S9_Isobar_Comparison_Plotter

June 8, 2021

[1]:
```
import VESIcal as v
import pandas as pd
%matplotlib inline
```

[2]:
```
alkbasalt = v.Sample({'SiO2': 49.0,
                      'TiO2': 1.27,
                      'Al2O3': 19.7,
                      'Fe2O3': 3.74,
                      'FeO': 5.33,
                      'MnO': 0.17,
                      'MgO': 4.82,
                      'CaO': 8.85,
                      'Na2O': 4.23,
                      'K2O': 1.00,
                      'P2O5': 0.37,
                      'H2O': 4.51,
                      'CO2': 0.25})

rhyolite = v.Sample({'SiO2':77.19,
                     'TiO2':0.06,
                     'Al2O3':12.80,
                     'FeO':0.94,
                     'MgO':0.03,
                     'CaO':0.53,
                     'Na2O':3.98,
                     'K2O':4.65,
                     'CO2':0.05,
                     'H2O':0.26})

sample_table = pd.DataFrame([alkbasalt.get_composition(), rhyolite.
 ↪get_composition()], index=["Alkali Basalt", "Rhyolite"])
sample_table
```

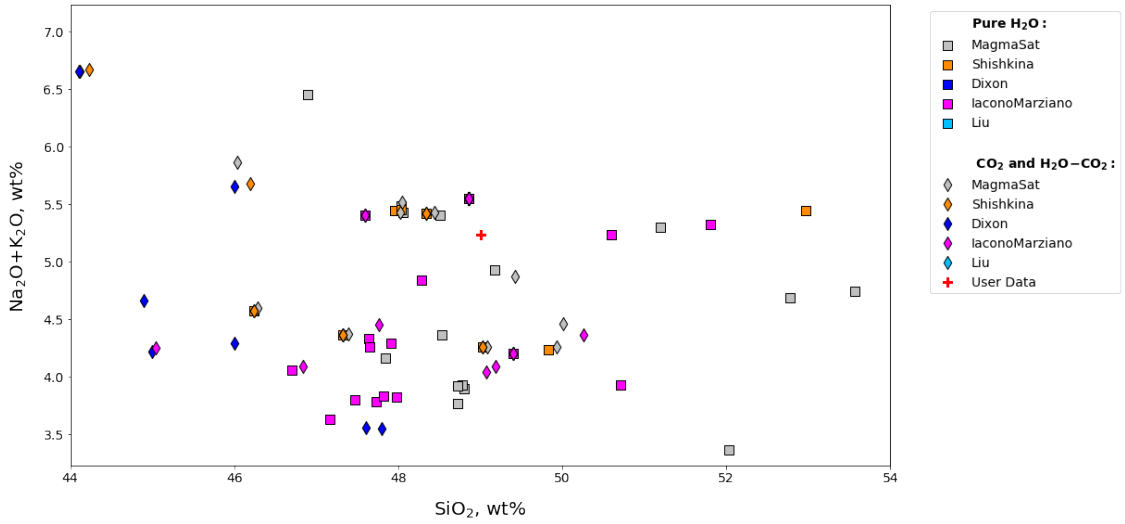
[2]:

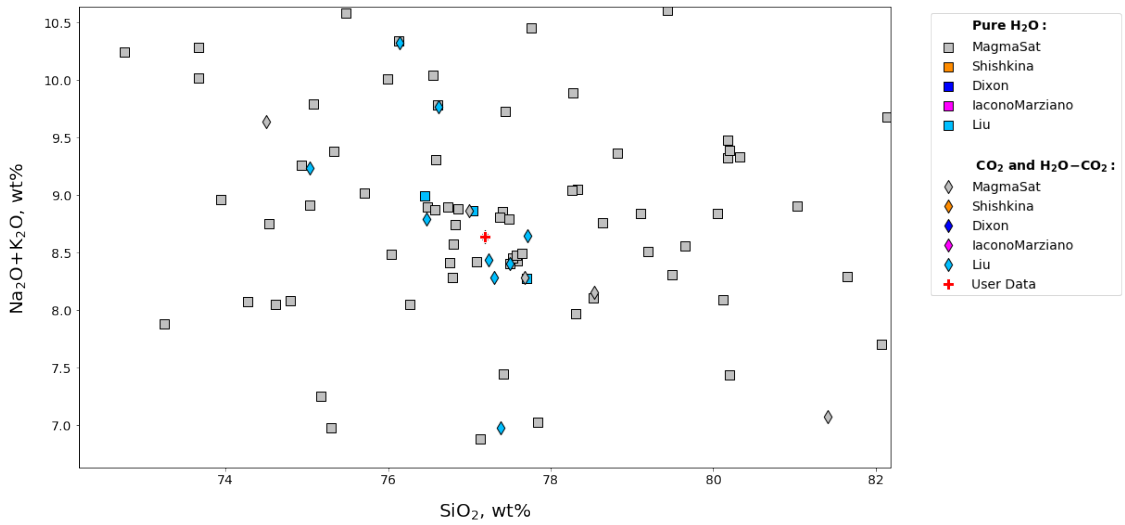
	SiO2	TiO2	Al2O3	Fe2O3	FeO	MnO	MgO	CaO	Na2O	K2O	\
Alkali Basalt	49.00	1.27	19.7	3.74	5.33	0.17	4.82	8.85	4.23	1.00	
Rhyolite	77.19	0.06	12.8	NaN	0.94	NaN	0.03	0.53	3.98	4.65	

```
                P2O5   H2O   CO2
Alkali Basalt   0.37  4.51  0.25
Rhyolite         NaN  0.26  0.05
```

[3]:
```
#check calibration
v.calib_plot(user_data=alkbasalt.get_composition(), model='mixed',␣
 ↪zoom='user_data')
v.calib_plot(user_data=rhyolite.get_composition(), model='mixed',␣
 ↪zoom='user_data')
```

[3]:
```
(<Figure size 1224x576 with 1 Axes>,
 <matplotlib.axes._subplots.AxesSubplot at 0x7fd733d23e90>)
```





[4]:
```
alkbasalt_isobars, alkbasalt_isopleths = v.
 ↪calculate_isobars_and_isopleths(sample=alkbasalt, temperature=1200,␣
 ↪pressure_list=[500, 1000, 2000], isopleth_list=[0.5], print_status=True).
 ↪result

rhyolite_isobars, rhyolite_isopleths = v.
 ↪calculate_isobars_and_isopleths(sample=rhyolite, temperature=800,␣
 ↪pressure_list=[500, 1000, 2000], isopleth_list=[0.5]).result
```

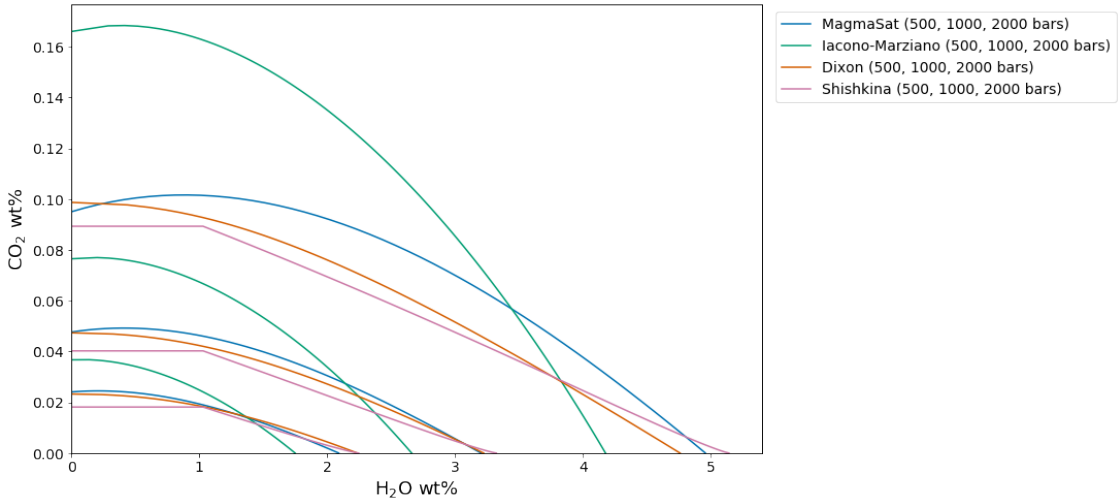
```
Calculating isobar at 500 bars
 done.
Calculating isobar at 1000 bars
 done.
Calculating isobar at 2000 bars
 done.
Done!
Calculating isobar at 500 bars
 done.
Calculating isobar at 1000 bars
 done.
Calculating isobar at 2000 bars
 done.
Done!
```

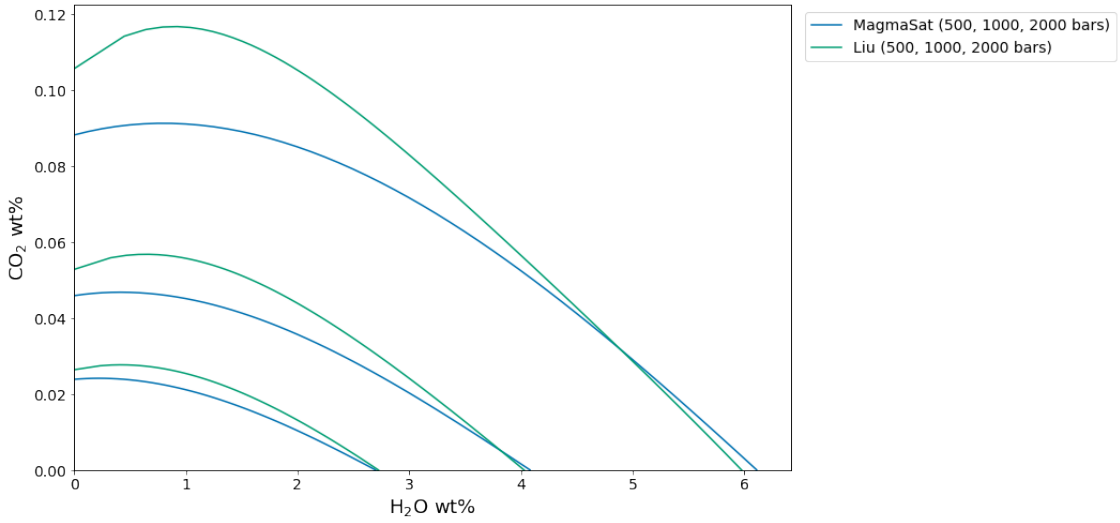
[5]:
```
Iac_alkbasalt_isobars, Iac_alkbasalt_isopleths = v.
 ↪calculate_isobars_and_isopleths(sample=alkbasalt, temperature=1200,␣
 ↪pressure_list=[500, 1000, 2000], isopleth_list=[0.5],␣
 ↪model="IaconoMarziano").result
Dixon_alkbasalt_isobars, Dixon_alkbasalt_isopleths = v.
 ↪calculate_isobars_and_isopleths(sample=alkbasalt, temperature=1200,␣
 ↪pressure_list=[500, 1000, 2000], isopleth_list=[0.5], model="Dixon").result
Shish_alkbasalt_isobars, Shish_alkbasalt_isopleths = v.
 ↪calculate_isobars_and_isopleths(sample=alkbasalt, temperature=1200,␣
 ↪pressure_list=[500, 1000, 2000], isopleth_list=[0.5],␣
 ↪model="ShishkinaIdealMixing").result

Liu_rhyolite_isobars, Liu_rhyolite_isopleths = v.
 ↪calculate_isobars_and_isopleths(sample=rhyolite, temperature=800,␣
 ↪pressure_list=[500, 1000, 2000], isopleth_list=[0.5], model="Liu").result
```

```
/opt/anaconda3/lib/python3.7/site-packages/VESIcal/calculate_classes.py:60:
RuntimeWarning: pressure exceeds 1000 bar, which Iacono-Marziano et al. (2012)
suggest as an upper calibration limit of the Dixon (1997, Pi-SiO2 simpl.) Model,
  w.warn(self.calib_check, RuntimeWarning)
```

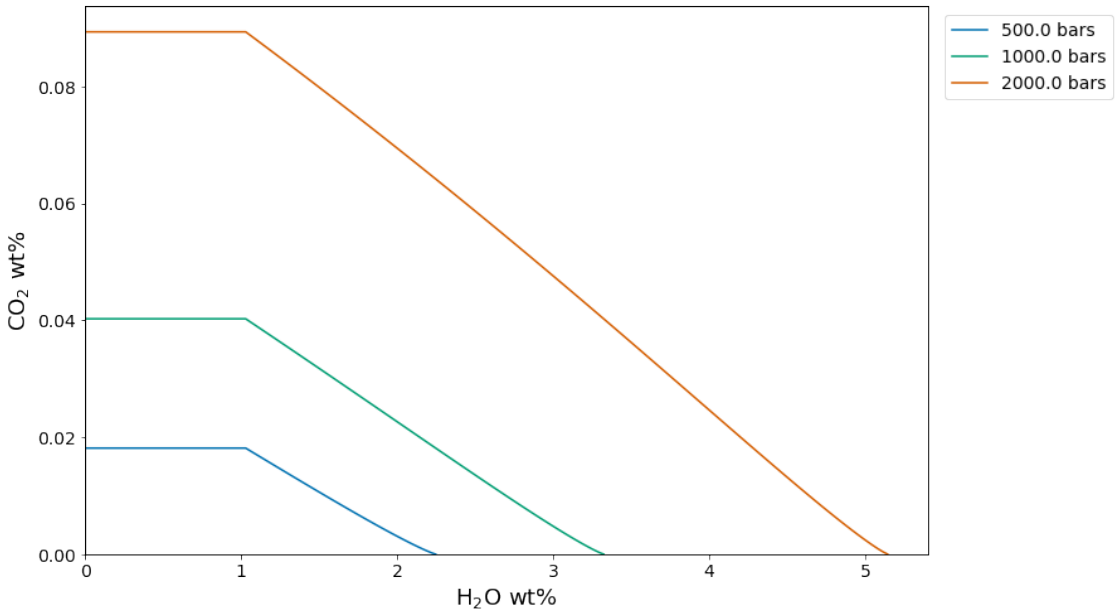
[6]:
```
```

```
fig, ax = v.plot(isobars=[alkbasalt_isobars, Iac_alkbasalt_isobars,␣
 ↪Dixon_alkbasalt_isobars, Shish_alkbasalt_isobars],␣
 ↪isobar_labels=["MagmaSat", "Iacono-Marziano", "Dixon", "Shishkina"])
v.show()

fig, ax = v.plot(isobars=[rhyolite_isobars, Liu_rhyolite_isobars],␣
 ↪isobar_labels=["MagmaSat", "Liu"])
v.show()
```





[7]:
```
fig, ax = v.plot(isobars=Shish_alkbasalt_isobars)
v.show()
```


500.0 bars
1000.0 bars
2000.0 bars
0.08
0.06
0.04
0.02
0.00
CO_2 wt%
0
1
2
3
4
5
H_2O wt%