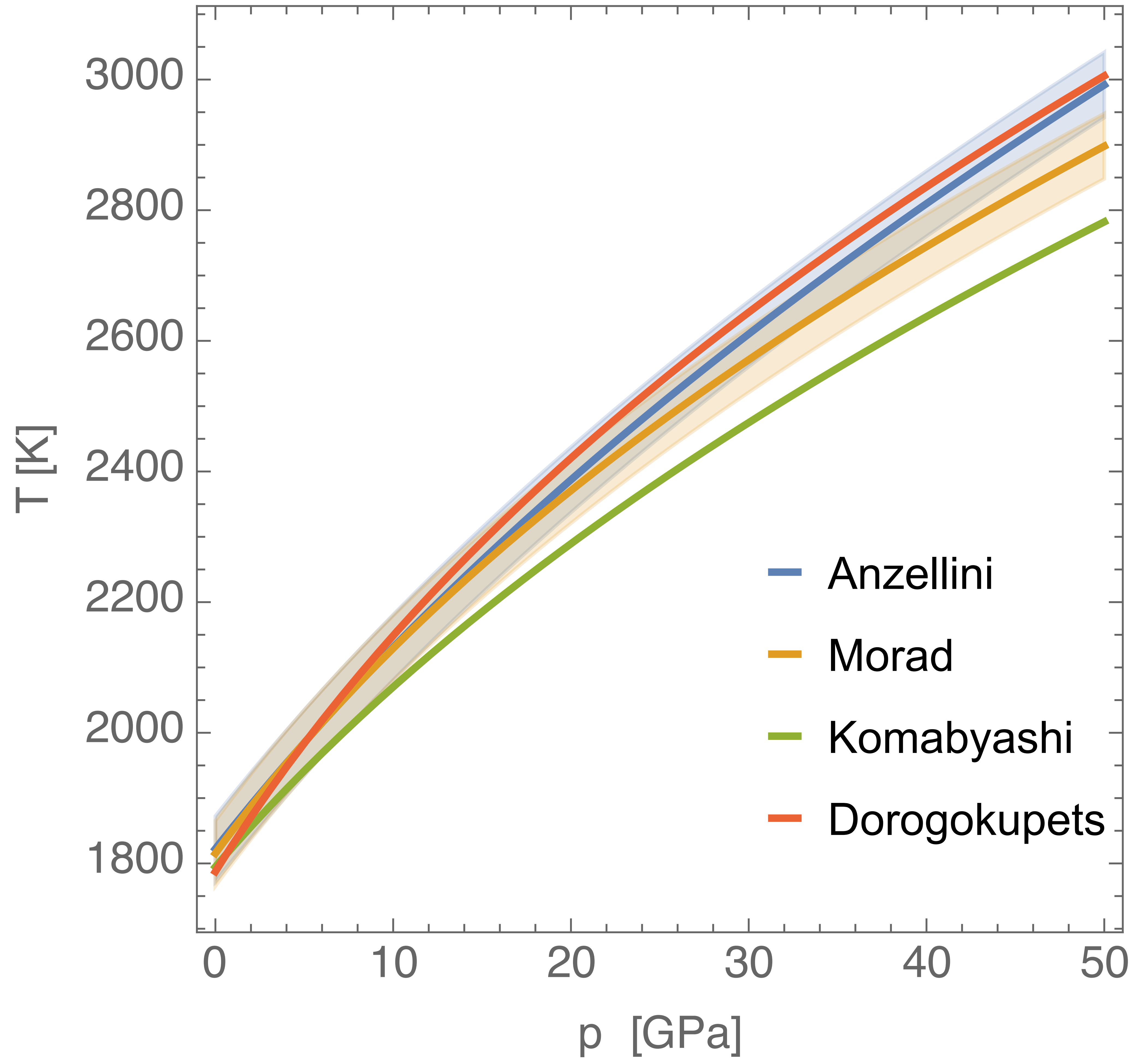
Fe melting T

- 2 sets of eos for Fe (bcc, fcc, l) Komabyashi 2014 and Dorogokupets 2017
  - based on lab data of bcc and fcc Fe and uses that data and Fe melting T to deduce eos for l-Fe => no direct measurements of l-Fe thermoelastic properties available at moderate p to construct an eos (except high p shock data)
  - both eos are in quite good agreement for V, KS
  - not so for alpha and Cp



EOS of liquid Fe (and bcc,fcc,hcp)

Complete thermodynamic models

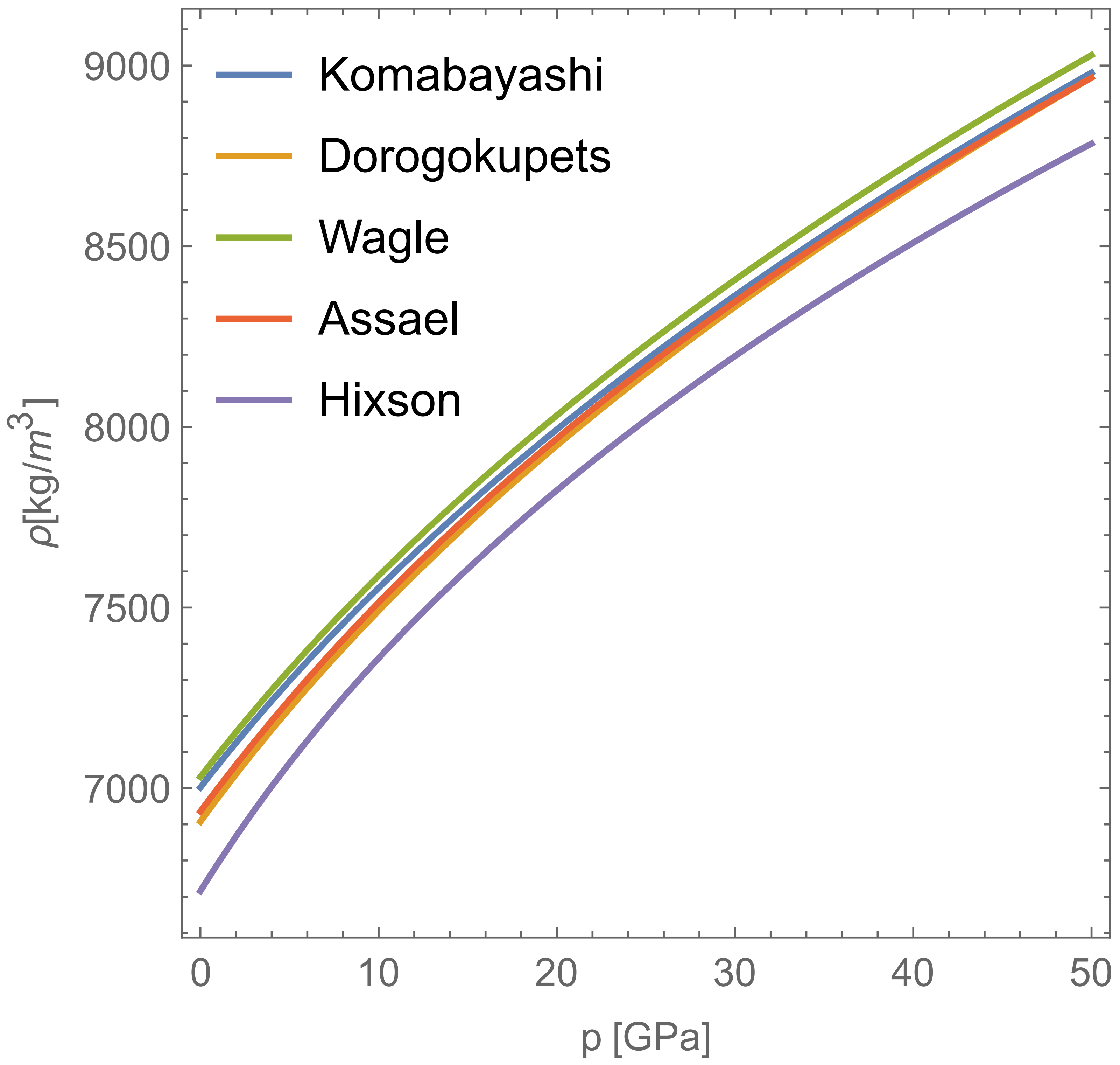
- Komabayashi 2014 (10.1002/2014JB010980)
  - deduced from lab data of fcc, hcp Fe and Fe liquidus
  - based on Anderson-Grüneisen eos formulation
- Dorogokupets 2017 (10.1038/srep41863)
  - deduced from lab data of bcc, fcc, hcp Fe and Fe liquidus
  - based on Mie-Einstein eos formulation
- Wagle 2019 (10.1029/2018JB016994)
  - ab initio + calibration
  - based on de Koker eos formulation

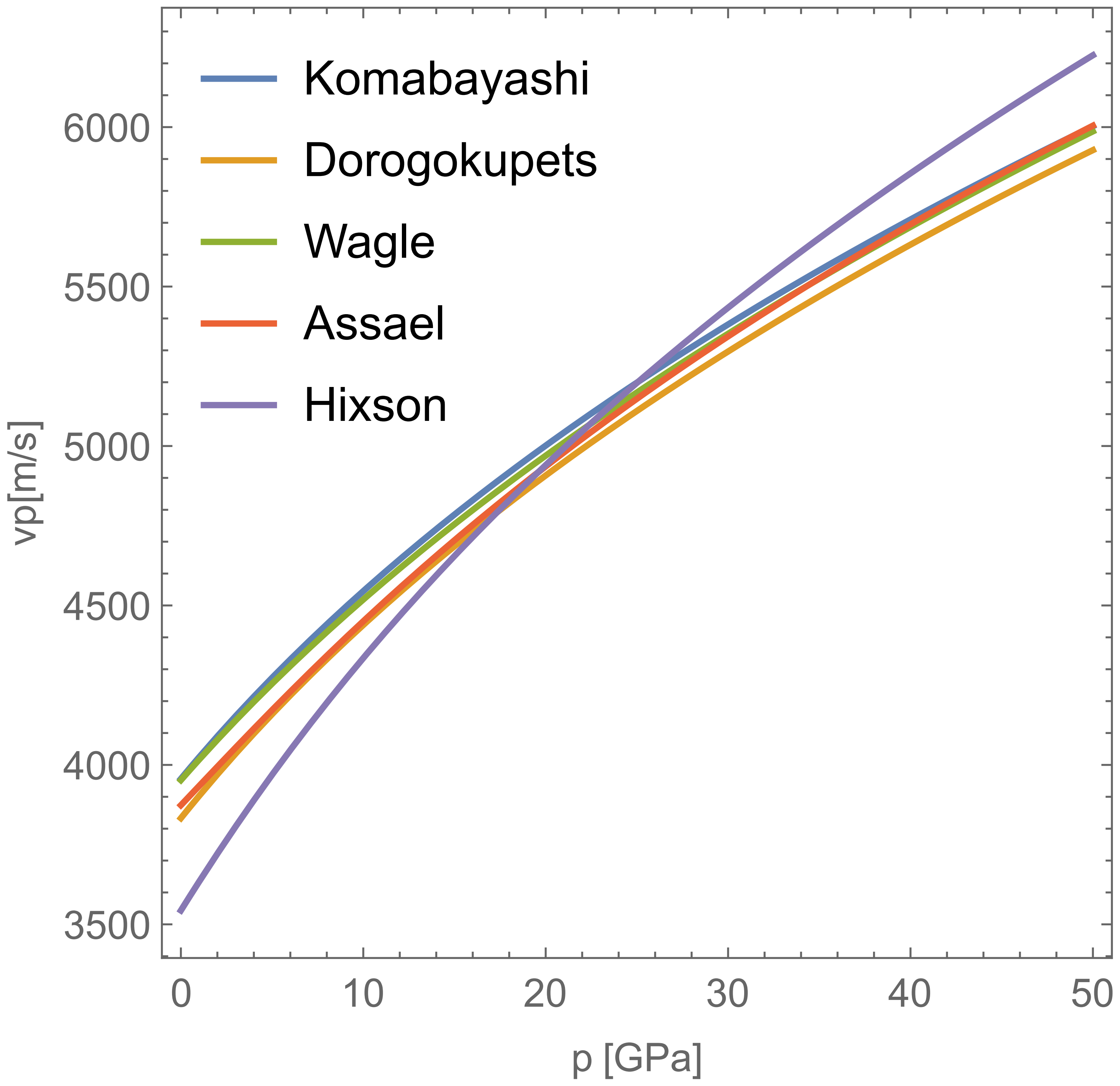
More or less agreeing with experimental data on the same level

p	T	ρ	$\Delta\rho$	Anderson	Komabayashi	Wagle	Dorokupets
21.5	2600	7910.	70	7955.39	7996.2	7992.92	7977.87
31.3	2870	8240.	110	8298.5	8328.53	8332.67	8319.1
40.6	2880	8640.	150	8669.85	8686.52	8725.	8669.2
40.7	3060	8480.	90	8609.43	8628.77	8641.81	8622.59
52.7	3250	8930.	70	8974.43	8980.56	9003.21	8975.03
52.8	3340	9190.	130	8948.49	8956.33	8967.49	8955.58
68.5	3530	9320.	100	9382.47	9373.85	9395.74	9371.13
69.8	3540	9300.	110	9417.32	9407.34	9430.41	9404.21
73.8	3630	9530.	70	9505.56	9492.56	9511.98	9491.2
106.3	4250	10 010.	110	10 165.8	10 130.7	10 125.1	10 138.
116.1	4350	10 100.	140	10 360.6	10 318.3	10 312.3	10 325.2

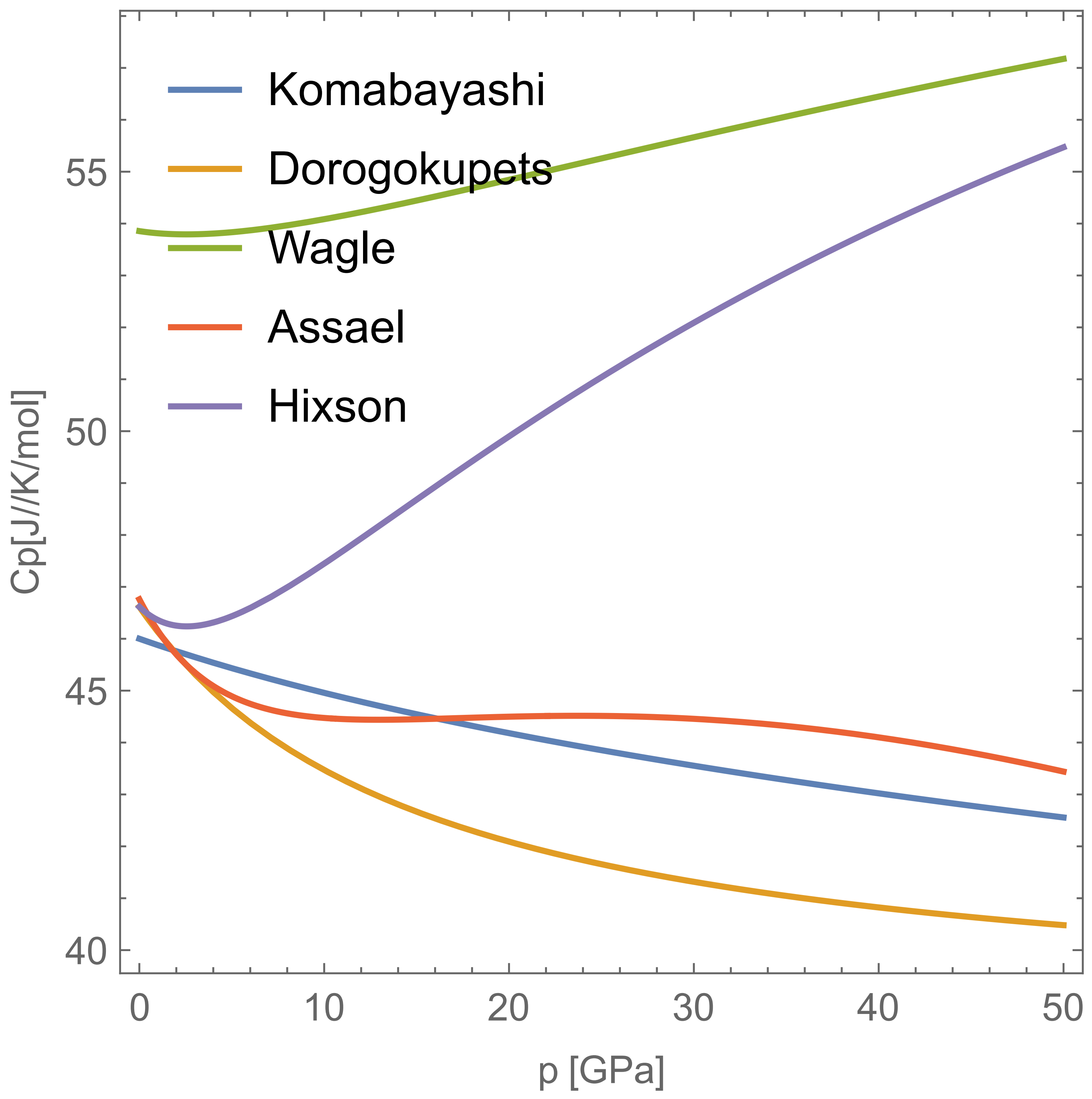
p	T	vp	Δvp	Anderson	Komabayashi	Wagle	Dorokupets
16.	2200	5030.	120	4793.29	4847.16	4829.09	4777.76
32.7	2700	5400.	320	5354.88	5472.9	5440.67	5391.83
44.9	2700	5820.	200	5803.21	5874.23	5875.97	5805.22

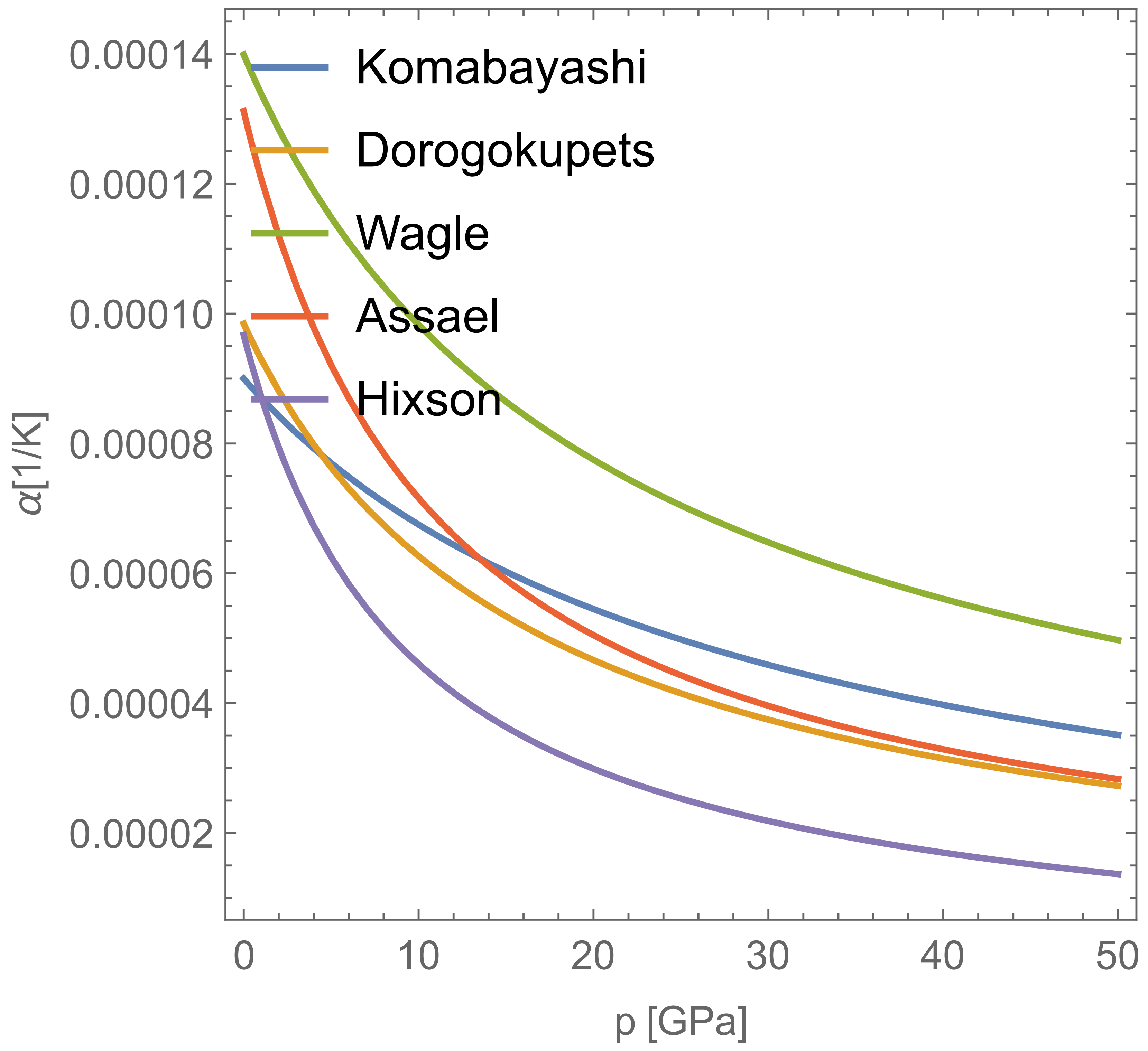
Equivalent results for density and acoustic velocity along isentropes





Significant differences for and C_p and α and adiabatic gradient





Affects conditions of snow occurrence and location where isentrope and liquidus cross

Model for liquid Fe-S based on new lab data (density, acoustic velocity) and l-Fe eos (Xu 2021, 10.1016/j.epsl.2021.116884)

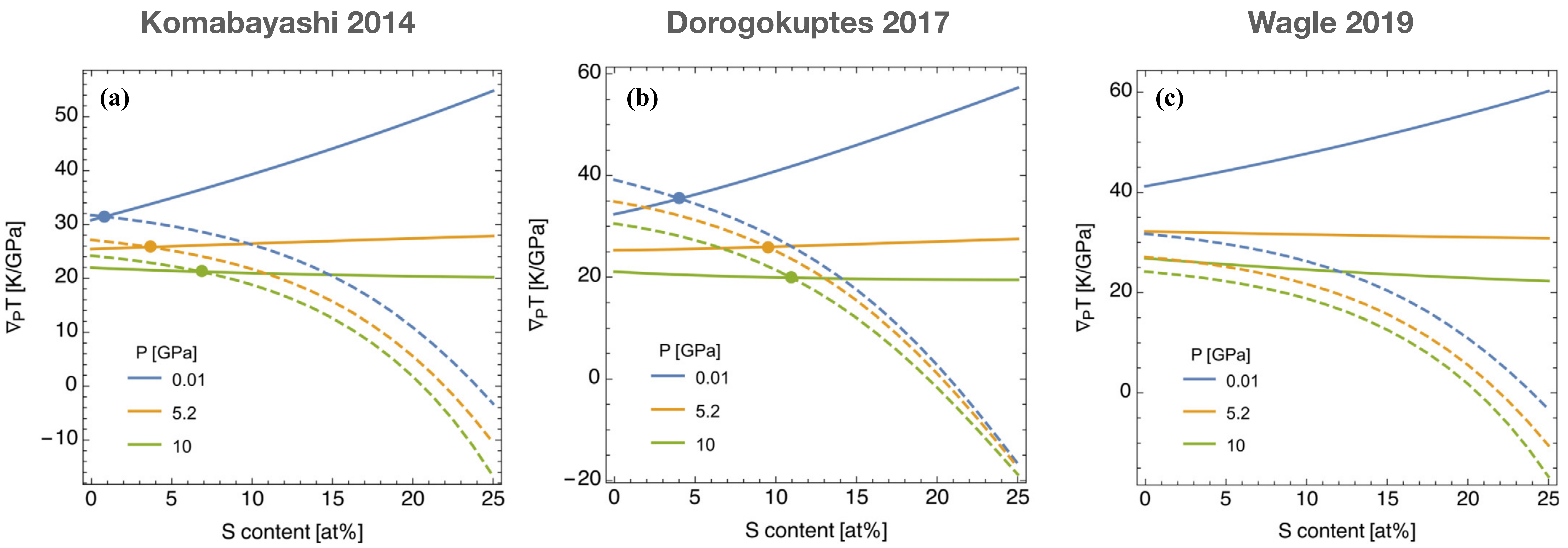
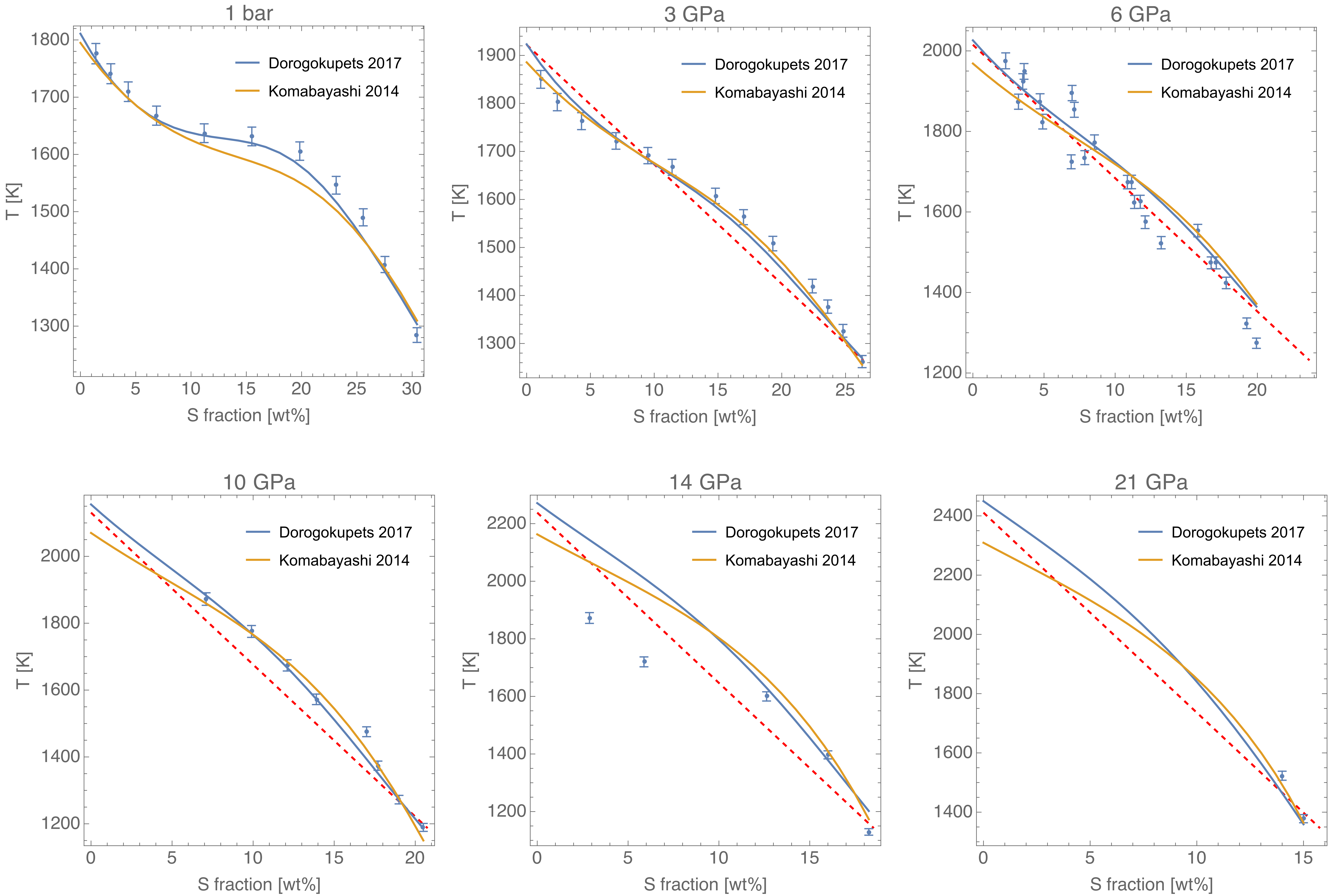


Fig. 7. Adiabatic gradient (solid lines) and slope of the liquidus (dashed lines) as a function of the S content at 0.01 GPa, 5.2 GPa, and 10 GPa, corresponding to core pressure of planetesimals, Moon and Ganymede, respectively, for the Model K (a), Model D (b), and Model W (2019) (c). Note that for the Model W the EOS' of solid Fe from Komabayashi (2014) has been used to compute the slope of the liquidi. For other differences in the models, please refer to section 2.5 and to Table S1 and S2 for the used parameters.

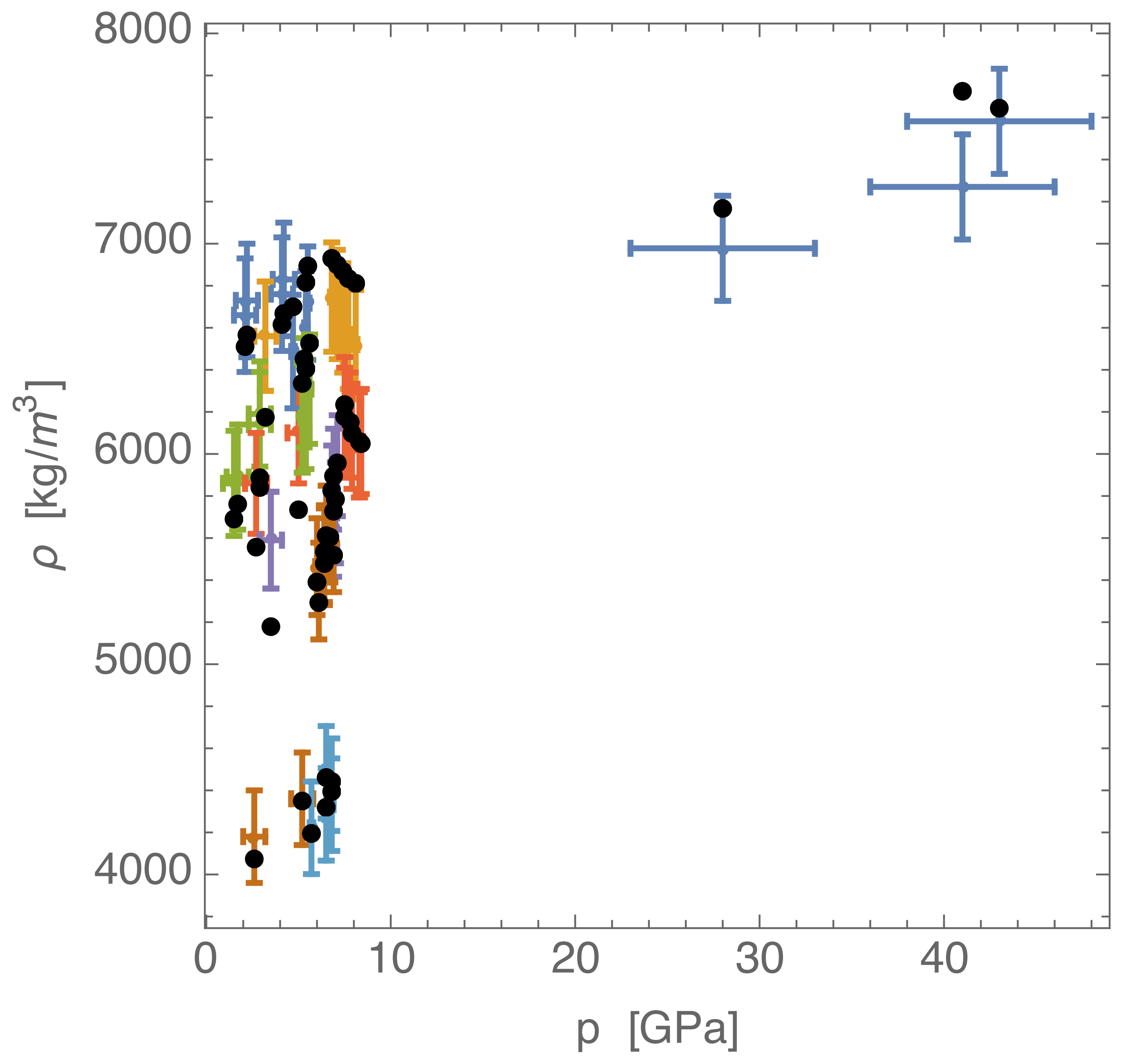
Fe-S liquidus

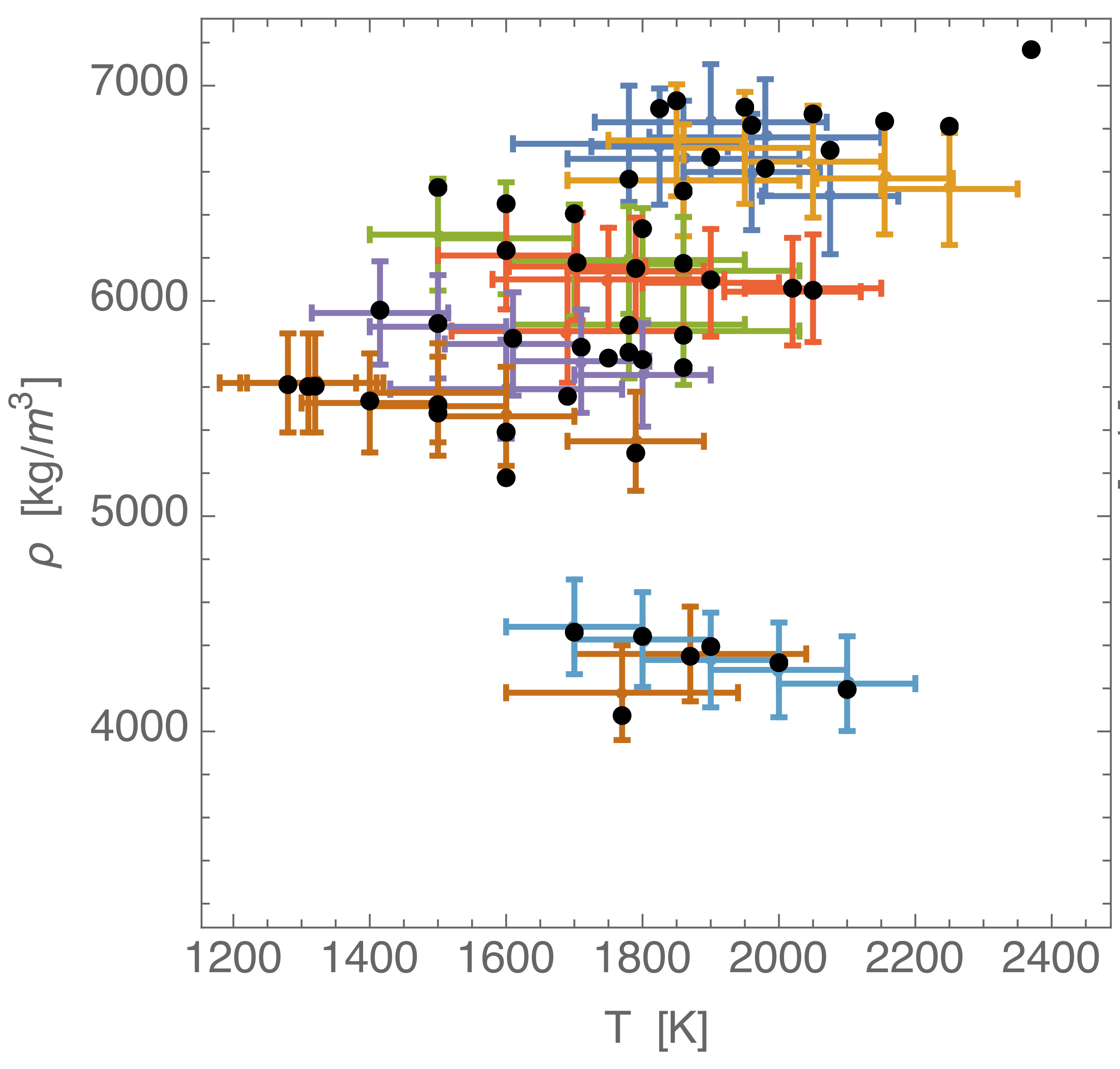


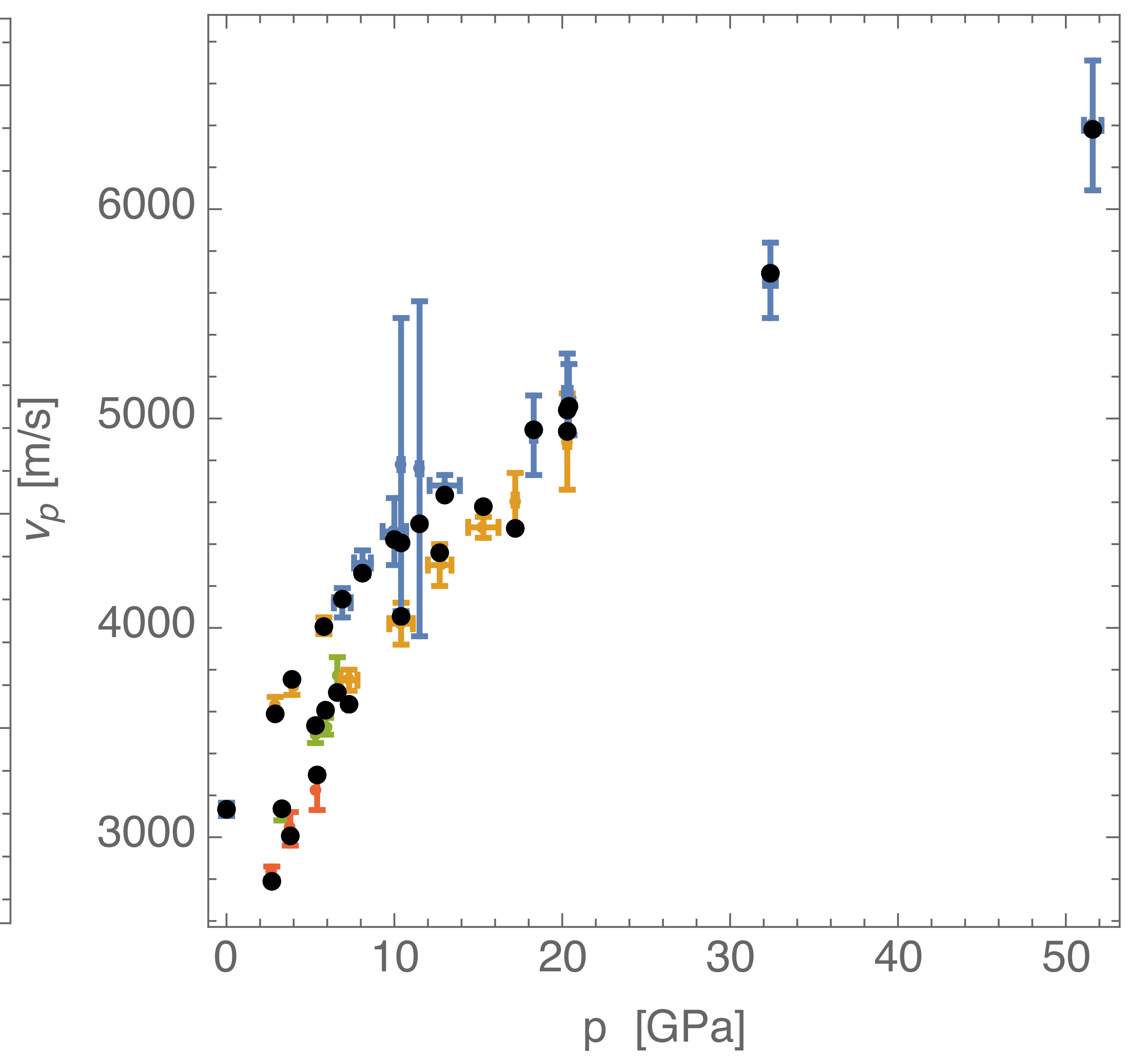
l Fe-S eos

- thermodynamic model for l Fe-S based on large set of density and acoustic velocity measurements (large nbr. of S fractions, 0-50GPa)

- to describe lab data requires that non-ideal p-dependent mixing of Fe and S







Thermodynamic quantities