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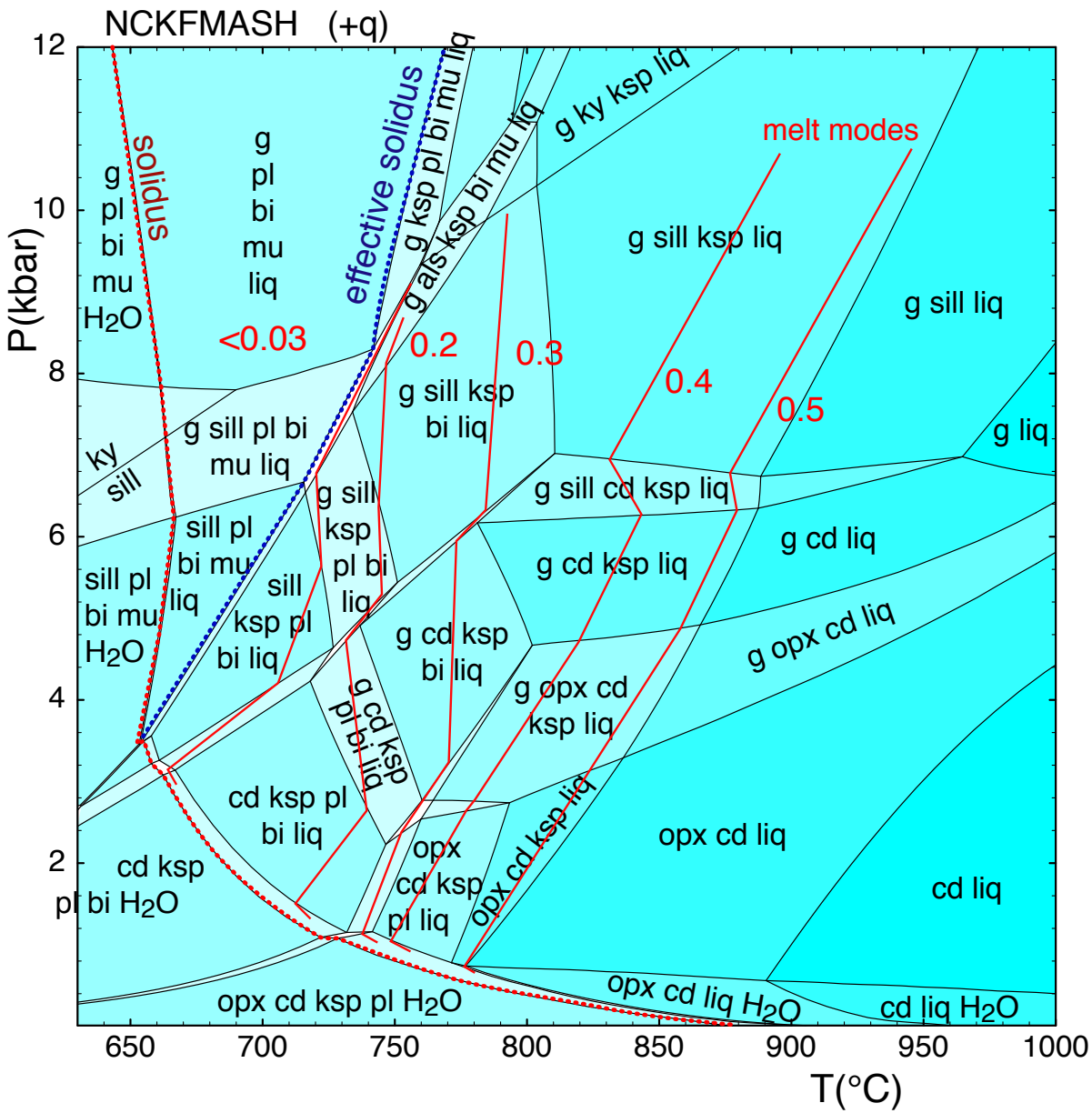
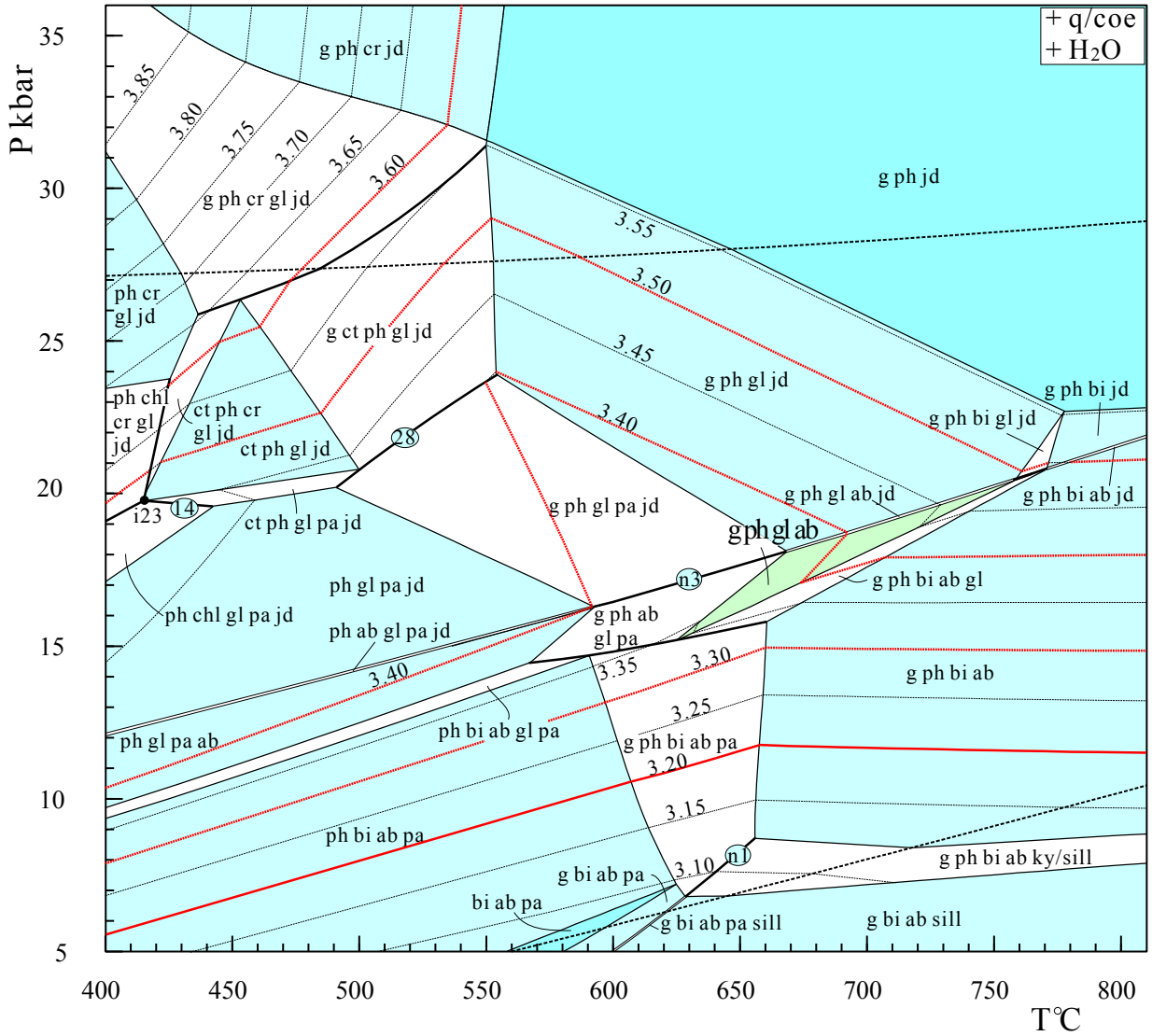
- Tx and Px pseudosections are equivalently drawn for a composition vector, at constant P and T, respectively.

PT pseudosection example



another *PT* pseudosection



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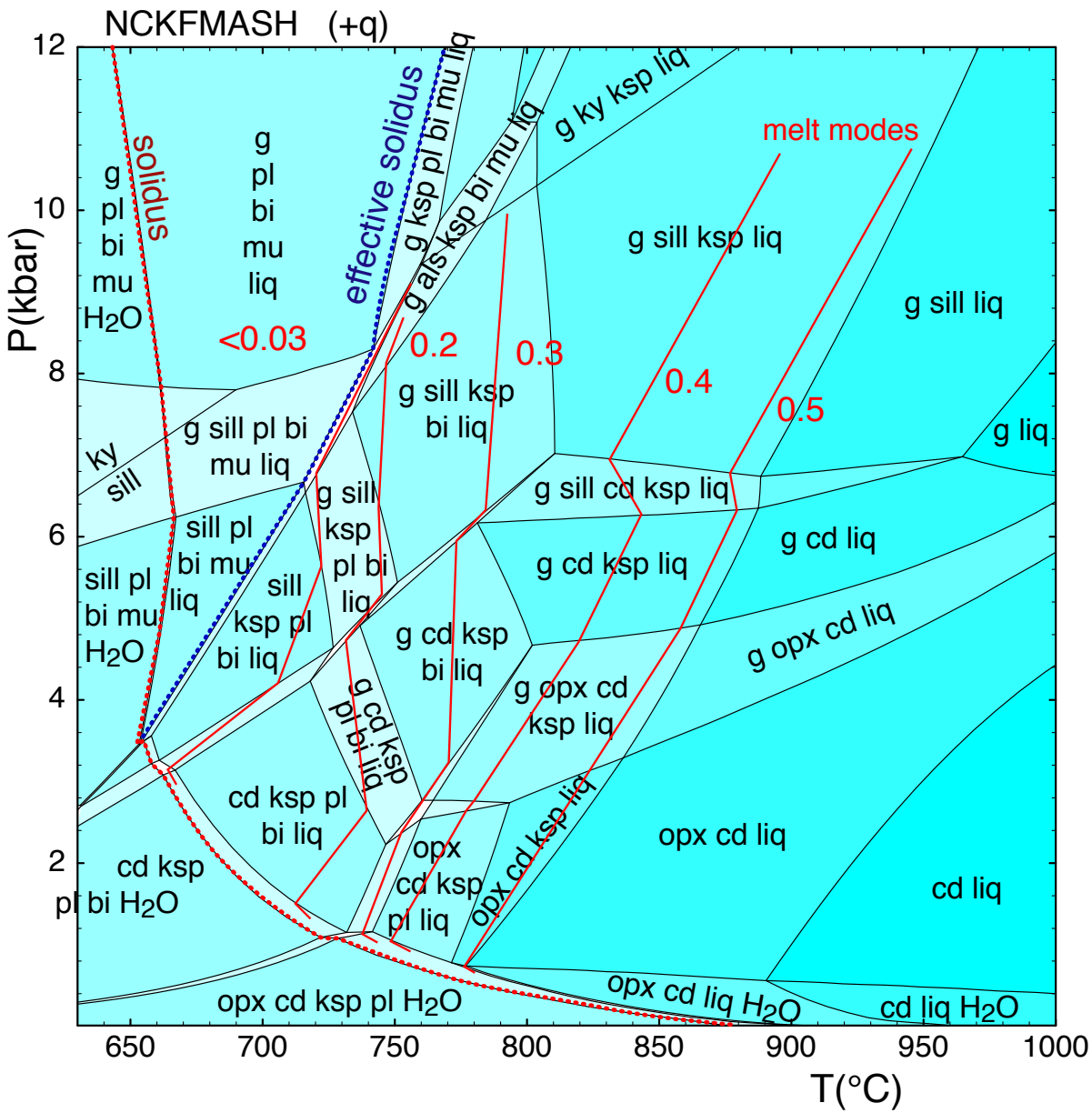
- phase compositions change continuously with PT around a pseudosection.

NCKFMASH *PT* pseudosection



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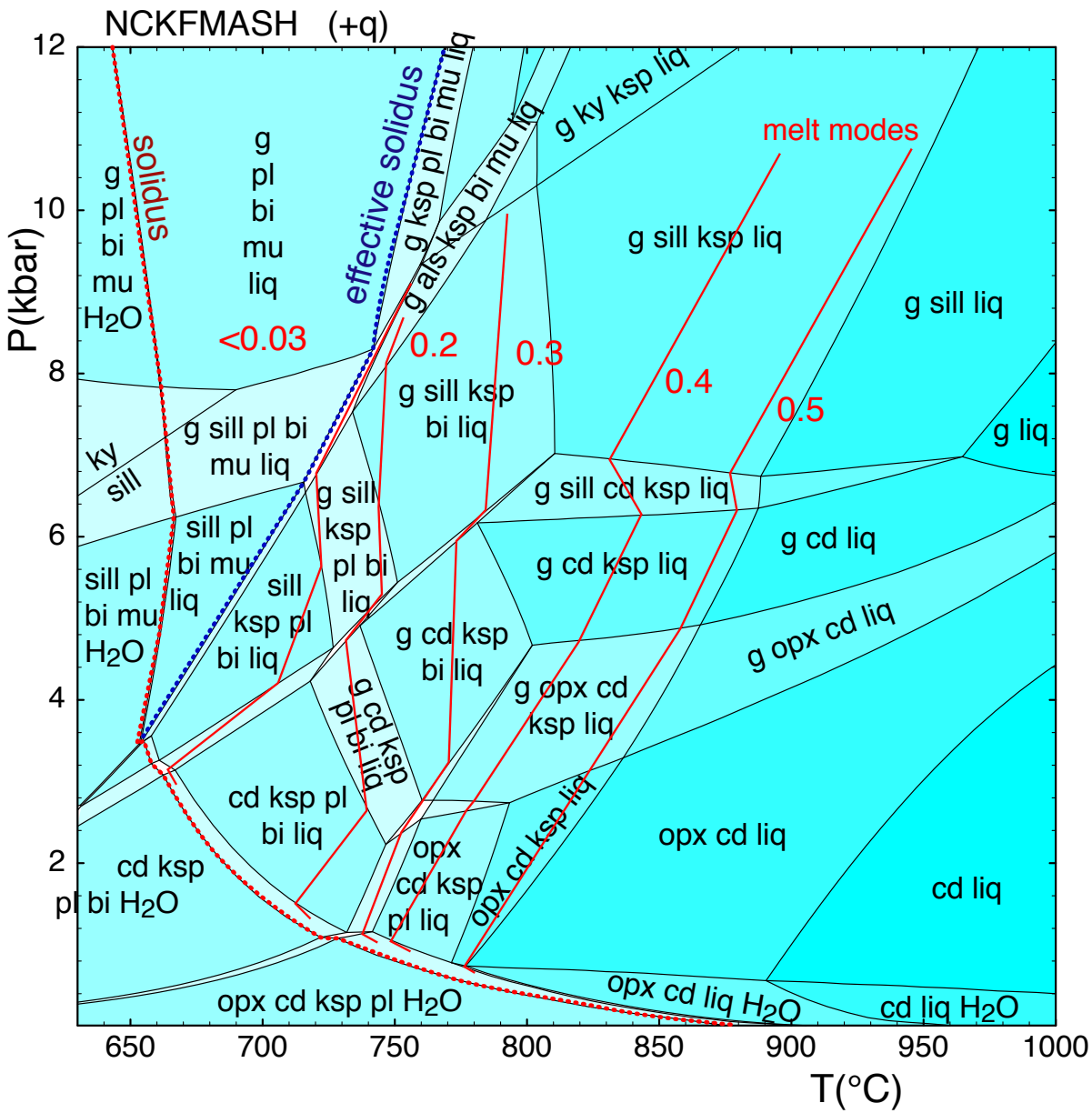
  - except if the line is an actual univariant reaction
  - but this view still holds if univariant lines are considered as zero width fields, themselves bounded by lines—as we shall see)
- variance changes by just one across each line (i.e. the number of phases in the assemblage changes by just one)
- at a point, there are *always* just 4 lines, connecting fields of variance m, $m+2$ and the two between them of variance $m+1$.

NCKFMASH *PT* pseudosection



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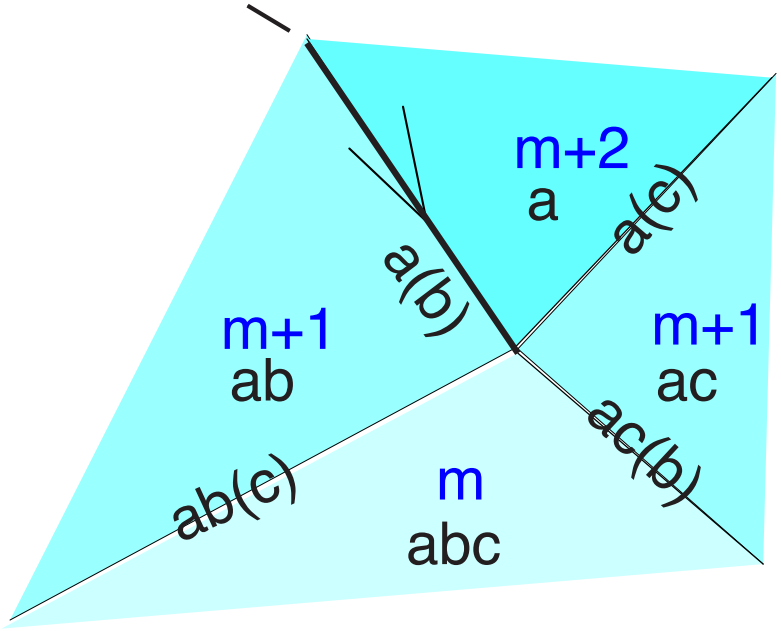
- at a point, there are *always* just 4 lines, connecting fields of variance m, $m+2$ and the two between them of variance $m+1$
- critical idea: following a line there are two possibilities:
  - lose a phase (at a point), or
  - gain a phase (at a point).

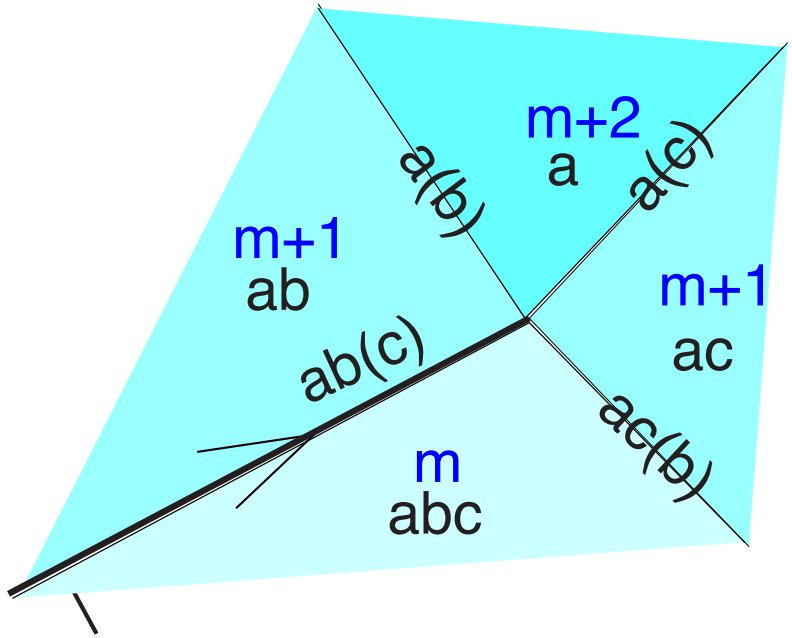
pseudosections

line being followed -
a + b joined by c at point



"add a phase" (c)

"lose a phase" (b)



line being followed -
mode of b goes to zero at point

gain/lose a phase

let's look at these two situations more closely

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- the losing of a phase is easy: the calculations along a line will see the mode of the phase being lost going to zero

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- the losing of a phase is easy: the calculations along a line will see the mode of the phase being lost going to zero
- the gaining of a phase requires guessing which phase might join the assemblage.

now let's do some calculations in THERMOCALC, building up the phase relationships around the staurolite isograd reaction in KFMASH,

starting with the univariant reaction itself

staurolite isograd: mode info when "seen"

```
composition (from script)
  SiO2 Al2O3   MgO   FeO   K2O
    60 16.76  7.28 10.92  5.05
<================================================>
phases : chl, bi, st, g, (mu, q, fluid)
 P(kbar)     T(°C)   x(chl)   y(chl)   Q(chl)    x(bi)    y(bi)    Q(bi) etc
    6.00     560.3   0.6903   0.6138   0.3861   0.7639   0.4411   0.1465
        23chl + 30g + 65mu = 65bi + 10st + 115q + 74H2O
    6.50     569.1   0.6348   0.6019   0.3981   0.7017   0.3940   0.2007
        25chl + 27g + 64mu = 64bi + 10st + 106q + 81H2O
    7.00     576.9   0.5885   0.5929   0.4070   0.6469   0.3530   0.2522
        27chl + 24g + 63mu = 63bi + 10st + 100q + 87H2O
    7.50     584.0   0.5484   0.5857   0.4142   0.5994   0.3190   0.2980
        28chl + 22g + 62mu = 62bi + 10st + 96q + 91H2O

  mode      chl      bi      st       g      mu       q
       0.1569  0.2282  0.0643          0.3484  0.2023
       0.2521  0.0897          0.0426  0.4450  0.1706
-------------------------------------------------------------------
```

staurolite isograd: di/trivariants (where are "holes")

P(kbar)	T(°C)	x(chl)	y(chl)	Q(chl)	x(bi)	y(bi)	Q(bi)	etc
7.00	576.9	0.5885	0.5929	0.4070	0.6469	0.3530	0.2522	
7.50	584.0	0.5484	0.5857	0.4142	0.5994	0.3190	0.2980	

mode	chl	bi	st	g	mu	q
	0.1569	0.2282	0.0643		0.3484	0.2023
	0.2521	0.0897		0.0426	0.4450	0.1706

P(kbar)	T(°C)	x(chl)	y(chl)	Q(chl)	x(bi)	y(bi)	Q(bi)
8.00	590.4	0.5126	0.5798	0.4202	0.5581	0.2915	0.3368

mode	chl	bi	st	g	mu	q
	0.0201	0.3623	0.1267		0.2639	0.2270
	0.2141	0.0910		0.0772	0.4515	0.1662

P(kbar)	T(°C)	x(chl)	y(chl)	Q(chl)	x(bi)	y(bi)	Q(bi)
8.50	596.5	0.4800	0.5746	0.4253	0.5219	0.2694	0.3686

mode	chl	bi	st	g	mu	q
		0.3397	0.1162	0.0401	0.2870	0.2171
	0.1820	0.0918		0.1065	0.4573	0.1624

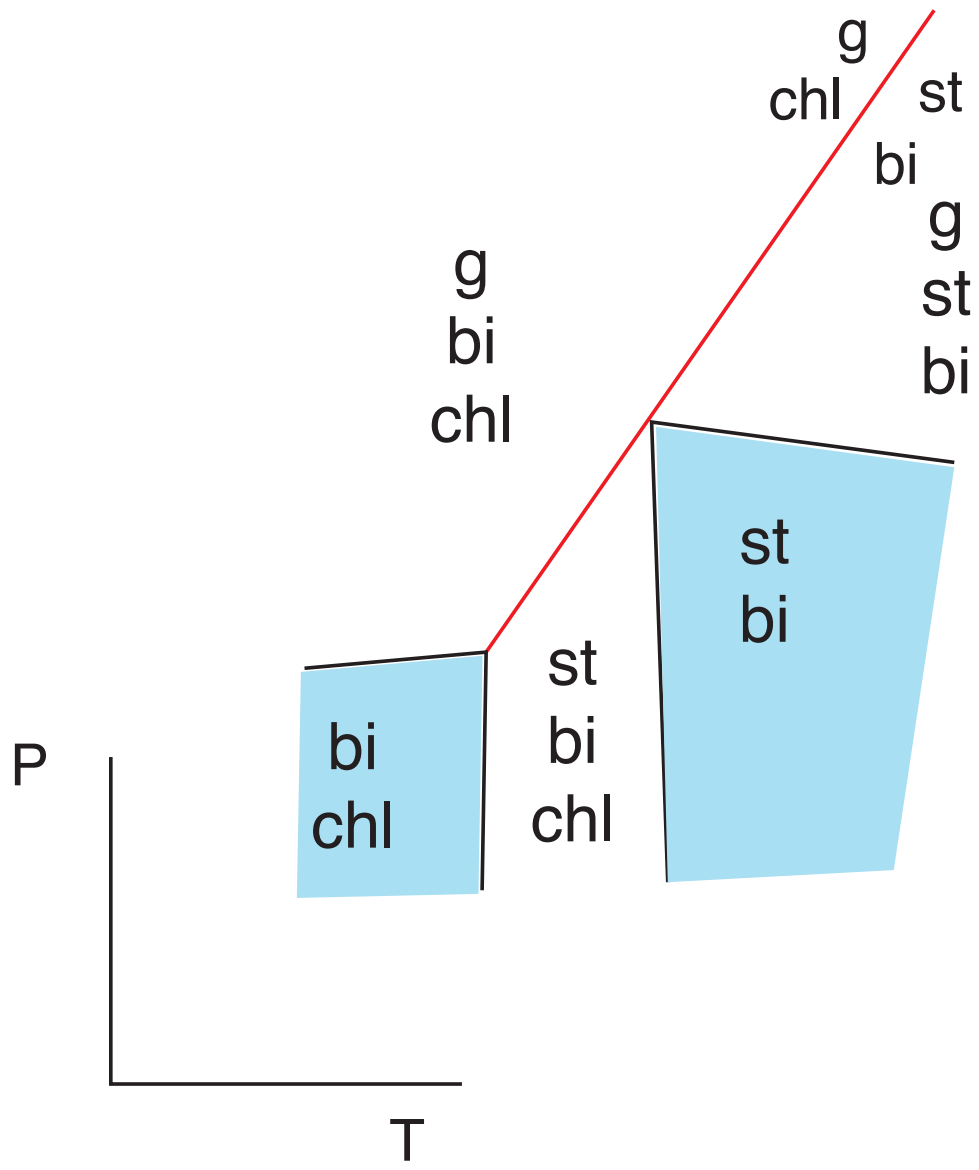
P(kbar)	T(°C)	x(chl)	y(chl)	Q(chl)	x(bi)	y(bi)	Q(bi)
9.00	602.2	0.4499	0.5701	0.4298	0.4898	0.2515	0.3939

mode	chl	bi	st	g	mu	q
		0.2981	0.0967	0.0795	0.3218	0.2039
	0.1539	0.0922		0.1322	0.4627	0.1590

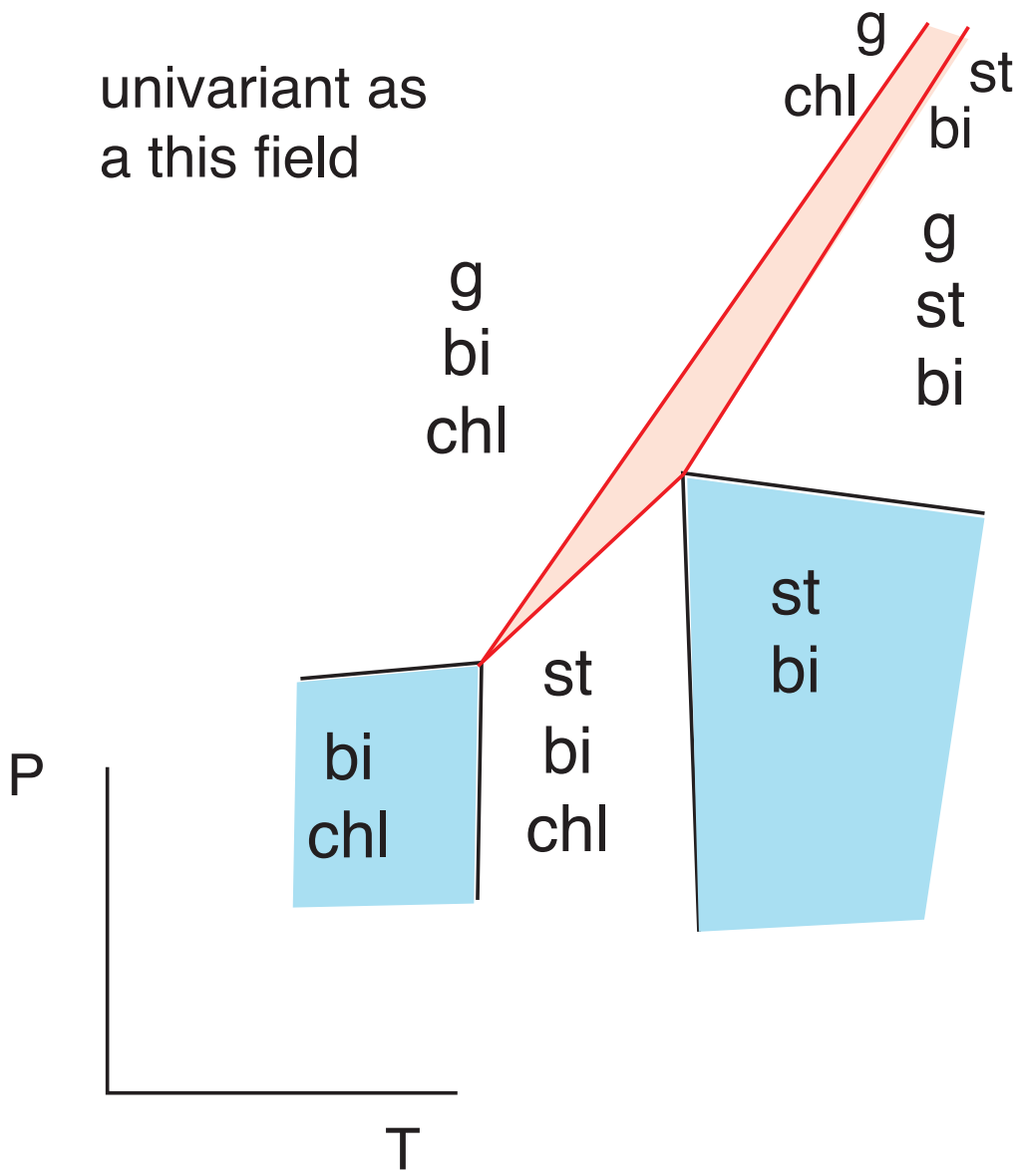
---

holes then don't change up P

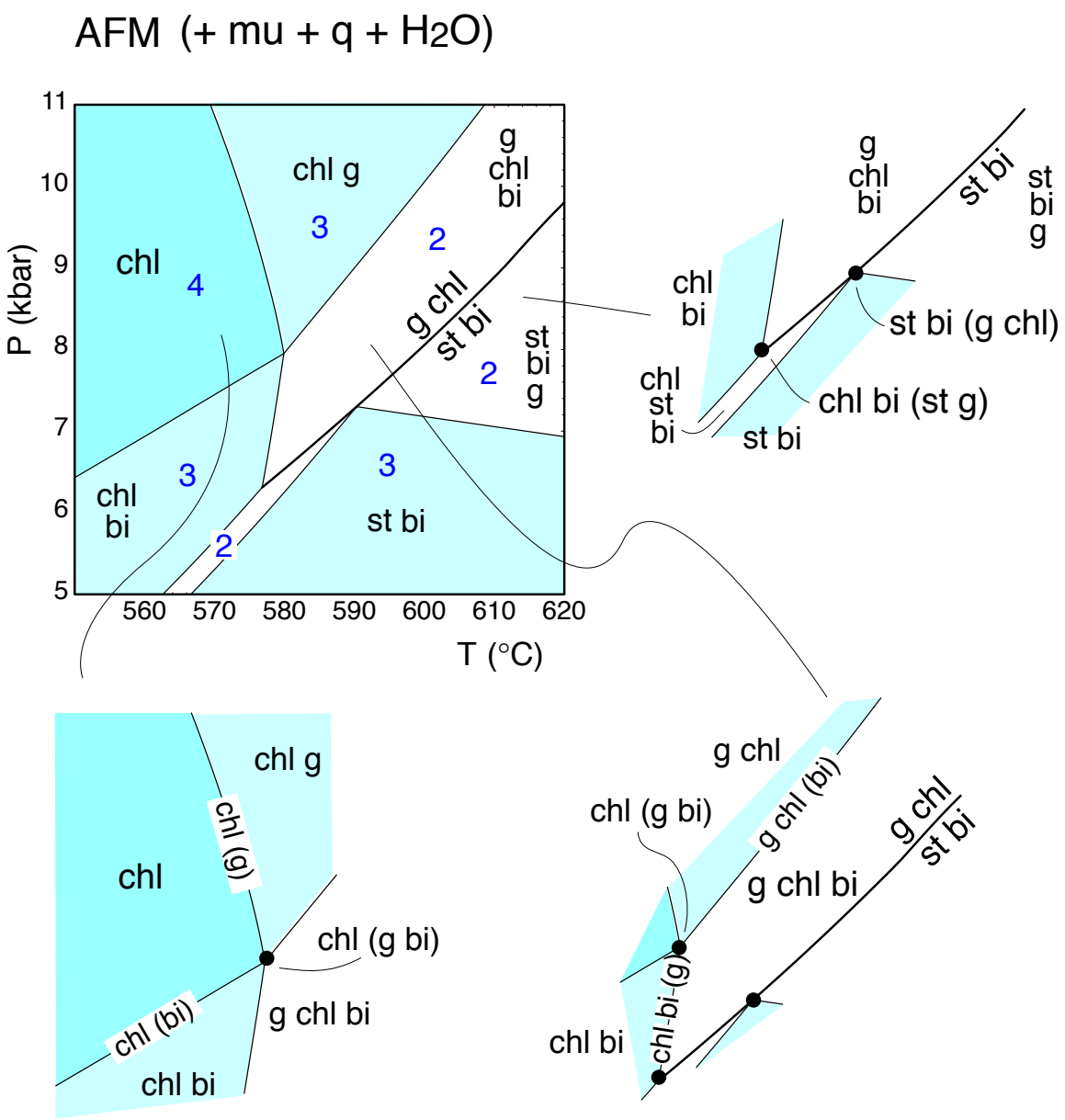
staurolite isograd: adding qualitative boundaries



staurolite isograd: invariant as a thin polygonal field



pseudosection construction



practical class time

do make use of the documentation, and you can look at this lecture material (it is in the "lectures" directory/folder on the CD),

and dave kelsey, johann diener, richard white and I are here to help.

have fun!