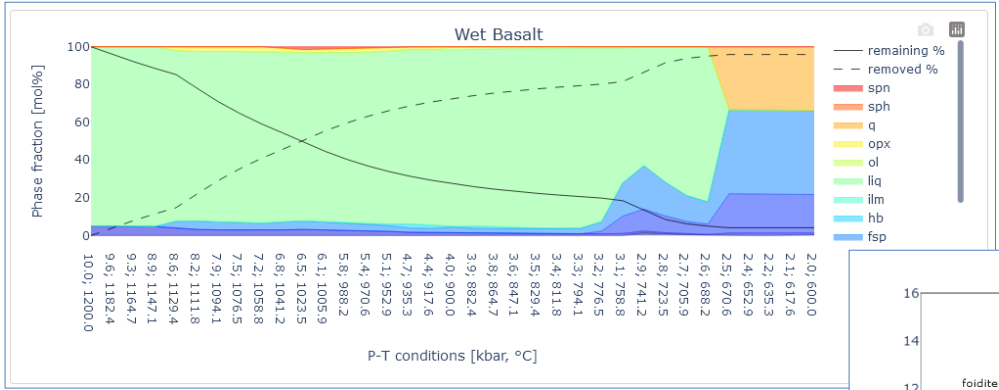
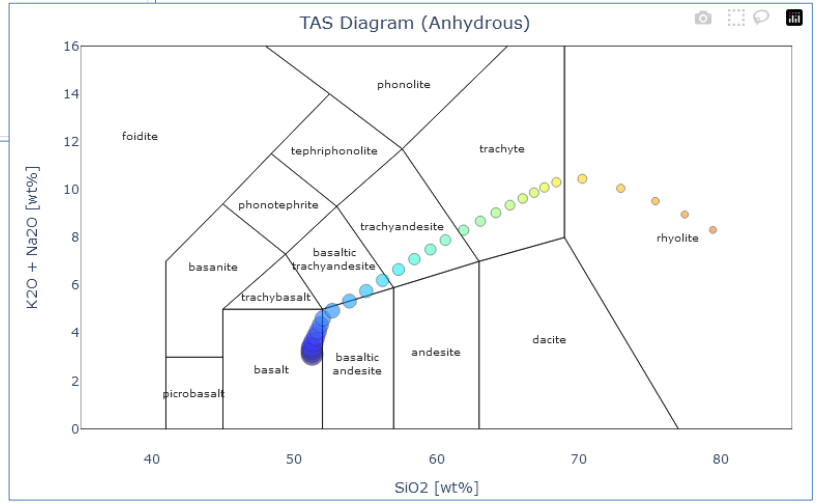
MAGEMinApp: PTX paths

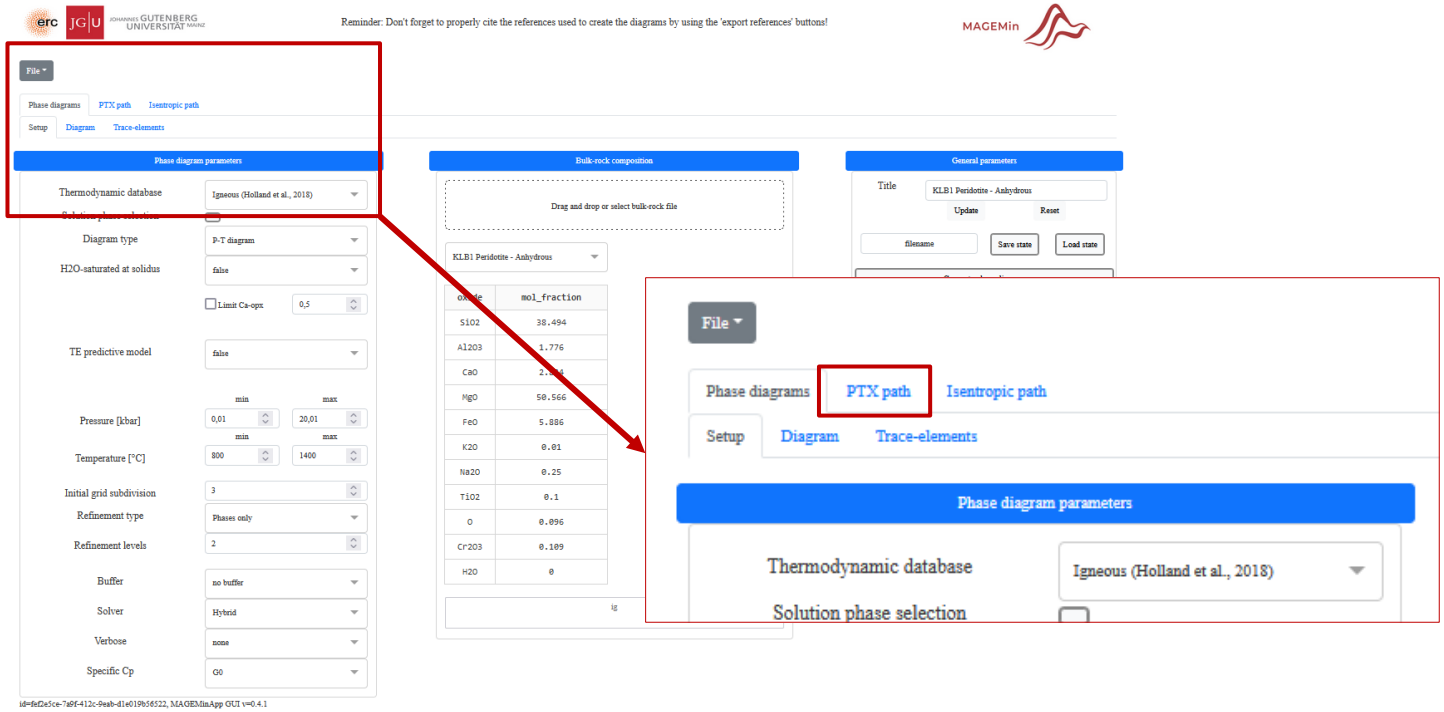
Granulites & Granulites 2024

MAGEMin



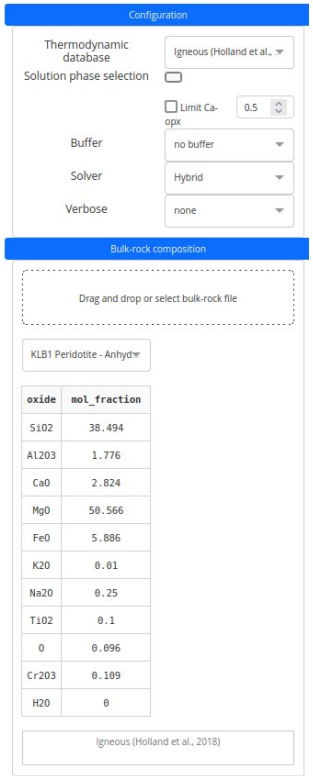


MAGEMinApp: PTX paths interface



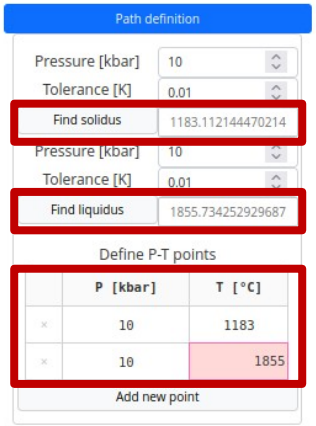
MAGEMinApp: PTX path, path definition (batch melting)

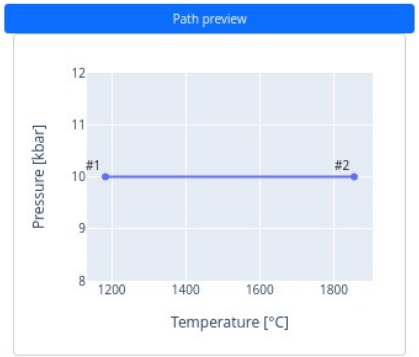
- The database/bulk-rock interface of the PTX paths tab is overall similar to the one of the phase diagrams

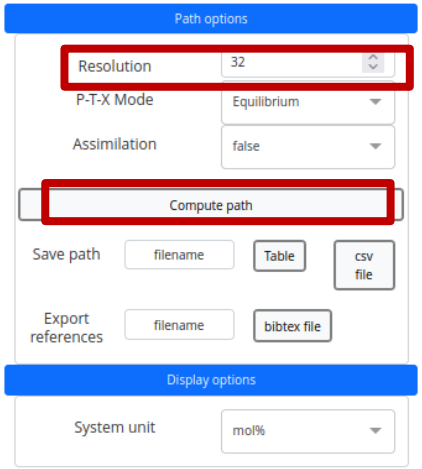


Database and bulk-rock selection panel

- Keep the default value for the database and the predefined bulk-rock (KLB-1 Peridotite)
- Click on find solidus and find liquidus to get the temperature range and modify the P-T points accordingly
  Note that the defined path is previewed in the central panel



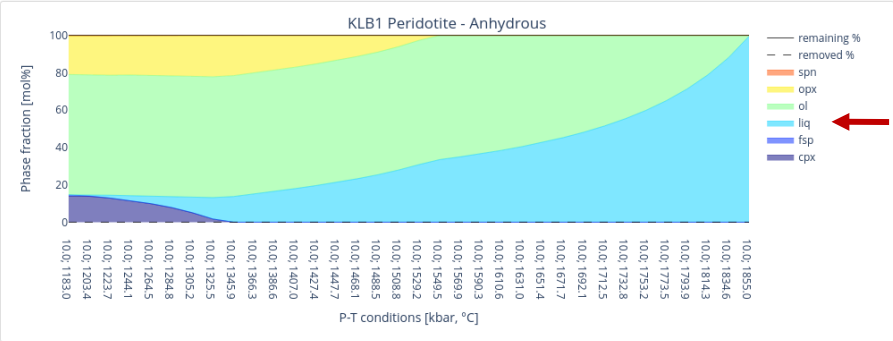




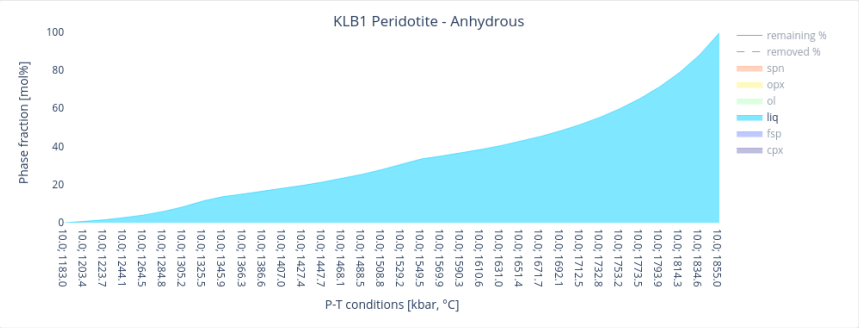
- Finally on the right panel set the resolution to 32 (number of intermediate PT calculations between P-T points)
- Then compute path!

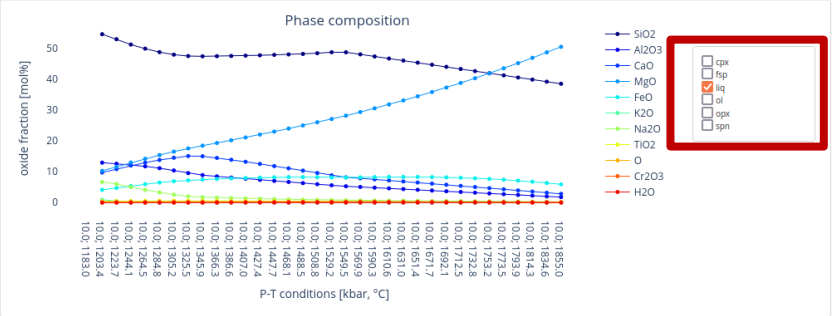
MAGEMinApp: PTX path, path visualization (batch melting)

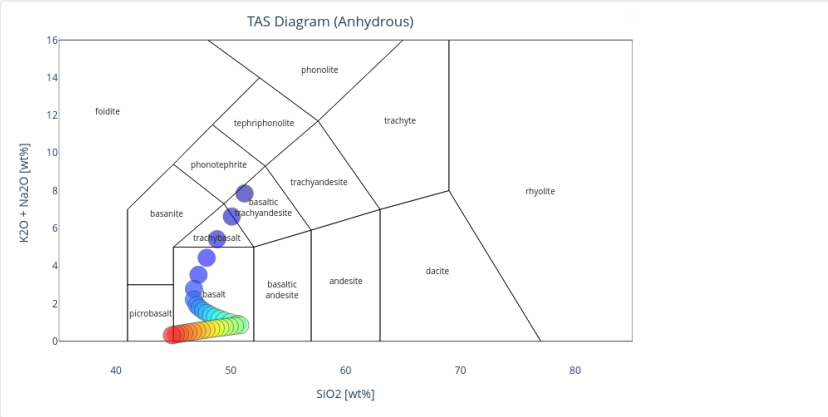
- The result of the PTX path should look like this...



- The plot can be saved by clicking on the camera in the top right corner
- Double clicking on the label of one phase will isolate it:



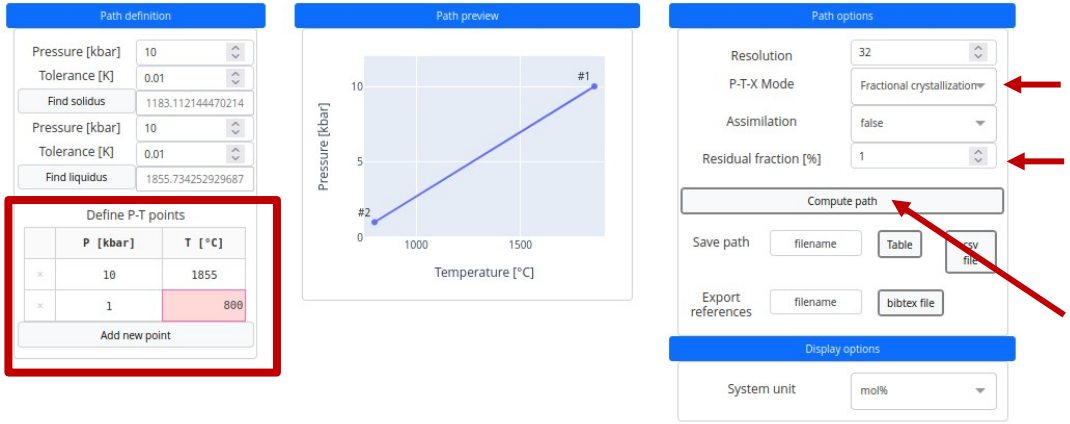




- Composition profile can be displayed by selecting given solution phase models
- If “liq” is selected, a TAS diagram showing the melt composition evolution will be displayed

MAGEMinApp: PTX path, fractional crystallization

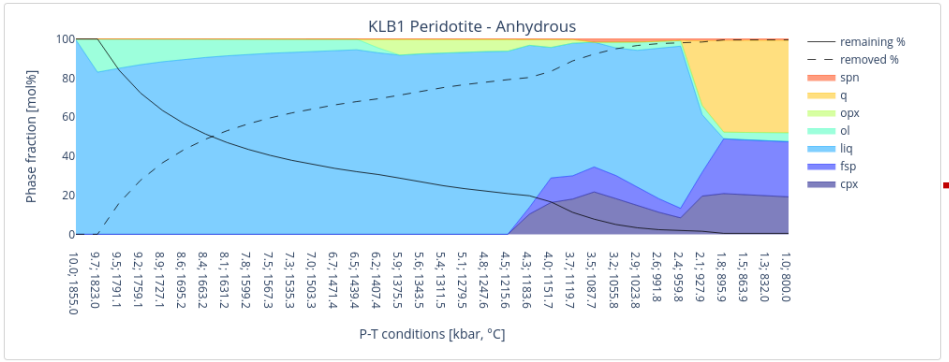
- First let's change the PT path as:

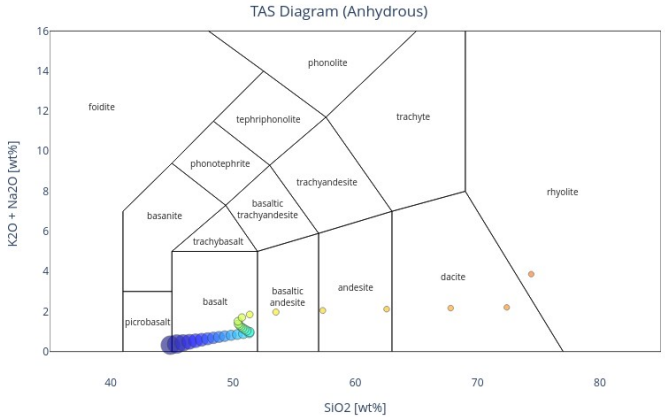


Select fractional crystallization

Choose residual fraction to be 1% (fraction of residual solid transported with the melt)

Compute path

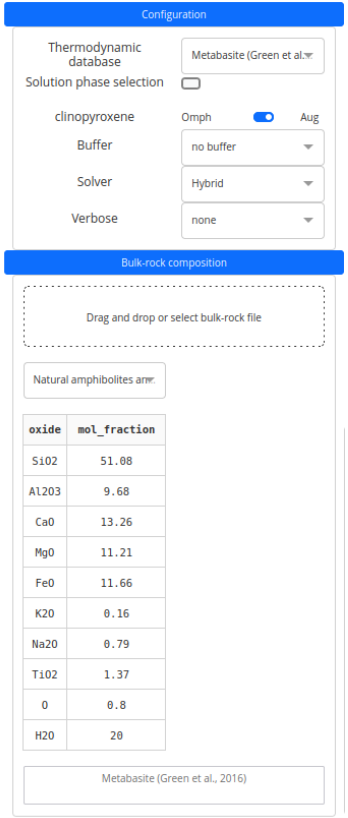


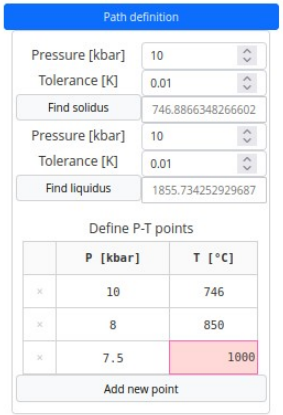


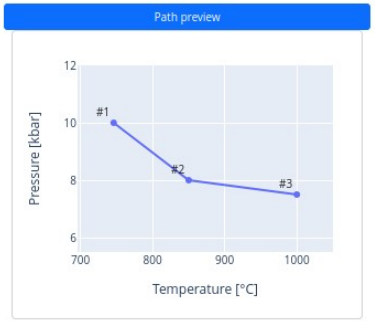
Note that in the TAS diagram for "liq" composition, the size of the circles scales with the fraction of melt

MAGEMinApp: PTX path, fractional melting

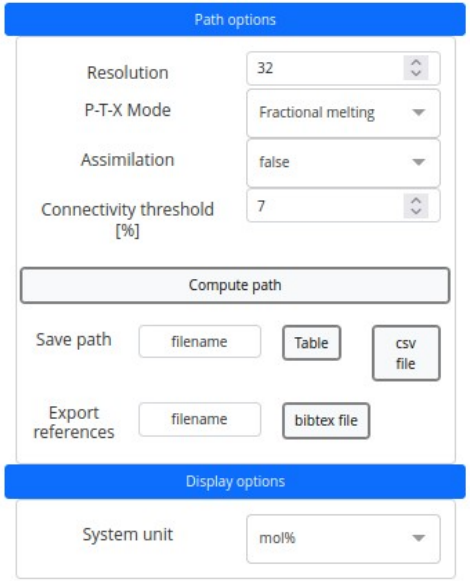
- Change database to “Metabasite”, select “aug” (Augite) and choose “Nature amphibolite...” bulk-rock composition from the list
  (you can also load your own bulk if you prefer)







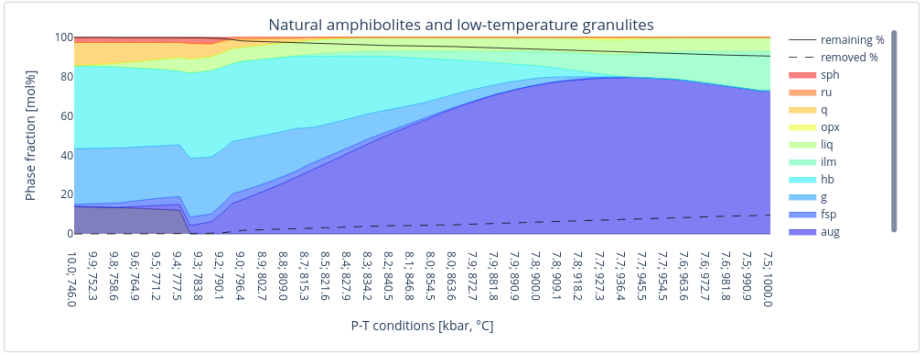
- Find the solidus at 10kbar and change path definition
- You can add new points by clicking “Add new point”

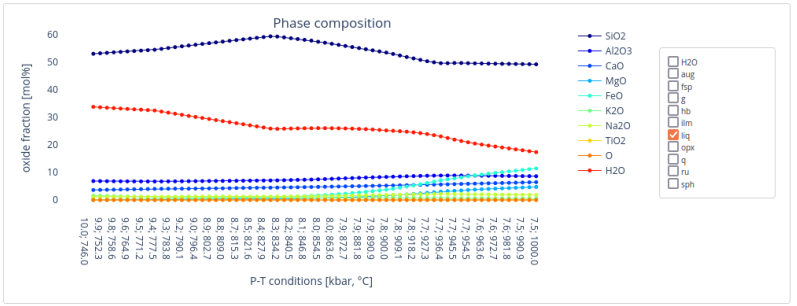


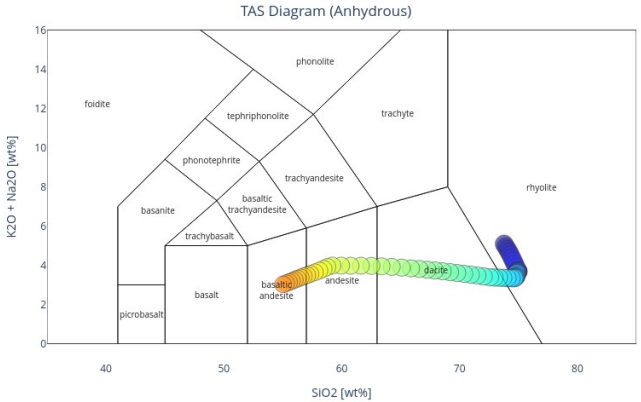
- Select “Fractional melting”
- Set connectivity threshold to 7% (fraction above which liquid is extracted)
- Compute path!

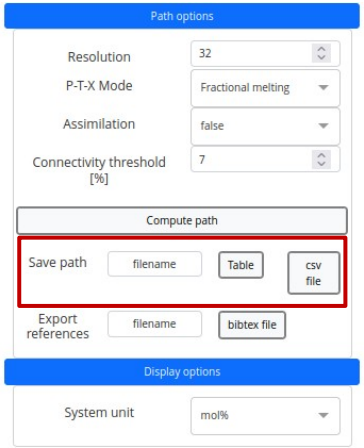
MAGEMinApp: PTX path, fractional melting

- If using the predefined bulk-rock composition, this yields:





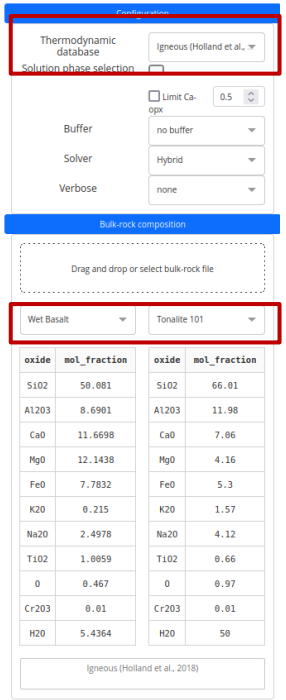


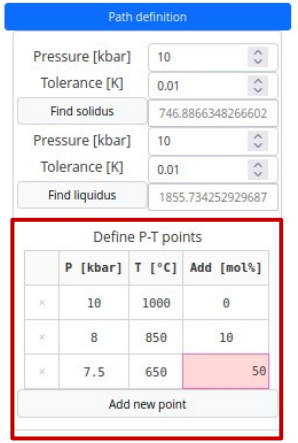


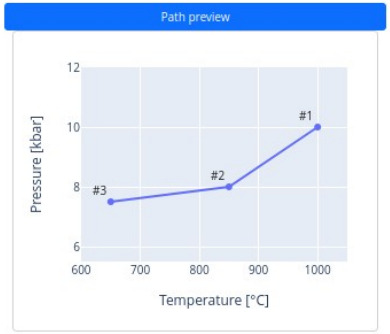
- Note that the results of the PTX path can be saved as Table or CSV file in the “Path options” panel

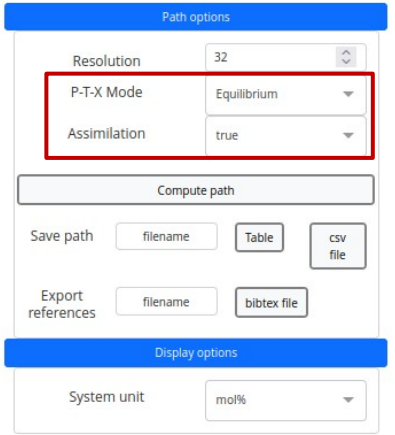
MAGEMinApp: PTX path, assimilation

- You can also assimilate a fixed composition (second bulk-rock) through the PT path
- Let's switch back to "Igneous" database
- Choose "P-T-X mode" = "Equilibrium" and activate assimilation in the "Path options" panel
  Note that when assimilation = true, a third colum in the "Path definition" table appears, here you can define the fraction of assimilated material at every point in mol%





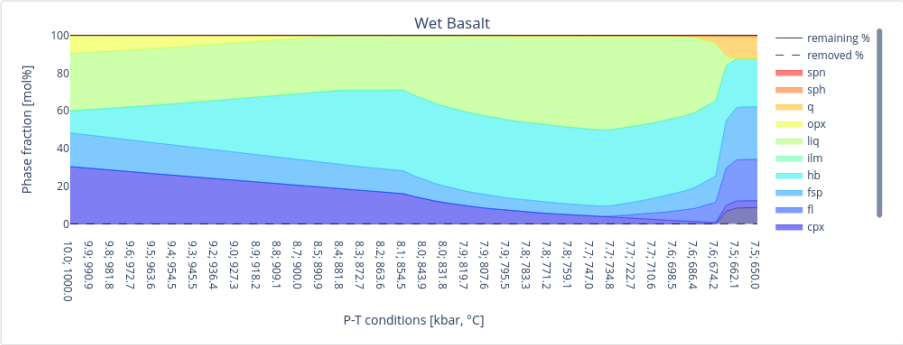


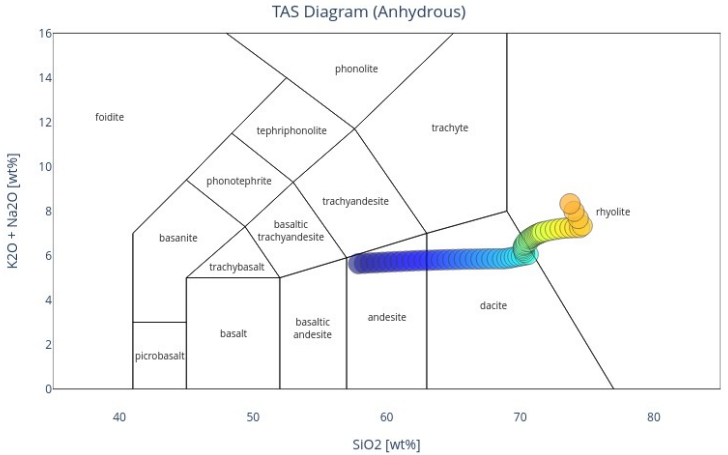


- Select "Wet basalt" for the left (principal) bulk and "Tonalite 101" for the right (assimilated) bulk
- Update the PT paths points including the fraction of assimilated material
- Compute the path!

MAGEMinApp: PTX path, assimilation

- This yields with assimilation





- And without assimilation