



Temperature limits for the liquid cores of the rocky planetary bodies

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A general expression for the liquid-solid phase transition temperature is obtained using bifurcation theory for iron and iron-rich melts at pressures up to that at the centre of the Earth. This agrees within 1.2 % of eight experimental results for iron melting or solidification in the pressure range 0 – 250 GPa. If the other planetary cores have a liquid-solid interface, their temperatures can now be estimated rather well using the pressure of the interface. For instance, in Mars, this interface pressure may be around 24 GPa. There the temperature is reduced from $T = 2200$ K for pure iron at most to $T = 1900$ K, if the main melt impurity is Si, but down to $T = 1700$ K, if the main melt impurity is S.