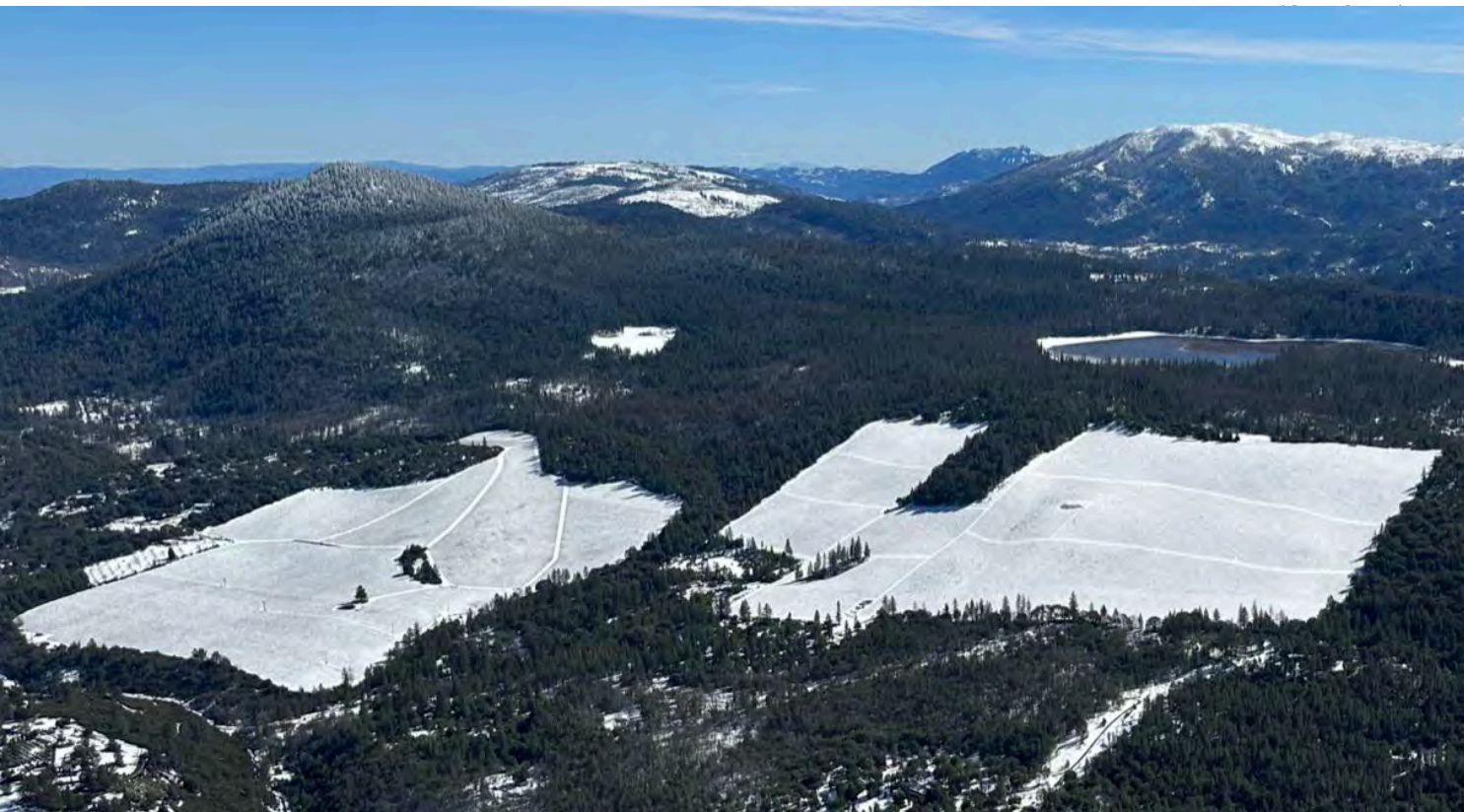
RED HILLS LAKE COUNTY, CALIFORNIA

PACIFIC OCEAN

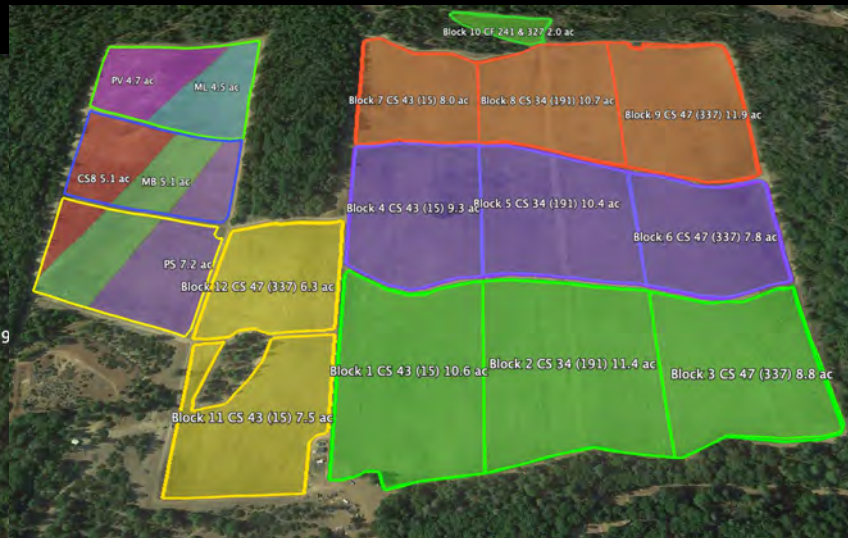




Obsidian Ridge Vineyard, Looking North



Obsidian Ridge Vineyard, Looking South 8



OBSIDIAN RIDGE VINEYARD

- 235 acres planted
- Original parcel planted 2000-2001
- Eli's Block planted 2017-2019



Obsidian Ridge Vineyard, Half Mile Block



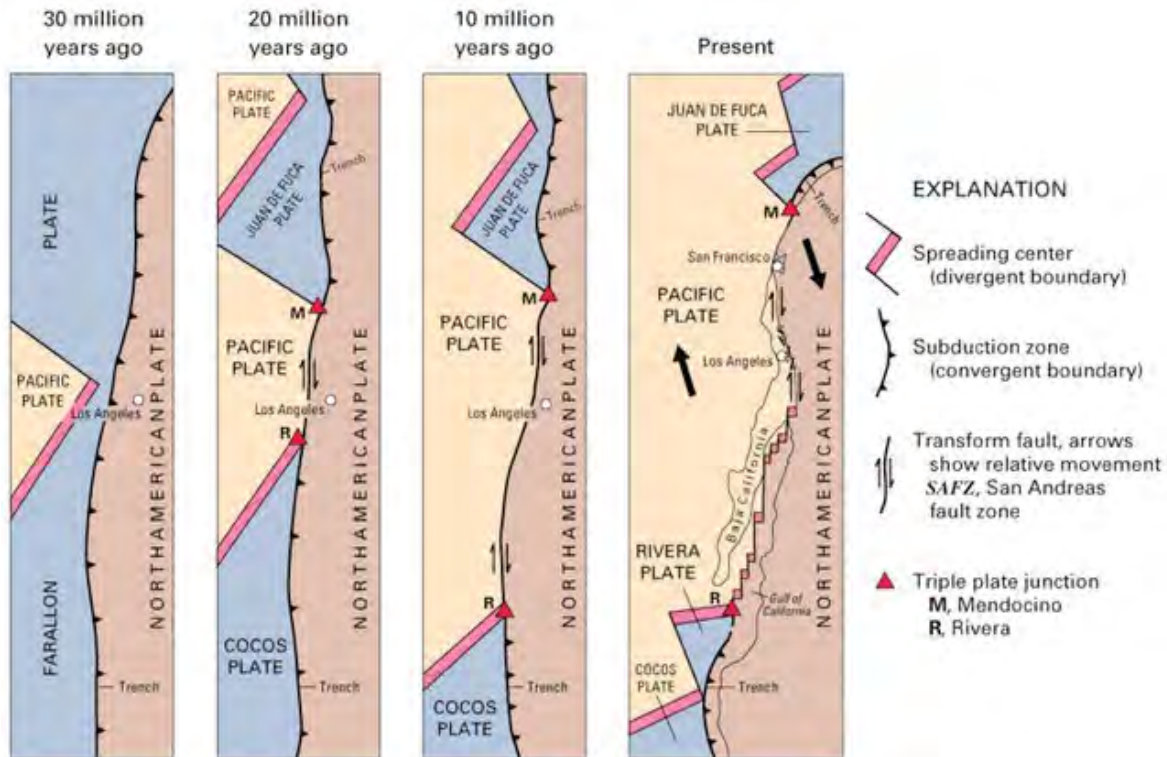
Obsidian Ridge Vineyard, Eli's Block



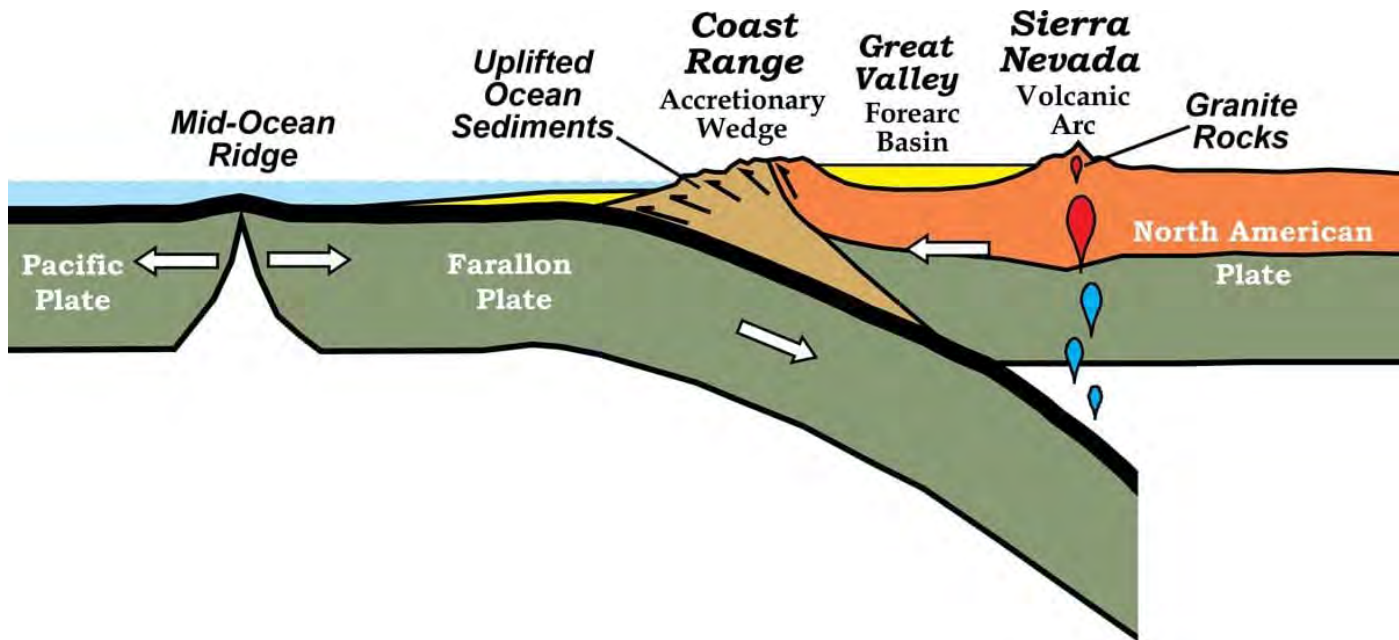
Geology & Soil

**WEST
COAST
RING
OF
FIRE**

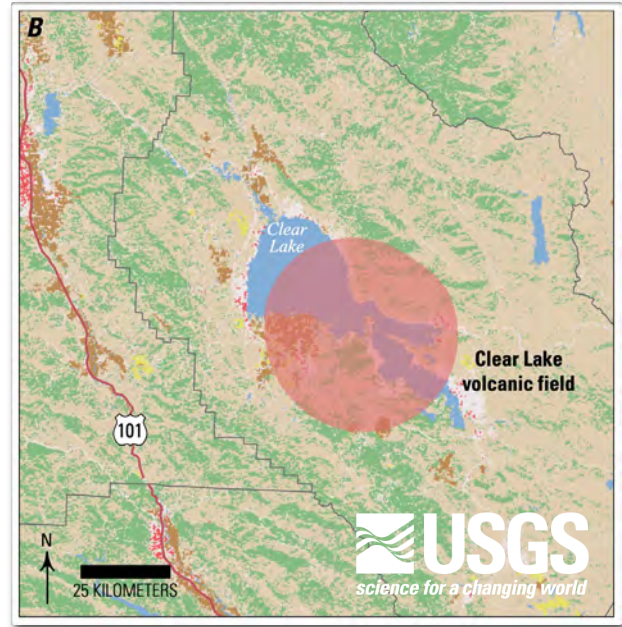
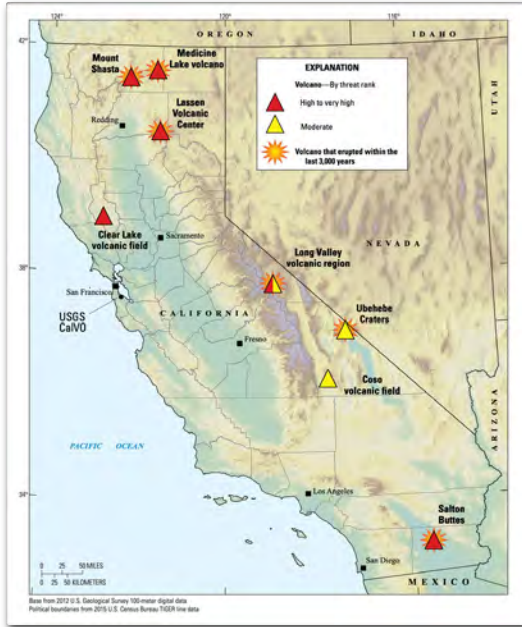








Clear Lake Volcanic Field



Clear Lake Volcanic Field

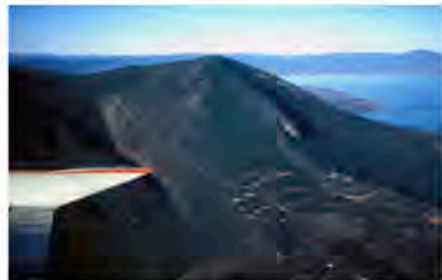
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[HAZARDS](#)
[MONITORING MAP](#)
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Hazards

At present, the system appears to be in a lull following a volcanically busy stretch between 60,000 and 10,000 years ago, which averaged 1 eruption every 1,800 years.

It is difficult to strictly compare the eruptive history of the Clear Lake Volcanics area to any other historically or presently active volcanic system within California. Clear Lake field is unlike both the Sonoma Volcanics to the south and the Cascades volcanoes to the north. The 2 million year volcanic history of the Clear Lake field is highly episodic, with long lulls in activity separated by shorter intervals of frequent eruptions. At present, the system appears to be in a lull following a volcanically busy stretch between 60,000 and 10,000 years ago, which averaged 1 eruption every 1,800 years. Because of long pauses in the volcanic activity near Clear Lake, it is currently uncertain what stage of volcanism the region might be undergoing. Intermittent seismic activity and the presence of heat at depth indicate that the system is still active and eruptions are likely.

If the magma chamber beneath the Clear Lake field were tapped again, eruptions might occur in the lake. These eruptions would be phreatomagmatic and would pose ash-fall and wave hazards to the lakeshore and ash-fall hazards to areas within a few kilometers of the vent. Eruptions away from the lake would produce silicic domes, cinder cones and flows and would be hazardous within a few kilometers of the vents. Future eruptions would be signaled by heightened earthquake activity.

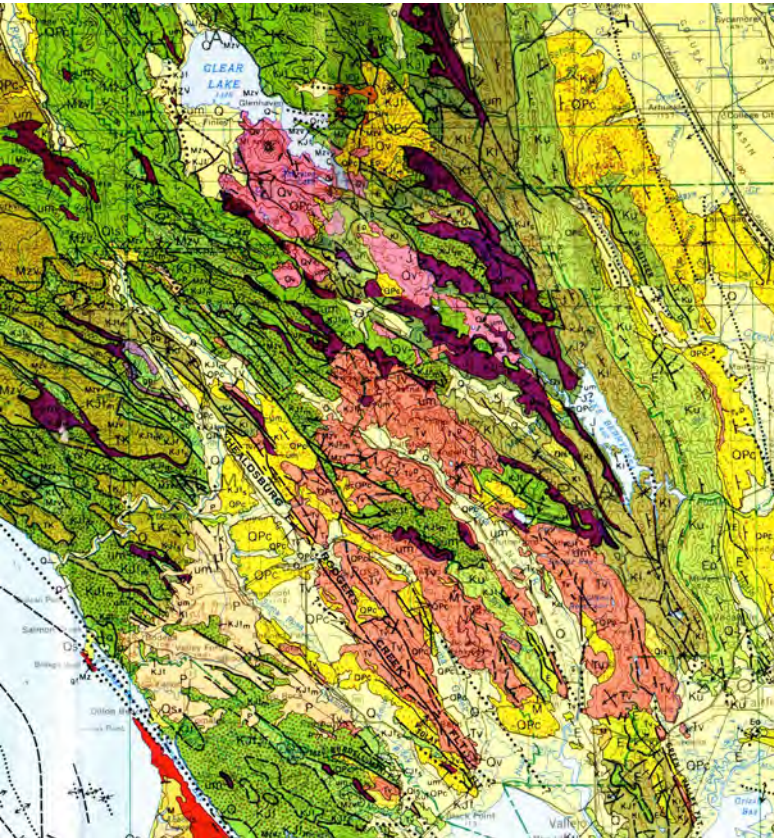


Mt. Konocti erupted during the most recent stage of volcanism (01. Ma to 10,000 years ago), and a future eruption from the same site would be devastating to the nearby inhabitants.

(Credit: Donnelly-Nolan, Julie M.. Public domain.)



Clear Lake Volcanic Field Geothermal Plants



Volcanic Regions & Soils

- Formed from the weathering of extrusive igneous rocks
- Relatively young, shallow and acidic soils
- Highly variable from one another depending on chemistry and climate
- Associated with higher concentration of aromatics, savory compounds, and acidity in wines.

Extrusive Volcanic Rocks & Soils

Categorized by rock type and (composition)

- **BASALT (Mafic):** Low in silica; high in magnesium & iron. The most common volcanic rock. Dark red and black, fertile, heat retentive. Weathers to clay; high affinity to water.

Etna, Willamette, Canary Islands, Yarra Valley

- **ANDESITE (Intermediate):** Variable soils that typically contain both mafic and felsic minerals and a significant amount of quartz. Includes dacite and andesite. Named for the Andes mountains.

Chile, Argentina, Alsace, North Coast CA

- **RHYOLITE (Felsic):** Over 65% silica; significant potassium. Born from extremely violent eruptions. Formed by rapid cooling of lava at the earth's surface. Includes pumice, ash, tuff, & obsidian. Low in nutrients; very low water-holding capacity.

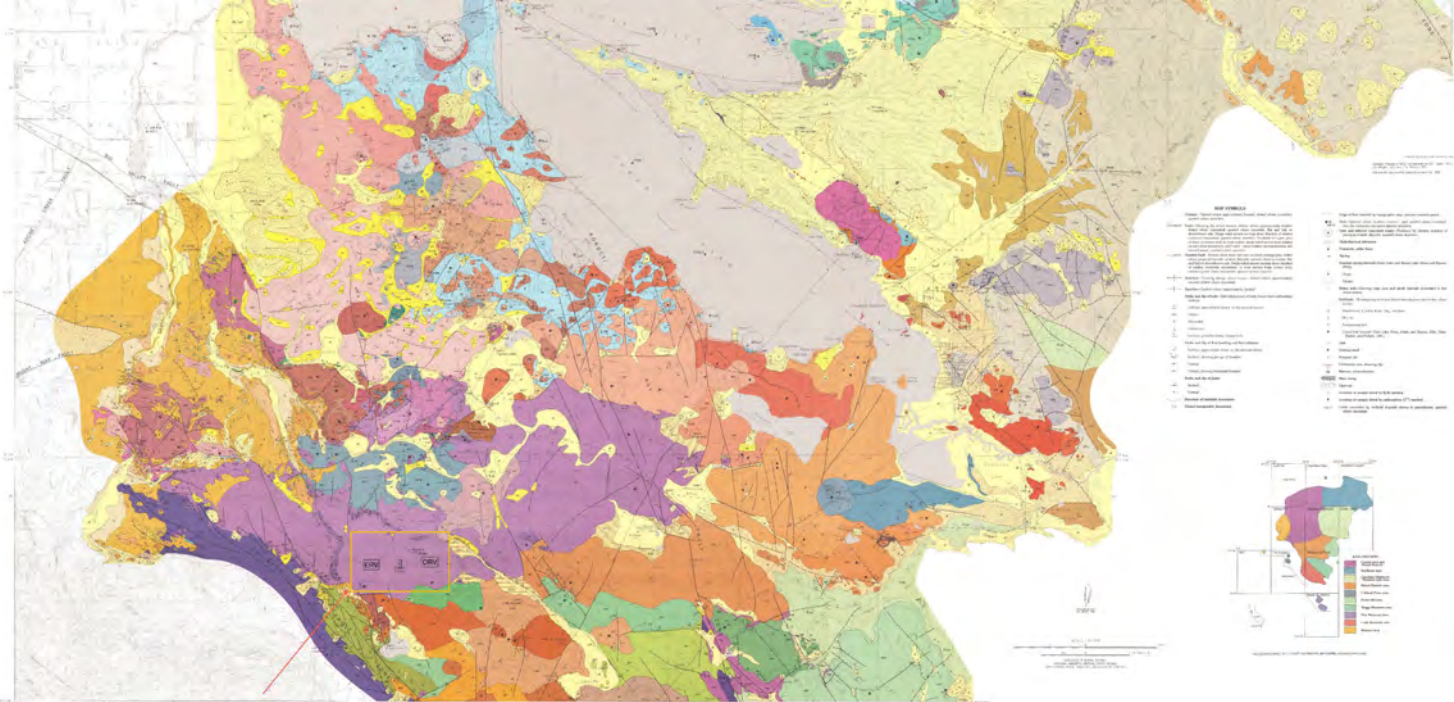
North Coast CA, Tokaj, Santorini

Obsidian: Unique Among Volcanics

- Obsidian is inert glass—neither rock nor mineral because its not crystalline
- Contributes no nutrients to soil
- Extremely low water retention/excellent drainage
- Highly reflective glass bounces UV into fruit zone
- Absorbs & radiates heat



Clear Lake Volcanic Field Geology

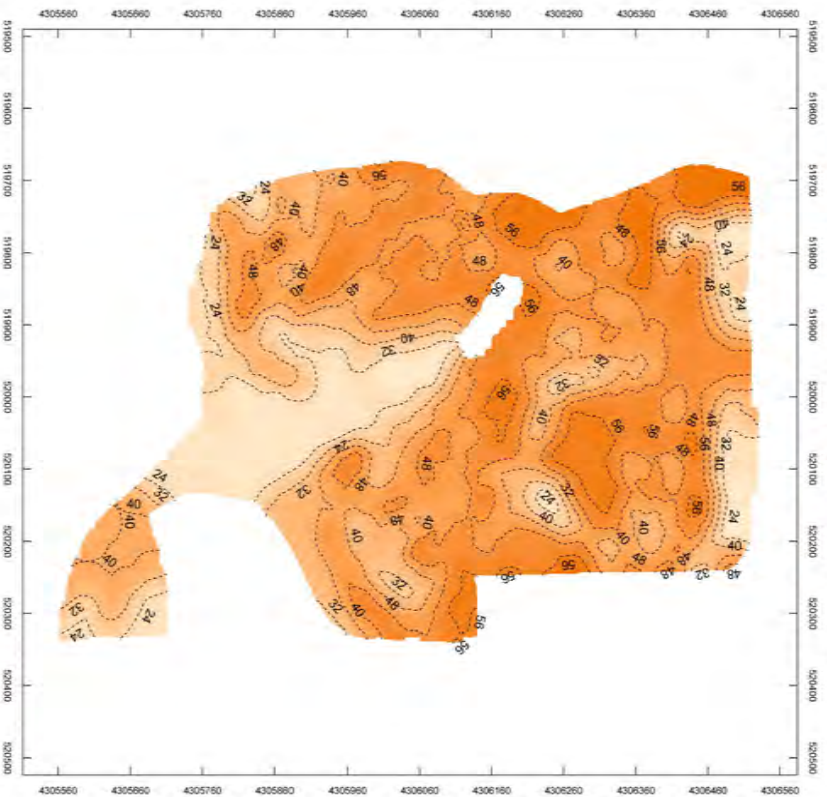


GEOLOGIC MAP AND STRUCTURE SECTIONS OF THE CLEAR LAKE VOLCANICS, NORTHERN CALIFORNIA

By B. C. Heun, Jr., J. M. Donnell-Nolan, and F. E. Giff

Obsidian Flow In Purple

Coarse Fragments - Surface



Coarse Fragments - Surface

0 40 80 120 160 200
Meters

**Obsidian Ridge -
All Blocks (111.7 acres)**

Map Type: Soil Property

Revision Date: 08/15/2005

Sample Date: 08/19/2005

Grid: WGS84, UTM Zone 10 North, Meters

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Coarse Fragments



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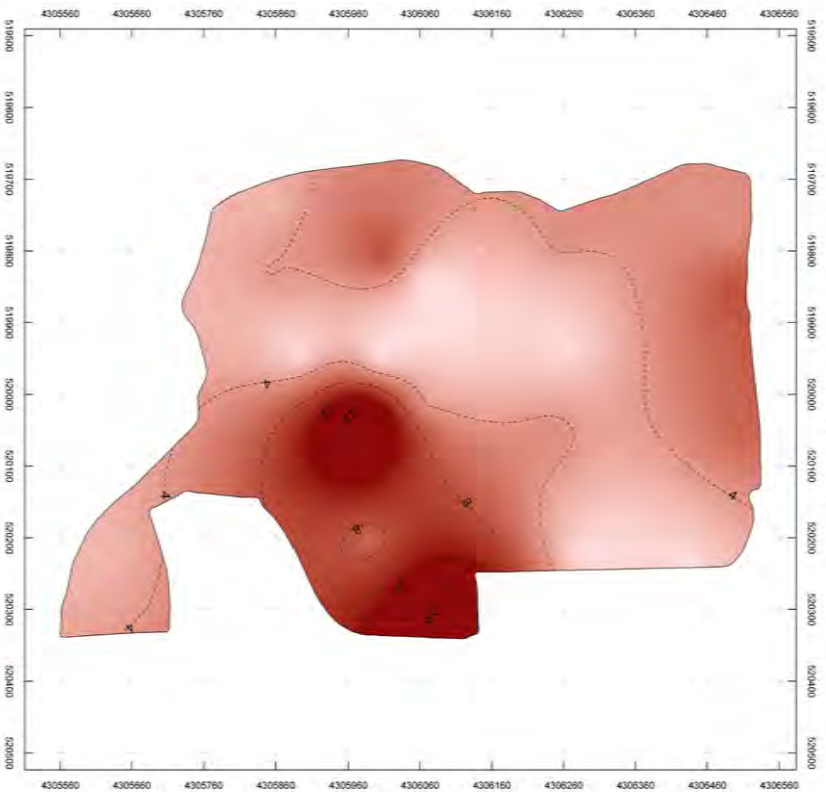
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Surface Phosphorus



Surface Phosphorus

0 50 100 150 200 250
Meters

Obsidian Ridge -
All Blocks (111.7 acres)

Map Type: Terror Chemical Map
Report Date: 11/03/2005
Sample Date: 08/19/2005
Grid: WGS84, UTM Zone 10 North, Meters
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P (ppm)

20.5
10.5
0.5

sisTM

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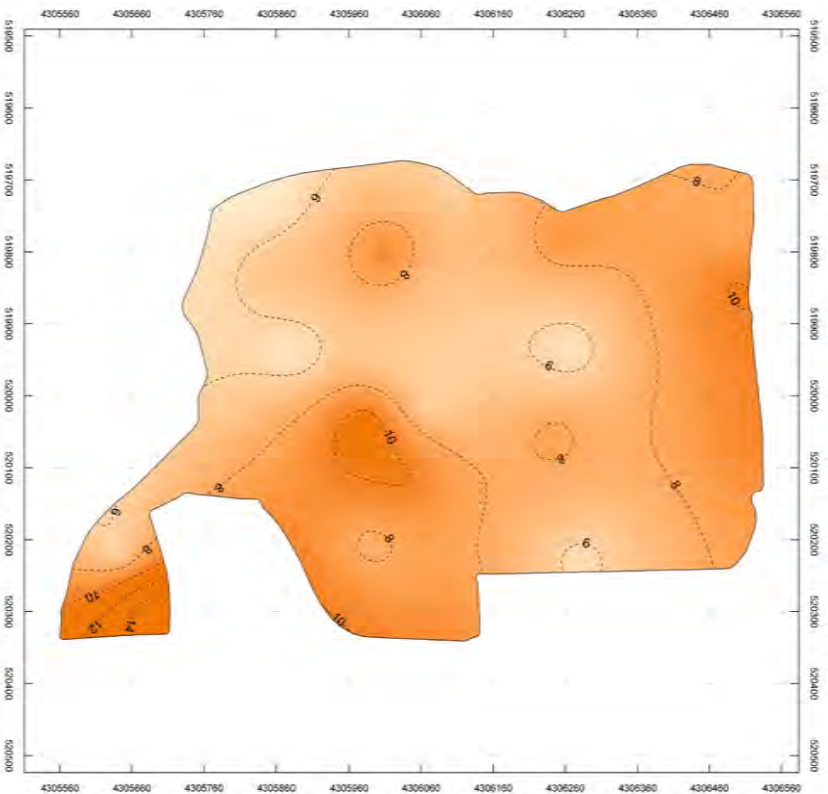


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Surface Calcium/Magnesium



Surface Ca/Mg

0 50 100 150 200 250
Meters

**Obsidian Ridge -
All Blocks (111.7 acres)**

Map Type: Terra! Chemical Map

Revision Date: 11.03.2005
Sample Date: 08.19.2005
Chemical Date: 11.22.05
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Phosphorus Deficiency





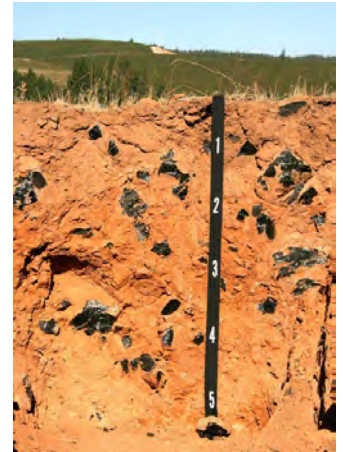
Abandoned Walnut Orchard (Pre-Obsidian Ridge Vineyard)



Site Prep 1999



Volcanic remnants: Obsidian and Lake County 'diamonds'





Obsidian Ridge Vineyard Eli's Block Pre-Planting



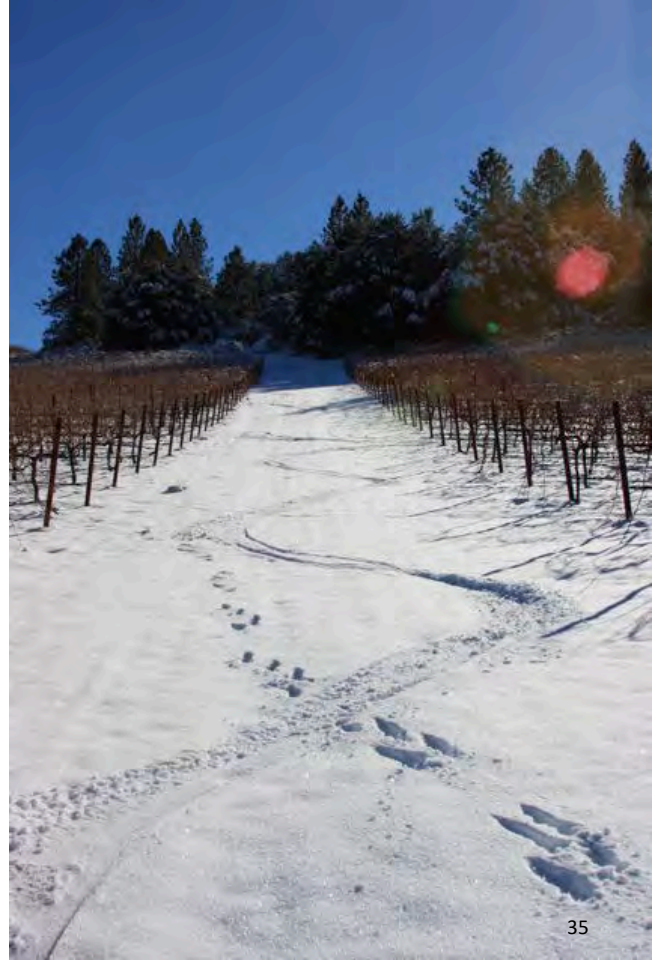
Co-Founders Michael Terrien, Peter Molnar, Arpad Molnar



Climate & Environment

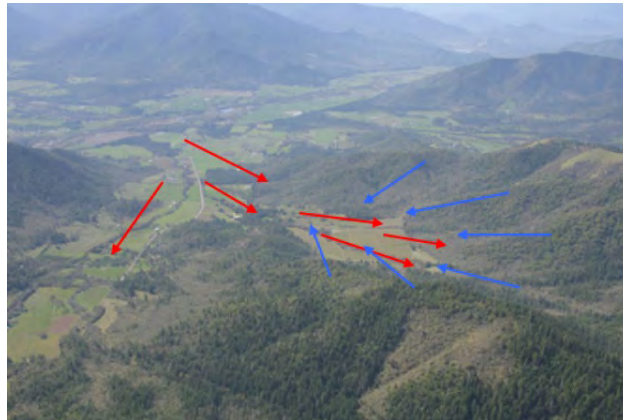
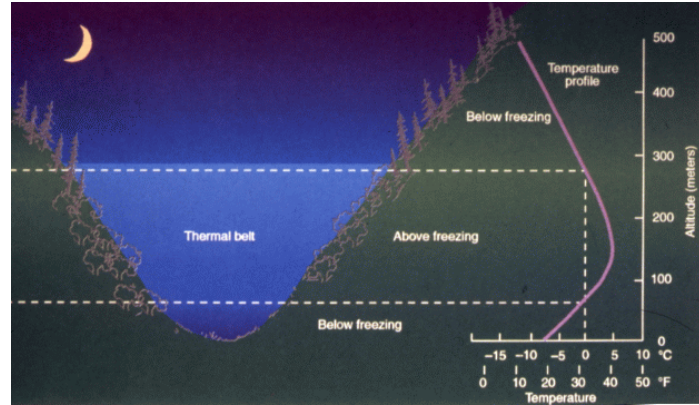
Volcanic Mountain Environment

- **Geography:** Continentality & Latitude
- **Elevation:** Relative & Absolute Relief
- **Atmosphere:** Lapse Rate & Humidity
- **Topography:** Terrain, Slope & Aspect



Geography & Topography

Farming at 3,000' is comparable to farming at sea level 900 miles north.



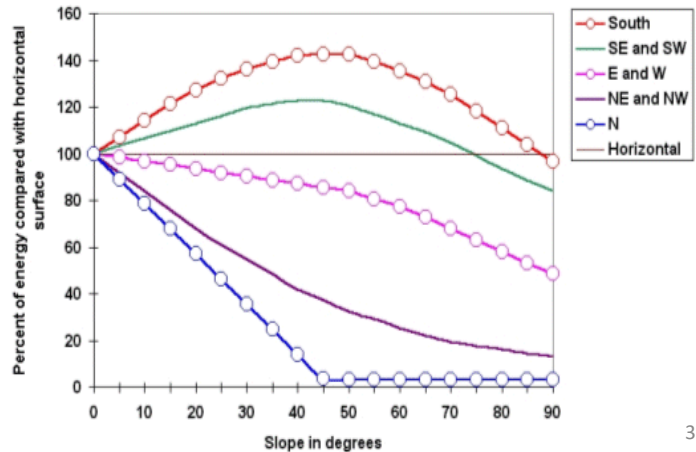
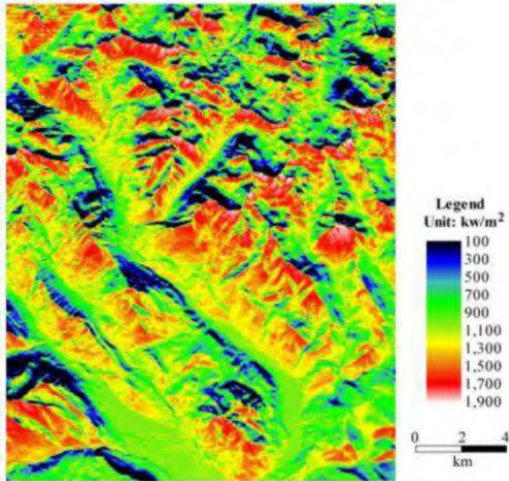
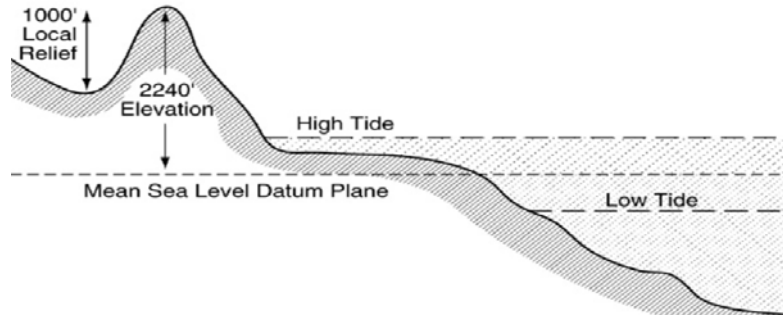
All weather is driven by air temperature, pressure & humidity.

Local weather is shaped by slope, aspect, diurnal characteristics, proximity to coast.

Slope & Relief

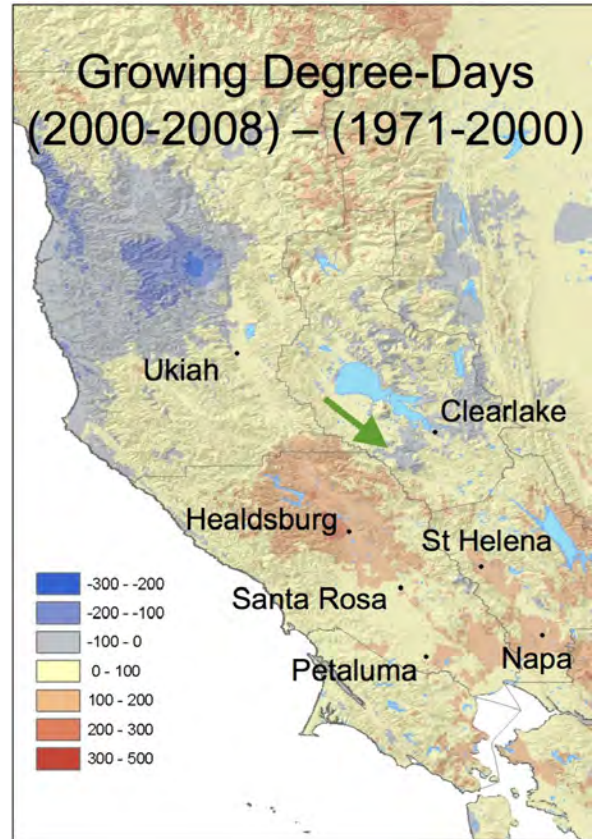
Relative vs Absolute Relief.

Sun angle is primary driver of heat loading and retention for both air & soil temperatures.



Impact of a Changing Climate

- Valley heat
- Diurnal Shifts/Night Cooling
- Extreme Events



Heat Event Comparison

North Coast Vineyard Data September 4-9, 2022			
Yountville			
	Duration(h:m)	Minimum	Maximum
2022-09-05 12:30:00	6h30m	105.5	113.9
2022-09-05 11:15:00	4h43m	105.4	116.9
2022-09-06 14:30:00	3h15m	105.2	109.2
Total Hours >105 Degrees	15		
Carneros			
Start			
	Duration(h:m)	Minimum	Maximum
2022-09-05 14:30:00	3h30m	105.2	111.8
2022-09-06 12:15:00	1h45m	105.9	111.5
Total Hours >105 Degrees	5		
Rutherford			
	Duration(h:m)	Minimum	Maximum
2022-09-04 13:30:00	0h15m	105.3	105.3
2022-09-04 14:30:00	2h45m	105.1	106.6
2022-09-05 12:00:00	6h30m	105.4	116.9
2022-09-06 10:45:00	5h30m	105.3	120.6
2022-09-07 16:00:00	0h30m	105.7	106.7
2022-09-07 18:45:00	0h43m	105.2	105.8
2022-09-08 13:30:00	4h30m	105.5	110.9
Total Hours >105 Degrees	21		
Angwin			
	Duration(h:m)	Minimum	Maximum
2022-09-05 11:45:00	6h45m	105.4	110.9
2022-09-06 11:00:00	5h48m	105.0	113.5
2022-09-08 11:45:00	5h30m	105.1	108.7
Total Hours >105 Degrees	18		

Alexander Valley			
	Duration(h:m)	Minimum	Maximum
2022-09-04 15:00:00	2h45m	105.3	106.6
2022-09-05 12:45:00	6h15m	106.0	115.6
2022-09-06 12:00:00	3h15m	105.3	119.4
2022-09-06 16:15:00	0h45m	105.2	105.7
2022-09-07 16:15:00	1h15m	105.3	107.1
2022-09-08 13:00:00	5h15m	105.3	109.1
Total Hours >105 Degrees	20		
Healdsburg			
	Duration(h:m)	Minimum	Maximum
2022-09-04 14:15:00	3h15m	105.1	106.9
2022-09-05 12:15:00	6h45m	105.0	117.2
2022-09-06 11:30:00	3h45m	105.3	118.3
2022-09-06 15:30:00	0h15m	105.2	105.2
2022-09-06 16:15:00	0h15m	106.1	106.1
2022-09-06 16:45:00	0h15m	105.6	105.6
2022-09-07 15:30:00	0h30m	105.0	105.2
2022-09-08 12:30:00	5h30m	105.9	110.3
Total Hours >105 Degrees	21		

ERV Block 9 2,870'			
	Duration(h:m)	Minimum	Maximum
2022-09-05 13:30:00	0h15m	105.4	105.4
2022-09-05 14:00:00	0h15m	105.3	105.3
2022-09-05 14:30:00	2h15m	105.0	106.5
2022-09-06 12:45:00	4h15m	105.1	108.2
Total Hours >105 Degrees	1		
ORV A1 2,360'			
	Duration(h:m)	Minimum	Maximum
2022-09-05 14:00:00	0h10m	105.6	105.7
2022-09-05 14:30:00	0h5m	105.5	105.5
2022-09-05 14:55:00	0h5m	105.1	105.1
2022-09-05 16:00:00	0h10m	105.6	105.7
2022-09-05 16:20:00	0h10m	105.9	105.3
2022-09-05 16:38:00	0h10m	105.0	105.2
2022-09-05 17:00:00	0h5m	105.2	105.2
2022-09-06 12:30:00	0h25m	105.6	106.2
2022-09-06 13:00:00	2h50m	105.1	110.5
Total Hours >105 Degrees	8		

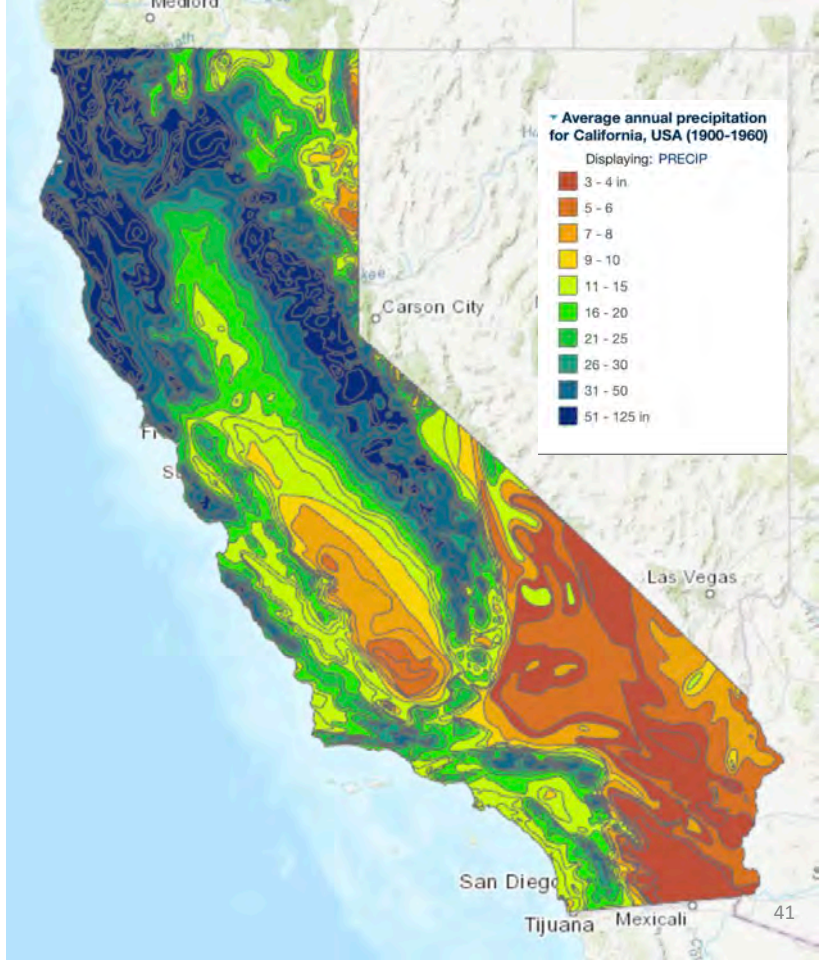
- Heatwave of Sept 4-9, 2022
- Significantly shorter and less extreme at altitude

A dark, high-contrast image of a tree trunk cross-section, showing concentric growth rings. The word "Viticulture" is overlaid in white text in the center. The image is mostly black with some grey and white tones representing the wood grain and the text.

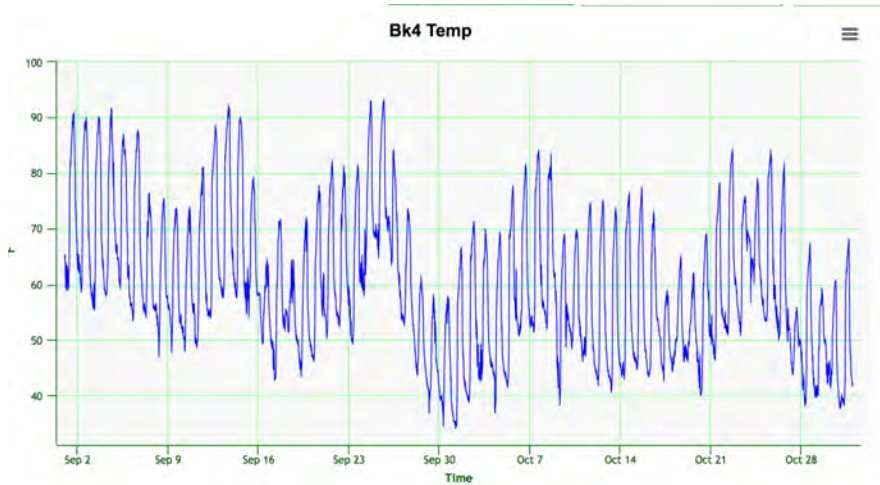
Viticulture

Volcanic Mountain Viticulture

- Ample Availability of Water
- High UV/Luminosity
 - Skin thickness
 - Skin to Pulp Ratio
 - Breakdown of pyrazines
- Low Pest & Disease Pressure

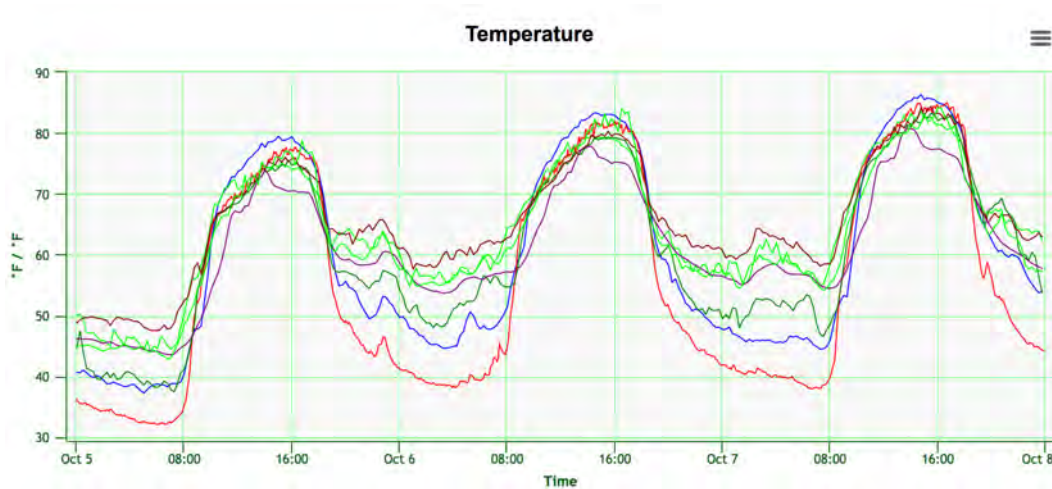


Large Diurnal Swings Throughout Growing Season



Harvest 2019 – September & October

Diurnal Swings Vary Greatly by Slope



Cold, heavy air descends at night to lower blocks (from Oct 2019)

THE RIPENING CURVE





Winemaking



The Holy Trinity of Cabernet

1. Complexity (phenolic ripeness)
2. Freshness (acidity)
3. Structure (drainage)

Volcanic Mountain Climate: Wine Impact

	Mountain climates	Obsidian Ridge Vineyard
Complexity (phenolic ripeness)	3% more UV every 1,000 feet	10%+ UV
Freshness (acidity)	Diurnal shifts	50 degree shifts
Structure (drainage)	Rocky soils	Covered in obsidian

Volcanic Journey Film

obsidianwineco.com/volcanicjourney





Obsidian Key Contacts

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