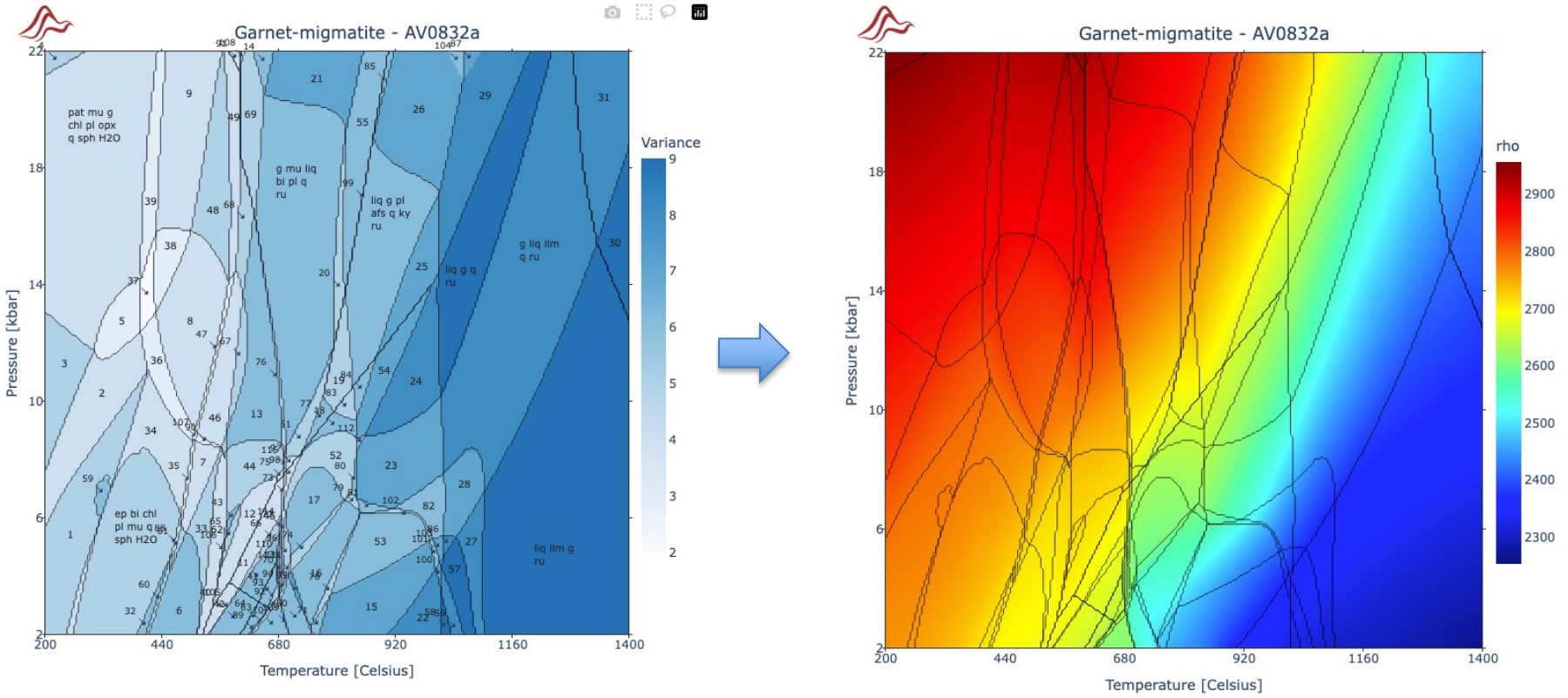
LaMEM short course

17-21 02 2025 Heidelberg

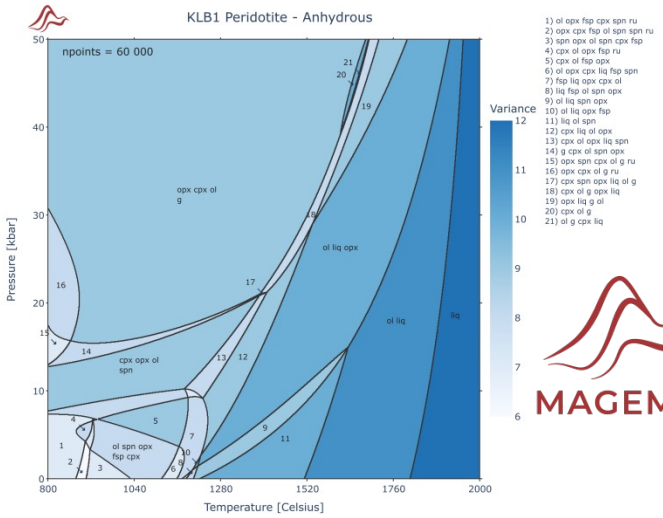
Nicolas Riel- nriel@uni-mainz.de

How to compute density diagram for LaMEM using MAGEMin?



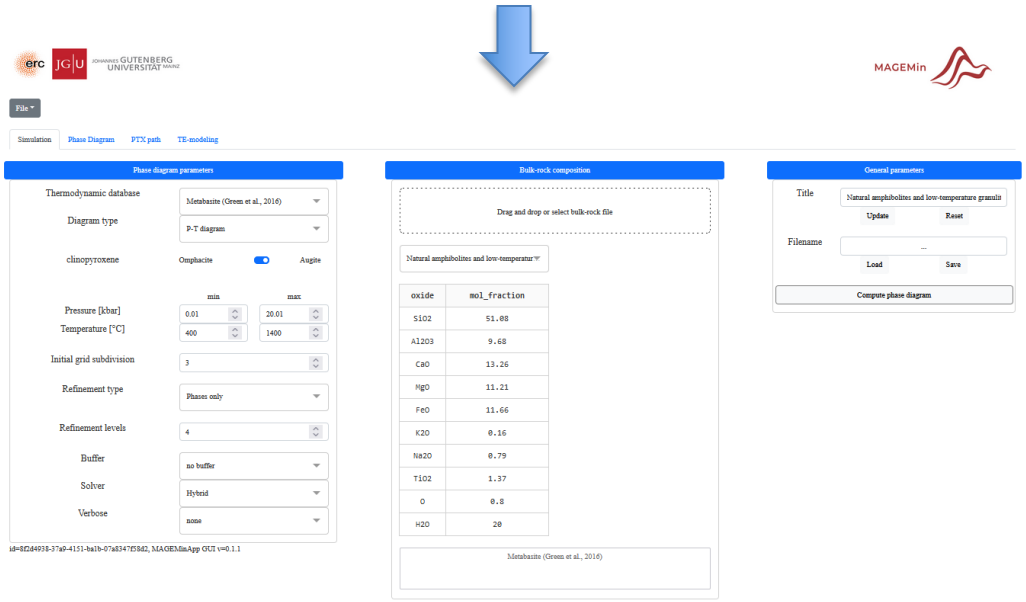
MAGEMinApp.jl

using MAGEMinApp *(https://github.com/ComputationalThermodynamics)*

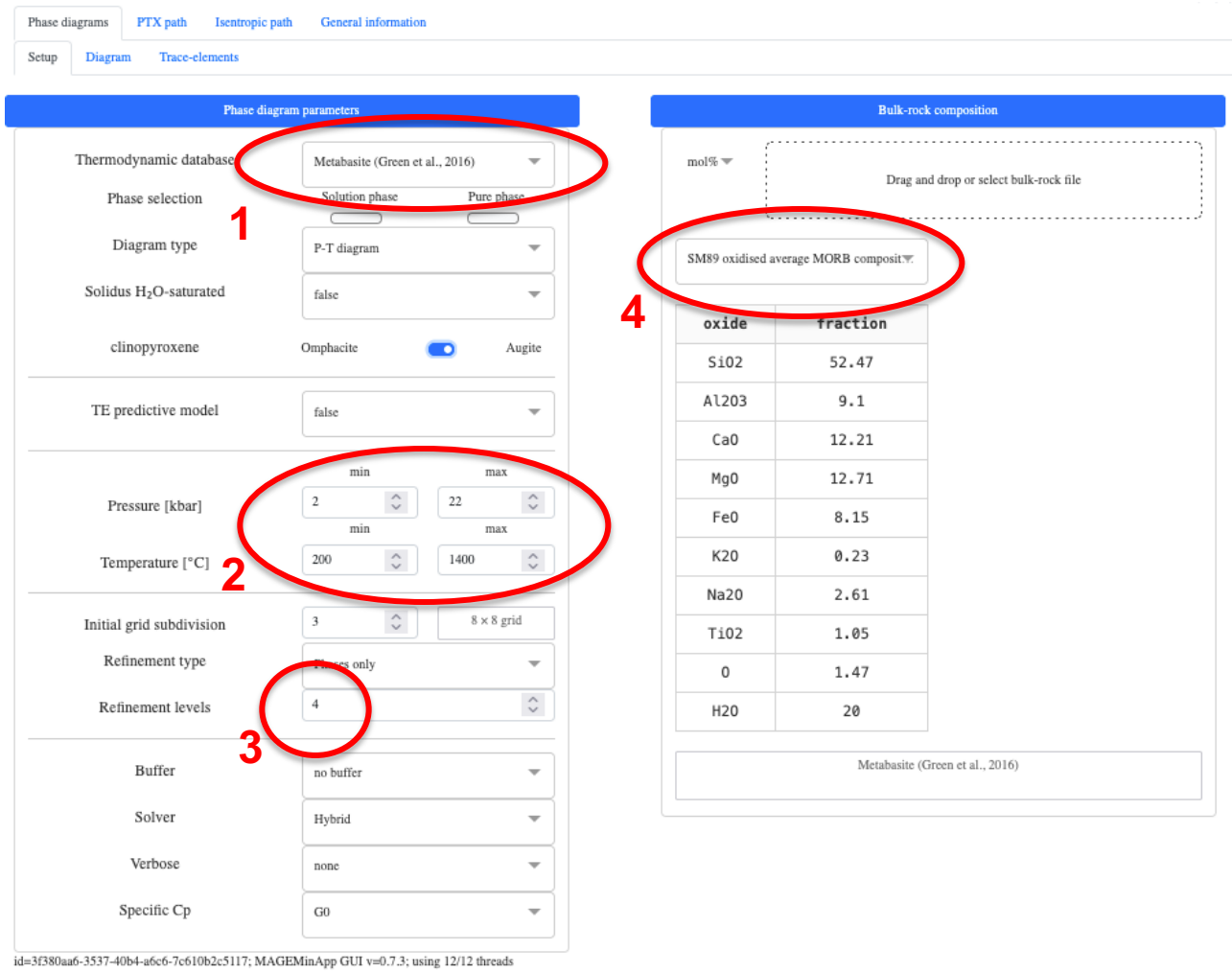


Julia –t 5 #threaded
Julia>] add MAGEMinApp
Julia> using MAGEMinApp
Julia> App()

http://127.0.0.1:8050/ web browser

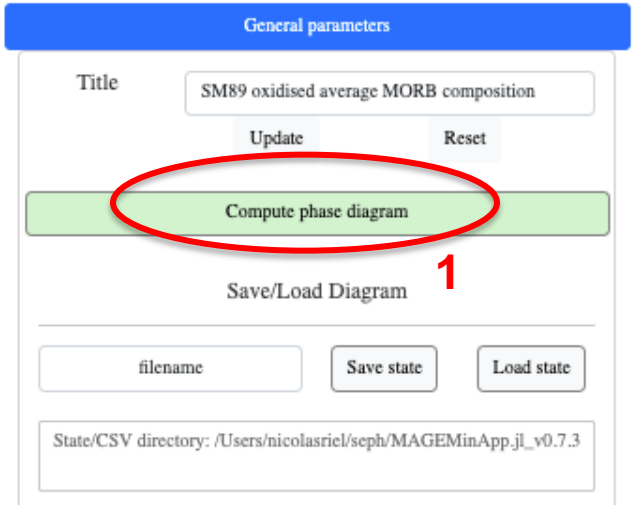


MAGEMin – phase diagrams

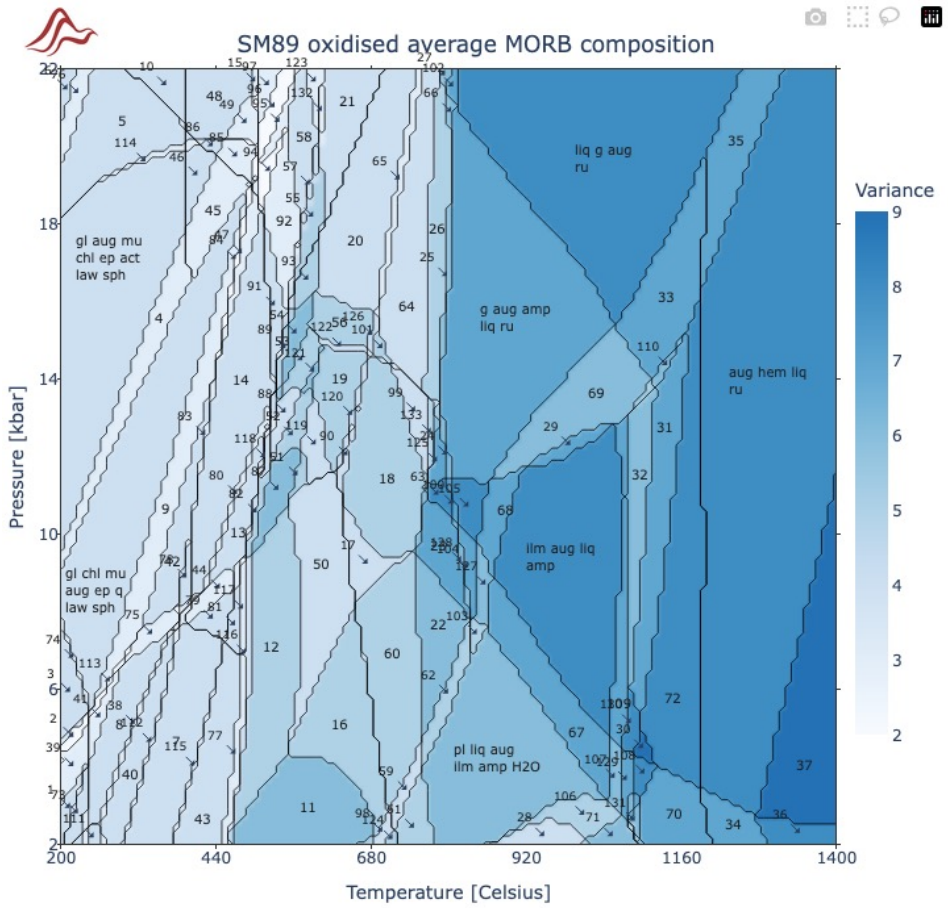


1. Select database,
2. select P-T range → 200 to 1200° C 2 to 24 kbar,
3. select levels of refinement = 4,
4. choose MORB composition

MAGEMin – phase diagrams

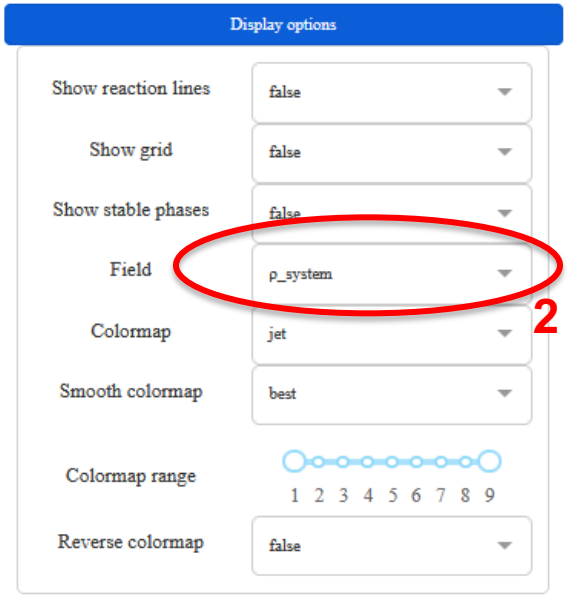


1. Compute diagram (wait a few minutes)

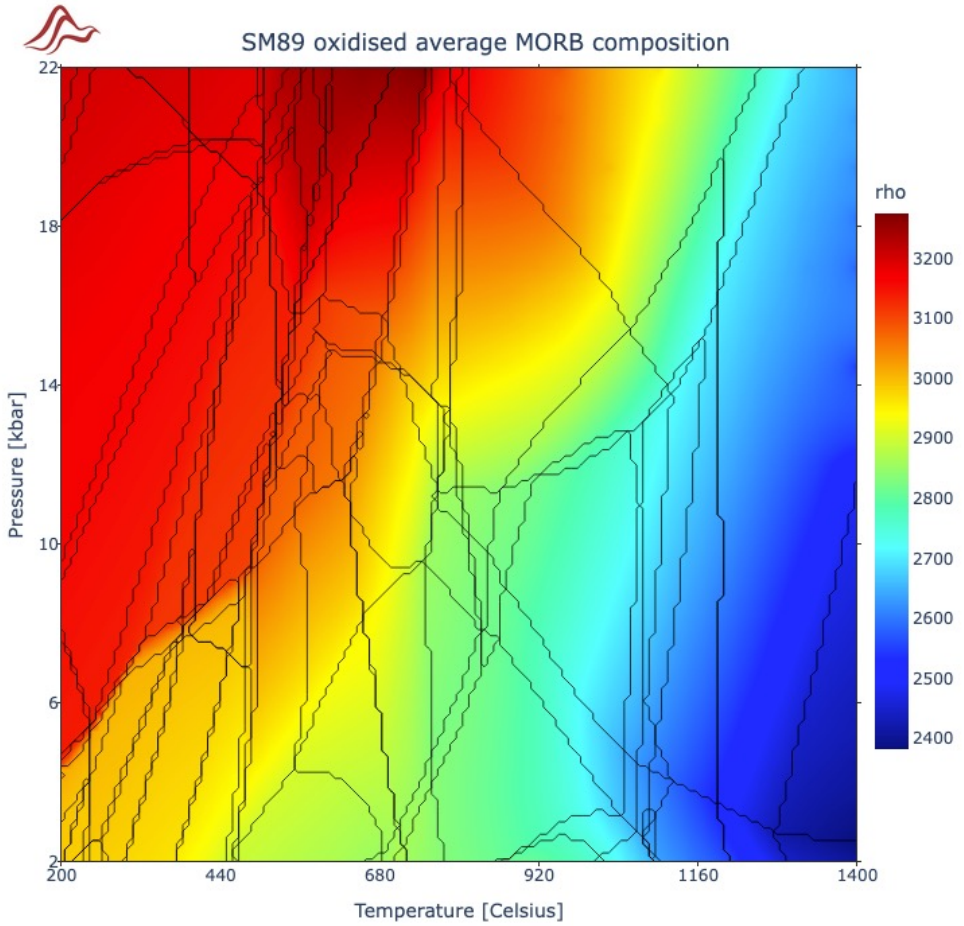


Gives a low-resolution diagram (enough for density)

MAGEMin – phase diagrams



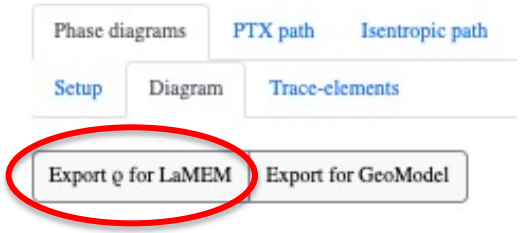
2. Change field to rho and colormap to jet



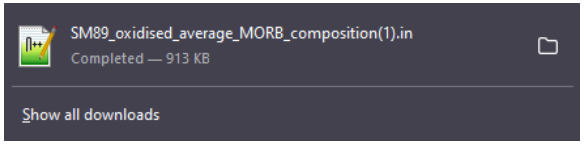
Gives a low-resolution diagram (enough for density)

MAGEMin – phase diagrams

Export to LaMEM



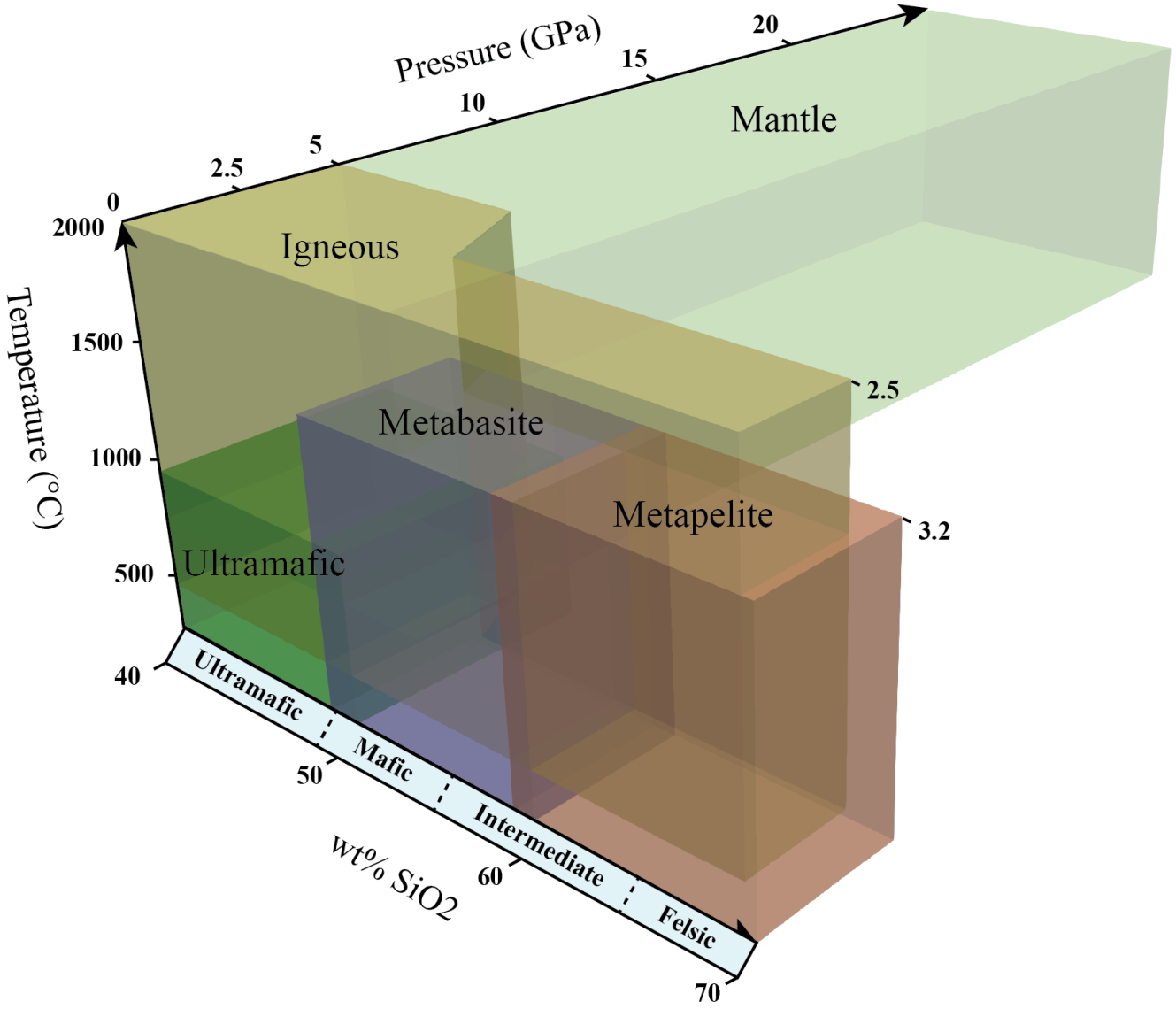
In the top-left
→ “export for LaMEM”



Now it can be added to your LaMEM julia script as rho_ph = “SM89_oxidised…”

- 3-4 refinements are enough for a LaMEM density diagram
- Can be done for any custom rock composition and PT conditions
- Make sure you use the right database
- Set minimum pressure > 0.0, e.g. 0.01!
- If your LaMEM simulation goes outside the computed diagram range, it will extrapolate the density from the used phase diagram

MAGEMin – how to choose database



Upper mantle density diagram (Peridotite.in)