Table 1. Parameters used in models (see also Figure 1).

Parameter	**Meaning**	**Value(s)**
Parameters and nominal values		
a) Mechanical parameters		
ρ_{crust}	crustal density	2700 kg/m^3
ρ_{mantle}	mantle density	3300 kg/m^3
D	flexural rigidity (isostasy model)	10^{22} Nm
	crustal thickness	35 km
	lower crustal thickness	see below
θ	subduction dip angle	20^o
ϕ_{eff} (0 - 10 km)	effective internal angle of friction	5°
ϕ_{eff} (10 - 35 km)		15^o
C	cohesion	10 MPa
P	solid pressure	Pa
$J_2^/$	second invariant of the deviatoric stress tensor	Pa^2
$\eta_{eff}^v = B^* \cdot (\dot{I}_2^/)^{(1-n)/2n} \cdot \exp[Q/nRT_K]$	general equation for effective viscosity	
$\dot{I}_2^/$	second invariant of strain rate tensor	s^{-2}
R	gas constant	8.314 J/mol^{o}K
T_K	absolute temperature	^{o}K
B, n, Q* as below		
WQ (0 – 10 km)	wet Black Hills quartzite flow law [after *Gleason and Tullis*, 1995]	*n* = 4.0 *B* *= 2.92 x 10^6 Pa.s$^{1/4}$ *Q* = 223 kJ/mol
WQ x 5 10 – 25 km or 10 – 20 km (see below)	modified wet Black Hills quartzite flow law	*B*= B* (WQ) x 5* (etc.)
DMD	dry Maryland diabase flow law [after *Mackwell et al.,* 1998]	*n* = 4.7 *B**= 1.91 x 10^5 Pa.s$^{1/4.7}$ *Q* = 485 kJ/mol
DMD/f (see below)	scaled dry Maryland diabase flow law	*B* = B* (DMD) / f*
'melt weakening'	linear reduction in effective viscosity over T range 700-750°C for WQ only	η_{700} = flow law value η_{750} = 10^{19} Pa.s
	length of Eulerian model domain	2000 km
b) Crustal scale models basal velocity boundary conditions		
V_P	pro-side (convergence) velocity	1.5 cm/y
V_R	retro-side velocity	-1.5 cm/y
V_S	S-point velocity (subduction advance)	0 cm/y

c) Thermal parameters

K	thermal conductivity	2.00 W/mºK
κ	thermal diffusivity	1.0×10^{-6} m^2/s
	($\kappa = K / \rho Cp$, where $\rho Cp = 2 \times 10^6$)	
T_s	surface temperature	0ºC
T_a	temperature at lithosphere/ asthenosphere boundary	1350ºC
q_m	basal mantle heat flux	20 mW/m^2
q_s	initial surface heat flux	71.25 mW/m^2
A_1 (0-20 km)	upper crustal heat production	2.0 µW/m^3
A_2 (20-35 km)	lower crustal heat production	0.75 µW/m^3

d) Crustal scale models surface denudation

slope x *f(t)* x *g(x)*	denudation rate (m/y)	
slope	local surface slope measured from finite element mesh	
f(t)	time function	constant
	specifies how denudation rate (m/y) varies with time when *g(x)* and slope = 1	
g(x)	spatial function	
	specifies how denudation rate varies with position *x*	*g(x)* = 0 = arid *g(x)* = 1 = wet

No denudation in Upper Mantle scale models

e) Specific model parameters – Crustal Scale Models

LHO-1
Lower crust (25 – 35 km) — *B* (DMD/5)*
15°

LHO-2
Lower crust (25-35 km)
Alternating 250 km long blocks of — *B* (DMD)*, *B* (DMD/10)*

LHO-3
Lower crust (25-35 km)
250 km long blocks arranged symmetrically with respect to S. Blocks have properties
B (DMD), B* (DMD/4), B* (DMD/8), B* (DMD/12), B*(DMD/16), B* (DMD/20)*
Order is from external to internal part of model.

f) Specific model parameters – Upper Mantle Scale Models

LHO-LS1 and LHO-LS2
Properties same as crustal models except where noted

	Model domain	2000 x 600 km
	Eulerian mesh	101 x 201
	upper crustal density	2800 kg/m^3

	lower crustal density ('basalt-eclogite', see text)	2950 – 3100 kg/m^3
	lithospheric mantle density	
	LHO-LS1	3300 kg/m^3
	LHO-LS2	3310 kg/m^3
	sublithospheric mantle density	3260 kg/m^3
ϕ_{eff}	strain softening	15^o $\rightarrow$ 2^o
	2nd invariant of strain	0.5 $\rightarrow$ 1.5
WQ x *5* (0 – 28 km)		*B** = *B** *(WQ* x *5)*
DMD/10 (28 – 34 km)		*B** = *B** *(WQ* x *10)*
WOl x *10* (34 – 100 km)		*B** = *B** *(WOl* x *10)*
WOl (100 – 600 km)		*B** = *B** *(WOl)*
α	volume coefficient of thermal expansion	3 x 10^{-5}/^{o}C
Velocity boundary conditions		
V_P (0 – 100 km)		5 cm/y
V_R (0 – 100 km)		0 cm/y
	small flux through side boundaries (see text)	
Other boundaries, free slip; upper surface, free surface		