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Supporting Information for

Quantitative evaluation of mantle flow traction on overlying tectonic plate: Linear versus power-law mantle rheology

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Text S1. The numerical methods

The numerical models are conducted with the finite difference code I2VIS, which combines fixed Eulerian nodal points and movable Lagrangian markers, and please refer to Gerya (2010) and Li et al. (2019) for details.

1 Governing equations

Three sets of conservation equations (mass, momentum and energy) as well as the constitutive relationships are solved in numerical models (Gerya, 2010).

(1) Stokes equation:

$$\frac{\partial \sigma'_{ij}}{\partial x_j} = \frac{\partial P}{\partial x_i} - \rho(C, M, P, T) g_i \quad (i, j = 1,2)$$

Where σ' is the deviatoric stress tensor, x the spatial coordinate, and g the gravitational acceleration. ρ is the density which depends on composition (C), melt fraction (M), dynamic pressure (P) and temperature (T). The density for a specific rock type can be described as:

$$\rho = \rho_{solid} - M(\rho_{solid} - \rho_{molten})$$

$$\rho_{solid|molten} = \rho_0[1 - \alpha(T - T_0)][1 + \beta(P - P_0)]$$

Where ρ_0 is the density in the reference condition with P_0= 0.1 MPa and $T_0 =$ 298 K. α and β are the thermal expansion coefficient and the compressibility coefficient, respectively, as shown in Table S2. Rock density is further adjusted for phase transitions.

The constitutive relationship:

$$\sigma'_{ij} = 2\eta_{eff}\dot{\varepsilon}_{ij}$$

$$\dot{\varepsilon}_{ij} = \frac{1}{2}\left(\frac{\partial v_i}{\partial x_j} + \frac{\partial v_j}{\partial x_i}\right)$$

Where $\dot{\varepsilon}$ is the deviatoric strain rate tensor, v the velocity tensor, and η_{eff} the effective viscosity.

(2) Conservation of mass:

The conservation of mass is still approximated by the incompressible continuity equation in the numerical models:

$$\frac{\partial v_i}{\partial x_i} = 0$$

(3) Energy equation:

$$\rho C_p\left(\frac{DT}{Dt}\right) = -\frac{\partial q_i}{\partial x_i} + H$$

$$q_i = -k(C,P,T)\frac{\partial T}{\partial x_i}$$

Where C_p is the effective isobaric heat capacity, DT/Dt the substantive time derivative of temperature, and q the thermal heat flux. H is the heat generation, which includes radioactive heat production (H_r), adiabatic heating (H_a) and shear heating (H_s). k is the thermal conductivity, depending on composition (C), pressure (P) and temperature (T).

2 Visco-Plastic-Peierls rheology

The constitutive relationships are described by the combined visco-plastic-Peierls flow laws. The ductile viscosity ($\eta_{ductile}$), the plastic equivalent ($\eta_{plastic}$) and the Peierls viscosity ($\eta_{peierls}$) of different rock types are calculated separately in numerical models.

(1) Viscous flow law of crustal rocks

The viscosity of continental crust is calculated by the flow law of Ranalli (1995):

$$\eta_{ductile} = \frac{1}{2}(A_R)^{-\frac{1}{n}}(\dot{\varepsilon}_{II})^{\frac{1-n}{n}} exp\left(\frac{E+PV}{nRT}\right)$$

Where $\dot{\varepsilon}_{II}$ is the second invariant of the strain rate tensor, A_R the pre-exponential factor, n the creep exponent, E the activation energy, V the activation volume, and R the gas constant. The flow law parameters are determined by experiments and shown in the Table S1 (Kirby & Kronenberg, 1987; Ranalli, 1995).

(2) Viscous flow law of mantle rocks

For mantle rocks, the viscosity is defined according to Hirth and Kohlstedt (2003):

$$\eta_{diffusion|dislocation} = \frac{1}{2}(A_H)^{-\frac{1}{n}}(\dot{\varepsilon}_{II})^{\frac{1-n}{n}} d^{\frac{p}{n}} exp\left(\frac{E+PV}{nRT}\right)$$

$$\frac{1}{\eta_{ductile}} = \frac{1}{\eta_{diffusion}} + \frac{1}{\eta_{dislocation}}$$

Where A_H (pre-exponential factor), n (creep exponent), p (grain size exponent), r (water content exponent), α (pre-melt-fraction factor), E (activation energy) and V (activation volume) are flow law parameters determined from the laboratory experiments (Table S1). d is the grain size (varied from 2.5 mm to 10 mm, and 5 mm in reference models), and p the exponent for grain size.

(3) Plastic deformation

The extended Drucker-Prager yield criterion is applied as follows:

$$\eta_{plastic} = \frac{\sigma_{yield}}{2\dot{\varepsilon}_{II}}$$

$$\sigma_{yield} = C_0 + Psin(\varphi_{eff})$$

Where σ_{yield} is the yield stress, C_0 the residual rock strength at P = 0 and P is the dynamic pressure. φ_{eff} is the effective internal friction angle, which includes the possible fluid/melt effects that control the brittle strength of fluid/melt containing porous or fractured media (Li et al., 2016, 2019).

(4) Peierls deformation

The Peierls mechanism is implemented to the deformation by low-temperature and high-pressure plasticity (Kameyama et al., 1999; Karato et al., 2001; Katayama & Karato, 2008):

$$\eta_{peierls} = \frac{1}{2A_{peierls}\sigma_{II}} exp\left(\frac{E+PV}{RT}\left(1-\left(\frac{\sigma_{II}}{\sigma_{peierls}}\right)^p\right)^q\right)$$

Where $A_{peierls}$, p, q, r are experimentally derived material constants. σ_{II} is the second invariant of stress tensor, $\sigma_{peierls}$ a stress value that limits the strength of the material.

(5) Effective viscosity

The effective viscosity is the minimum value among the ductile viscosity ($\eta_{ductile}$), the plastic equivalent ($\eta_{plastic}$), and the Peierls viscosity ($\eta_{peierls}$):

$$\eta_{eff} = \min\left(\eta_{ductile}, \eta_{plastic}, \eta_{peierls}\right)$$

The final viscosity is controlled by the cut-off values of $[10^{18}, 10^{25}] Pa \cdot s$.

3 Phase transitions

The phase transitions at 410 km and 660 km discontinuities are included in the numerical models (e.g., Bina & Helffrich, 1994; Li et al., 2019), which modify the mantle density structure in addition to the gradual pressure and temperature dependence. In the current study, these phase transitions only affect the density, whereas the related variations of latent heat and possible viscosity change are not considered (Li et al., 2019). The resulting density structure of the mantle is consistent with the Preliminary Reference Earth Model (PREM) (Dziewonski & Anderson, 1981). The Clapeyron slopes of 2.0 MPa/K and -1.0 MPa/K are applied for the 410 km and 660 km discontinuities, respectively, which do not affect the model results significantly.

Text S2. Numerical model configuration

The numerical models are configured in a 2-D spatial domain of 8000 km in length and 800 km in depth, as shown in Figure S1a. The spatial resolution of the model is 10 km in the horizontal direction, while that in the vertical direction is 1 km from 0 to 300 km and gradually changes to 10 km downward to the bottom. A 10-km-thick "sticky" air layer with a low density and viscosity is set above the continental lithosphere. The model without lithospheric root contains a 90-km-thick continental lithosphere, including an upper crust of 20 km and a lower crust of 15 km. In contrast, the model with a lithospheric root contains a 2000-km-length thicker lithosphere as shown in Figure S1b. The thickness of lithospheric root is varied, with a value of 100 km in the reference model (i.e. the total lithospheric thickness of 190 km).

For the temperature field configuration, the top and bottom boundaries of the model are set to be 273 K and 1923 K respectively. The initial thermal gradient of the sublithospheric mantle is 0.5 K/km. The initial temperature of the 90-km-thick continental lithosphere-asthenosphere-boundary is 1573 K, with a linear gradient within the lithosphere. The "sticky air" layer remains the constant temperature of 273 K. The left and right boundaries of the model are adiabatic with no horizontal heat flux.

For the mechanical boundary condition, permeable condition is applied below 100 km on the left and right boundaries. Once markers migrate into the model domain across the left boundary, additional markers will migrate out from the right side permeable boundary to guarantee the mass conservation. The prescribed mantle/plate velocity contrast is obtained by setting the markers velocity on permeable boundaries, which is 1 cm/yr in the reference model, as shown by the white arrows in Figure S1a-b. Other boundaries are all free-slip.

For the rheology configuration, all models are conducted with two different rheological models: linear rheology versus power-law rheology. For linear rheology, n (creep exponent as in Equation 2) in the dislocation creep of olivine is set to be 1, which is 3.5 for power-law rheology (Hirth & Kohlstedt, 2003). The viscous flow law of mantle rock is independent of strain rate in the linear rheology regime, whereas the viscosity decreases with strain rate in the power-law rheology regime, as shown in Figure S1c-f.

For the grain size of mantle rheology, it is not well constrained according to the previous studies (e.g., Karato et al., 1995; Hirth & Kohlstedt, 2003). Consequently, three different values are tested and compared: 2.5 mm, 5 mm (reference models) and 10 mm. The simulated effective viscosity profiles with different grain sizes are shown in Figure S2. The profile with grain size of 5 mm is quite consistent with the joint inversions of GIA and global convection observations (Figures S2a and S2d), which is thus chosen as the reference case.

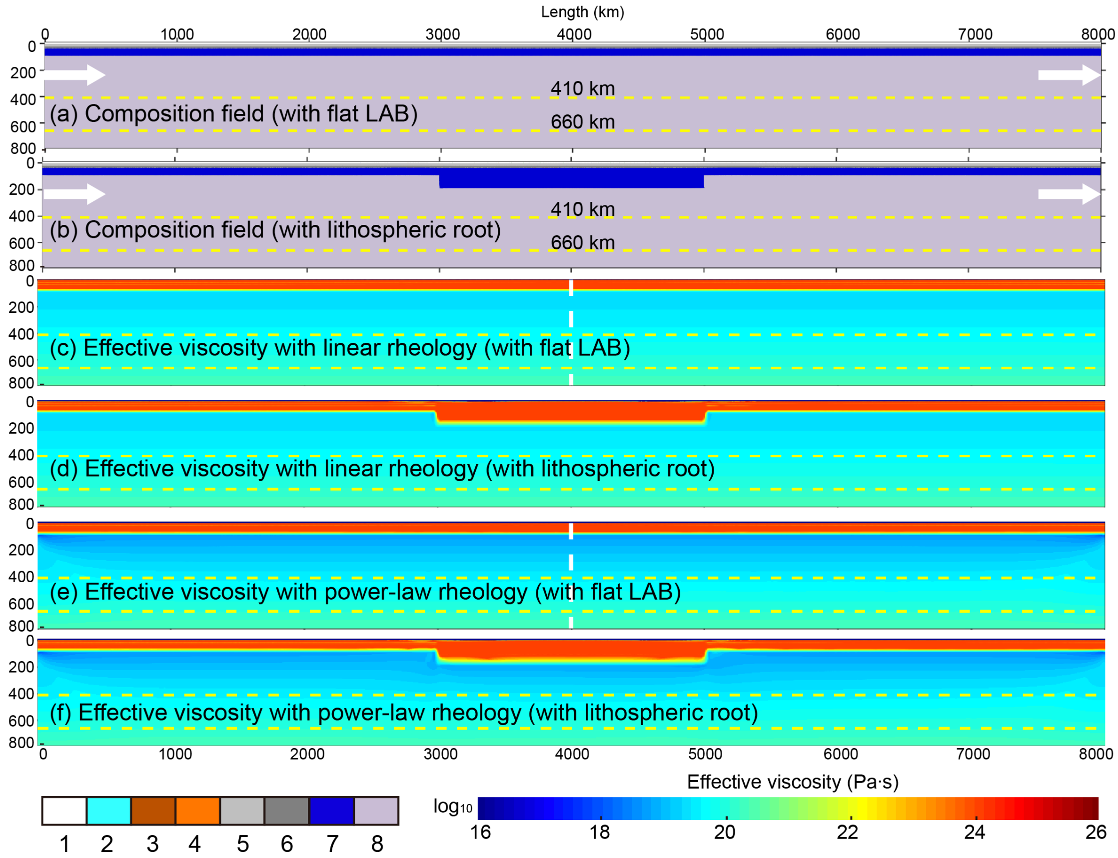


Figure S1. Model configuration. (a-b) Composition field with flat LAB or with a lithospheric root. The yellow dashed lines represent the phase transitions at 410 and 660 km in depth. The white arrows indicate the sub-plate mantle velocity configuration, with a value of 1 cm/yr in the models shown here. The colorbar at the bottom left corner indicates the composition field of the model: 1-sticky air; 2-sea water; 3,4-sediment; 5-continental upper crust; 6-continental lower crust; 7-lithospheric mantle; 8-asthenosphere. (c-d) Effective viscosity field with linear rheology. (e-f) Effective viscosity field with power-law rheology. The vertical white lines indicate the location of profiles shown in Figure S2.

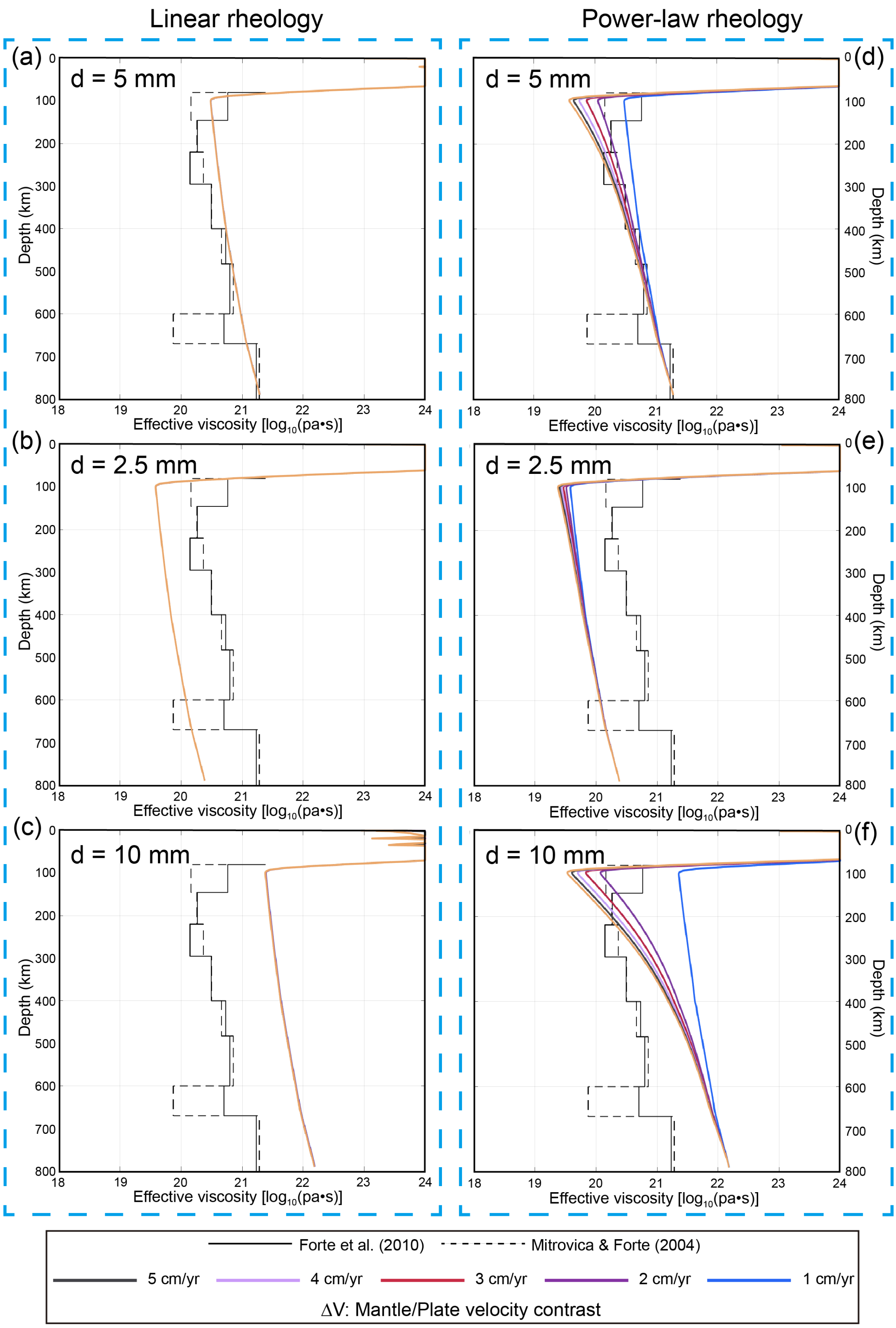


Figure S2. Comparison of effective viscosity profiles as indicated in Figure S1, with either linear (a-c) or power-law (d-f) rheology, and different grain sizes shown at the top left corner in each figure. The simulated profiles are compared to the sublithospheric mantle viscosity inferred from the joint inversions of glacial isostatic adjustment (GIA) data as well as the global convection observations (Forte et al., 2010; Mitrovica & Forte, 2004). The colored lines represent the models with variable mantle/plate velocity contrast as shown in the colorbar at the bottom.

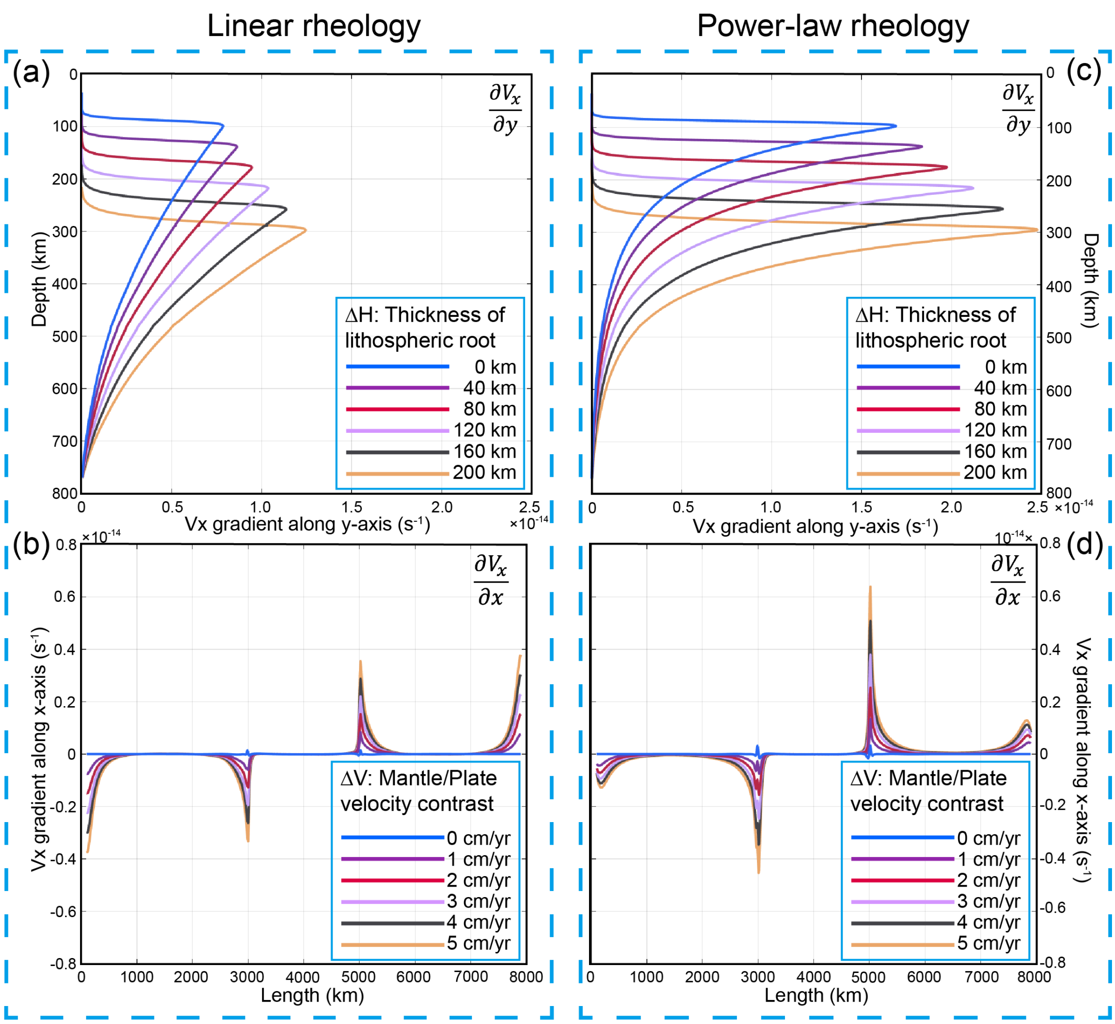


Figure S3. Method for dynamically defining the lithosphere-asthenosphere boundary (LAB) and the vertical walls of lithospheric root. (a) Profiles of $\frac{\partial V_x}{\partial y}$ along depth with linear rheology. (b) Profiles of $\frac{\partial V_x}{\partial x}$ along horizontal direction with linear rheology. (c) Profiles of $\frac{\partial V_x}{\partial y}$ along depth with power-law rheology. (d) Profiles of $\frac{\partial V_x}{\partial x}$ along horizontal direction with power-law rheology. The position of LAB is defined as the peak value of $\frac{\partial V_x}{\partial y}$ as shown in (a) and (c), whereas the position of vertical walls are defined as the peak values at around 3000 km (left wall) and 5000 km (right wall).

Different colors represent the models with variable mantle/plate velocity contrast or variable thickness of lithospheric root, as shown in the colorbar at the bottom right corner of each figure.

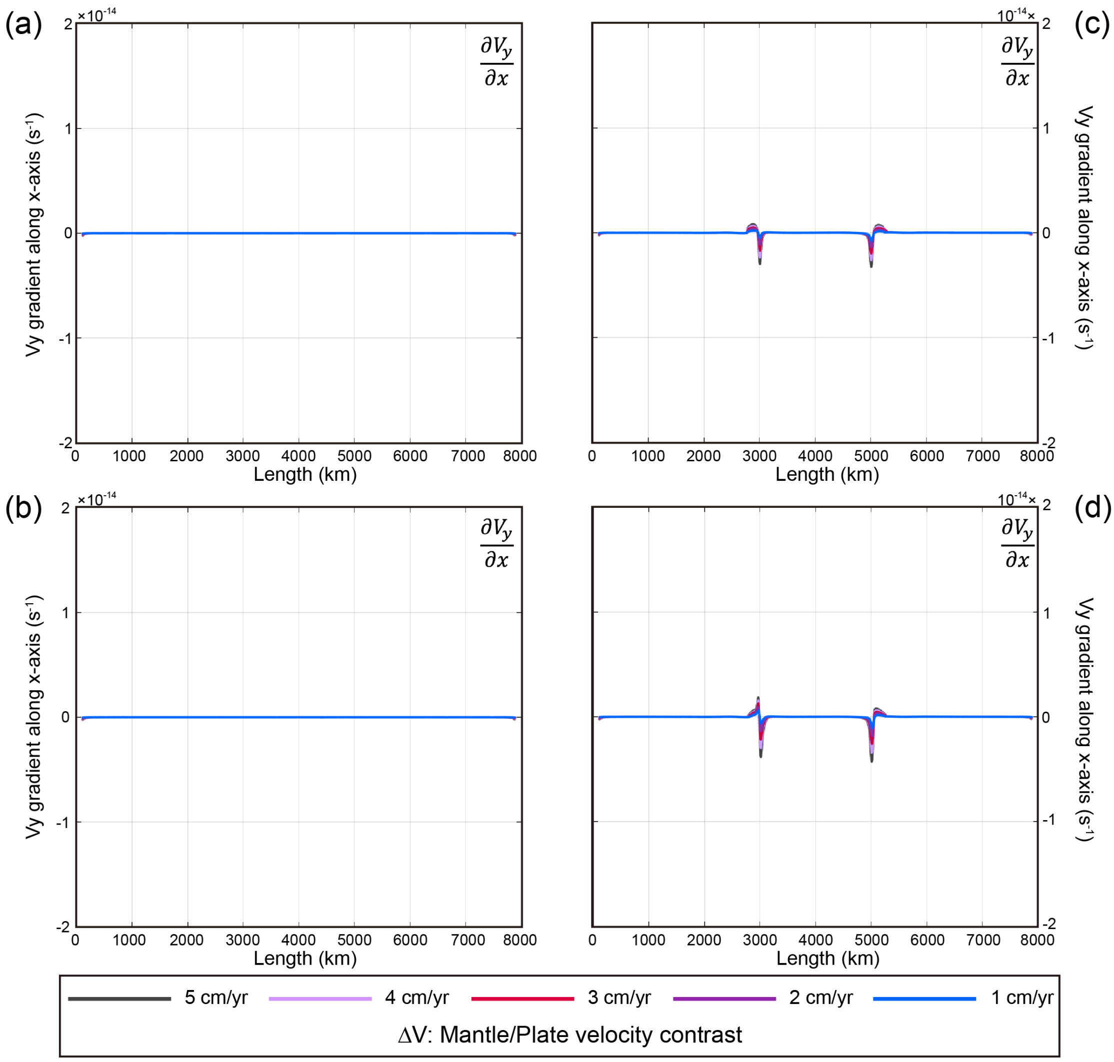
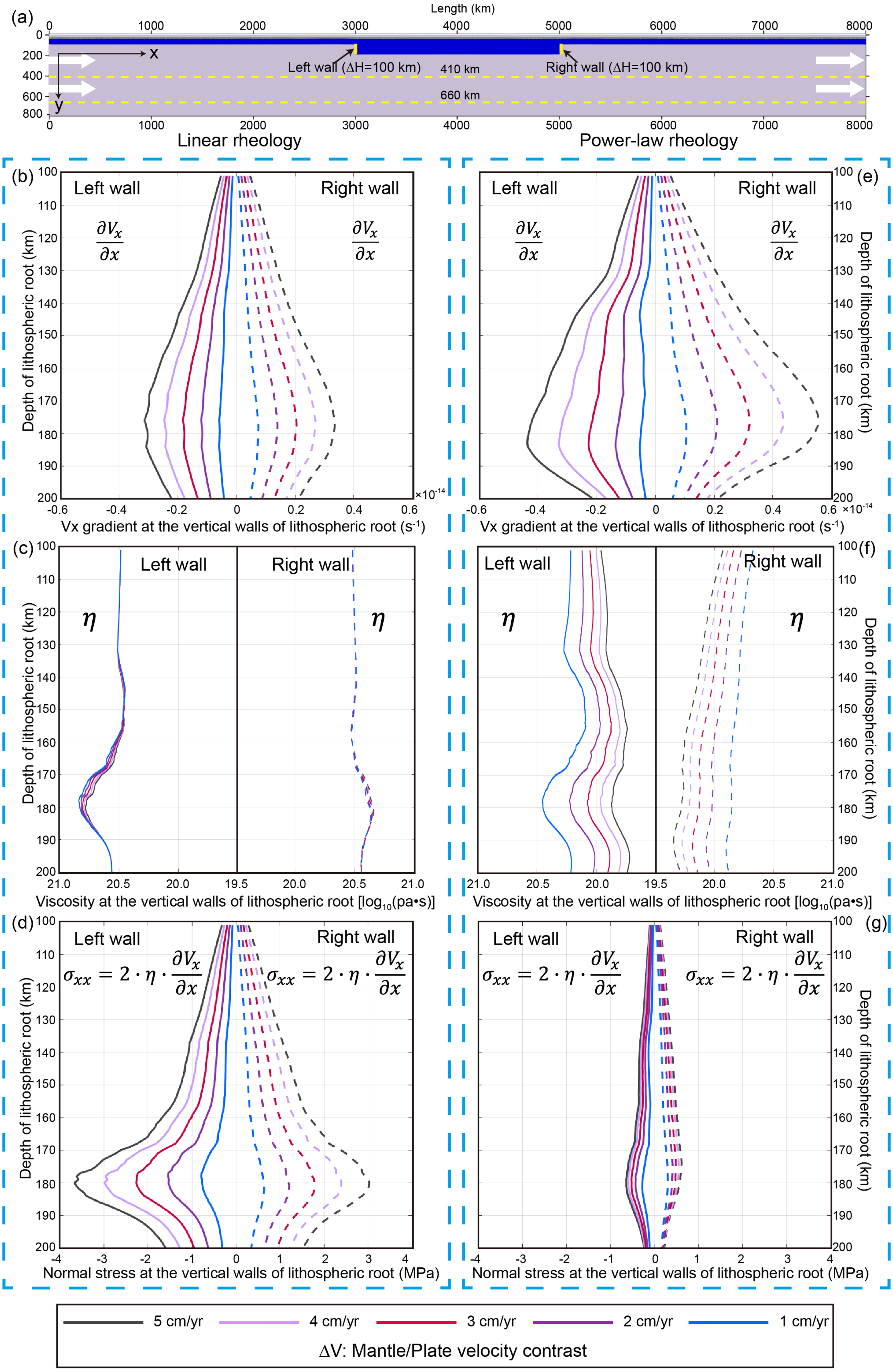


Figure S4. The negligible component of $\frac{\partial V_y}{\partial x}$ at the LAB in the models with (a) linear rheology and flat LAB (Figure 1b), (b) power-law rheology and flat LAB (Figure 1e), (c) linear rheology and a lithospheric root (Figure 2b), (d) power-law rheology and a lithospheric root (Figure 2e). It is worth noting that the $\frac{\partial V_y}{\partial x}$ value at the vertical walls of lithospheric roots are significant; however, the resulting shear stress by integrating over the horizontal x-direction is negligible.



(a)
Length (km)
Left wall (ΔH=100 km)
Right wall (ΔH=100 km)
410 km
660 km
Linear rheology
Power-law rheology
Left wall
Right wall
Depth of lithospheric root (km)
Vx gradient at the vertical walls of lithospheric root (s-1)
Viscosity at the vertical walls of lithospheric root [log10(pa•s)]
Normal stress at the vertical walls of lithospheric root (MPa)
5 cm/yr
4 cm/yr
3 cm/yr
2 cm/yr
1 cm/yr
ΔV: Mantle/Plate velocity contrast

Figure S5. Normal stress calculation at the vertical walls of lithospheric root, indicated by the yellow solid lines in (a), with either linear (b-d) or power-law (e-g) rheology. The solid and dashed lines represent the values at the left and right walls, respectively.

Table S1. Viscous flow law parameters used in the numerical models [a)].

Symbol	Flow law	$A_R(MPa^{-n} \cdot s^{-1})$	A_H	n	p	$E^*(kJ/mol)$	$V^*(10^{-6}m^3/mol)$
A*	Wet quartize	3.2×10^{-4}	-	2.3	-	154	8
B*	Plagioclase An_{75}	3.3×10^{-4}	-	3.2	-	238	8
C*	Diffusion creep of olivine	-	1.5×10^{9}	1	3	375	4.5
D*	Dislocation creep of olivine	-	1.1×10^{5}	3.5	0	530	11

[a)] Viscous parameters of crustal rocks (A* and B*) are from Kirby & Kronenberg (1987) and Ranalli (1995). Viscous parameters of mantle rocks (C*, D*) are from Hirth & Kohlstedt (2003)

Table S2. Material properties used in the numerical experiments [a)].

Material (state)	ρ_0 $(kg \cdot m^{-3})$	C_p $(J \cdot kg^{-1} \cdot K^{-1})$	k [b)] $(W \cdot m^{-1} \cdot K^{-1})$	T_{solidus} [c)] (K)	T_{liquius} [d)] (K)	Q_L $(kJ \cdot kg^{-1})$	H_r $(\mu W \cdot m^{-3})$	**Viscous** [e)] Flow law	**Plastic** [f)] $C_0(\text{MPa})$	**Plastic** [f)] $\sin(\varphi_{\text{eff}})$
Sticky air (1)	1	3.3×10^6	200	-	-	-	0	10^{18} Pa·s	-	-
Sticky water (2)	1000	3.3×10^3	200	-	-	-	0	10^{18} Pa·s	-	-
Sediment (3, 4)	2700	1000	K_1	T_{S1}	T_{L1}	300	2.0	A*	10~1	0.1~0.05
Continental upper crust (5)	2700	1000	K_1	T_{S1}	T_{L1}	300	1.0	A*	10~1	0.1~0.05
Continental lower crust (6)	2900	1000	K_1	T_{S2}	T_{L2}	380	1.0	B*	10~1	0.6~0.1
Lithospheric mantle (7)	3300	1000	K_2	T_{S3}	T_{L3}	400	0.022	C*+D*	10~1	0.6~0.1
Asthenosphere (8)	3300	1000	K_2	T_{S3}	T_{L3}	400	0.022	C*+D*	10~1	0.6~0.1
References [g)]	1,2	1,2	3	6,7	6,7	1,2	1	4,5	-	-

[a)] The thermal expansion coefficient $\alpha = 3 \times 10^{-5}\ \text{K}^{-1}$ and the compressibility coefficient $\beta = 1 \times 10^{-5}\ \text{MPa}^{-1}$ are used for all types.

[b)] $\text{K}_1 = (0.64 + 807/(T_\text{K} + 77)) \cdot \exp(0.00004 P_{\text{MPa}})$; $\text{K}_2 = (0.73 + 1293/(T_\text{K} + 77)) \cdot \exp(0.00004 P_{\text{MPa}})$.

[c)] $T_{S1} = \{889 + 17900/(P + 54) + 20200/(P + 54)^2\ at\ P < 1200\ \text{MPa}\}$ or $\{831 + 0.06P\ at\ P > 1200\ \text{MPa}\}$; $T_{S2} = 1327 + 0.0906P$; $T_{S3} =$ KATZ2003.

[d)] $T_{L1} = 1262 + 0.09P$; $T_{L2} = 1423 + 0.105P$; $T_{L3} =$ KATZ2003.

[e)] Parameters of viscous flow laws are shown in Table S1.

[f)] Strain weakening effect is included in plastic rheology, in which both cohesion C_0 and effective friction angle $\sin(\varphi_{\text{eff}})$ decrease with larger strain rate.

[g)] References: 1-Turcotte & Schubert (2002); 2-Bittner & Schmeling (1995); 3-Clauser & Huenges (1995); 4-Ranalli (1995); 5-Hirth & Kohlstedt (2003); 6-Schmidt & Poli (1998); 7-Katz et al. (2003).

Table S3. Summary of the model parameters and results.

Model ID	Mantle Rheology	Mantle/plate velocity contrast (cm/yr)	Thickness of lithospheric root (km)	Grain size for mantle rheology (mm)	Shear force (N/m)	Normal force (N/m)	Whole mantle flow traction (N/m)
001	linear	1	0	5	1.63E+12	0.00E+00	1.63E+12
002	linear	1	20	5	1.71E+12	7.48E+09	1.72E+12
003	linear	1	40	5	1.80E+12	2.23E+10	1.82E+12
004	linear	1	60	5	1.90E+12	3.43E+10	1.93E+12
005	linear	1	80	5	2.00E+12	4.81E+10	2.05E+12
006	linear	1	100	5	2.12E+12	6.41E+10	2.18E+12
007	linear	1	120	5	2.24E+12	8.03E+10	2.32E+12
008	linear	1	140	5	2.39E+12	9.74E+10	2.48E+12
009	linear	1	160	5	2.54E+12	1.14E+11	2.66E+12
010	linear	1	180	5	2.71E+12	1.33E+11	2.84E+12
011	linear	1	200	5	2.89E+12	1.55E+11	3.04E+12
012	linear	2	0	5	3.24E+12	0.00E+00	3.24E+12
013	linear	2	20	5	3.41E+12	1.45E+10	3.43E+12
014	linear	2	40	5	3.60E+12	4.25E+10	3.64E+12
015	linear	2	60	5	3.79E+12	6.66E+10	3.86E+12
016	linear	2	80	5	4.01E+12	9.41E+10	4.10E+12
017	linear	2	100	5	4.24E+12	1.26E+11	4.37E+12
018	linear	2	120	5	4.50E+12	1.58E+11	4.66E+12
019	linear	2	140	5	4.78E+12	1.92E+11	4.97E+12
020	linear	2	160	5	5.09E+12	2.26E+11	5.32E+12
021	linear	2	180	5	5.43E+12	2.62E+11	5.69E+12
022	linear	2	200	5	5.80E+12	3.06E+11	6.10E+12
023	linear	3	0	5	4.83E+12	0.00E+00	4.83E+12
024	linear	3	20	5	5.09E+12	2.10E+10	5.12E+12
025	linear	3	40	5	5.37E+12	6.32E+10	5.43E+12
026	linear	3	60	5	5.66E+12	9.84E+10	5.76E+12
027	linear	3	80	5	5.98E+12	1.40E+11	6.12E+12
028	linear	3	100	5	6.33E+12	1.87E+11	6.52E+12
029	linear	3	120	5	6.72E+12	2.34E+11	6.95E+12
030	linear	3	140	5	7.13E+12	2.83E+11	7.42E+12
031	linear	3	160	5	7.61E+12	3.36E+11	7.94E+12
032	linear	3	180	5	8.10E+12	3.90E+11	8.49E+12
033	linear	3	200	5	8.65E+12	4.53E+11	9.10E+12

034	linear	4	0	5	6.41E+12	-2.54E+05	6.41E+12
035	linear	4	20	5	6.76E+12	3.01E+10	6.79E+12
036	linear	4	40	5	7.12E+12	8.31E+10	7.20E+12
037	linear	4	60	5	7.51E+12	1.30E+11	7.64E+12
038	linear	4	80	5	7.93E+12	1.85E+11	8.12E+12
039	linear	4	100	5	8.41E+12	2.44E+11	8.65E+12
040	linear	4	120	5	8.91E+12	3.07E+11	9.22E+12
041	linear	4	140	5	9.47E+12	3.75E+11	9.84E+12
042	linear	4	160	5	1.01E+13	4.44E+11	1.05E+13
043	linear	4	180	5	1.07E+13	5.16E+11	1.13E+13
044	linear	4	200	5	1.15E+13	5.98E+11	1.21E+13
045	linear	5	0	5	7.99E+12	0.00E+00	7.99E+12
046	linear	5	20	5	8.42E+12	3.75E+10	8.46E+12
047	linear	5	40	5	8.87E+12	1.03E+11	8.97E+12
048	linear	5	60	5	9.35E+12	1.61E+11	9.51E+12
049	linear	5	80	5	9.88E+12	2.27E+11	1.01E+13
050	linear	5	100	5	1.05E+13	3.04E+11	1.08E+13
051	linear	5	120	5	1.11E+13	3.82E+11	1.15E+13
052	linear	5	140	5	1.18E+13	4.66E+11	1.22E+13
053	linear	5	160	5	1.25E+13	5.52E+11	1.31E+13
054	linear	5	180	5	1.34E+13	6.41E+11	1.40E+13
055	linear	5	200	5	1.43E+13	7.43E+11	1.50E+13
056	linear	6	0	5	9.55E+12	0.00E+00	9.55E+12
057	linear	6	20	5	1.01E+13	4.50E+10	1.01E+13
058	linear	6	40	5	1.06E+13	1.23E+11	1.07E+13
059	linear	6	60	5	1.12E+13	1.93E+11	1.14E+13
060	linear	6	80	5	1.18E+13	2.72E+11	1.21E+13
061	linear	6	100	5	1.25E+13	3.63E+11	1.29E+13
062	linear	6	120	5	1.32E+13	4.56E+11	1.37E+13
063	linear	6	140	5	1.41E+13	5.56E+11	1.46E+13
064	linear	6	160	5	1.50E+13	6.59E+11	1.56E+13
065	linear	6	180	5	1.59E+13	7.65E+11	1.67E+13
066	linear	6	200	5	1.70E+13	8.77E+11	1.79E+13
067	linear	7	0	5	1.11E+13	0.00E+00	1.11E+13
068	linear	7	20	5	1.17E+13	5.26E+10	1.18E+13
069	linear	7	40	5	1.23E+13	1.43E+11	1.25E+13
070	linear	7	60	5	1.30E+13	2.22E+11	1.32E+13
071	linear	7	80	5	1.37E+13	3.16E+11	1.41E+13
072	linear	7	100	5	1.45E+13	4.23E+11	1.50E+13
073	linear	7	120	5	1.54E+13	5.31E+11	1.59E+13
074	linear	7	140	5	1.64E+13	6.47E+11	1.70E+13

075	linear	7	160	5	1.74E+13	7.66E+11	1.82E+13
076	linear	7	180	5	1.85E+13	8.88E+11	1.94E+13
077	linear	7	200	5	1.97E+13	1.02E+12	2.08E+13
078	linear	8	0	5	1.27E+13	0.00E+00	1.27E+13
079	linear	8	20	5	1.33E+13	6.01E+10	1.34E+13
080	linear	8	40	5	1.40E+13	1.62E+11	1.42E+13
081	linear	8	60	5	1.48E+13	2.53E+11	1.51E+13
082	linear	8	80	5	1.56E+13	3.61E+11	1.60E+13
083	linear	8	100	5	1.66E+13	4.82E+11	1.70E+13
084	linear	8	120	5	1.76E+13	6.06E+11	1.82E+13
085	linear	8	140	5	1.86E+13	7.36E+11	1.94E+13
086	linear	8	160	5	1.98E+13	8.73E+11	2.07E+13
087	linear	8	180	5	2.10E+13	1.01E+12	2.21E+13
088	linear	8	200	5	2.25E+13	1.16E+12	2.36E+13
089	linear	9	0	5	1.42E+13	0.00E+00	1.42E+13
090	linear	9	20	5	1.50E+13	6.77E+10	1.50E+13
091	linear	9	40	5	1.57E+13	1.79E+11	1.59E+13
092	linear	9	60	5	1.66E+13	2.85E+11	1.69E+13
093	linear	9	80	5	1.75E+13	4.06E+11	1.79E+13
094	linear	9	100	5	1.86E+13	5.41E+11	1.91E+13
095	linear	9	120	5	1.97E+13	6.80E+11	2.04E+13
096	linear	9	140	5	2.09E+13	8.26E+11	2.17E+13
097	linear	9	160	5	2.22E+13	9.80E+11	2.32E+13
098	linear	9	180	5	2.36E+13	1.13E+12	2.47E+13
099	linear	9	200	5	2.51E+13	1.30E+12	2.64E+13
100	linear	10	0	5	1.57E+13	0.00E+00	1.57E+13
101	linear	10	20	5	1.66E+13	7.52E+10	1.67E+13
102	linear	10	40	5	1.75E+13	1.99E+11	1.77E+13
103	linear	10	60	5	1.84E+13	3.16E+11	1.87E+13
104	linear	10	80	5	1.95E+13	4.51E+11	1.99E+13
105	linear	10	100	5	2.06E+13	6.00E+11	2.12E+13
106	linear	10	120	5	2.18E+13	7.54E+11	2.25E+13
107	linear	10	140	5	2.31E+13	9.15E+11	2.40E+13
108	linear	10	160	5	2.46E+13	1.09E+12	2.57E+13
109	linear	10	180	5	2.61E+13	1.26E+12	2.74E+13
110	linear	10	200	5	2.78E+13	1.44E+12	2.92E+13
111	power-law	1	0	5	8.88E+11	0.00E+00	8.88E+11
112	power-law	1	20	5	9.33E+11	3.79E+09	9.37E+11
113	power-law	1	40	5	9.81E+11	1.19E+10	9.93E+11
114	power-law	1	60	5	1.04E+12	1.66E+10	1.05E+12
115	power-law	1	80	5	1.09E+12	2.26E+10	1.12E+12

116	power-law	1	100	5	1.16E+12	3.02E+10	1.19E+12
117	power-law	1	120	5	1.22E+12	3.78E+10	1.26E+12
118	power-law	1	140	5	1.30E+12	4.61E+10	1.35E+12
119	power-law	1	160	5	1.38E+12	5.50E+10	1.44E+12
120	power-law	1	180	5	1.47E+12	6.41E+10	1.54E+12
121	power-law	1	200	5	1.57E+12	7.45E+10	1.65E+12
122	power-law	2	0	5	1.35E+12	0.00E+00	1.35E+12
123	power-law	2	20	5	1.42E+12	5.34E+09	1.43E+12
124	power-law	2	40	5	1.50E+12	1.69E+10	1.52E+12
125	power-law	2	60	5	1.59E+12	2.50E+10	1.61E+12
126	power-law	2	80	5	1.68E+12	3.47E+10	1.71E+12
127	power-law	2	100	5	1.78E+12	4.65E+10	1.82E+12
128	power-law	2	120	5	1.89E+12	5.81E+10	1.95E+12
129	power-law	2	140	5	2.01E+12	7.12E+10	2.08E+12
130	power-law	2	160	5	2.14E+12	8.51E+10	2.23E+12
131	power-law	2	180	5	2.28E+12	1.00E+11	2.38E+12
132	power-law	2	200	5	2.44E+12	1.17E+11	2.56E+12
133	power-law	3	0	5	1.67E+12	0.00E+00	1.67E+12
134	power-law	3	20	5	1.77E+12	6.23E+09	1.78E+12
135	power-law	3	40	5	1.86E+12	2.03E+10	1.89E+12
136	power-law	3	60	5	1.97E+12	3.07E+10	2.00E+12
137	power-law	3	80	5	2.09E+12	4.31E+10	2.13E+12
138	power-law	3	100	5	2.21E+12	5.73E+10	2.27E+12
139	power-law	3	120	5	2.35E+12	7.23E+10	2.42E+12
140	power-law	3	140	5	2.50E+12	8.87E+10	2.59E+12
141	power-law	3	160	5	2.67E+12	1.06E+11	2.77E+12
142	power-law	3	180	5	2.85E+12	1.25E+11	2.97E+12
143	power-law	3	200	5	3.05E+12	1.46E+11	3.20E+12
144	power-law	4	0	5	1.93E+12	0.00E+00	1.93E+12
145	power-law	4	20	5	2.04E+12	7.00E+09	2.04E+12
146	power-law	4	40	5	2.15E+12	2.29E+10	2.17E+12
147	power-law	4	60	5	2.27E+12	3.51E+10	2.30E+12
148	power-law	4	80	5	2.41E+12	4.91E+10	2.46E+12
149	power-law	4	100	5	2.55E+12	6.59E+10	2.62E+12
150	power-law	4	120	5	2.71E+12	8.33E+10	2.80E+12
151	power-law	4	140	5	2.89E+12	1.02E+11	2.99E+12
152	power-law	4	160	5	3.07E+12	1.22E+11	3.20E+12
153	power-law	4	180	5	3.29E+12	1.44E+11	3.43E+12
154	power-law	4	200	5	3.53E+12	1.68E+11	3.69E+12
155	power-law	5	0	5	2.14E+12	0.00E+00	2.14E+12
156	power-law	5	20	5	2.26E+12	7.64E+09	2.27E+12

157	power-law	5	40	5	2.38E+12	2.50E+10	2.41E+12
158	power-law	5	60	5	2.52E+12	3.86E+10	2.56E+12
159	power-law	5	80	5	2.67E+12	5.43E+10	2.73E+12
160	power-law	5	100	5	2.83E+12	7.29E+10	2.91E+12
161	power-law	5	120	5	3.01E+12	9.21E+10	3.10E+12
162	power-law	5	140	5	3.20E+12	1.13E+11	3.32E+12
163	power-law	5	160	5	3.42E+12	1.35E+11	3.55E+12
164	power-law	5	180	5	3.65E+12	1.59E+11	3.81E+12
165	power-law	5	200	5	3.91E+12	1.86E+11	4.10E+12
166	power-law	6	0	5	2.32E+12	0.00E+00	2.32E+12
167	power-law	6	20	5	2.45E+12	8.18E+09	2.46E+12
168	power-law	6	40	5	2.58E+12	2.67E+10	2.61E+12
169	power-law	6	60	5	2.74E+12	4.13E+10	2.78E+12
170	power-law	6	80	5	2.90E+12	5.87E+10	2.96E+12
171	power-law	6	100	5	3.07E+12	7.89E+10	3.15E+12
172	power-law	6	120	5	3.26E+12	9.97E+10	3.36E+12
173	power-law	6	140	5	3.48E+12	1.22E+11	3.60E+12
174	power-law	6	160	5	3.71E+12	1.46E+11	3.85E+12
175	power-law	6	180	5	3.96E+12	1.72E+11	4.14E+12
176	power-law	6	200	5	4.25E+12	2.01E+11	4.45E+12
177	power-law	7	0	5	2.48E+12	0.00E+00	2.48E+12
178	power-law	7	20	5	2.61E+12	8.64E+09	2.62E+12
179	power-law	7	40	5	2.76E+12	2.83E+10	2.79E+12
180	power-law	7	60	5	2.92E+12	4.39E+10	2.97E+12
181	power-law	7	80	5	3.09E+12	6.26E+10	3.16E+12
182	power-law	7	100	5	3.28E+12	8.40E+10	3.36E+12
183	power-law	7	120	5	3.49E+12	1.06E+11	3.59E+12
184	power-law	7	140	5	3.71E+12	1.30E+11	3.85E+12
185	power-law	7	160	5	3.97E+12	1.55E+11	4.12E+12
186	power-law	7	180	5	4.24E+12	1.83E+11	4.42E+12
187	power-law	7	200	5	4.55E+12	2.13E+11	4.76E+12
188	power-law	8	0	5	2.62E+12	0.00E+00	2.62E+12
189	power-law	8	20	5	2.76E+12	9.06E+09	2.77E+12
190	power-law	8	40	5	2.92E+12	2.96E+10	2.95E+12
191	power-law	8	60	5	3.09E+12	4.62E+10	3.13E+12
192	power-law	8	80	5	3.27E+12	6.61E+10	3.33E+12
193	power-law	8	100	5	3.47E+12	8.86E+10	3.55E+12
194	power-law	8	120	5	3.68E+12	1.12E+11	3.80E+12
195	power-law	8	140	5	3.93E+12	1.37E+11	4.06E+12
196	power-law	8	160	5	4.19E+12	1.64E+11	4.36E+12
197	power-law	8	180	5	4.48E+12	1.93E+11	4.67E+12

198	power-law	8	200	5	4.80E+12	2.25E+11	5.03E+12
199	power-law	9	0	5	2.75E+12	0.00E+00	2.75E+12
200	power-law	9	20	5	2.90E+12	9.43E+09	2.91E+12
201	power-law	9	40	5	3.06E+12	3.05E+10	3.09E+12
202	power-law	9	60	5	3.24E+12	4.83E+10	3.29E+12
203	power-law	9	80	5	3.43E+12	6.92E+10	3.50E+12
204	power-law	9	100	5	3.64E+12	9.27E+10	3.73E+12
205	power-law	9	120	5	3.86E+12	1.17E+11	3.98E+12
206	power-law	9	140	5	4.12E+12	1.43E+11	4.26E+12
207	power-law	9	160	5	4.39E+12	1.72E+11	4.56E+12
208	power-law	9	180	5	4.69E+12	2.02E+11	4.90E+12
209	power-law	9	200	5	5.03E+12	2.36E+11	5.27E+12
210	power-law	10	0	5	2.86E+12	0.00E+00	2.86E+12
211	power-law	10	20	5	3.02E+12	9.78E+09	3.03E+12
212	power-law	10	40	5	3.20E+12	3.15E+10	3.23E+12
213	power-law	10	60	5	3.38E+12	5.02E+10	3.43E+12
214	power-law	10	80	5	3.58E+12	7.20E+10	3.65E+12
215	power-law	10	100	5	3.79E+12	9.65E+10	3.89E+12
216	power-law	10	120	5	4.04E+12	1.22E+11	4.16E+12
217	power-law	10	140	5	4.30E+12	1.49E+11	4.45E+12
218	power-law	10	160	5	4.59E+12	1.78E+11	4.77E+12
219	power-law	10	180	5	4.90E+12	2.10E+11	5.11E+12
220	power-law	10	200	5	5.26E+12	2.45E+11	5.50E+12
221	linear	1	0	2.5	2.15E+11	0.00E+00	2.15E+11
222	linear	1	20	2.5	2.26E+11	1.57E+09	2.28E+11
223	linear	1	40	2.5	2.39E+11	7.39E+09	2.47E+11
224	linear	1	60	2.5	2.53E+11	1.20E+10	2.65E+11
225	linear	1	80	2.5	2.68E+11	1.01E+10	2.78E+11
226	linear	1	100	2.5	2.86E+11	1.15E+10	2.98E+11
227	linear	1	120	2.5	3.06E+11	1.44E+10	3.20E+11
228	linear	1	140	2.5	3.28E+11	1.72E+10	3.45E+11
229	linear	1	160	2.5	3.52E+11	2.01E+10	3.72E+11
230	linear	1	180	2.5	3.81E+11	2.39E+10	4.05E+11
231	linear	1	200	2.5	4.12E+11	2.73E+10	4.40E+11
232	linear	2	0	2.5	4.30E+11	0.00E+00	4.30E+11
233	linear	2	20	2.5	4.54E+11	2.36E+09	4.56E+11
234	linear	2	40	2.5	4.80E+11	9.75E+09	4.90E+11
235	linear	2	60	2.5	5.09E+11	1.63E+10	5.26E+11
236	linear	2	80	2.5	5.41E+11	1.60E+10	5.57E+11
237	linear	2	100	2.5	5.77E+11	1.96E+10	5.96E+11
238	linear	2	120	2.5	6.17E+11	2.50E+10	6.42E+11

239	linear	2	140	2.5	6.62E+11	3.03E+10	6.93E+11
240	linear	2	160	2.5	7.12E+11	3.57E+10	7.48E+11
241	linear	2	180	2.5	7.70E+11	4.24E+10	8.12E+11
242	linear	2	200	2.5	8.34E+11	4.92E+10	8.83E+11
243	linear	3	0	2.5	6.44E+11	0.00E+00	6.44E+11
244	linear	3	20	2.5	6.82E+11	3.19E+09	6.85E+11
245	linear	3	40	2.5	7.21E+11	1.29E+10	7.34E+11
246	linear	3	60	2.5	7.65E+11	2.05E+10	7.85E+11
247	linear	3	80	2.5	8.14E+11	2.19E+10	8.35E+11
248	linear	3	100	2.5	8.68E+11	2.77E+10	8.95E+11
249	linear	3	120	2.5	9.28E+11	3.56E+10	9.64E+11
250	linear	3	140	2.5	9.96E+11	4.31E+10	1.04E+12
251	linear	3	160	2.5	1.07E+12	5.14E+10	1.13E+12
252	linear	3	180	2.5	1.16E+12	6.09E+10	1.22E+12
253	linear	3	200	2.5	1.26E+12	7.10E+10	1.33E+12
254	linear	4	0	2.5	8.59E+11	3.63E+05	8.59E+11
255	linear	4	20	2.5	9.09E+11	4.38E+09	9.13E+11
256	linear	4	40	2.5	9.62E+11	1.57E+10	9.78E+11
257	linear	4	60	2.5	1.02E+12	2.47E+10	1.04E+12
258	linear	4	80	2.5	1.08E+12	2.78E+10	1.11E+12
259	linear	4	100	2.5	1.16E+12	3.55E+10	1.19E+12
260	linear	4	120	2.5	1.24E+12	4.57E+10	1.28E+12
261	linear	4	140	2.5	1.33E+12	5.61E+10	1.39E+12
262	linear	4	160	2.5	1.44E+12	6.71E+10	1.50E+12
263	linear	4	180	2.5	1.55E+12	7.95E+10	1.63E+12
264	linear	4	200	2.5	1.68E+12	9.28E+10	1.77E+12
265	linear	5	0	2.5	1.07E+12	0.00E+00	1.07E+12
266	linear	5	20	2.5	1.14E+12	5.33E+09	1.14E+12
267	linear	5	40	2.5	1.20E+12	1.84E+10	1.22E+12
268	linear	5	60	2.5	1.28E+12	2.89E+10	1.31E+12
269	linear	5	80	2.5	1.36E+12	3.33E+10	1.39E+12
270	linear	5	100	2.5	1.45E+12	4.36E+10	1.49E+12
271	linear	5	120	2.5	1.55E+12	5.62E+10	1.61E+12
272	linear	5	140	2.5	1.67E+12	6.91E+10	1.73E+12
273	linear	5	160	2.5	1.80E+12	8.27E+10	1.88E+12
274	linear	5	180	2.5	1.94E+12	9.81E+10	2.04E+12
275	linear	5	200	2.5	2.11E+12	1.14E+11	2.22E+12
276	linear	6	0	2.5	1.29E+12	0.00E+00	1.29E+12
277	linear	6	20	2.5	1.36E+12	6.29E+09	1.37E+12
278	linear	6	40	2.5	1.44E+12	2.11E+10	1.46E+12
279	linear	6	60	2.5	1.53E+12	3.31E+10	1.56E+12

280	linear	6	80	2.5	1.63E+12	3.91E+10	1.67E+12
281	linear	6	100	2.5	1.74E+12	5.17E+10	1.79E+12
282	linear	6	120	2.5	1.86E+12	6.67E+10	1.93E+12
283	linear	6	140	2.5	2.00E+12	8.21E+10	2.08E+12
284	linear	6	160	2.5	2.16E+12	9.83E+10	2.25E+12
285	linear	6	180	2.5	2.33E+12	1.17E+11	2.44E+12
286	linear	6	200	2.5	2.53E+12	1.36E+11	2.66E+12
287	linear	7	0	2.5	1.50E+12	0.00E+00	1.50E+12
288	linear	7	20	2.5	1.59E+12	7.24E+09	1.60E+12
289	linear	7	40	2.5	1.68E+12	2.38E+10	1.71E+12
290	linear	7	60	2.5	1.79E+12	3.68E+10	1.82E+12
291	linear	7	80	2.5	1.90E+12	4.49E+10	1.95E+12
292	linear	7	100	2.5	2.03E+12	5.98E+10	2.09E+12
293	linear	7	120	2.5	2.17E+12	7.72E+10	2.25E+12
294	linear	7	140	2.5	2.33E+12	9.51E+10	2.43E+12
295	linear	7	160	2.5	2.51E+12	1.14E+11	2.63E+12
296	linear	7	180	2.5	2.71E+12	1.36E+11	2.85E+12
297	linear	7	200	2.5	2.95E+12	1.57E+11	3.11E+12
298	linear	8	0	2.5	1.72E+12	0.00E+00	1.72E+12
299	linear	8	20	2.5	1.82E+12	8.20E+09	1.82E+12
300	linear	8	40	2.5	1.92E+12	2.65E+10	1.95E+12
301	linear	8	60	2.5	2.04E+12	4.10E+10	2.08E+12
302	linear	8	80	2.5	2.17E+12	5.07E+10	2.22E+12
303	linear	8	100	2.5	2.32E+12	6.79E+10	2.38E+12
304	linear	8	120	2.5	2.48E+12	8.77E+10	2.57E+12
305	linear	8	140	2.5	2.66E+12	1.08E+11	2.77E+12
306	linear	8	160	2.5	2.87E+12	1.30E+11	3.00E+12
307	linear	8	180	2.5	3.10E+12	1.54E+11	3.26E+12
308	linear	8	200	2.5	3.37E+12	1.79E+11	3.55E+12
309	linear	9	0	2.5	1.93E+12	0.00E+00	1.93E+12
310	linear	9	20	2.5	2.04E+12	9.15E+09	2.05E+12
311	linear	9	40	2.5	2.16E+12	2.88E+10	2.19E+12
312	linear	9	60	2.5	2.30E+12	4.51E+10	2.34E+12
313	linear	9	80	2.5	2.44E+12	5.65E+10	2.50E+12
314	linear	9	100	2.5	2.60E+12	7.60E+10	2.68E+12
315	linear	9	120	2.5	2.79E+12	9.83E+10	2.89E+12
316	linear	9	140	2.5	2.99E+12	1.21E+11	3.12E+12
317	linear	9	160	2.5	3.23E+12	1.44E+11	3.38E+12
318	linear	9	180	2.5	3.49E+12	1.72E+11	3.66E+12
319	linear	9	200	2.5	3.79E+12	2.01E+11	3.99E+12
320	linear	10	0	2.5	2.14E+12	0.00E+00	2.14E+12

321	linear	10	20	2.5	2.27E+12	1.01E+10	2.28E+12
322	linear	10	40	2.5	2.41E+12	3.15E+10	2.44E+12
323	linear	10	60	2.5	2.55E+12	4.92E+10	2.60E+12
324	linear	10	80	2.5	2.72E+12	6.24E+10	2.78E+12
325	linear	10	100	2.5	2.90E+12	8.41E+10	2.98E+12
326	linear	10	120	2.5	3.10E+12	1.09E+11	3.21E+12
327	linear	10	140	2.5	3.33E+12	1.33E+11	3.46E+12
328	linear	10	160	2.5	3.59E+12	1.60E+11	3.75E+12
329	linear	10	180	2.5	3.88E+12	1.90E+11	4.07E+12
330	linear	10	200	2.5	4.21E+12	2.23E+11	4.43E+12
331	power-law	1	0	2.5	1.94E+11	2.22E+05	1.94E+11
332	power-law	1	20	2.5	2.05E+11	1.42E+09	2.06E+11
333	power-law	1	40	2.5	2.19E+11	7.22E+09	2.26E+11
334	power-law	1	60	2.5	2.31E+11	1.22E+10	2.43E+11
335	power-law	1	80	2.5	2.40E+11	9.98E+09	2.50E+11
336	power-law	1	100	2.5	2.53E+11	9.79E+09	2.63E+11
337	power-law	1	120	2.5	2.69E+11	1.21E+10	2.81E+11
338	power-law	1	140	2.5	2.89E+11	1.40E+10	3.03E+11
339	power-law	1	160	2.5	3.10E+11	1.63E+10	3.26E+11
340	power-law	1	180	2.5	3.59E+11	1.93E+10	3.79E+11
341	power-law	1	200	2.5	3.70E+11	2.17E+10	3.91E+11
342	power-law	2	0	2.5	3.66E+11	0.00E+00	3.66E+11
343	power-law	2	20	2.5	3.86E+11	2.13E+09	3.88E+11
344	power-law	2	40	2.5	4.07E+11	9.40E+09	4.17E+11
345	power-law	2	60	2.5	4.32E+11	1.56E+10	4.47E+11
346	power-law	2	80	2.5	4.59E+11	1.44E+10	4.73E+11
347	power-law	2	100	2.5	4.88E+11	1.59E+10	5.04E+11
348	power-law	2	120	2.5	5.21E+11	1.99E+10	5.41E+11
349	power-law	2	140	2.5	5.58E+11	2.38E+10	5.82E+11
350	power-law	2	160	2.5	5.98E+11	2.81E+10	6.26E+11
351	power-law	2	180	2.5	6.44E+11	3.32E+10	6.77E+11
352	power-law	2	200	2.5	6.98E+11	3.79E+10	7.35E+11
353	power-law	3	0	2.5	5.22E+11	0.00E+00	5.22E+11
354	power-law	3	20	2.5	5.51E+11	2.76E+09	5.54E+11
355	power-law	3	40	2.5	5.82E+11	1.13E+10	5.94E+11
356	power-law	3	60	2.5	6.17E+11	1.85E+10	6.36E+11
357	power-law	3	80	2.5	6.55E+11	1.84E+10	6.73E+11
358	power-law	3	100	2.5	6.97E+11	2.14E+10	7.19E+11
359	power-law	3	120	2.5	7.43E+11	2.71E+10	7.71E+11
360	power-law	3	140	2.5	7.96E+11	3.27E+10	8.28E+11
361	power-law	3	160	2.5	8.54E+11	3.88E+10	8.93E+11

362	power-law	3	180	2.5	9.20E+11	4.59E+10	9.66E+11
363	power-law	3	200	2.5	9.96E+11	5.26E+10	1.05E+12
364	power-law	4	0	2.5	6.65E+11	0.00E+00	6.65E+11
365	power-law	4	20	2.5	7.03E+11	3.33E+09	7.06E+11
366	power-law	4	40	2.5	7.44E+11	1.29E+10	7.57E+11
367	power-law	4	60	2.5	7.87E+11	2.12E+10	8.09E+11
368	power-law	4	80	2.5	8.36E+11	2.22E+10	8.58E+11
369	power-law	4	100	2.5	8.89E+11	2.66E+10	9.16E+11
370	power-law	4	120	2.5	9.49E+11	3.38E+10	9.83E+11
371	power-law	4	140	2.5	1.02E+12	4.05E+10	1.06E+12
372	power-law	4	160	2.5	1.09E+12	4.82E+10	1.14E+12
373	power-law	4	180	2.5	1.18E+12	5.72E+10	1.23E+12
374	power-law	4	200	2.5	1.27E+12	6.62E+10	1.34E+12
375	power-law	5	0	2.5	7.99E+11	0.00E+00	7.99E+11
376	power-law	5	20	2.5	8.45E+11	3.76E+09	8.49E+11
377	power-law	5	40	2.5	8.93E+11	1.45E+10	9.08E+11
378	power-law	5	60	2.5	9.46E+11	2.37E+10	9.70E+11
379	power-law	5	80	2.5	1.00E+12	2.56E+10	1.03E+12
380	power-law	5	100	2.5	1.07E+12	3.14E+10	1.10E+12
381	power-law	5	120	2.5	1.14E+12	3.96E+10	1.18E+12
382	power-law	5	140	2.5	1.22E+12	4.81E+10	1.27E+12
383	power-law	5	160	2.5	1.31E+12	5.73E+10	1.37E+12
384	power-law	5	180	2.5	1.41E+12	6.79E+10	1.48E+12
385	power-law	5	200	2.5	1.52E+12	7.88E+10	1.60E+12
386	power-law	6	0	2.5	9.27E+11	0.00E+00	9.27E+11
387	power-law	6	20	2.5	9.79E+11	4.23E+09	9.83E+11
388	power-law	6	40	2.5	1.03E+12	1.60E+10	1.05E+12
389	power-law	6	60	2.5	1.10E+12	2.61E+10	1.12E+12
390	power-law	6	80	2.5	1.16E+12	2.86E+10	1.19E+12
391	power-law	6	100	2.5	1.24E+12	3.55E+10	1.27E+12
392	power-law	6	120	2.5	1.32E+12	4.53E+10	1.37E+12
393	power-law	6	140	2.5	1.41E+12	5.51E+10	1.47E+12
394	power-law	6	160	2.5	1.52E+12	6.58E+10	1.58E+12
395	power-law	6	180	2.5	1.63E+12	7.81E+10	1.71E+12
396	power-law	6	200	2.5	1.76E+12	9.08E+10	1.85E+12
397	power-law	7	0	2.5	1.05E+12	0.00E+00	1.05E+12
398	power-law	7	20	2.5	1.10E+12	4.67E+09	1.11E+12
399	power-law	7	40	2.5	1.17E+12	1.73E+10	1.18E+12
400	power-law	7	60	2.5	1.24E+12	2.83E+10	1.26E+12
401	power-law	7	80	2.5	1.31E+12	3.16E+10	1.34E+12
402	power-law	7	100	2.5	1.40E+12	3.97E+10	1.44E+12

403	power-law	7	120	2.5	1.49E+12	5.08E+10	1.54E+12
404	power-law	7	140	2.5	1.59E+12	6.18E+10	1.65E+12
405	power-law	7	160	2.5	1.71E+12	7.39E+10	1.78E+12
406	power-law	7	180	2.5	1.84E+12	8.76E+10	1.93E+12
407	power-law	7	200	2.5	1.98E+12	1.02E+11	2.08E+12
408	power-law	8	0	2.5	1.16E+12	0.00E+00	1.16E+12
409	power-law	8	20	2.5	1.22E+12	5.08E+09	1.23E+12
410	power-law	8	40	2.5	1.29E+12	1.86E+10	1.31E+12
411	power-law	8	60	2.5	1.37E+12	3.01E+10	1.40E+12
412	power-law	8	80	2.5	1.45E+12	3.45E+10	1.49E+12
413	power-law	8	100	2.5	1.54E+12	4.36E+10	1.59E+12
414	power-law	8	120	2.5	1.65E+12	5.59E+10	1.70E+12
415	power-law	8	140	2.5	1.76E+12	6.81E+10	1.83E+12
416	power-law	8	160	2.5	1.89E+12	8.15E+10	1.97E+12
417	power-law	8	180	2.5	2.03E+12	9.66E+10	2.13E+12
418	power-law	8	200	2.5	2.20E+12	1.11E+11	2.31E+12
419	power-law	9	0	2.5	1.26E+12	0.00E+00	1.26E+12
420	power-law	9	20	2.5	1.33E+12	5.47E+09	1.34E+12
421	power-law	9	40	2.5	1.41E+12	1.96E+10	1.43E+12
422	power-law	9	60	2.5	1.49E+12	3.21E+10	1.53E+12
423	power-law	9	80	2.5	1.58E+12	3.72E+10	1.62E+12
424	power-law	9	100	2.5	1.69E+12	4.74E+10	1.73E+12
425	power-law	9	120	2.5	1.80E+12	6.08E+10	1.86E+12
426	power-law	9	140	2.5	1.92E+12	7.41E+10	2.00E+12
427	power-law	9	160	2.5	2.06E+12	8.87E+10	2.15E+12
428	power-law	9	180	2.5	2.22E+12	1.04E+11	2.32E+12
429	power-law	9	200	2.5	2.40E+12	1.21E+11	2.52E+12
430	power-law	10	0	2.5	1.36E+12	0.00E+00	1.36E+12
431	power-law	10	20	2.5	1.44E+12	5.84E+09	1.45E+12
432	power-law	10	40	2.5	1.53E+12	2.08E+10	1.55E+12
433	power-law	10	60	2.5	1.62E+12	3.39E+10	1.65E+12
434	power-law	10	80	2.5	1.71E+12	3.98E+10	1.75E+12
435	power-law	10	100	2.5	1.82E+12	5.10E+10	1.87E+12
436	power-law	10	120	2.5	1.94E+12	6.54E+10	2.01E+12
437	power-law	10	140	2.5	2.08E+12	7.97E+10	2.16E+12
438	power-law	10	160	2.5	2.23E+12	9.49E+10	2.32E+12
439	power-law	10	180	2.5	2.40E+12	1.12E+11	2.51E+12
440	power-law	10	200	2.5	2.59E+12	1.31E+11	2.72E+12
441	linear	1	0	10	8.54E+12	0.00E+00	8.54E+12
442	linear	1	20	10	8.81E+12	3.43E+10	8.85E+12
443	linear	1	40	10	9.07E+12	9.28E+10	9.17E+12

444	linear	1	60	10	9.33E+12	1.41E+11	9.47E+12
445	linear	1	80	10	9.54E+12	1.88E+11	9.73E+12
446	linear	1	100	10	9.79E+12	2.39E+11	1.00E+13
447	linear	1	120	10	1.00E+13	2.87E+11	1.03E+13
448	linear	1	140	10	1.02E+13	3.31E+11	1.05E+13
449	linear	1	160	10	1.04E+13	3.83E+11	1.07E+13
450	linear	1	180	10	1.05E+13	4.29E+11	1.10E+13
451	linear	1	200	10	1.07E+13	4.86E+11	1.12E+13
452	linear	2	0	10	1.64E+13	0.00E+00	1.64E+13
453	linear	2	20	10	1.69E+13	6.68E+10	1.70E+13
454	linear	2	40	10	1.75E+13	1.80E+11	1.76E+13
455	linear	2	60	10	1.80E+13	2.73E+11	1.82E+13
456	linear	2	80	10	1.84E+13	3.67E+11	1.88E+13
457	linear	2	100	10	1.89E+13	4.70E+11	1.94E+13
458	linear	2	120	10	1.94E+13	5.63E+11	1.99E+13
459	linear	2	140	10	1.98E+13	6.42E+11	2.04E+13
460	linear	2	160	10	2.01E+13	7.19E+11	2.08E+13
461	linear	2	180	10	2.04E+13	8.07E+11	2.12E+13
462	linear	2	200	10	2.07E+13	8.93E+11	2.16E+13
463	linear	3	0	10	2.39E+13	0.00E+00	2.39E+13
464	linear	3	20	10	2.48E+13	9.91E+10	2.49E+13
465	linear	3	40	10	2.55E+13	2.69E+11	2.58E+13
466	linear	3	60	10	2.63E+13	4.08E+11	2.67E+13
467	linear	3	80	10	2.68E+13	5.52E+11	2.74E+13
468	linear	3	100	10	2.75E+13	7.06E+11	2.82E+13
469	linear	3	120	10	2.82E+13	8.36E+11	2.90E+13
470	linear	3	140	10	2.88E+13	9.51E+11	2.97E+13
471	linear	3	160	10	2.92E+13	1.06E+12	3.03E+13
472	linear	3	180	10	2.96E+13	1.18E+12	3.08E+13
473	linear	3	200	10	2.99E+13	1.30E+12	3.12E+13
474	linear	4	0	10	3.03E+13	0.00E+00	3.03E+13
475	linear	4	20	10	3.14E+13	1.25E+11	3.15E+13
476	linear	4	40	10	3.22E+13	3.53E+11	3.26E+13
477	linear	4	60	10	3.30E+13	5.31E+11	3.36E+13
478	linear	4	80	10	3.37E+13	7.19E+11	3.44E+13
479	linear	4	100	10	3.44E+13	9.11E+11	3.53E+13
480	linear	4	120	10	3.50E+13	1.07E+12	3.61E+13
481	linear	4	140	10	3.55E+13	1.19E+12	3.67E+13
482	linear	4	160	10	3.59E+13	1.34E+12	3.72E+13
483	linear	4	180	10	3.61E+13	1.49E+12	3.75E+13
484	linear	4	200	10	3.63E+13	1.62E+12	3.79E+13

485	linear	5	0	10	3.47E+13	0.00E+00	3.47E+13
486	linear	5	20	10	3.60E+13	1.46E+11	3.61E+13
487	linear	5	40	10	3.70E+13	4.29E+11	3.74E+13
488	linear	5	60	10	3.78E+13	6.41E+11	3.85E+13
489	linear	5	80	10	3.85E+13	8.60E+11	3.94E+13
490	linear	5	100	10	3.93E+13	1.08E+12	4.04E+13
491	linear	5	120	10	3.99E+13	1.27E+12	4.11E+13
492	linear	5	140	10	4.03E+13	1.41E+12	4.17E+13
493	linear	5	160	10	4.07E+13	1.57E+12	4.23E+13
494	linear	5	180	10	4.08E+13	1.74E+12	4.26E+13
495	linear	5	200	10	4.09E+13	1.89E+12	4.28E+13
496	linear	6	0	10	3.79E+13	0.00E+00	3.79E+13
497	linear	6	20	10	3.95E+13	1.61E+11	3.96E+13
498	linear	6	40	10	4.06E+13	5.05E+11	4.11E+13
499	linear	6	60	10	4.15E+13	7.48E+11	4.22E+13
500	linear	6	80	10	4.24E+13	9.83E+11	4.34E+13
501	linear	6	100	10	4.31E+13	1.23E+12	4.43E+13
502	linear	6	120	10	4.37E+13	1.43E+12	4.52E+13
503	linear	6	140	10	4.42E+13	1.62E+12	4.58E+13
504	linear	6	160	10	4.47E+13	1.79E+12	4.65E+13
505	linear	6	180	10	4.47E+13	1.98E+12	4.67E+13
506	linear	6	200	10	4.48E+13	2.16E+12	4.70E+13
507	linear	7	0	10	4.08E+13	0.00E+00	4.08E+13
508	linear	7	20	10	4.26E+13	1.73E+11	4.28E+13
509	linear	7	40	10	4.39E+13	5.83E+11	4.45E+13
510	linear	7	60	10	4.50E+13	8.55E+11	4.58E+13
511	linear	7	80	10	4.60E+13	1.12E+12	4.71E+13
512	linear	7	100	10	4.67E+13	1.39E+12	4.80E+13
513	linear	7	120	10	4.71E+13	1.61E+12	4.87E+13
514	linear	7	140	10	4.78E+13	1.82E+12	4.96E+13
515	linear	7	160	10	4.82E+13	2.01E+12	5.02E+13
516	linear	7	180	10	4.87E+13	2.24E+12	5.09E+13
517	linear	7	200	10	4.88E+13	2.43E+12	5.12E+13
518	linear	8	0	10	4.36E+13	0.00E+00	4.36E+13
519	linear	8	20	10	4.57E+13	1.83E+11	4.59E+13
520	linear	8	40	10	4.73E+13	6.65E+11	4.79E+13
521	linear	8	60	10	4.85E+13	9.56E+11	4.94E+13
522	linear	8	80	10	4.94E+13	1.25E+12	5.07E+13
523	linear	8	100	10	5.04E+13	1.55E+12	5.20E+13
524	linear	8	120	10	5.11E+13	1.80E+12	5.29E+13
525	linear	8	140	10	5.18E+13	2.03E+12	5.38E+13

526	linear	8	160	10	5.23E+13	2.25E+12	5.46E+13
527	linear	8	180	10	5.19E+13	2.51E+12	5.44E+13
528	linear	8	200	10	5.17E+13	2.68E+12	5.44E+13
529	linear	9	0	10	4.65E+13	0.00E+00	4.65E+13
530	linear	9	20	10	4.89E+13	1.92E+11	4.91E+13
531	linear	9	40	10	5.04E+13	7.47E+11	5.12E+13
532	linear	9	60	10	5.18E+13	1.08E+12	5.29E+13
533	linear	9	80	10	5.28E+13	1.39E+12	5.42E+13
534	linear	9	100	10	5.34E+13	1.72E+12	5.51E+13
535	linear	9	120	10	5.40E+13	1.99E+12	5.60E+13
536	linear	9	140	10	5.49E+13	2.25E+12	5.72E+13
537	linear	9	160	10	5.61E+13	2.49E+12	5.86E+13
538	linear	9	180	10	5.60E+13	2.76E+12	5.87E+13
539	linear	9	200	10	5.63E+13	2.96E+12	5.93E+13
540	linear	10	0	10	4.95E+13	0.00E+00	4.95E+13
541	linear	10	20	10	5.20E+13	1.96E+11	5.22E+13
542	linear	10	40	10	5.41E+13	8.42E+11	5.49E+13
543	linear	10	60	10	5.16E+13	1.08E+12	5.27E+13
544	linear	10	80	10	5.67E+13	1.53E+12	5.82E+13
545	linear	10	100	10	5.78E+13	1.88E+12	5.97E+13
546	linear	10	120	10	5.86E+13	2.16E+12	6.08E+13
547	linear	10	140	10	5.92E+13	2.46E+12	6.16E+13
548	linear	10	160	10	5.24E+13	2.46E+12	5.48E+13
549	linear	10	180	10	5.99E+13	3.03E+12	6.29E+13
550	linear	10	200	10	5.29E+13	2.84E+12	5.57E+13
551	power-law	1	0	10	1.54E+12	0.00E+00	1.54E+12
552	power-law	1	20	10	1.62E+12	6.24E+09	1.62E+12
553	power-law	1	40	10	1.70E+12	2.52E+10	1.73E+12
554	power-law	1	60	10	1.80E+12	5.49E+10	1.85E+12
555	power-law	1	80	10	1.90E+12	9.01E+10	1.99E+12
556	power-law	1	100	10	2.00E+12	1.15E+11	2.12E+12
557	power-law	1	120	10	2.12E+12	1.27E+11	2.25E+12
558	power-law	1	140	10	2.24E+12	1.45E+11	2.39E+12
559	power-law	1	160	10	2.38E+12	1.64E+11	2.54E+12
560	power-law	1	180	10	2.52E+12	1.84E+11	2.70E+12
561	power-law	1	200	10	2.68E+12	2.10E+11	2.89E+12
562	power-law	2	0	10	1.97E+12	0.00E+00	1.97E+12
563	power-law	2	20	10	2.07E+12	7.68E+09	2.08E+12
564	power-law	2	40	10	2.19E+12	2.96E+10	2.22E+12
565	power-law	2	60	10	2.32E+12	6.30E+10	2.38E+12
566	power-law	2	80	10	2.45E+12	1.02E+11	2.55E+12

567	power-law	2	100	10	2.59E+12	1.31E+11	2.72E+12
568	power-law	2	120	10	2.75E+12	1.49E+11	2.90E+12
569	power-law	2	140	10	2.92E+12	1.72E+11	3.10E+12
570	power-law	2	160	10	3.10E+12	1.97E+11	3.30E+12
571	power-law	2	180	10	3.30E+12	2.26E+11	3.53E+12
572	power-law	2	200	10	3.53E+12	2.59E+11	3.79E+12
573	power-law	3	0	10	2.25E+12	0.00E+00	2.25E+12
574	power-law	3	20	10	2.38E+12	8.64E+09	2.39E+12
575	power-law	3	40	10	2.52E+12	3.26E+10	2.55E+12
576	power-law	3	60	10	2.66E+12	6.82E+10	2.73E+12
577	power-law	3	80	10	2.81E+12	1.10E+11	2.92E+12
578	power-law	3	100	10	2.99E+12	1.41E+11	3.13E+12
579	power-law	3	120	10	3.17E+12	1.63E+11	3.33E+12
580	power-law	3	140	10	3.37E+12	1.90E+11	3.56E+12
581	power-law	3	160	10	3.58E+12	2.19E+11	3.80E+12
582	power-law	3	180	10	3.82E+12	2.51E+11	4.07E+12
583	power-law	3	200	10	4.08E+12	2.89E+11	4.37E+12
584	power-law	4	0	10	2.47E+12	0.00E+00	2.47E+12
585	power-law	4	20	10	2.61E+12	9.39E+09	2.62E+12
586	power-law	4	40	10	2.77E+12	3.49E+10	2.80E+12
587	power-law	4	60	10	2.92E+12	7.22E+10	3.00E+12
588	power-law	4	80	10	3.09E+12	1.16E+11	3.21E+12
589	power-law	4	100	10	3.29E+12	1.48E+11	3.44E+12
590	power-law	4	120	10	3.49E+12	1.74E+11	3.67E+12
591	power-law	4	140	10	3.71E+12	2.03E+11	3.91E+12
592	power-law	4	160	10	3.95E+12	2.34E+11	4.18E+12
593	power-law	4	180	10	4.21E+12	2.70E+11	4.48E+12
594	power-law	4	200	10	4.49E+12	3.12E+11	4.81E+12
595	power-law	5	0	10	2.65E+12	0.00E+00	2.65E+12
596	power-law	5	20	10	2.80E+12	1.00E+10	2.81E+12
597	power-law	5	40	10	2.97E+12	3.68E+10	3.01E+12
598	power-law	5	60	10	3.14E+12	7.55E+10	3.22E+12
599	power-law	5	80	10	3.33E+12	1.20E+11	3.45E+12
600	power-law	5	100	10	3.54E+12	1.54E+11	3.69E+12
601	power-law	5	120	10	3.75E+12	1.82E+11	3.93E+12
602	power-law	5	140	10	3.99E+12	2.13E+11	4.20E+12
603	power-law	5	160	10	4.24E+12	2.47E+11	4.49E+12
604	power-law	5	180	10	4.52E+12	2.85E+11	4.81E+12
605	power-law	5	200	10	4.83E+12	3.29E+11	5.16E+12
606	power-law	6	0	10	2.81E+12	0.00E+00	2.81E+12
607	power-law	6	20	10	2.97E+12	1.06E+10	2.98E+12

608	power-law	6	40	10	3.15E+12	3.84E+10	3.19E+12
609	power-law	6	60	10	3.33E+12	7.83E+10	3.41E+12
610	power-law	6	80	10	3.53E+12	1.24E+11	3.65E+12
611	power-law	6	100	10	3.75E+12	1.59E+11	3.91E+12
612	power-law	6	120	10	3.98E+12	1.89E+11	4.17E+12
613	power-law	6	140	10	4.23E+12	2.21E+11	4.45E+12
614	power-law	6	160	10	4.50E+12	2.57E+11	4.76E+12
615	power-law	6	180	10	4.80E+12	2.98E+11	5.09E+12
616	power-law	6	200	10	5.13E+12	3.45E+11	5.48E+12
617	power-law	7	0	10	2.94E+12	0.00E+00	2.94E+12
618	power-law	7	20	10	3.12E+12	1.10E+10	3.13E+12
619	power-law	7	40	10	3.30E+12	3.98E+10	3.34E+12
620	power-law	7	60	10	3.50E+12	8.06E+10	3.58E+12
621	power-law	7	80	10	3.70E+12	1.28E+11	3.83E+12
622	power-law	7	100	10	3.93E+12	1.64E+11	4.10E+12
623	power-law	7	120	10	4.18E+12	1.95E+11	4.37E+12
624	power-law	7	140	10	4.44E+12	2.29E+11	4.67E+12
625	power-law	7	160	10	4.73E+12	2.67E+11	4.99E+12
626	power-law	7	180	10	5.04E+12	3.09E+11	5.35E+12
627	power-law	7	200	10	5.39E+12	3.58E+11	5.75E+12
628	power-law	8	0	10	3.07E+12	0.00E+00	3.07E+12
629	power-law	8	20	10	3.25E+12	1.14E+10	3.26E+12
630	power-law	8	40	10	3.44E+12	4.10E+10	3.48E+12
631	power-law	8	60	10	3.64E+12	8.27E+10	3.72E+12
632	power-law	8	80	10	3.86E+12	1.30E+11	3.99E+12
633	power-law	8	100	10	4.10E+12	1.68E+11	4.27E+12
634	power-law	8	120	10	4.35E+12	2.00E+11	4.55E+12
635	power-law	8	140	10	4.62E+12	2.35E+11	4.86E+12
636	power-law	8	160	10	4.92E+12	2.75E+11	5.20E+12
637	power-law	8	180	10	5.25E+12	3.18E+11	5.56E+12
638	power-law	8	200	10	5.61E+12	3.68E+11	5.98E+12
639	power-law	9	0	10	3.18E+12	0.00E+00	3.18E+12
640	power-law	9	20	10	3.38E+12	1.16E+10	3.39E+12
641	power-law	9	40	10	3.57E+12	4.21E+10	3.61E+12
642	power-law	9	60	10	3.78E+12	8.45E+10	3.86E+12
643	power-law	9	80	10	4.01E+12	1.32E+11	4.14E+12
644	power-law	9	100	10	4.25E+12	1.71E+11	4.42E+12
645	power-law	9	120	10	4.51E+12	2.05E+11	4.71E+12
646	power-law	9	140	10	4.79E+12	2.42E+11	5.03E+12
647	power-law	9	160	10	5.11E+12	2.81E+11	5.39E+12
648	power-law	9	180	10	5.45E+12	3.26E+11	5.77E+12

649	power-law	9	200	10	5.82E+12	3.78E+11	6.20E+12
650	power-law	10	0	10	3.28E+12	0.00E+00	3.28E+12
651	power-law	10	20	10	3.49E+12	1.19E+10	3.50E+12
652	power-law	10	40	10	3.69E+12	4.31E+10	3.73E+12
653	power-law	10	60	10	3.90E+12	8.62E+10	3.99E+12
654	power-law	10	80	10	4.14E+12	1.35E+11	4.28E+12
655	power-law	10	100	10	4.39E+12	1.74E+11	4.57E+12
656	power-law	10	120	10	4.66E+12	2.09E+11	4.87E+12
657	power-law	10	140	10	4.96E+12	2.47E+11	5.20E+12
658	power-law	10	160	10	5.28E+12	2.87E+11	5.57E+12
659	power-law	10	180	10	5.64E+12	3.33E+11	5.97E+12
660	power-law	10	200	10	6.02E+12	3.87E+11	6.40E+12