Preliminary results on the rheological characterization of the 2021 lava from Cumbre Vieja volcano (La Palma, Canary Islands, Spain)

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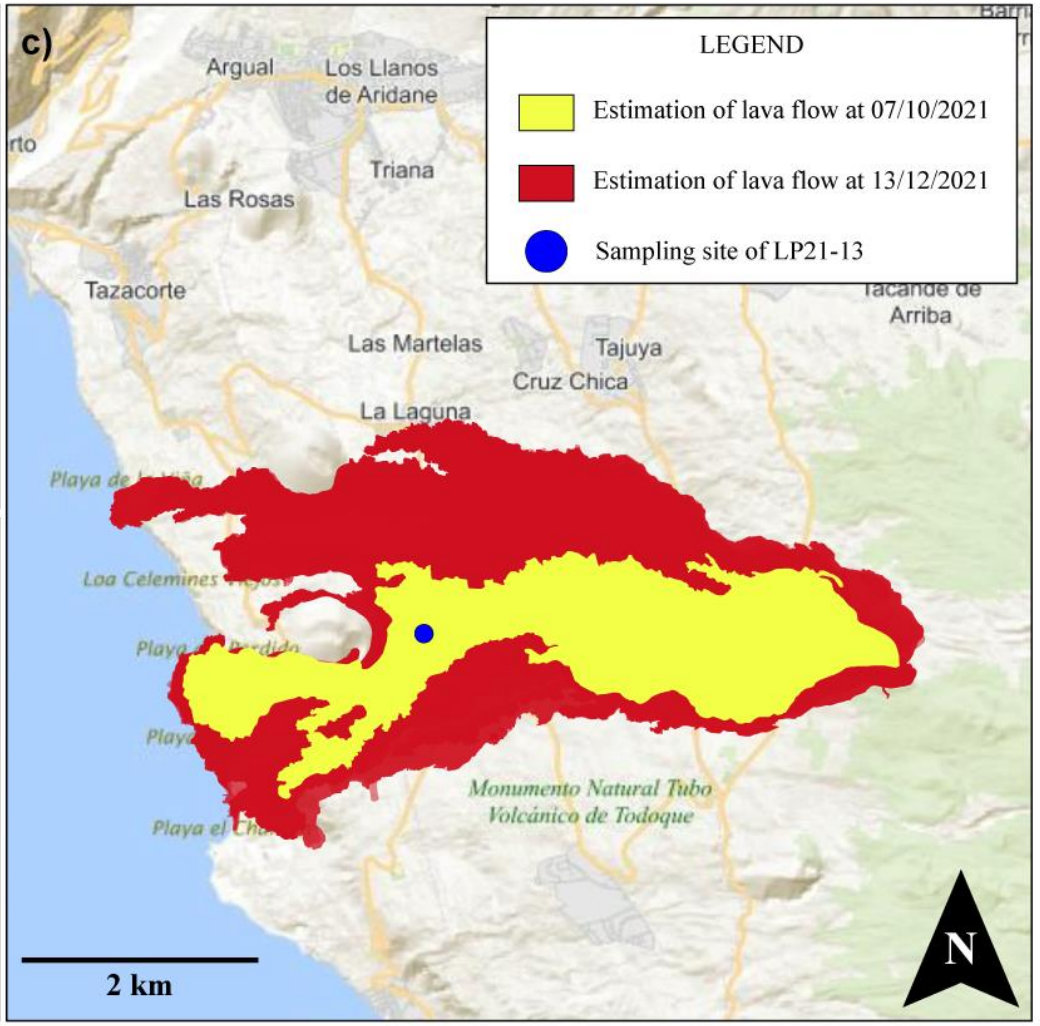
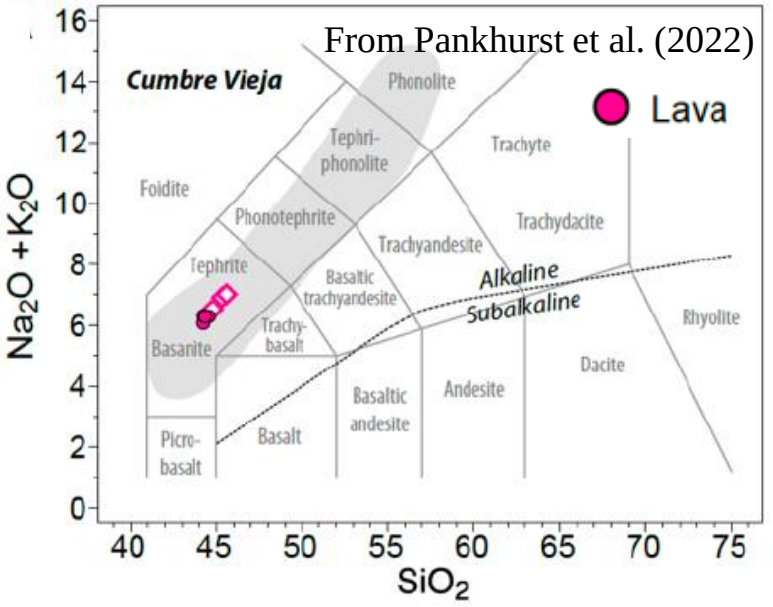
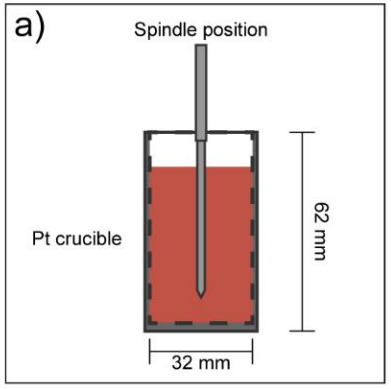
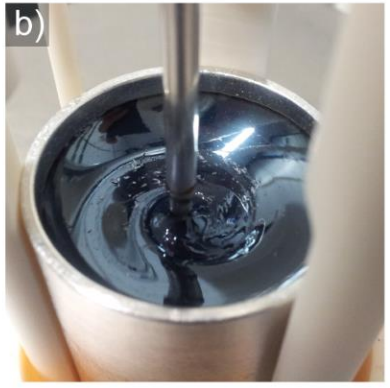
Starting Material and Experimental Apparatus



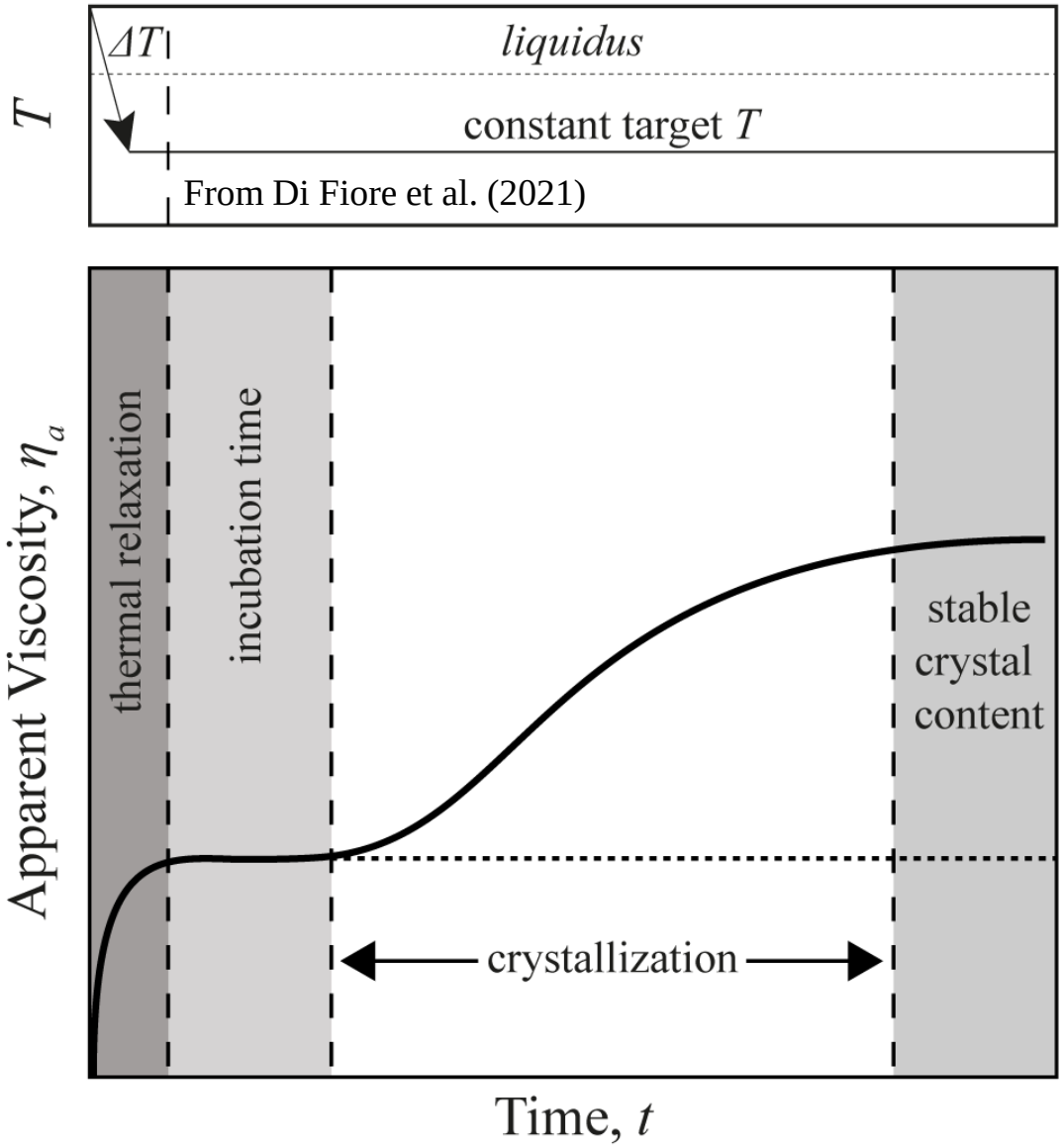
From Pankhurst et al. (2022)







Isothermal Deformation Experiments (IDEs)



Starting experimental conditions:

Superliquidus = 1400 °C

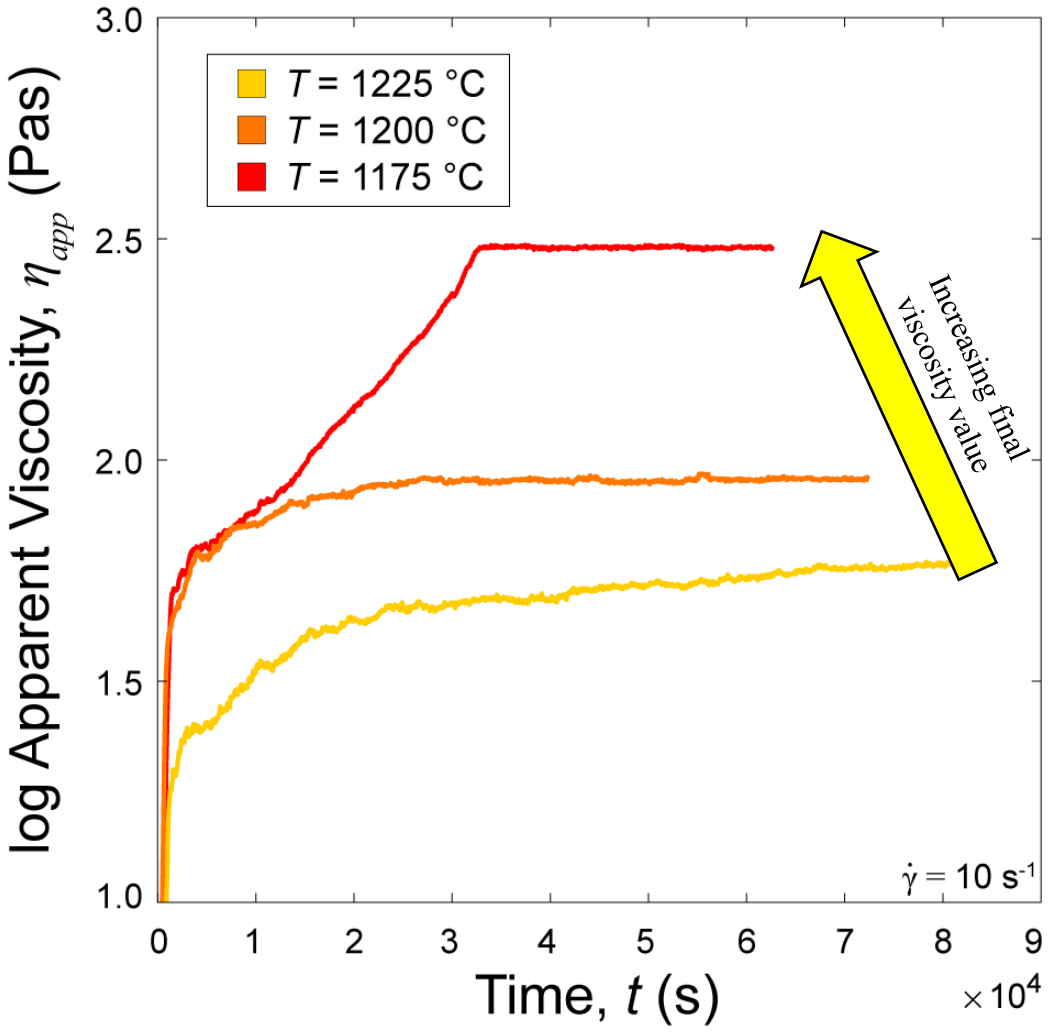
Cooling rate = 25 °C/min

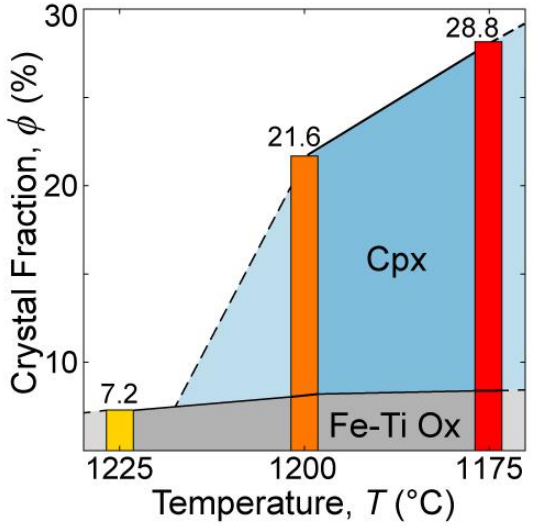
Target *T*: 1225 – 1200 – 1175 °C

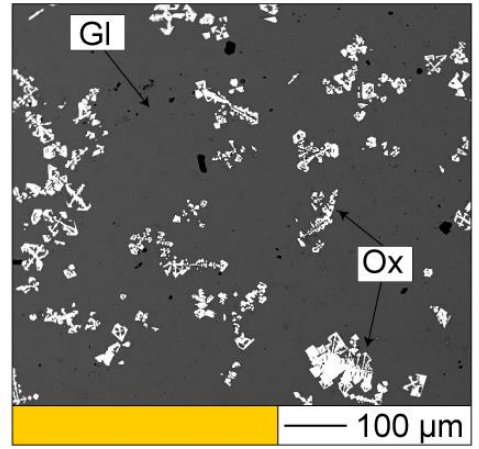
Shear rate = 10 s^{-1}

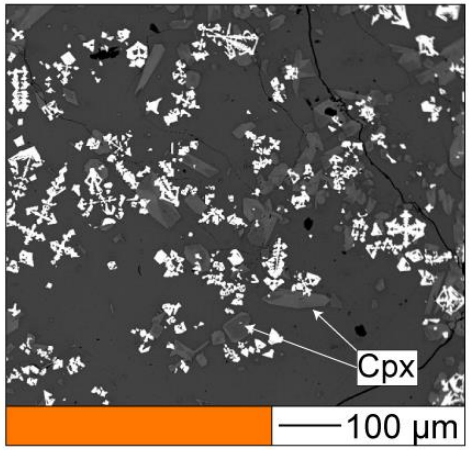
Isothermal Deformation Experiments (IDEs)

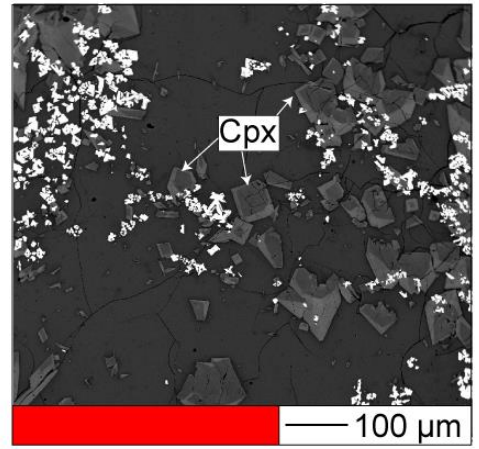
Results



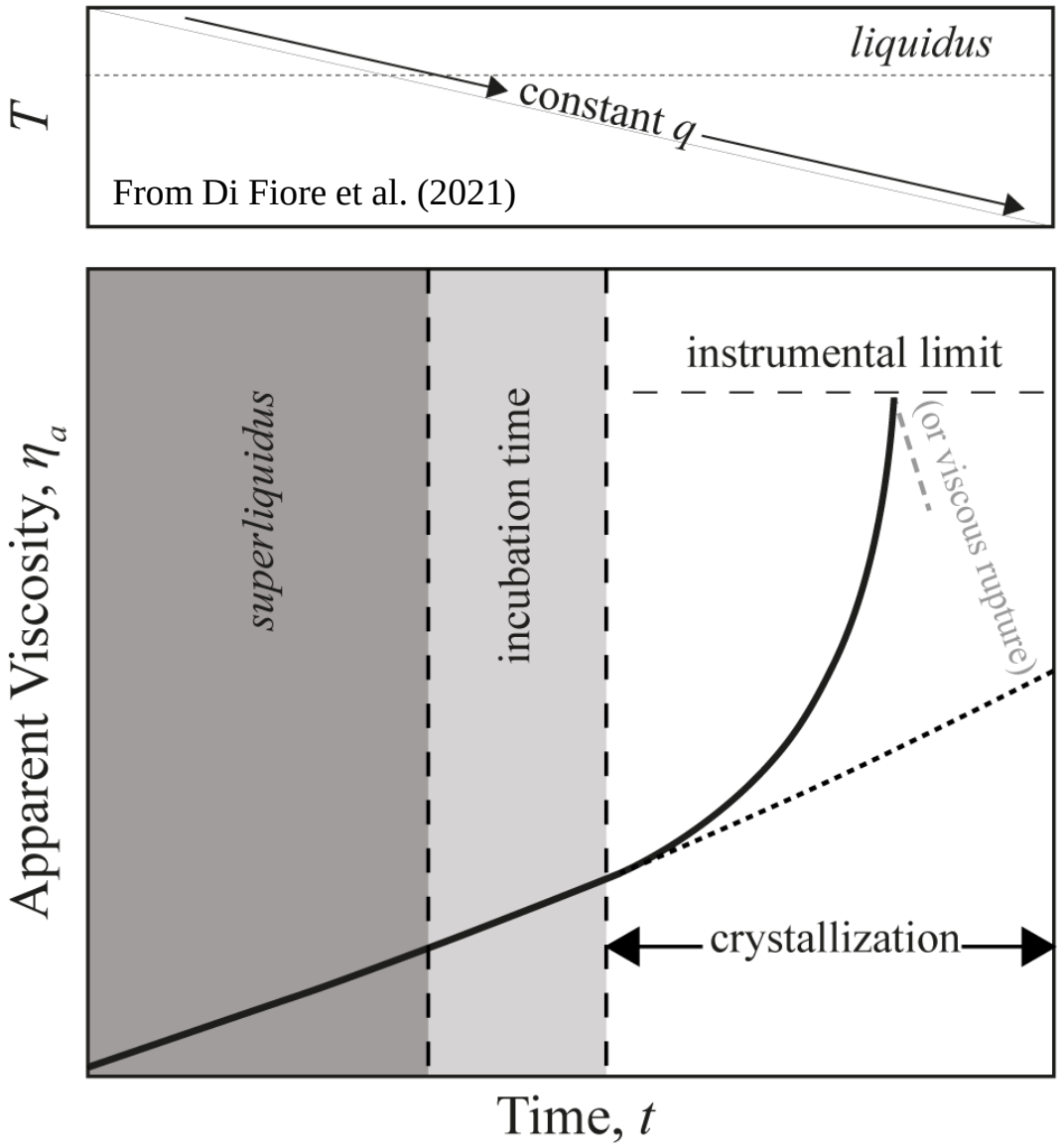








Cooling Deformation Experiments (CDEs)



Starting experimental conditions:

Superliquidus = 1400 °C

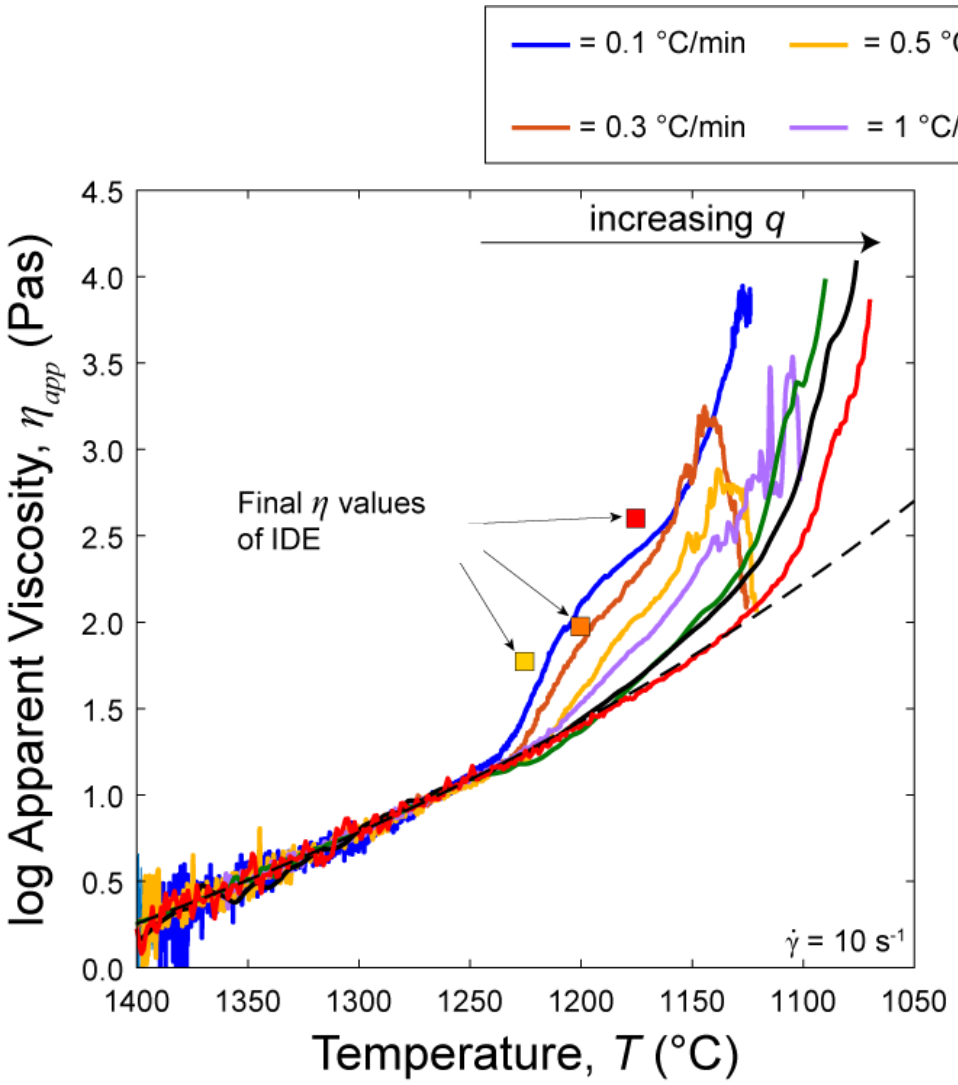
Cooling rate = 0.1 – 0.3 – 0.5 – 1 – 3 – 5 – 10 °C/min

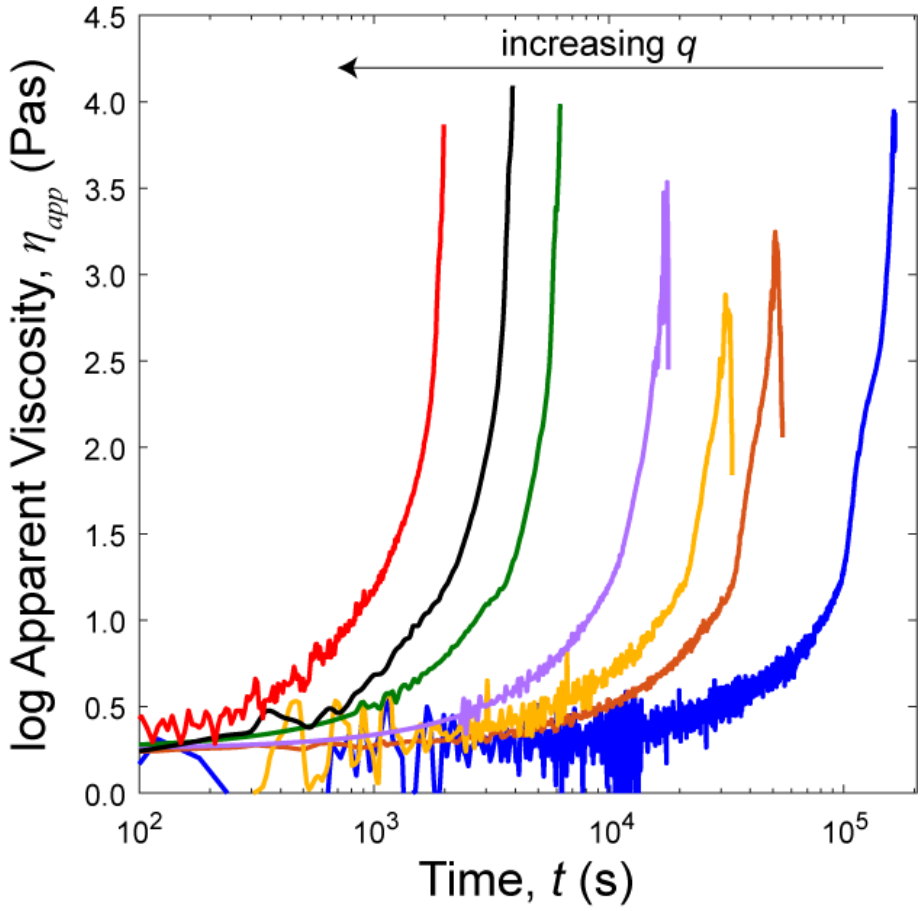
Shear rate = 10 s^{-1}

All experiments stopped at viscosity values of Log 4.0 (Pa s)

Cooling Deformation Experiments (CDEs)

Results





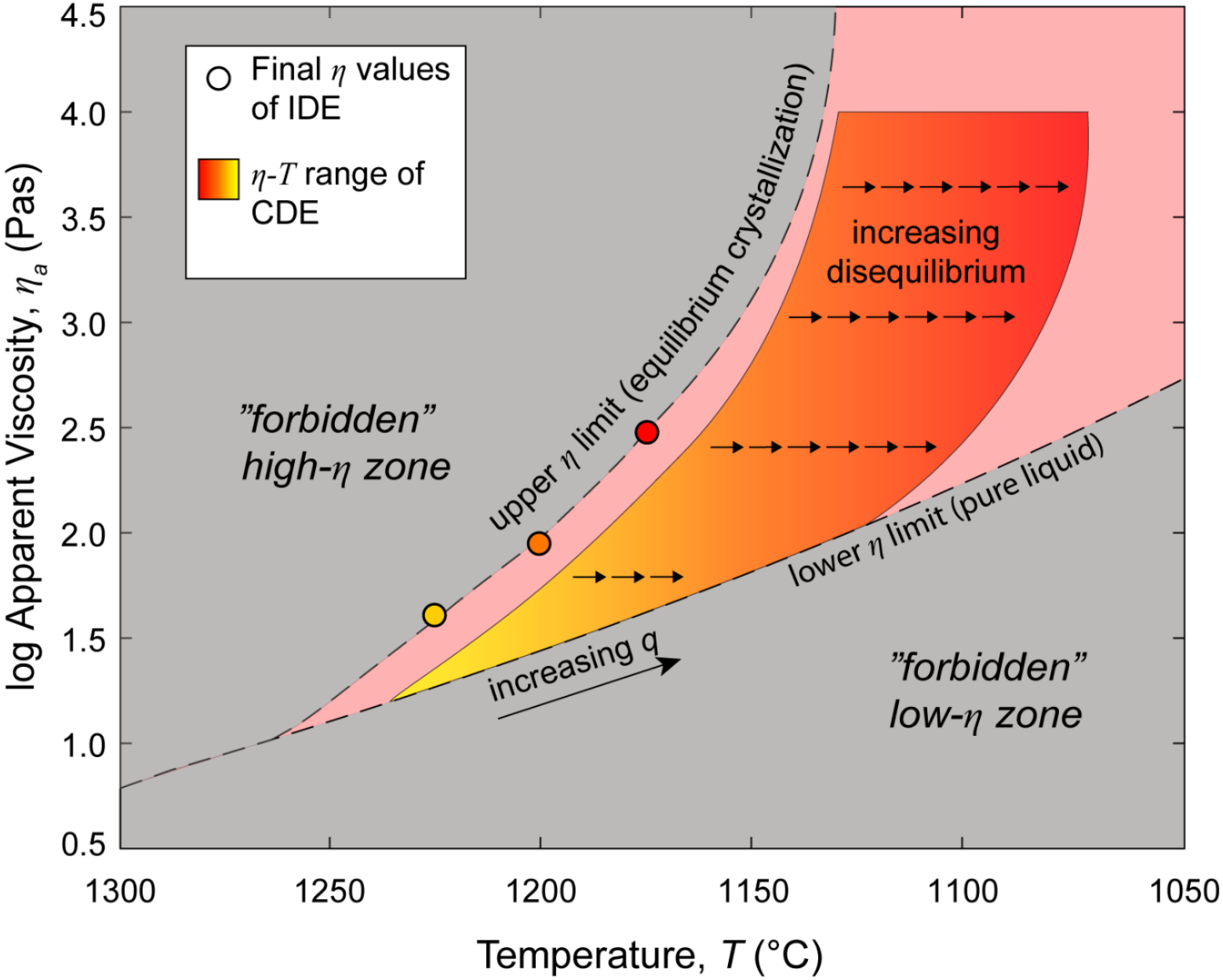
1) Crystallization onsets occur at lower *T* and lower *t* with increasing cooling rate;

2) for cooling rate of 1 °C/min or less the onset viscous rupture (Non-Newtonian behavior) is observed;

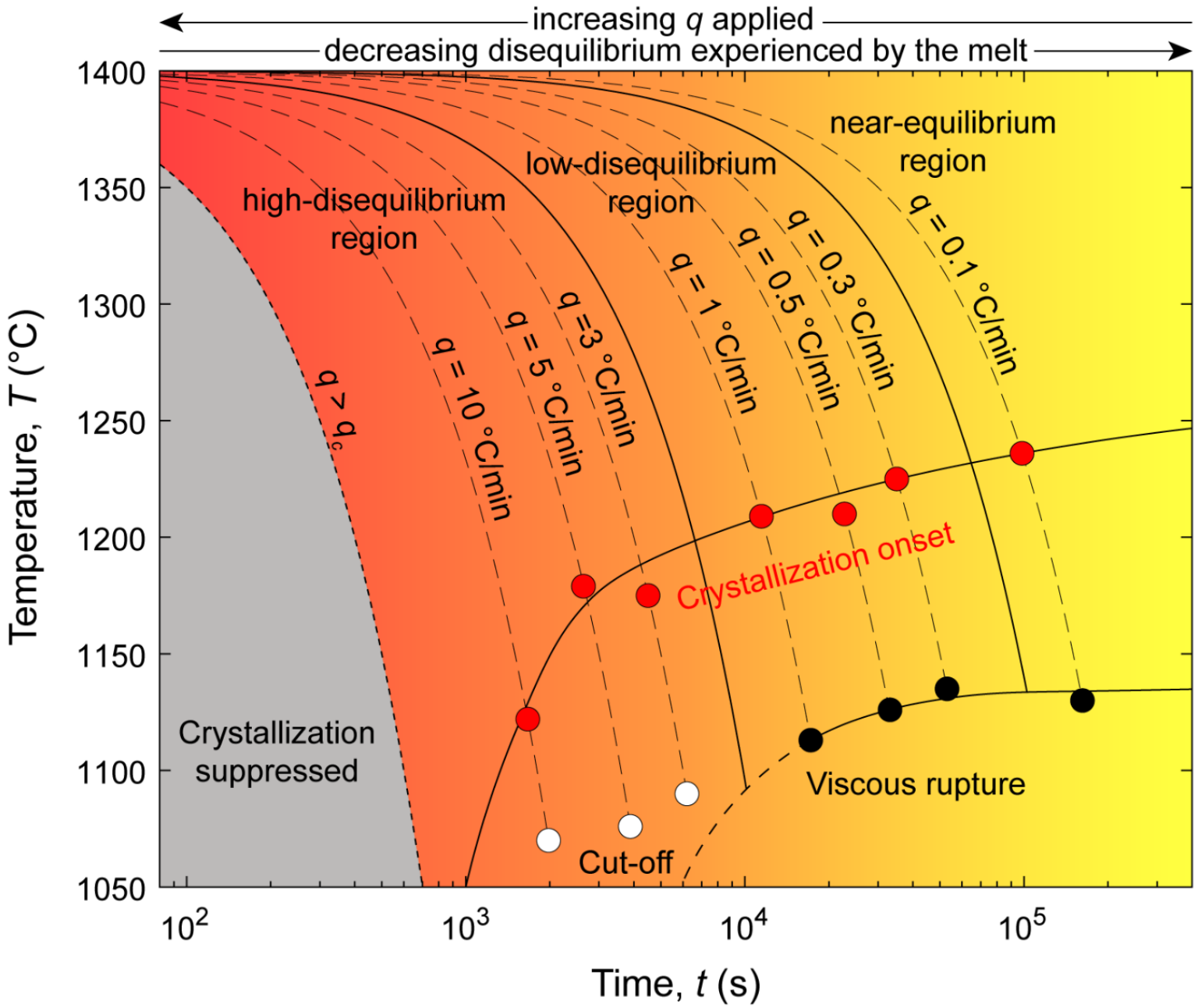
3) at higher cooling rate a steep viscosity increase is observed;

4) the *t* at which the experiments are interrupted decrease of 2 orders of magnitude with increasing the cooling rate.

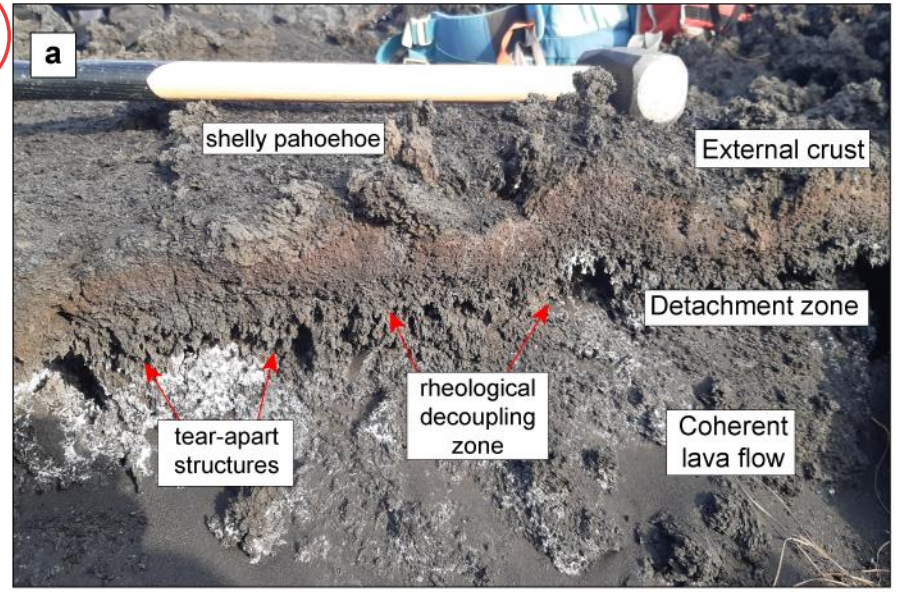
Thermo-rheological diagram of La Palma 2021 products

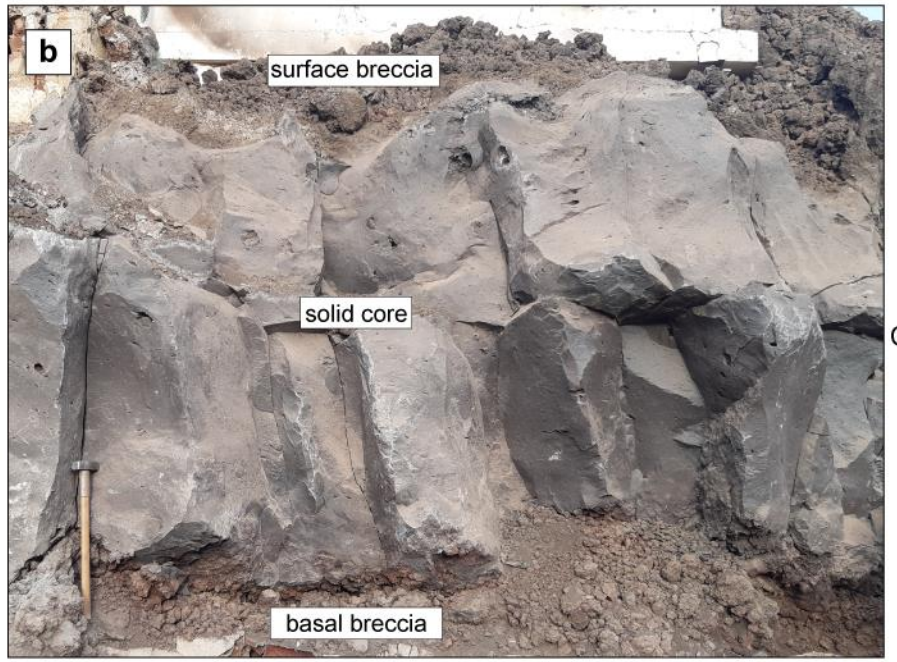


TTT diagram of La Palma 2021 products



Flow and emplacement dynamics of La Palma 2021 lavas





Increasing distance and time from the vent

Increasing disequilibrium

Increasing disequilibrium

Core

Increasing disequilibrium

THANKS FOR YOUR ATTENTION

And remember…

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