Users's guide NEMMO

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Problem

Imput parameters:

`r_body`	radius of the body
`r_core`	core radius of the body
`albedo`	albedo
`rho`	density
`gravity`	gravity acceleration
`initial_heat_production`	initial heat production
`c0`	initial composition in anorthite component
`ce`	eutectic composition
`k_crust`	thermal conductivity of the crust
`D`	partition coefficient of the heat producing elements
`heat_source`	`False` for a global magma ocean `True` for a non-global magma ocean
`r_flottability`	`None` for a global magma ocean radius of the depth of the magma ocean
`distance_sun_object`	distance Sun-body
`n_factor`	factor to increase the precision of the resolution in the cumulates
`overturn`	`False` without overturn `True` with overturn `None` without overturn and negglect flux from cumulates
`t_overturn`	factor to modify the decay of the overturn

Table 1: input problem

run Stage#1

Import the class `Stage1Analysis` from `evolution.py`
Define the problem (see Section Problem) `stage1 = Stage1Analysis(...)`
Run the analysis `analysis = stage1.run_stage1_analysis()`
Output table 1

run Stage#2

Import the class `Stage2Analysis` from `evolution.py`
Define the problem (see Section Problem) `stage2 = Stage2Analysis(...)`
Run the analysis `analysis = stage2.run_stage2_analysis()`
Output table 2

getter functions for the temporal evolution (`ndarray`)	
`get_time_history()`	time
`get_r_history()`	radius
`get_T_history()`	temperature
`get_Ts_history()`	surface temperature
`get_h_solid_history()`	heat producion in the solid
`get_h_lmo_history()`	heat production in the cumulates
getter functions for the radial profile (`ndarray`)	
`get_hr_history`	radial distribution of heat producing elements
`get_T_profil`	temperature

Table 2: output stage 1

getter functions for the temporal evolution (`ndarray`)	
`get_time_history()`	time
`get_radius_history()`	2 variables: crust radius and cumulates radius
`get_temp_history()`	2 variable: surface temperature and core temperature
`get_h_history()`	3 variables: heat production of the LMO, crust and cumulates
`get_drdt_history()`	2 variables: growth rate of the crust and cumulates
`get_flux_history()`	5 varibales: flux of the crust, cumulates, LMO, latent heat and overturn
`get_boundary_temp()`	2 varibales: boundary temperature at the bottom of the crust and top of cumulates
getter functions for the radial profile (`ndarray`)	
`get_crust_profil()`	3 variables: radius, temperature profile and heat production profile of the crust
`get_solid_profil()`	variables: radius, temperature profile and heat production profile of the cumulates
getter functions for the overturn constant (`float`)	
`get_overturn_constant()`	3 variables: heat stored in the cumulates, initial flux and decay

Table 3: output stage 2