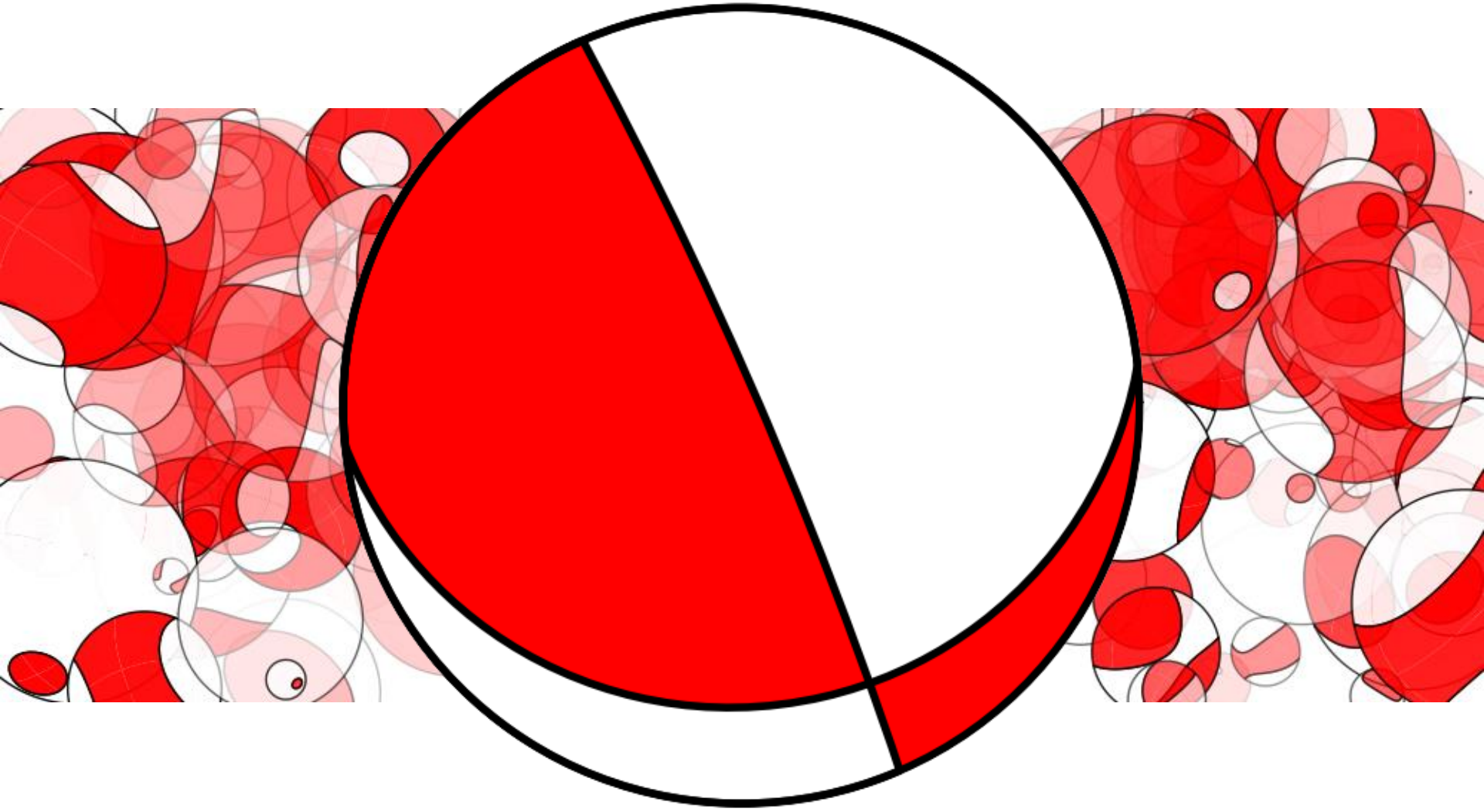

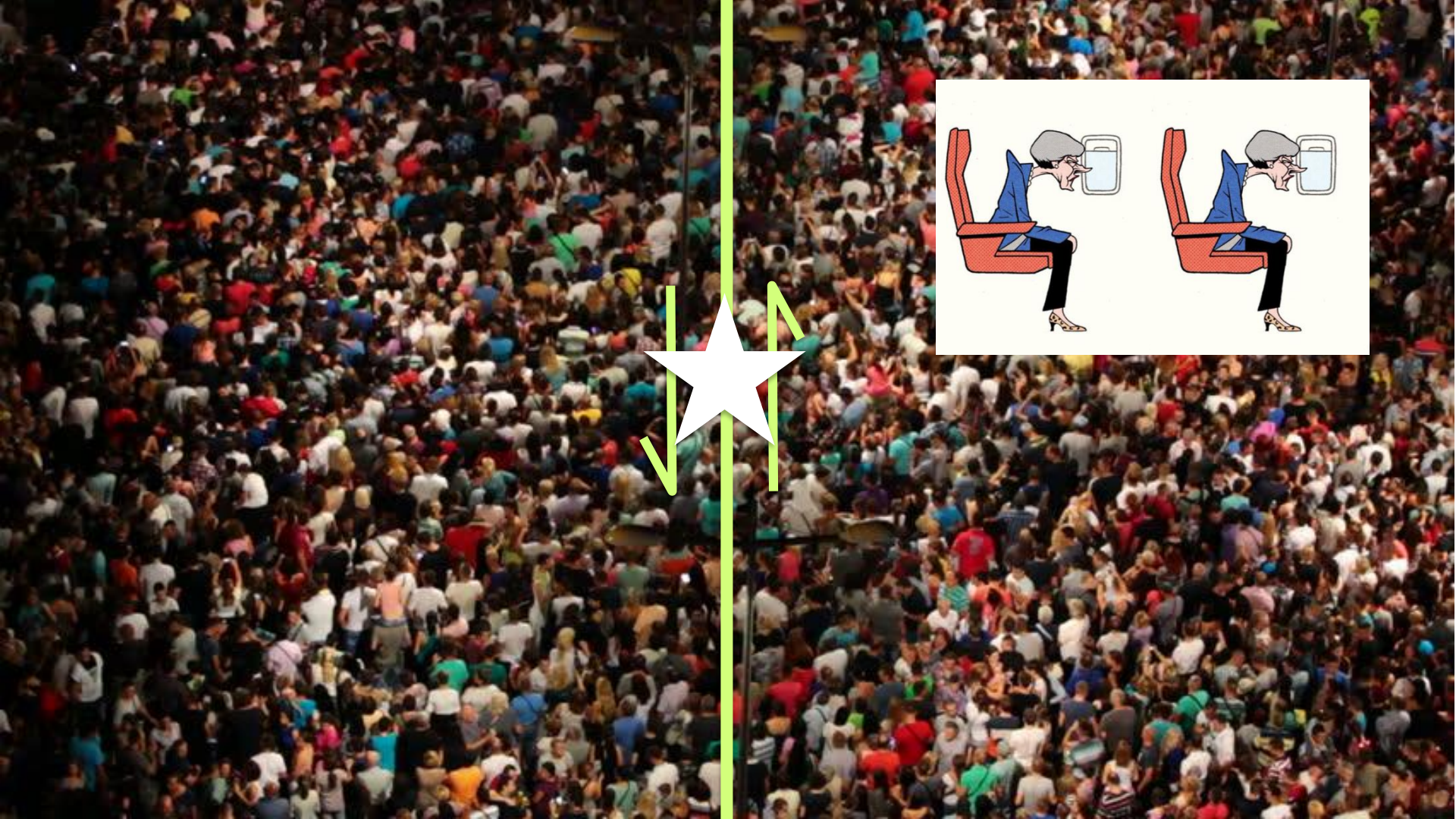

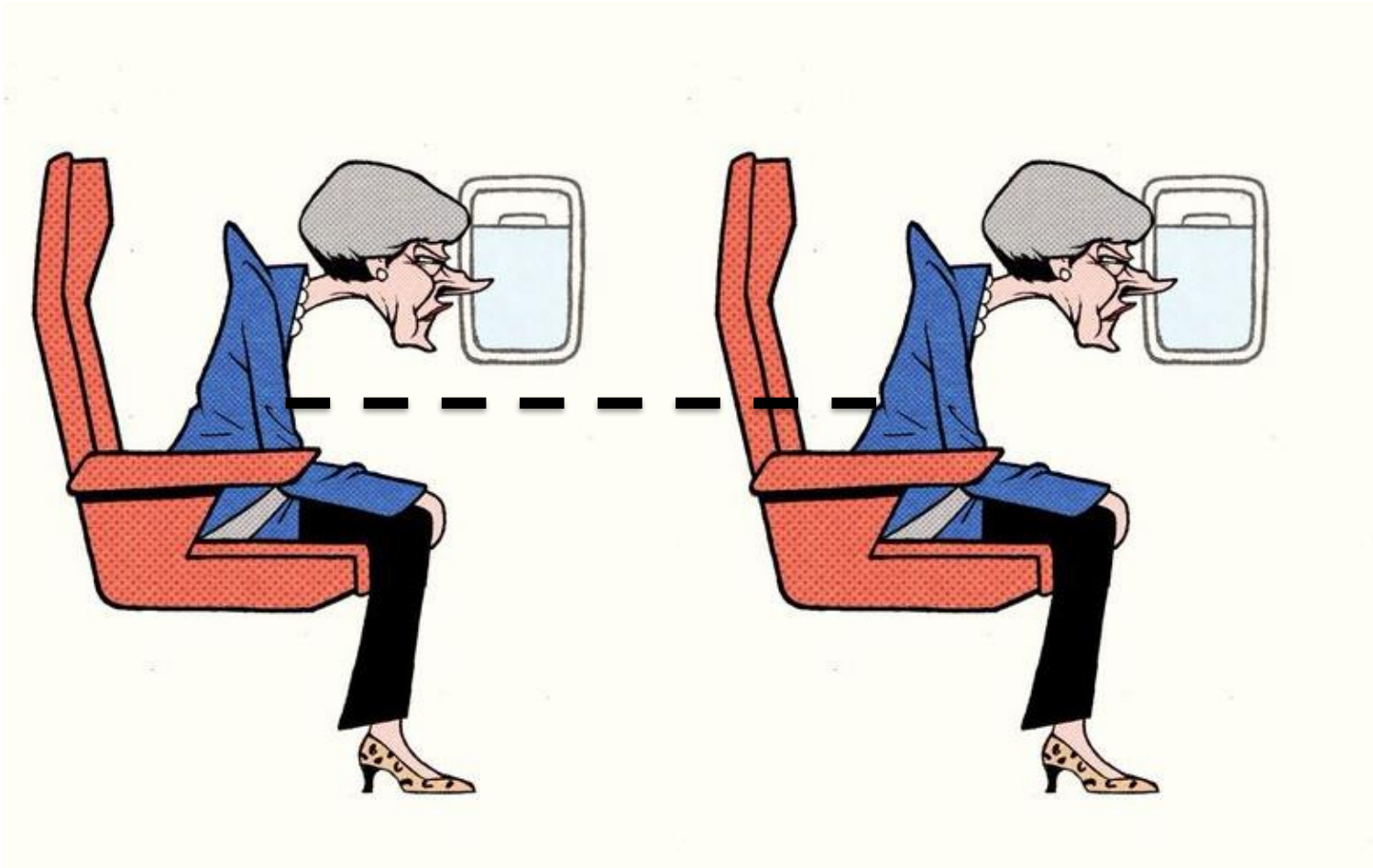

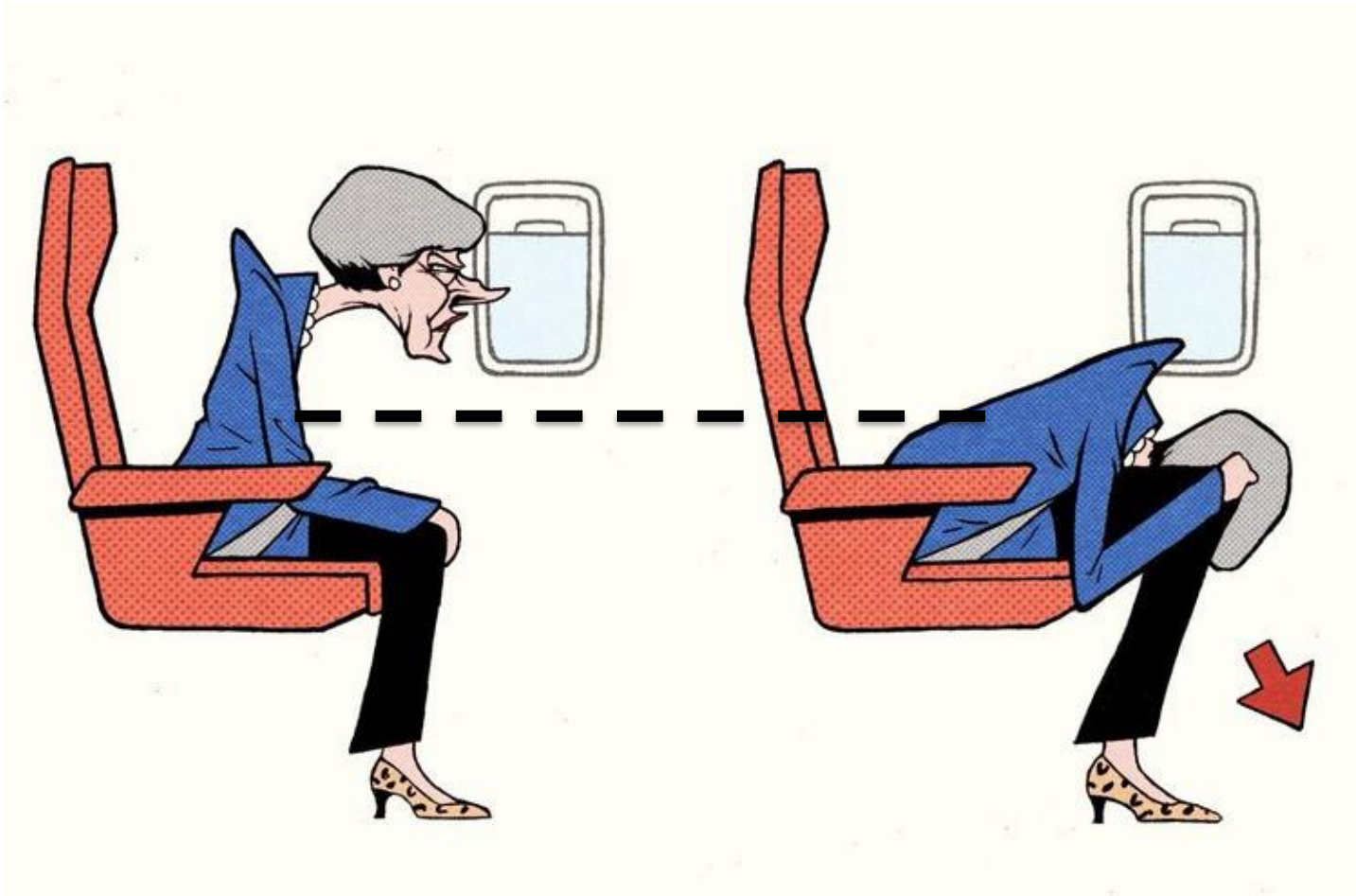

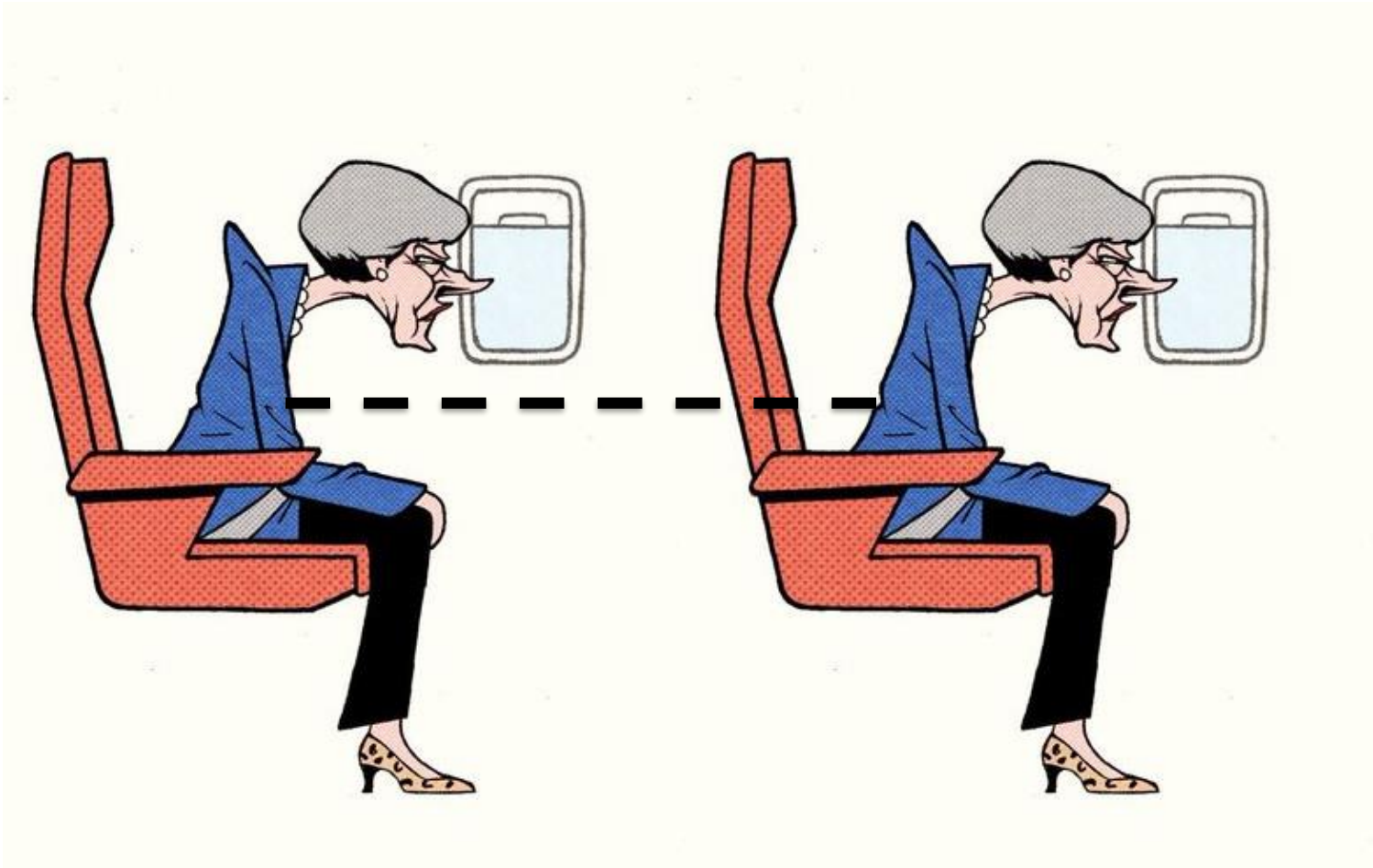

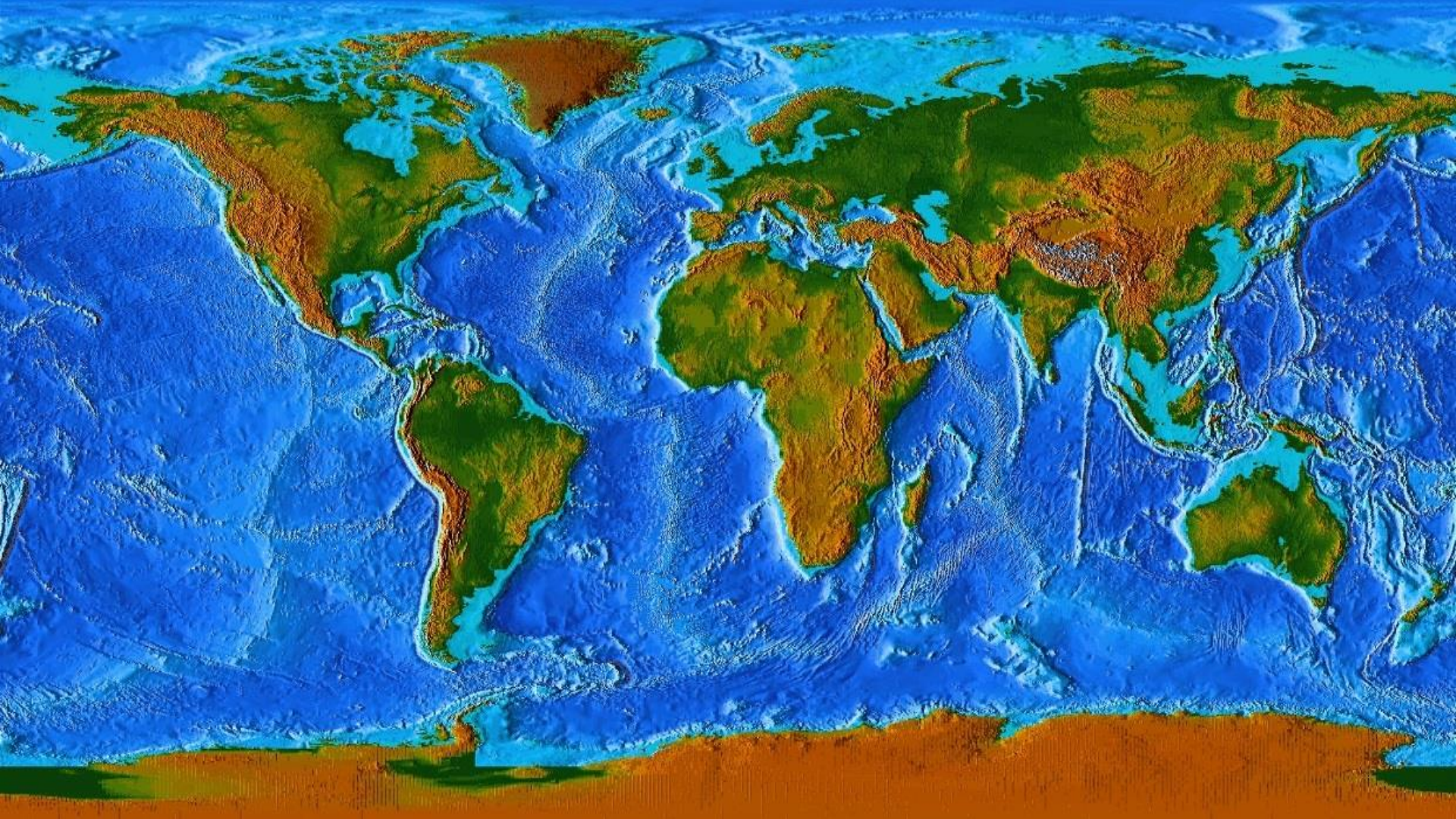

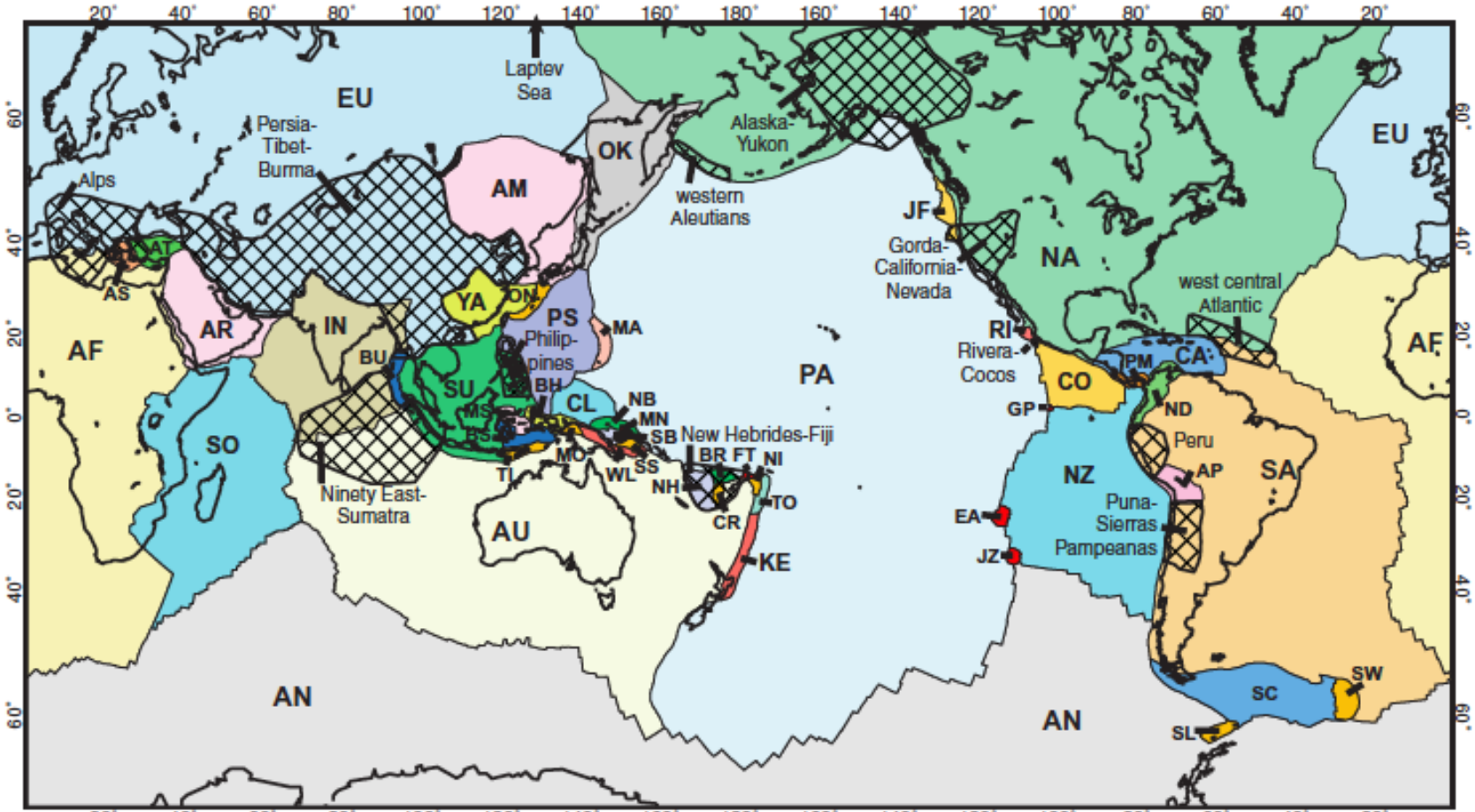
EU
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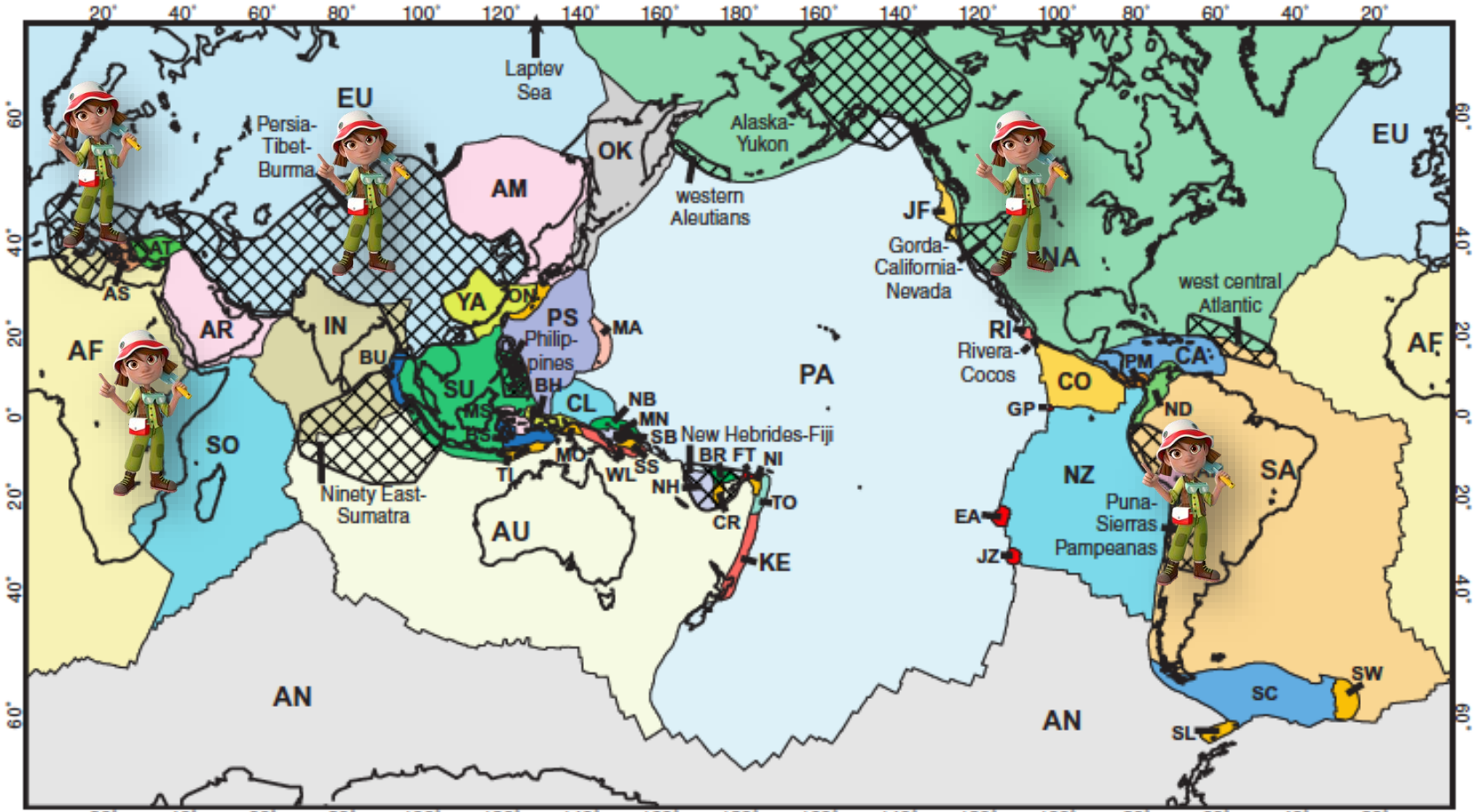
Bird (2003)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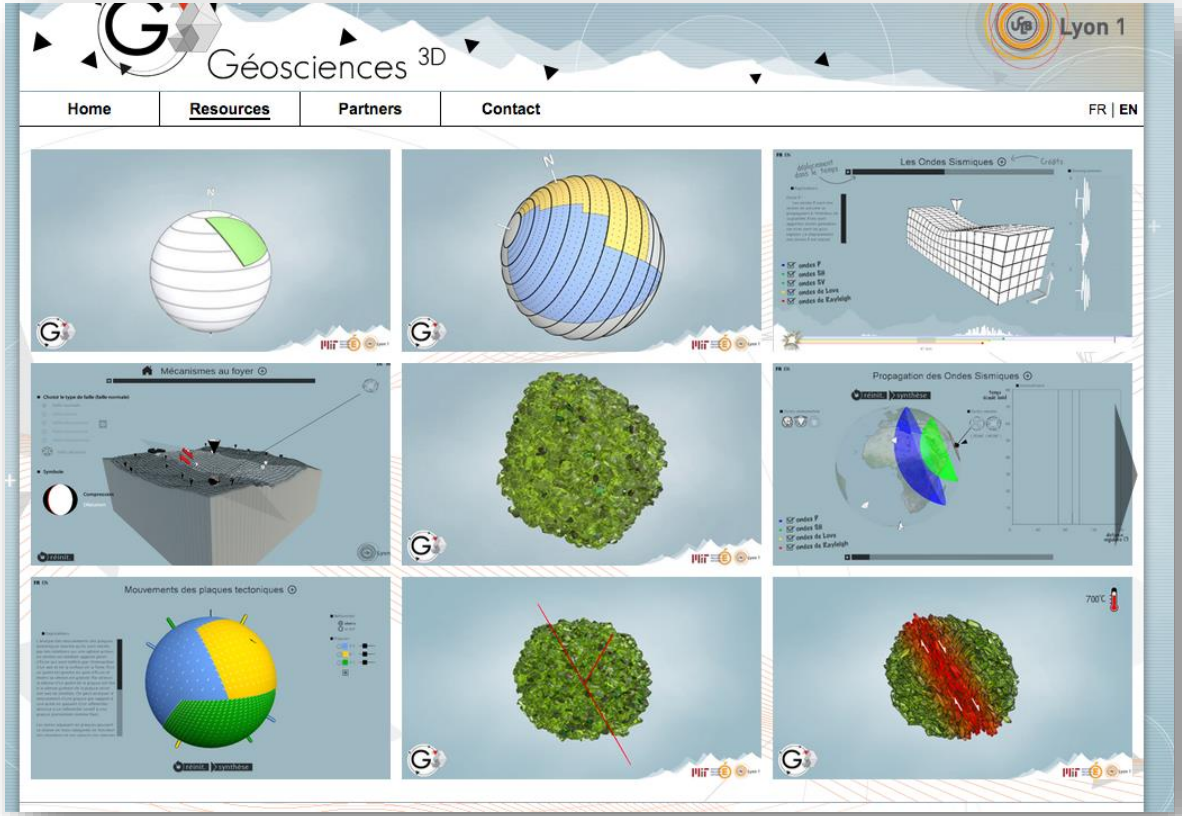
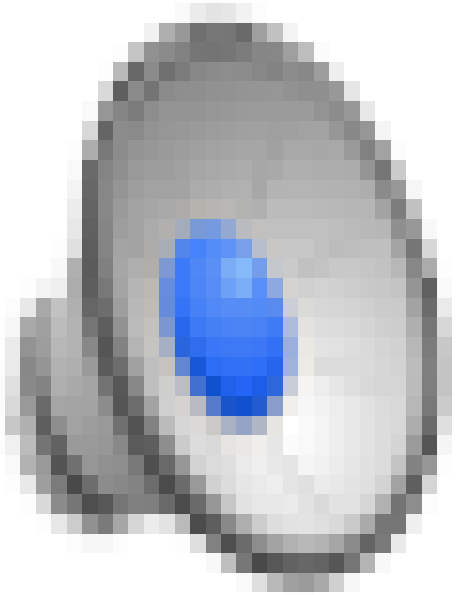
Bird (2003)

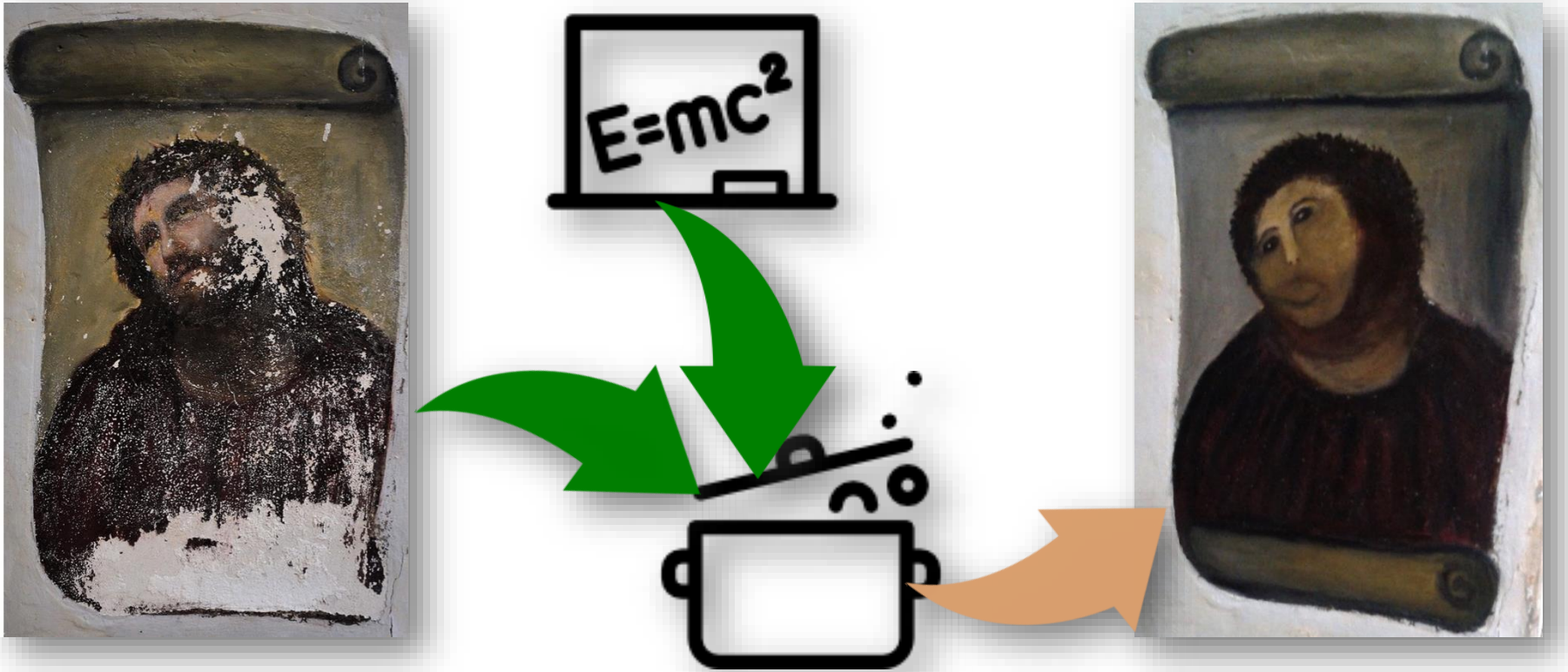
Some shapes of plate tectonics to come

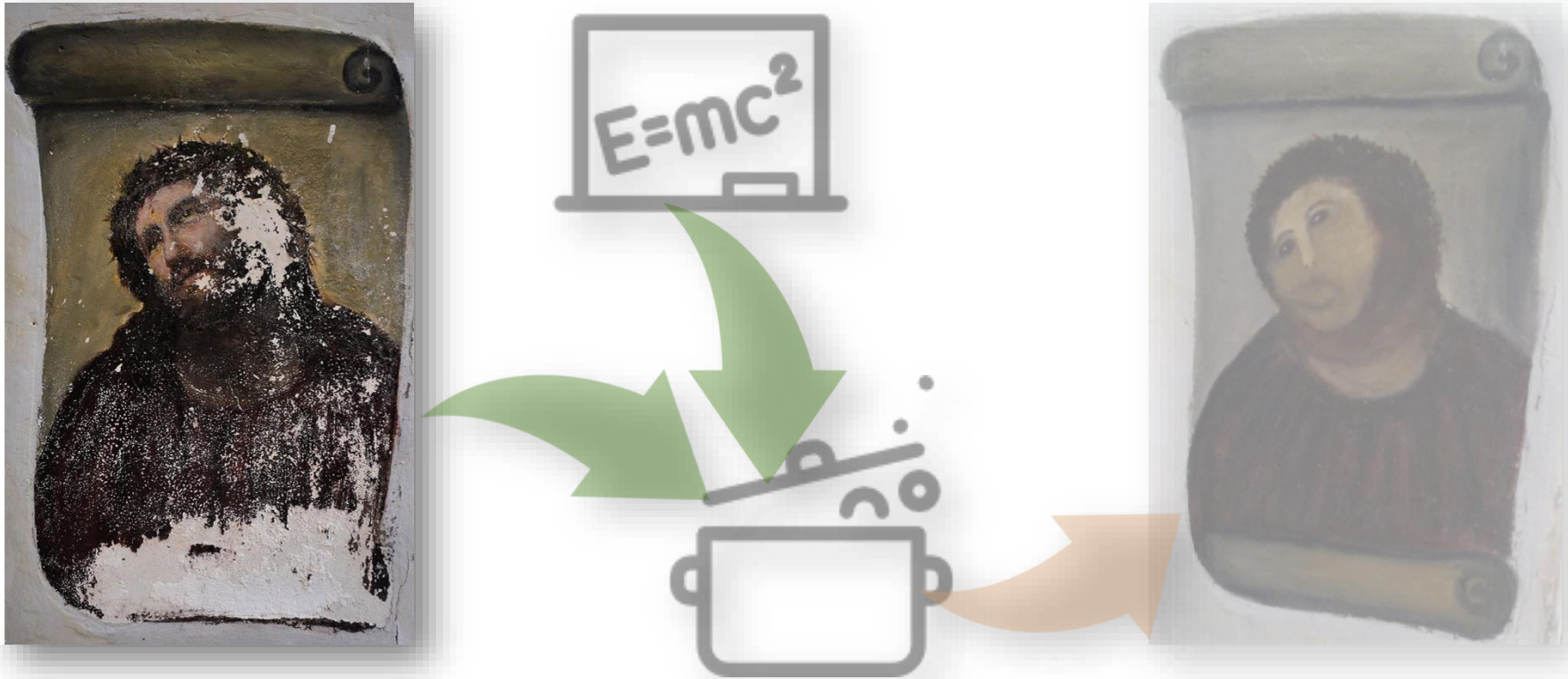
AUGURY
Reconstructing Earth's mantle convection

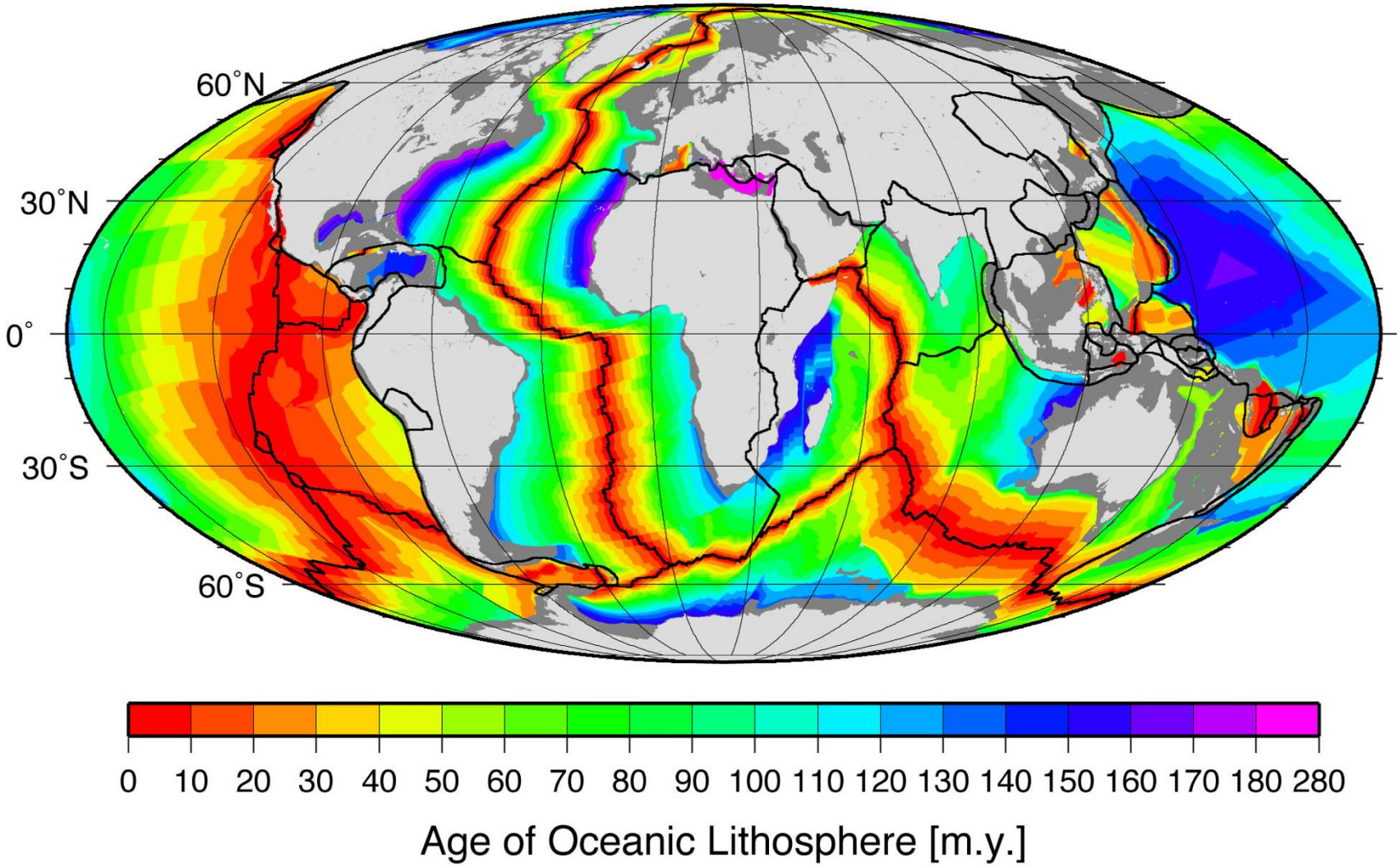
European Research Council
Established by the European Commission


Géosciences 3D
Lyon 1
Home
Resources
Partners
Contact
FR | EN
Les Ondes Sismiques
Mécanismes au foyer
Propagation des Ondes Sismiques
Mouvements des plaques tectoniques
700°C




E=mc²


E=mc²


60˚N
30˚N
0˚
30˚S
60˚S
0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150 160 170 180 280
Age of Oceanic Lithosphere [m.y.]

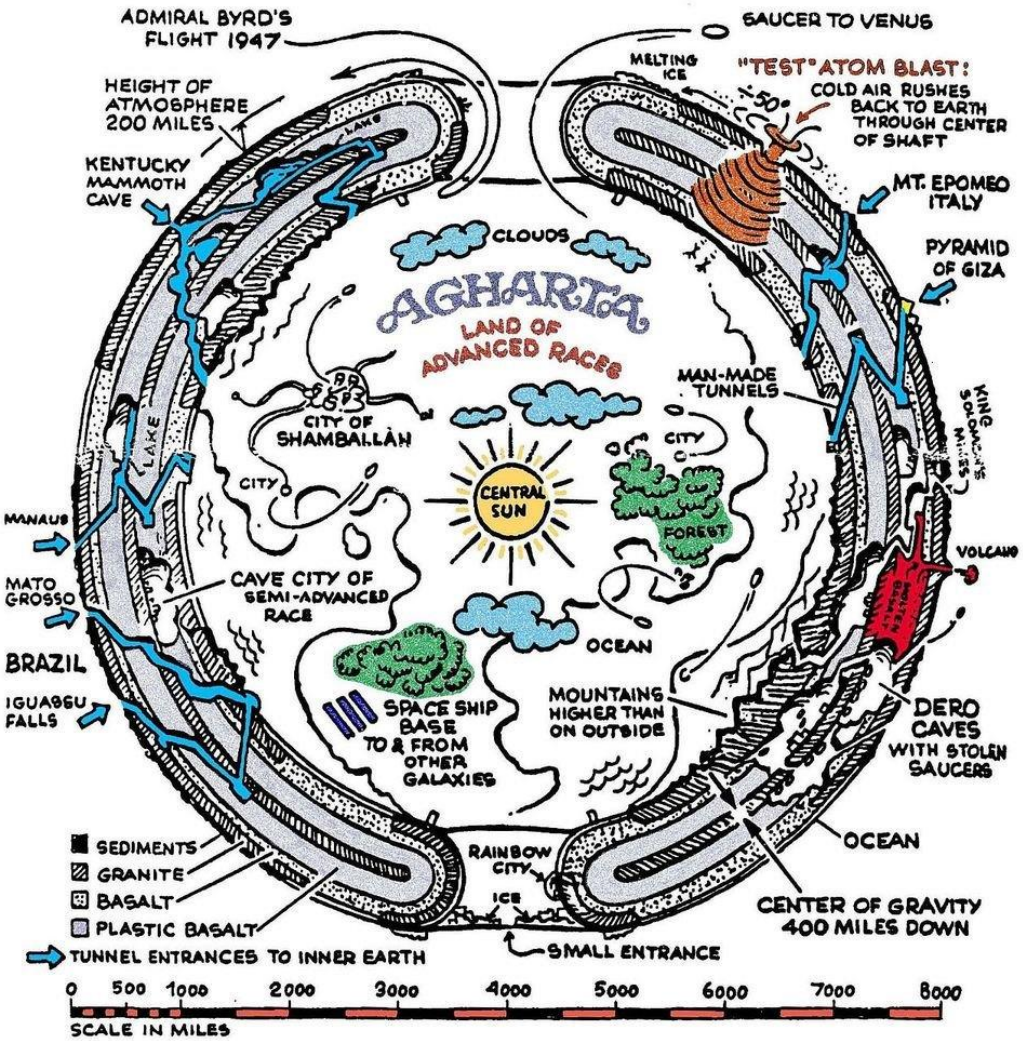
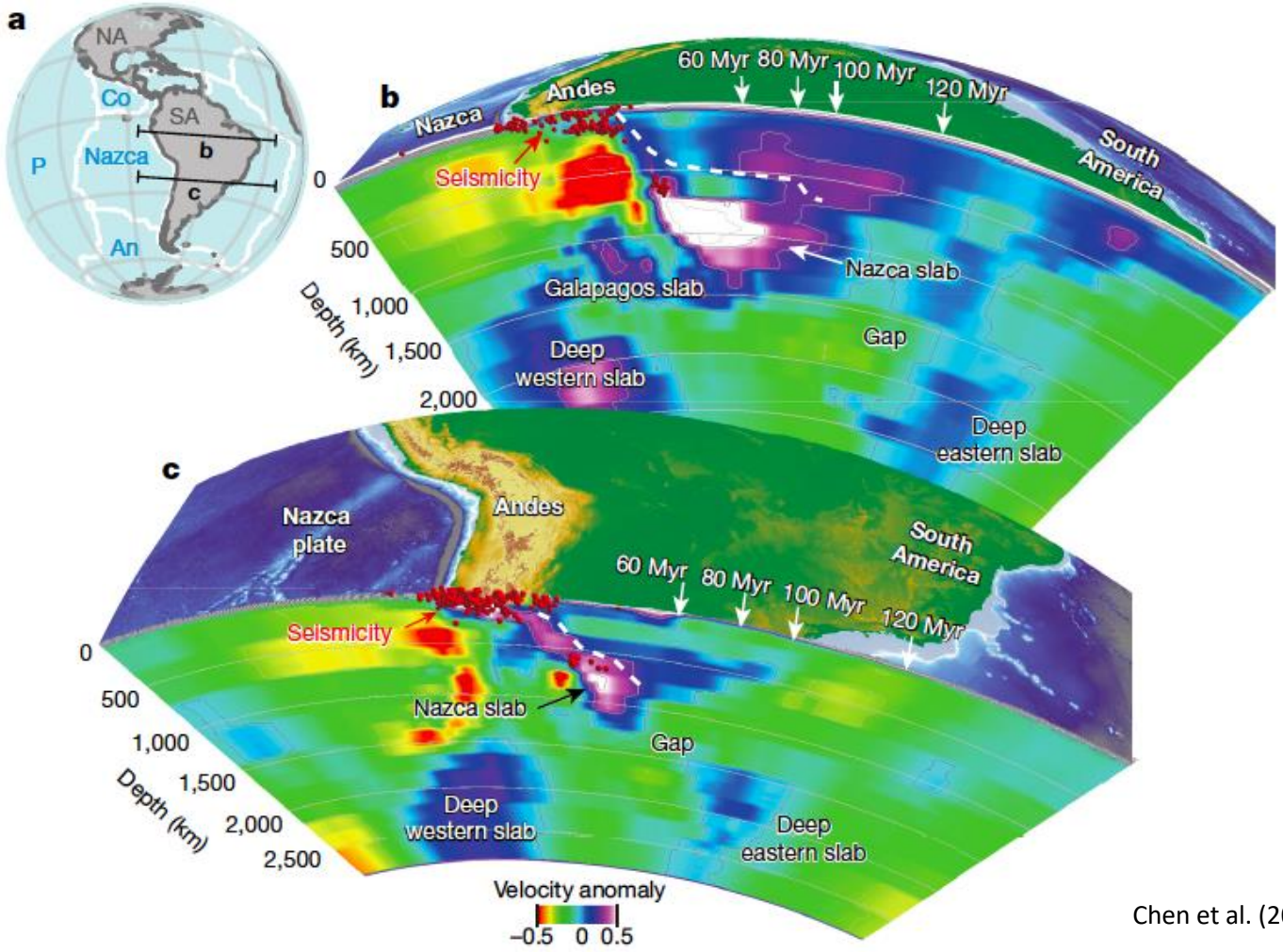
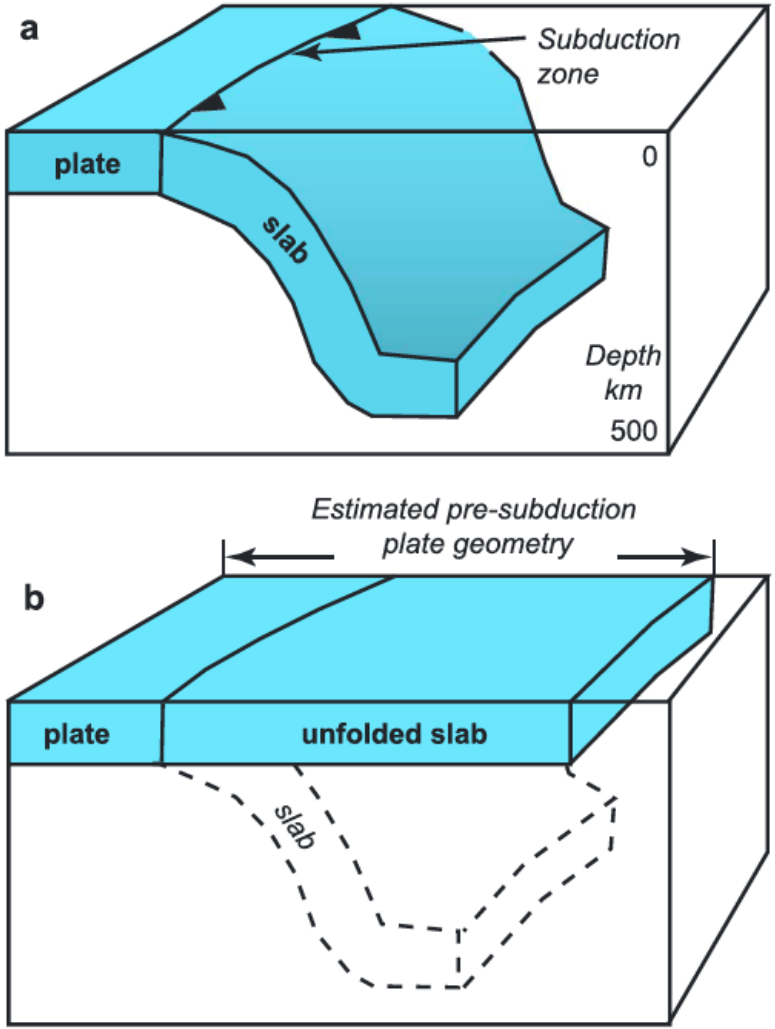

ADMIRAL BYRD'S FLIGHT 1947
SAUCER TO VENUS
MELTING ICE
"TEST" ATOM BLAST!
COLD AIR RUSHES BACK TO EARTH THROUGH CENTER OF SHAFT
-50°
HEIGHT OF ATMOSPHERE 200 MILES
KENTUCKY MAMMOTH CAVE
MT. EPOMEO ITALY
PYRAMID OF GIZA
CLOUDS
AGHARTA
LAND OF ADVANCED RACES
MAN-MADE TUNNELS
CITY OF SHAMBALLAH
CITY
CENTRAL SUN
CITY
FOREST
KING SOLOMON'S MINES
LAKE
MANAUS
MATO GROSSO
BRAZIL
IGUAÇU FALLS
CAVE CITY OF SEMI-ADVANCED RACE
VOLCANO
OCEAN
SPACE SHIP BASE TO & FROM OTHER GALAXIES
MOUNTAINS HIGHER THAN ON OUTSIDE
DERO CAVES WITH STOLEN SAUCERS
OCEAN
SEDIMENTS
GRANITE
BASALT
PLASTIC BASALT
TUNNEL ENTRANCES TO INNER EARTH
RAINBOW CITY
ICE
SMALL ENTRANCE
CENTER OF GRAVITY 400 MILES DOWN
0 500 1000 2000 3000 4000 5000 6000 7000 8000
SCALE IN MILES


Plate tectonics enhancers
L-GLUTAMINE
WEIDER
1000 CAPS
DYMATIZE

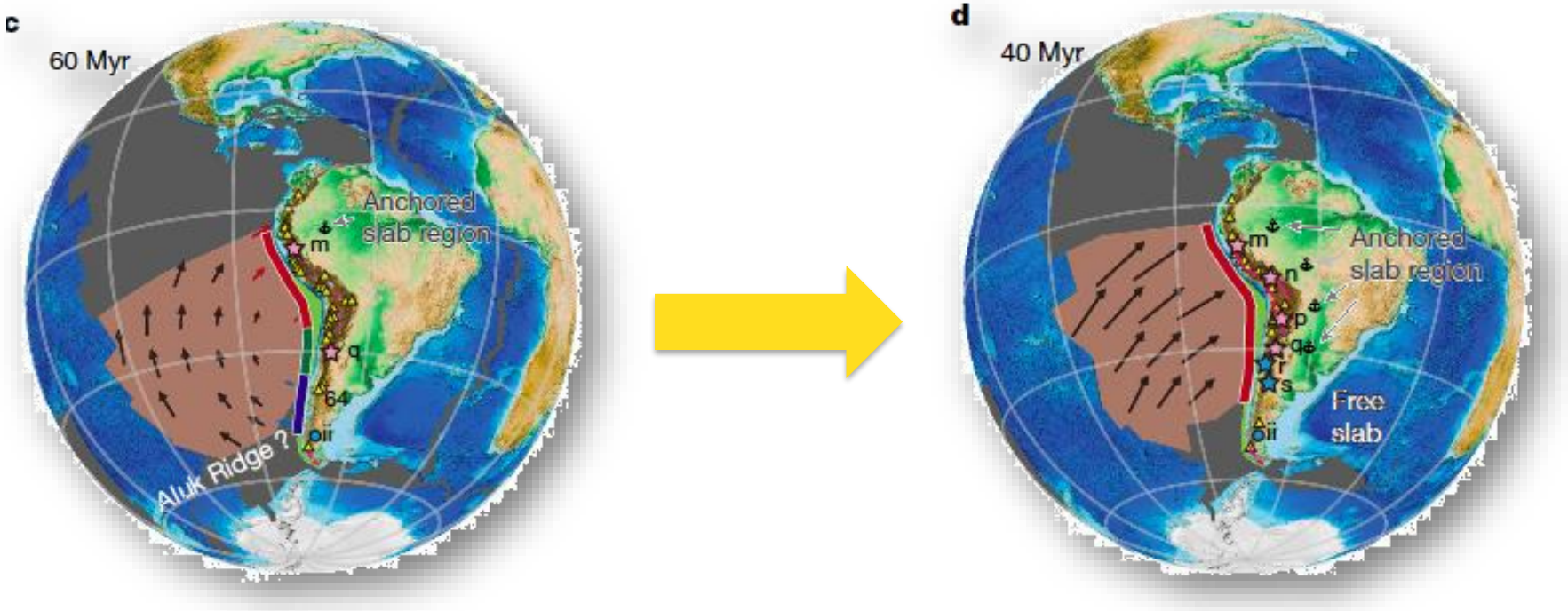

The tomography enhancer



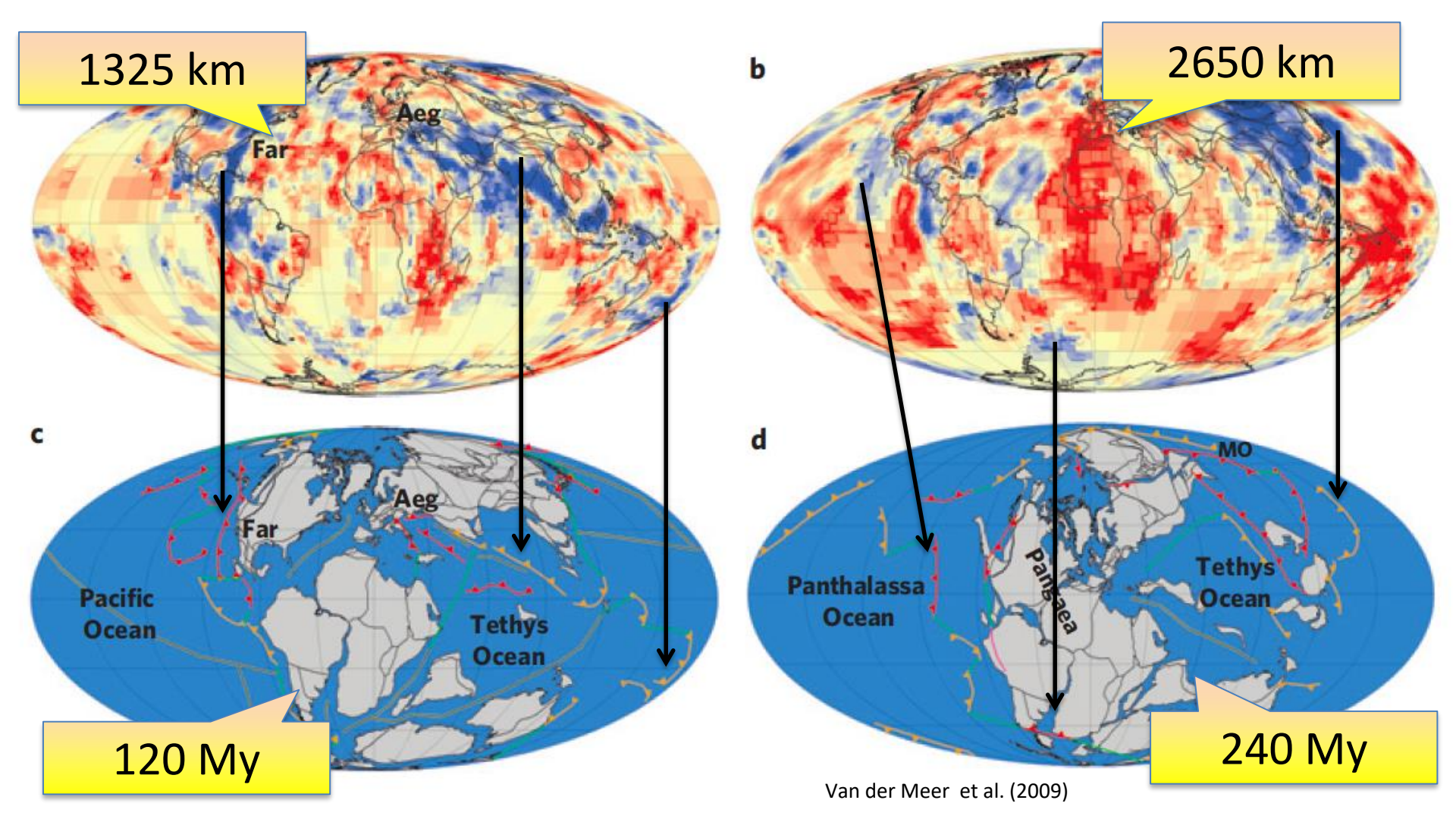
Chen et al. (2019)


a
Subduction zone
plate
slab
0
Depth km
500
Estimated pre-subduction plate geometry
b
plate
unfolded slab
slab

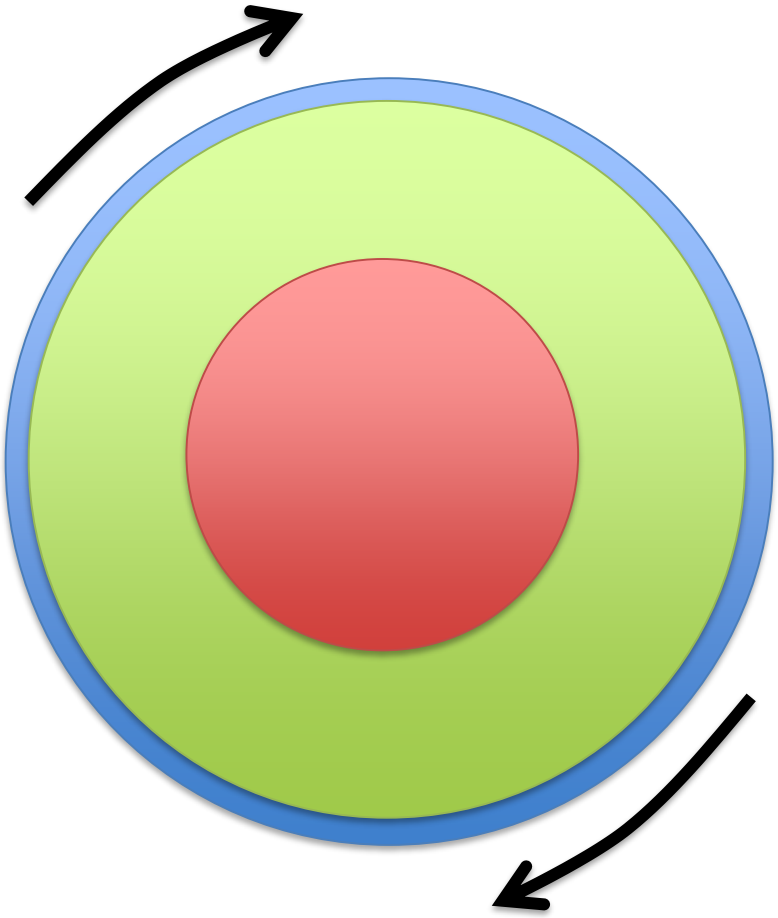
Wu et al. (2016)



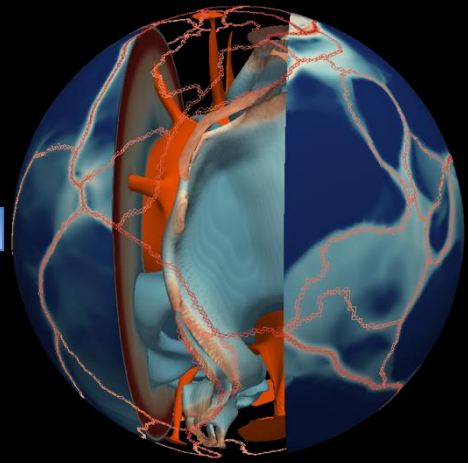
Chen et al. (2019)

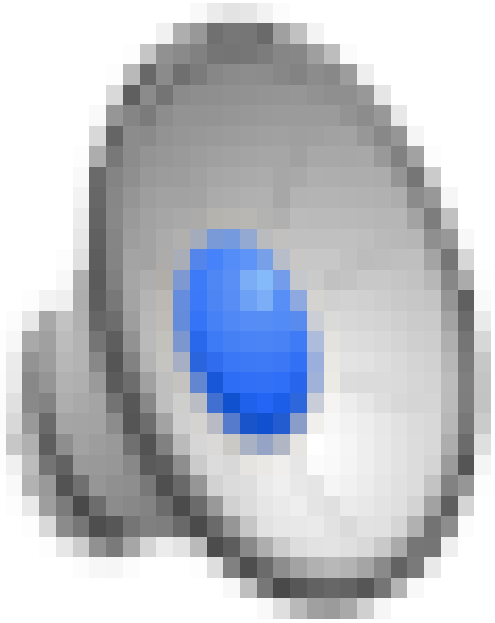


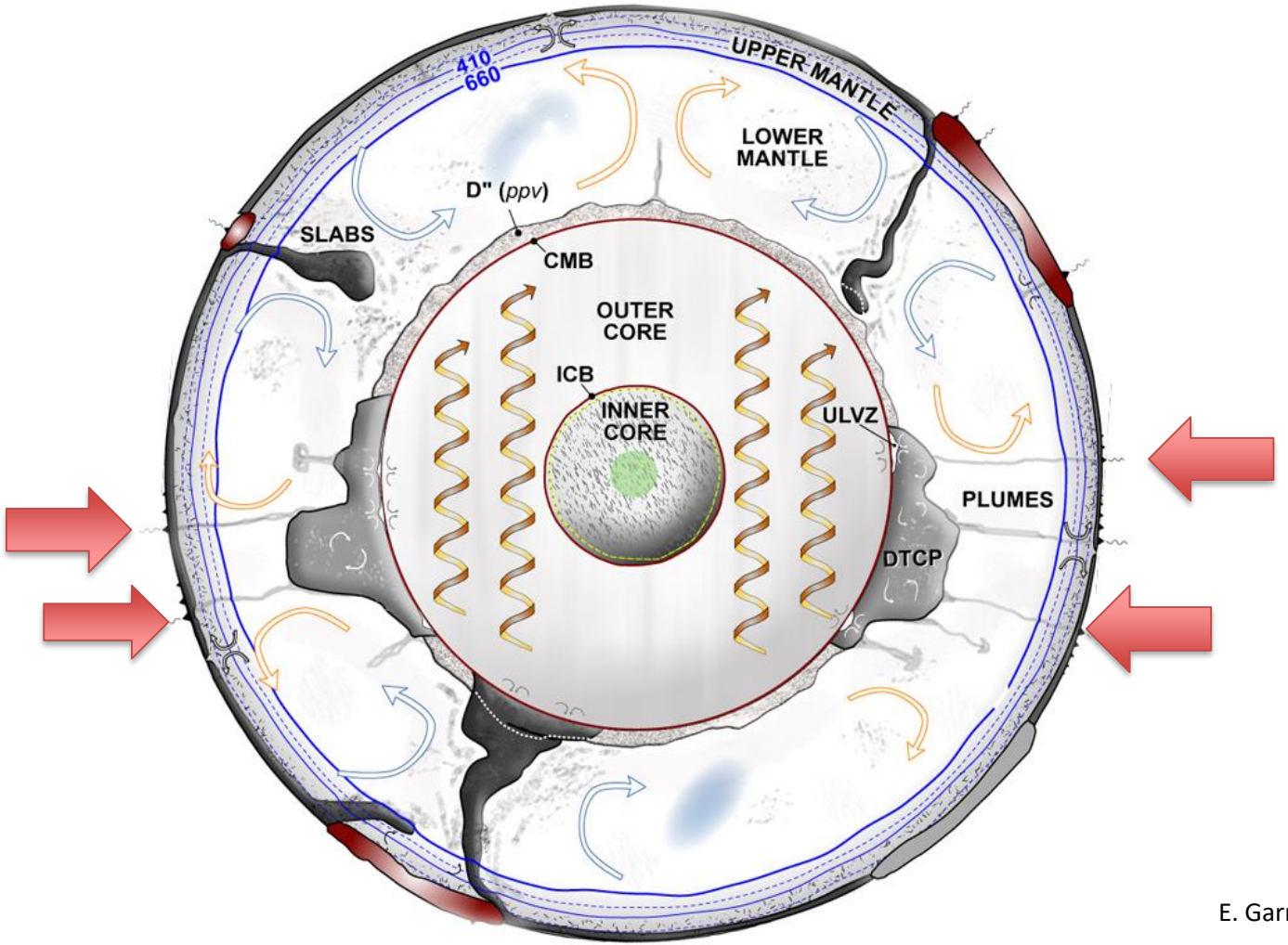
Van der Meer et al. (2009)



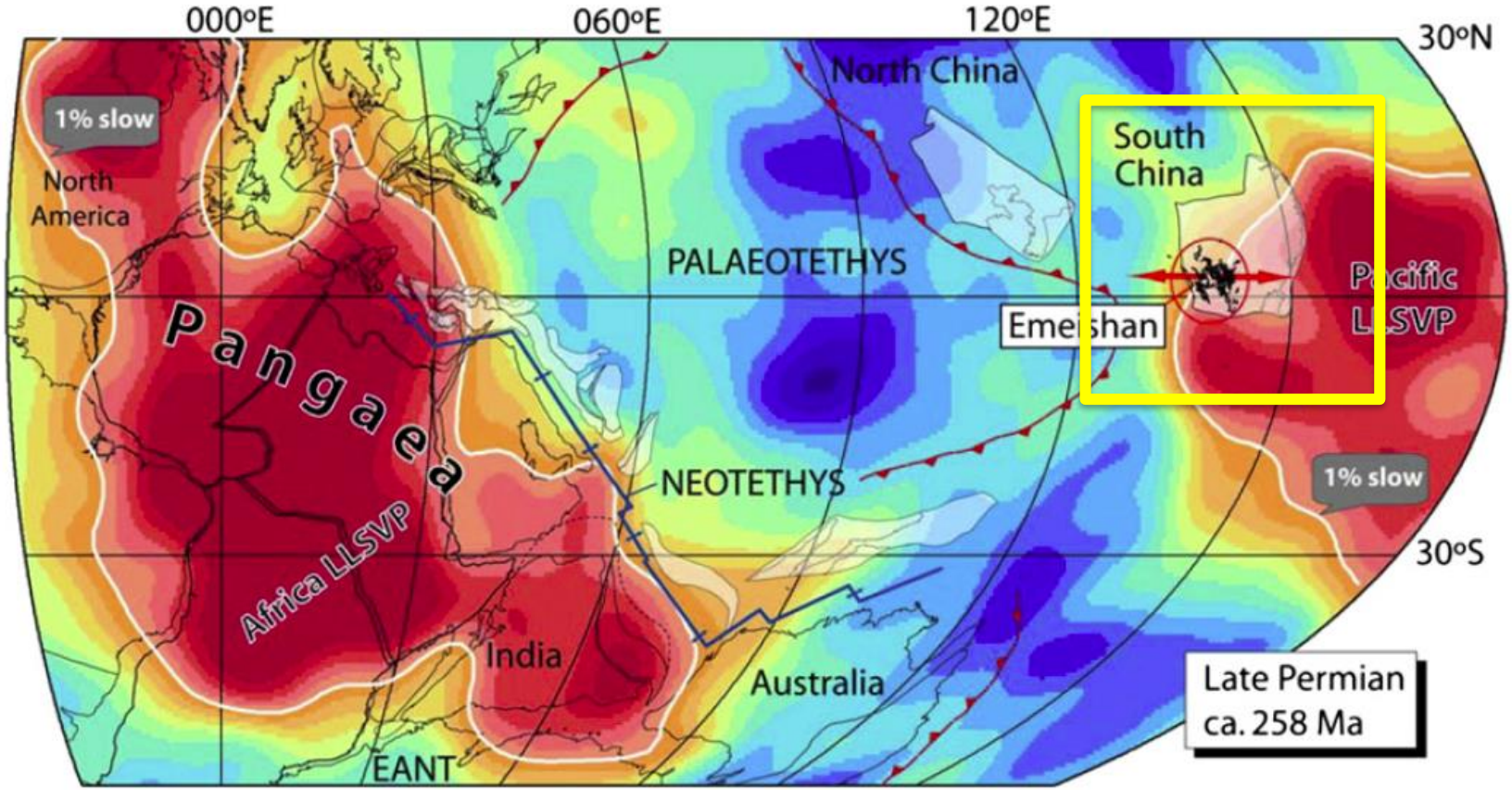
The geodynamics enhancer



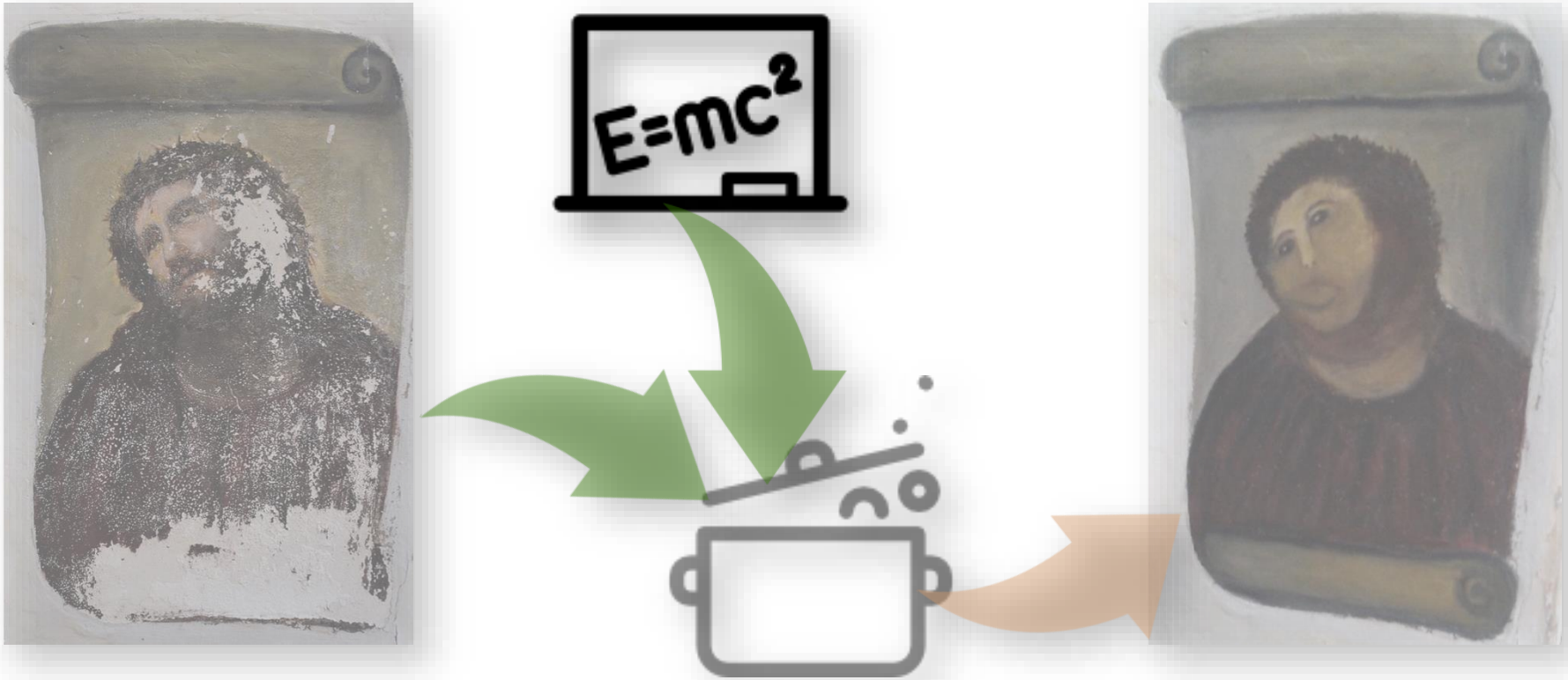


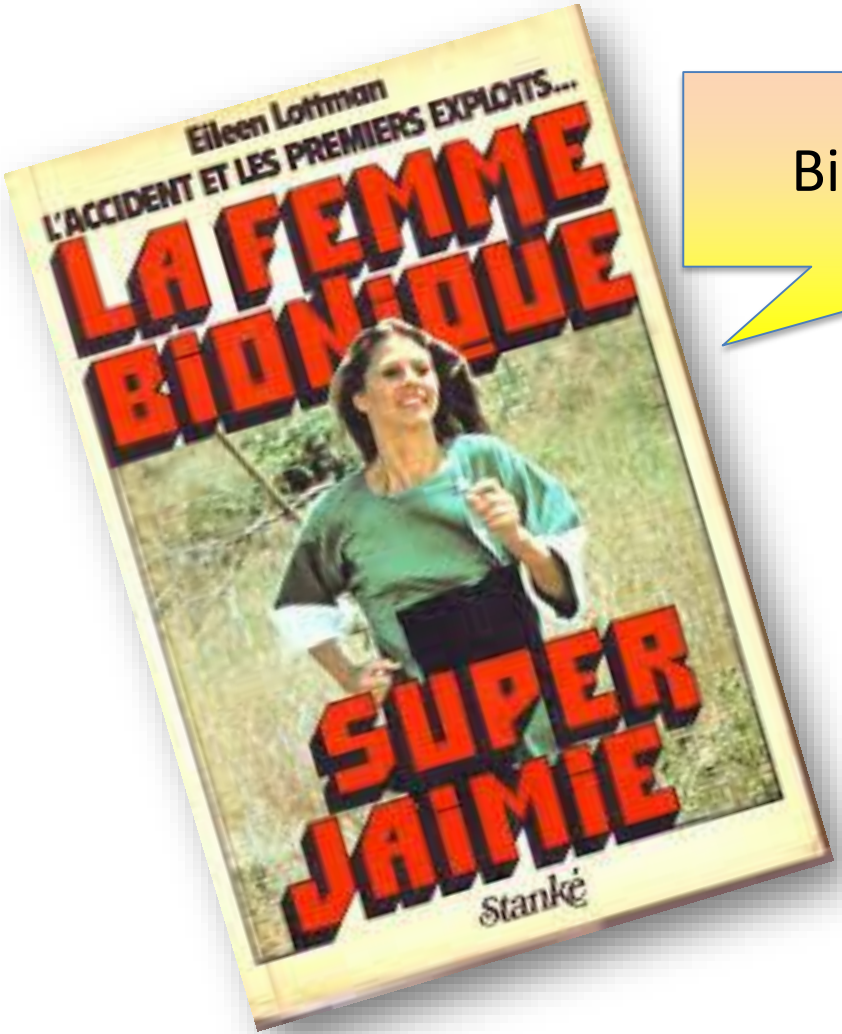

410
660
UPPER MANTLE
LOWER MANTLE
D" (ppv)
SLABS
CMB
OUTER CORE
ICB
INNER CORE
ULVZ
PLUMES
DTCP

E. Garnero



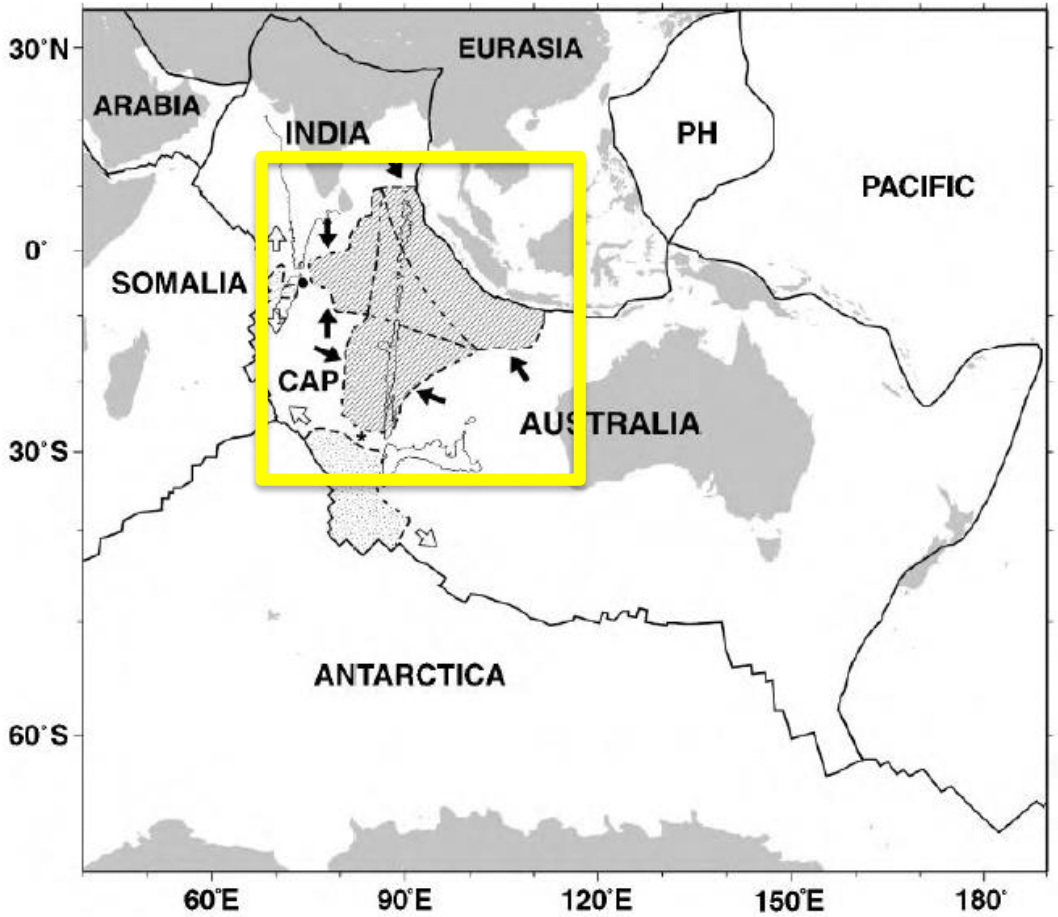
Torsvik et al. (2008)


E=mc²

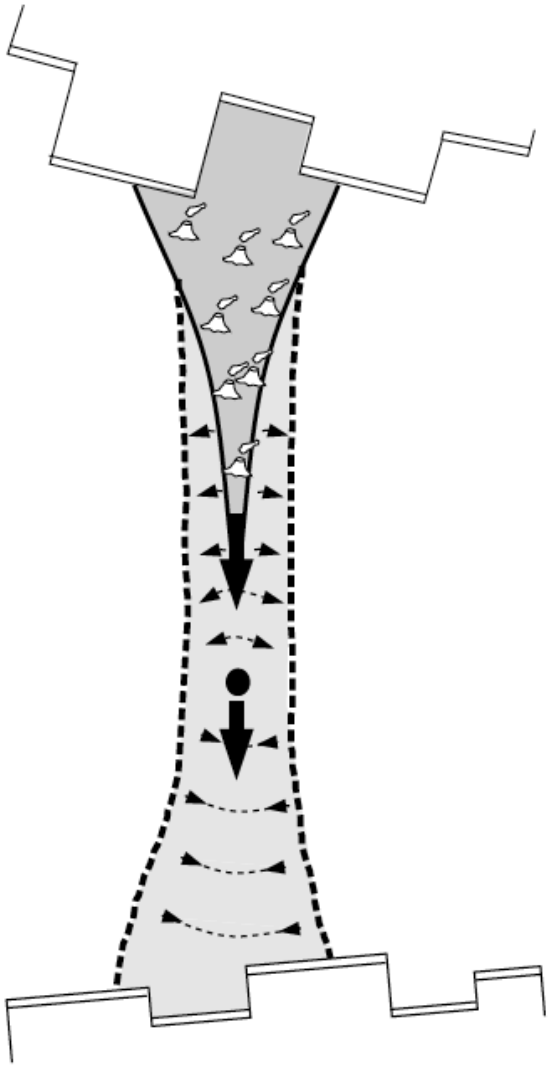


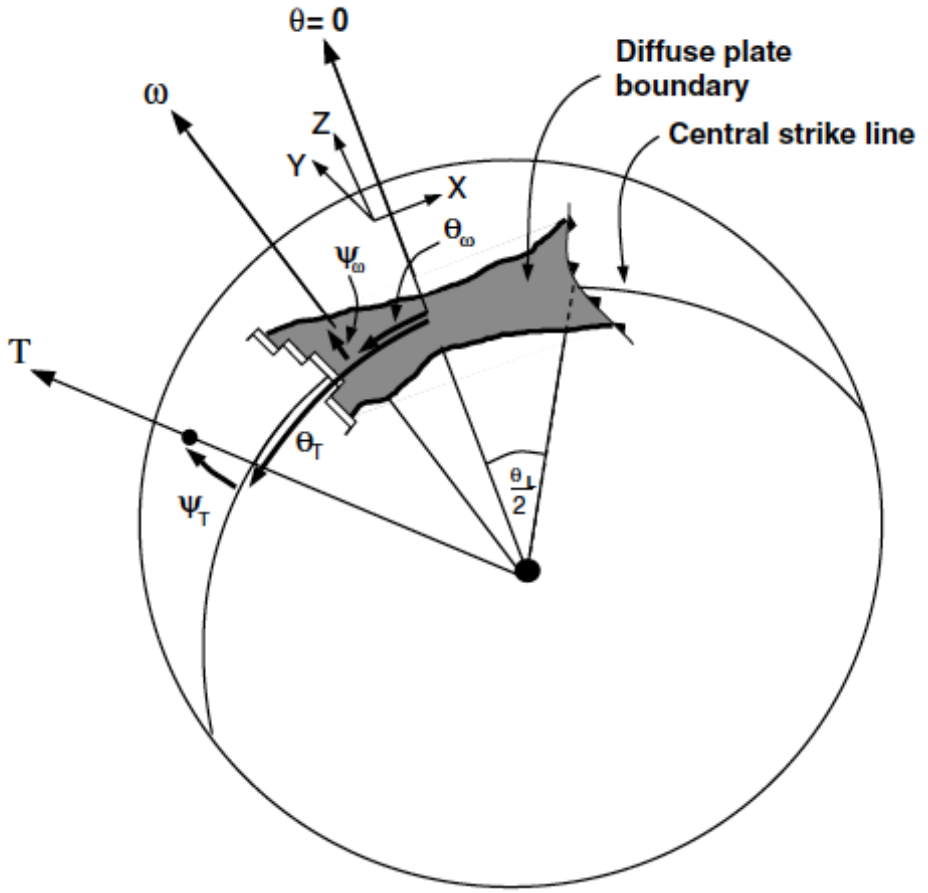
Bionic plate tectonics

Non-rigid plates

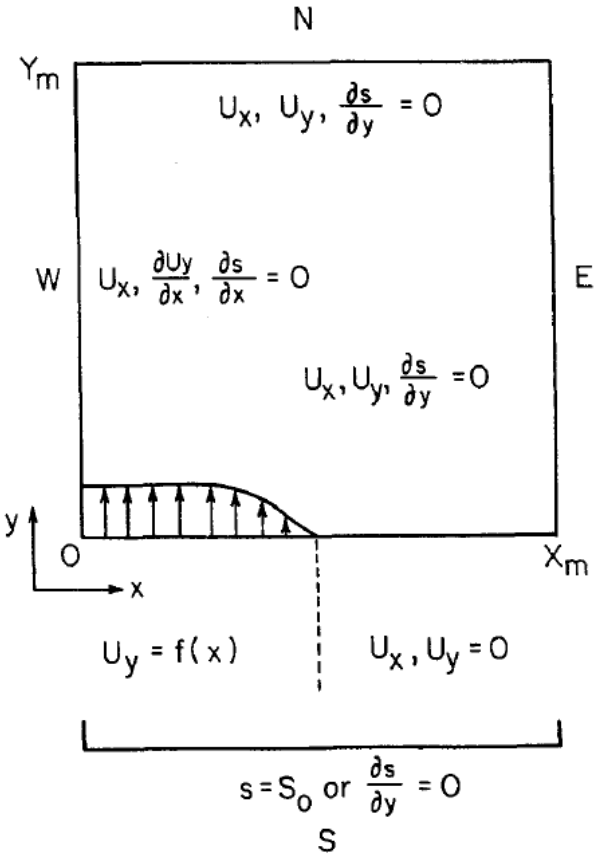


Royet & Gordon (1997)

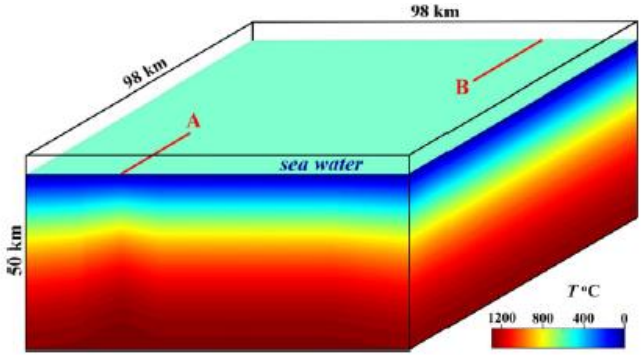


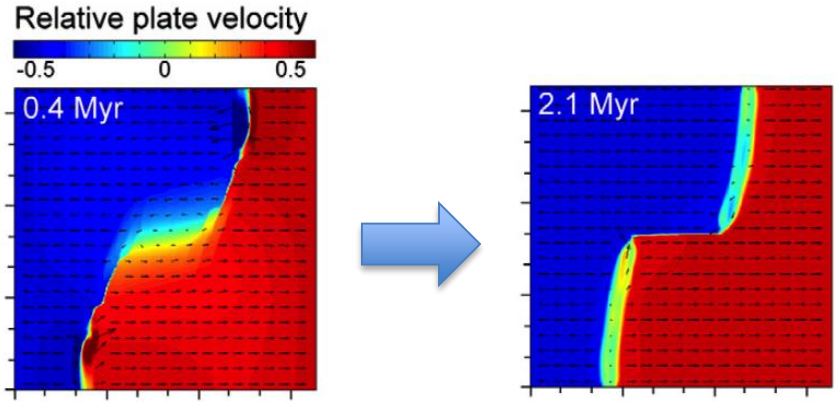


Zatman et al. (2001)

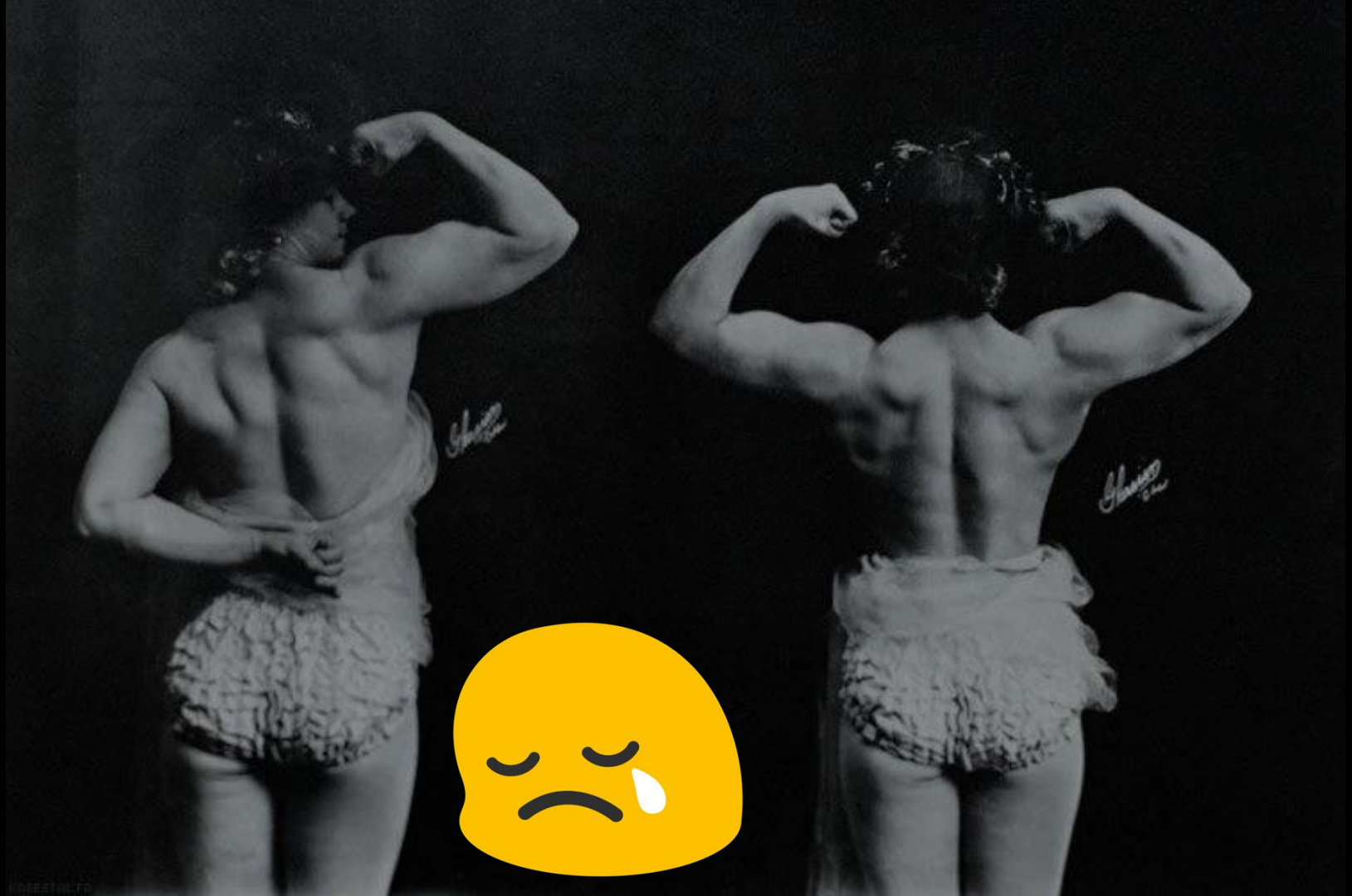


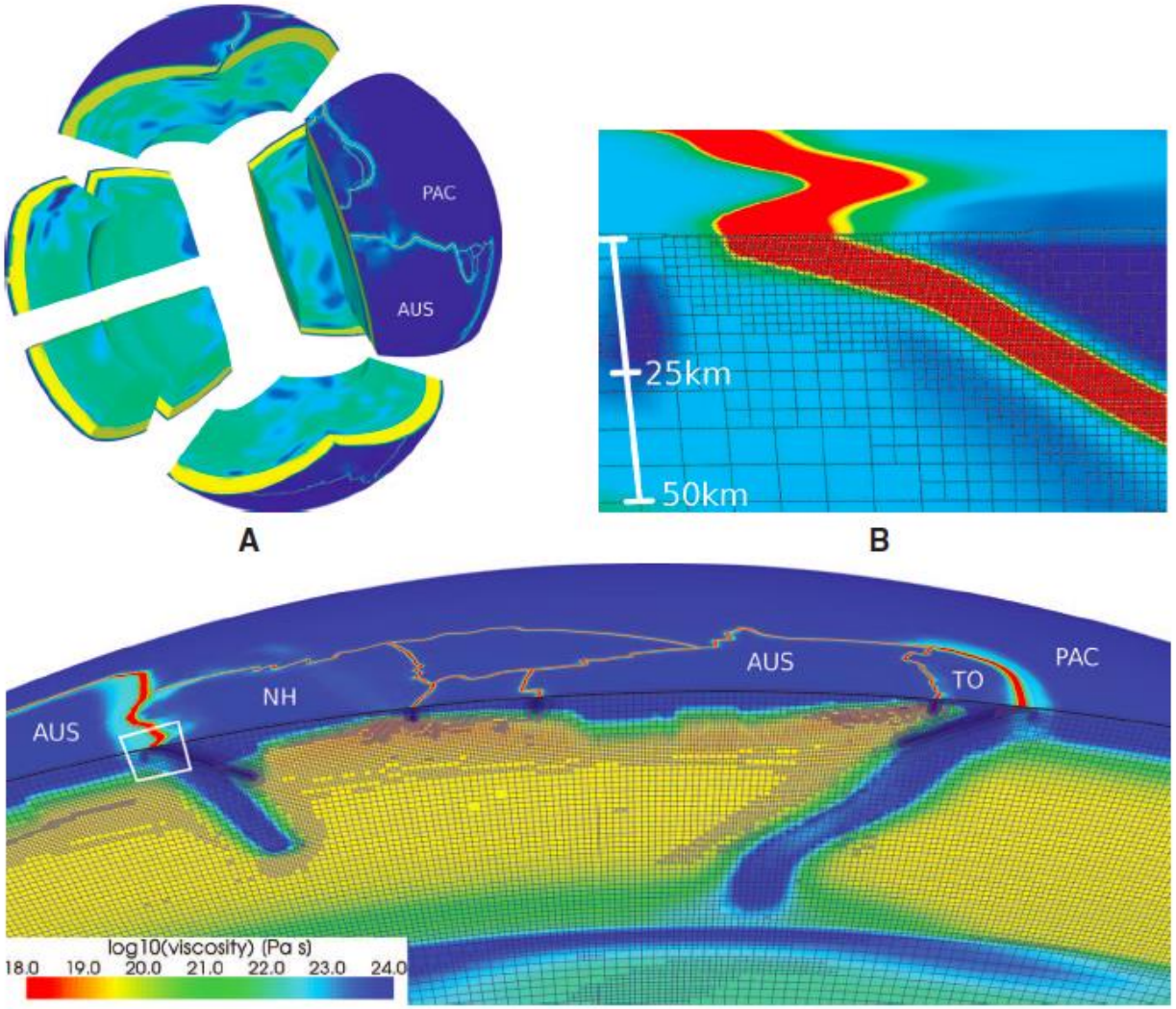
England & McKenzie (1982)



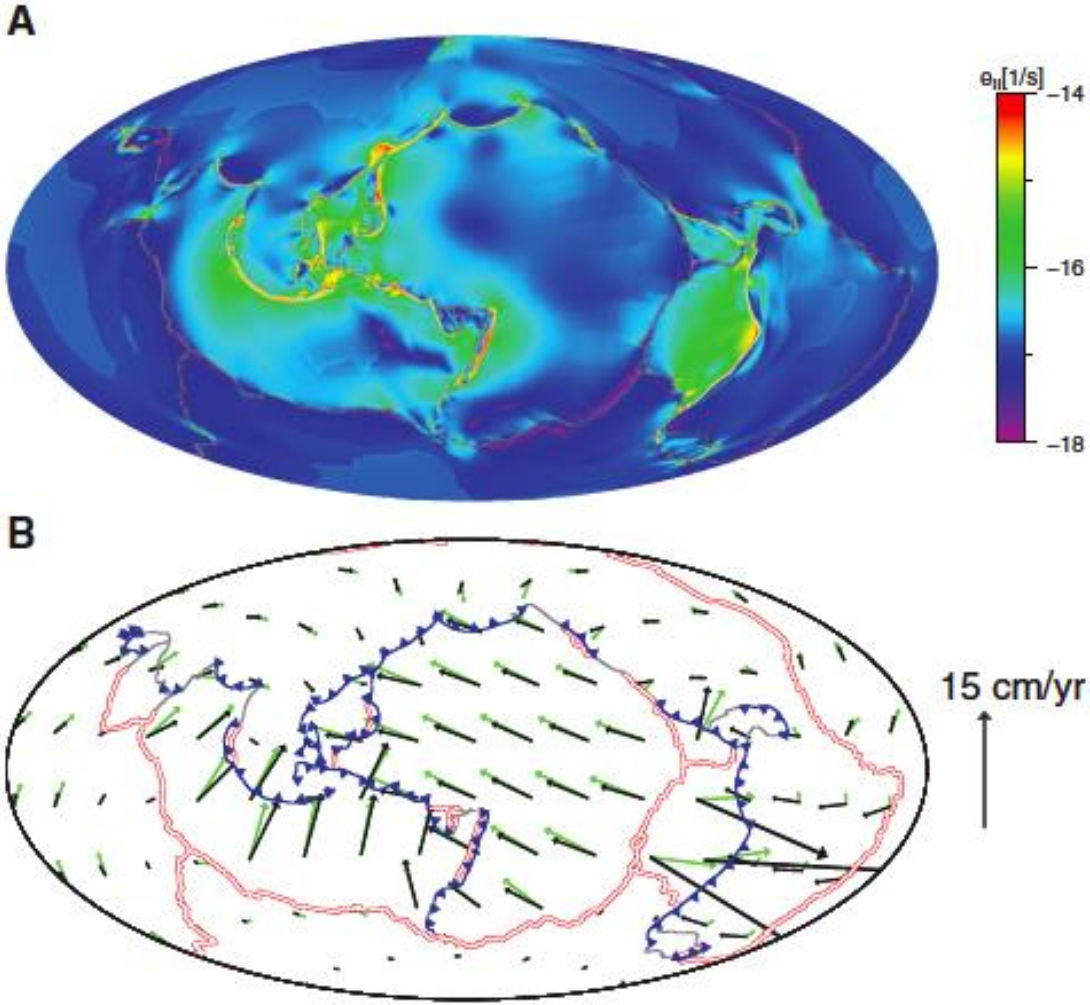


Gerya (2013)



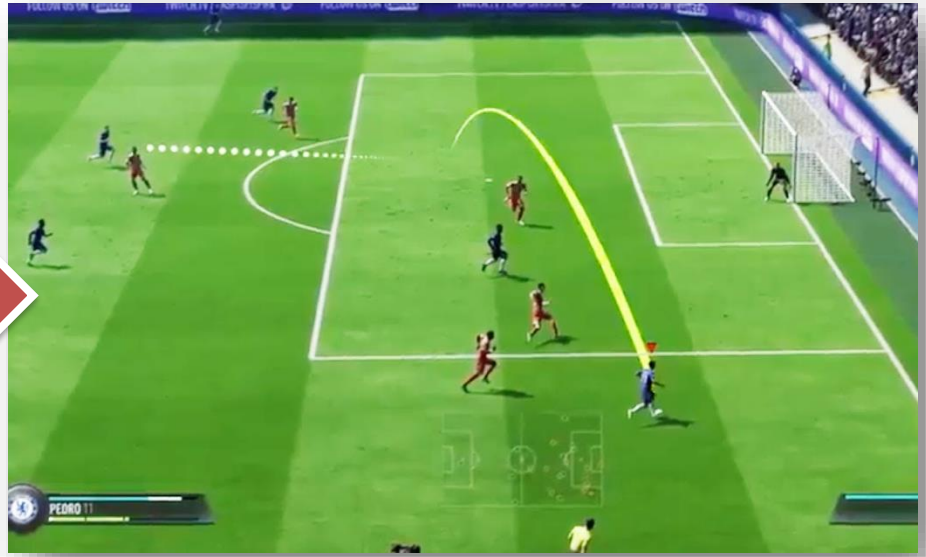


Stadler et al. (2010)

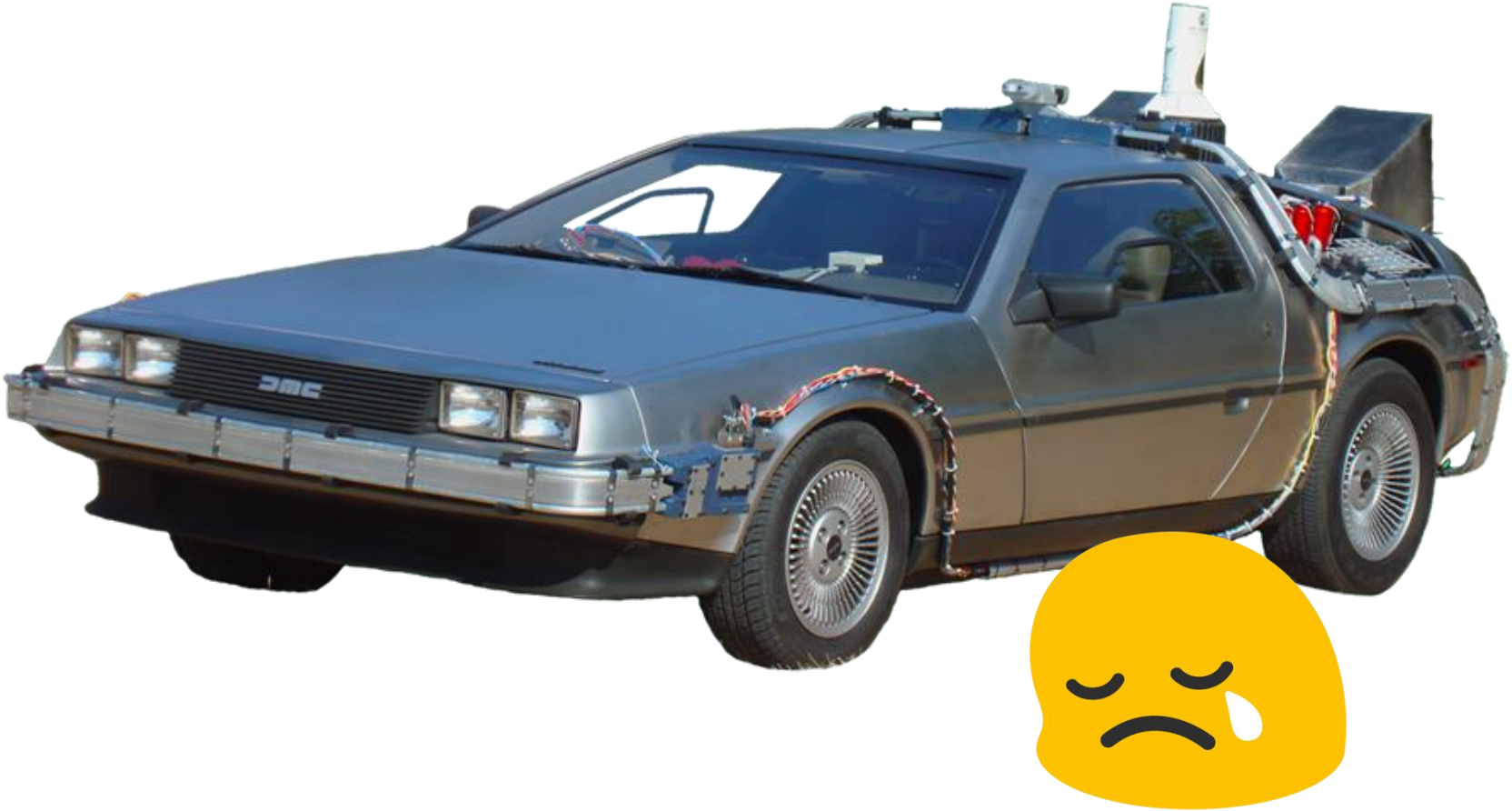


Stadler et al. (2010)

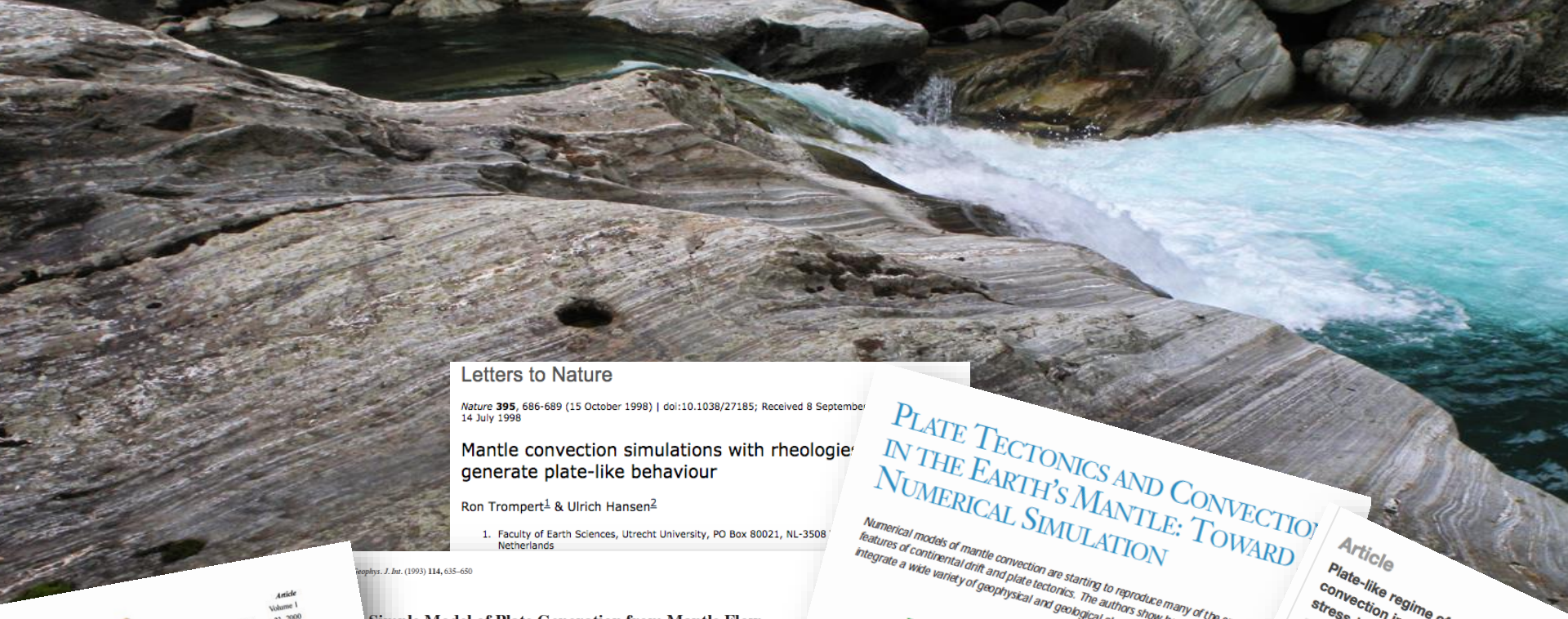
Lateral motion



Lateral+vertical motion


DMC


Dynamic feedback between lithosphere and mantle



Letters to Nature

Nature **395**, 686-689 (15 October 1998) | doi:10.1038/27185; Received 8 Septembe
14 July 1998

Mantle convection simulations with rheologie
generate plate-like behaviour

Ron Trompert[1] & Ulrich Hansen[2]

1. Faculty of Earth Sciences, Utrecht University, PO Box 80021, NL-3508
Netherlands

Geochemistry Geophysics Geosystems G3
AN ELECTRONIC JOURNAL OF THE EARTH SCIENCES
Published by AGU and the Geochemical Society

Article
Volume 1
Published August 23, 2000
Paper number 2000GC000036
ISSN: 1525-2027

nsistent generation of tectonic plates in
lependent, three-dimensional mantle
ection simulations
eudoplastic yielding

Tackley
ment of Earth and Space Sciences, University of California, Los Angeles, 405 Hilgard Avenue, Los Angeles, nia 90095 (ptackley@zepher.ess.ucla.edu)

Abstract: Presented here are self-consistent, three-dimensional simulations of mantle convection, approximation of plate tectonic behavior that is continuous in space and time. material description of silicate deformation, with a simple ...; however, the required yield strength or ... Toroidal/poloidal ratios ... form of

Geophys. J. Int. (1993) **114**, 635–650

Simple Model of Plate Generation from Mantle Flow

id Bercovici*
ment of Geology & Geophysics
of Ocean & Earth Science & Technology
y of Hawaii, Honolulu
Department of Geology & Geophysics, Yale University

SUMMARY

A simple model of non-Newtonian creeping flow is used to evaluate cla
allow viscous mantle flow to become plate-like. The model describes
motion driven by sources and sinks. The sources represent spreading
resent subduction zones; the sources and sinks thus also prescribe
the surface flow field. The toroidal (strike-slip) component of the
solution of the Stokes equation with non-Newtonian rheology. As
the model, the horizontal divergence from the two-dimensional
Olson & Bercovici (1991) is used for the source-sink field. The
fluid flow reproduces the rectangular plate is used to measure the

PLATE TECTONICS AND CONVECTIO
IN THE EARTH'S MANTLE: TOWARD
NUMERICAL SIMULATION

Numerical models of mantle convection are starting to reproduce many of the essential features of continental drift and plate tectonics. The authors show how such methods ca integrate a wide variety of geophysical and geological observations.

Plate tectonics is a kinematic description of Earth that treats the outer shell of its mantle as a number of plates or rigid spherical caps that move with respect to each other (see the "Plate tectonics" sidebar). The mantle is the outer, solid 3,000-km-thick shell that overlies Earth's fluid outer core. An enormous amount of geological and geophysical data has gone into determining the motion of the plates,[1] and within the last few years direct GPS measurements have corroborated the geological constraints on the motions of plates.

A fundamental question in geology has been, what drives the plates? This question has largely been solved—the plates are part of a system of large-scale thermal convection—and geodynamicists have moved on to more difficult questions, such as what are the details of the coupling between surface motions and deeper mantle flow? and why do we have plate tectonics as co

posed to some other mode of tectr
mal convection?

Answering these more subtle qu
plicated by the fact that the primar
motion is to consume the old oce
cycle it into the mantle. The plate
plate history is therefore limited
to 200 million years or so (less
rely heavily on evidence draw
cal and computational mod
continents that are not const
plate motions. Ideally these
dence go hand in hand to re

Model formulation

The equations

1525-2027/00/0108 © 2000 EIS

LOUIS M

Article

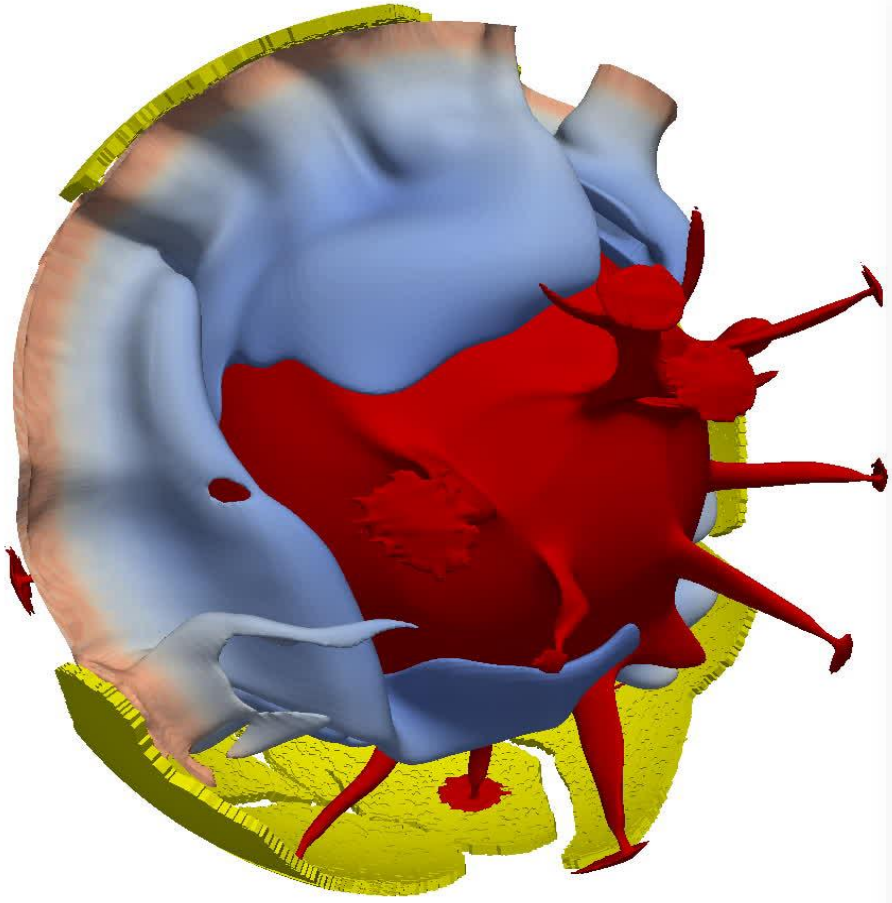
Plate-like regime of a numerically mode
convection in a fluid with temperature-, p
stress-history-dependent viscosity

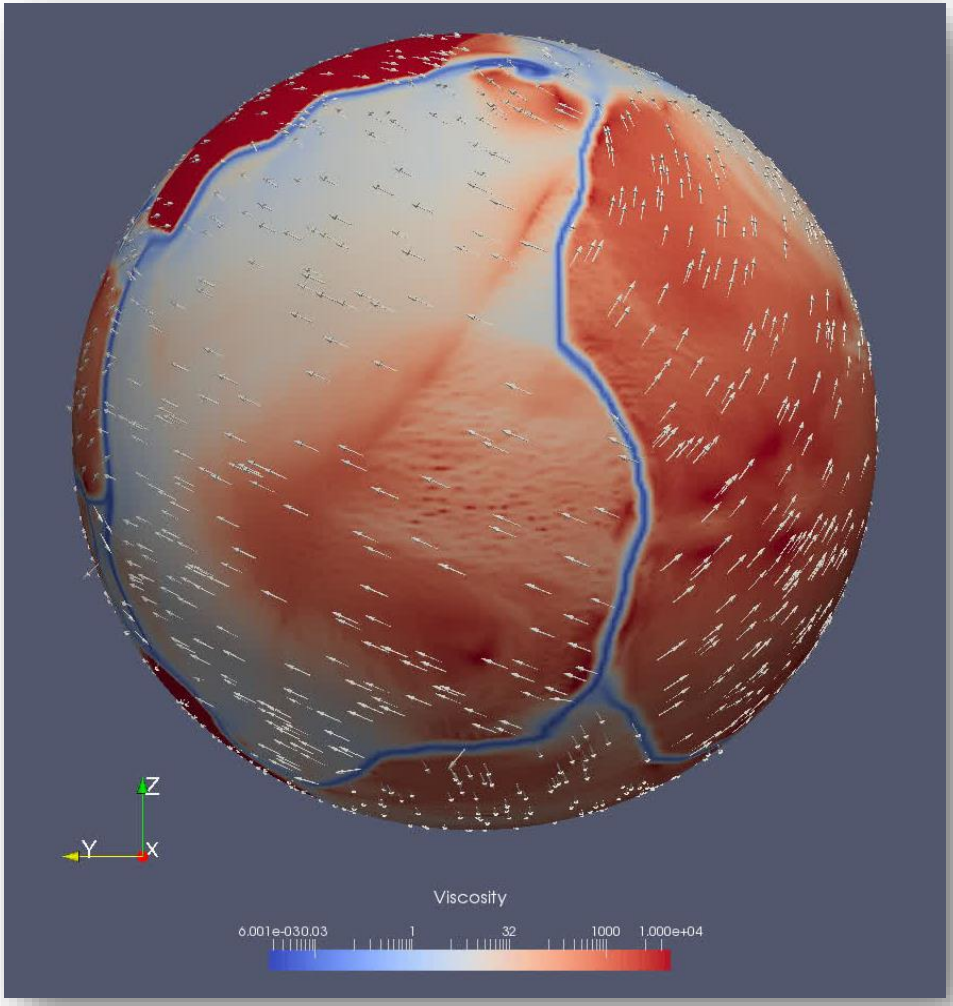
Masaki Ogawa

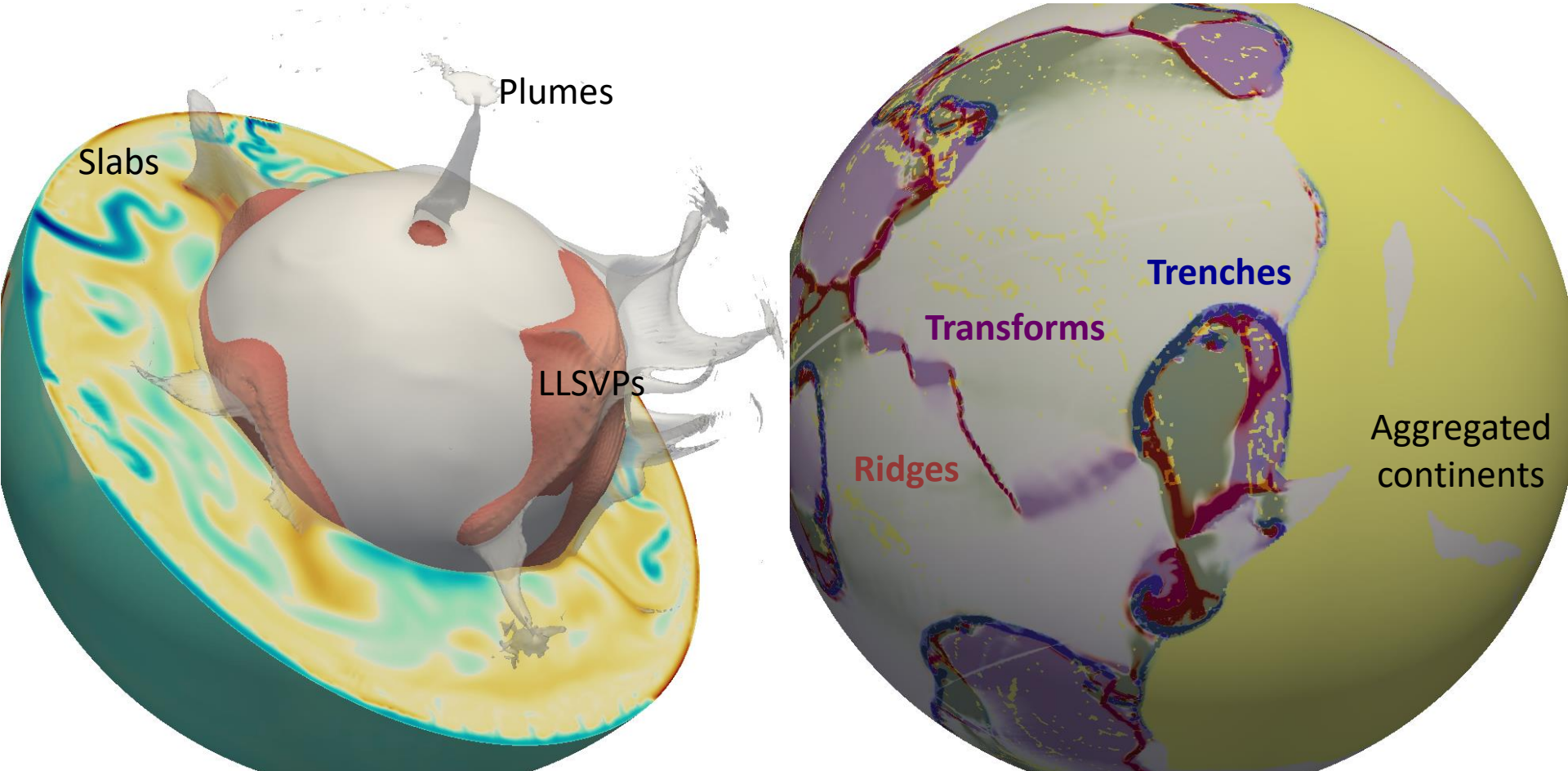
Journal of Geophysical Research Atmospheres (Impact Factor: 3.43). 02/2
DOI: 10.1029/2000JB000069

ABSTRACT

A series of numerical models are presented for two-dimensional thermal convec
with viscosity that nonlinearly depends on "degree of damage" omega as well as
and pressure; omega increases and viscosity decreases with time when the com
strong viscous dissipation. The convecting fluid recovers from the damage
time that depends on temperature. The omega dependence of visc
viscosity relationship that consists of two branches, the "int
"damaged branch" at high stress, with a hysteresis
(large) and viscosity is high (low) on the intac
depend on stress history. The depen
induces a regime where the
fragmented into smalle
lithosphere are
Each pl




Z
Y
X
Viscosity
6.001e-03
0.03
1
32
1000
1,000e+04


Plumes
Slabs
LLSVPs
Trenches
Transforms
Ridges
Aggregated
continents

Some shapes of plate tectonics to come

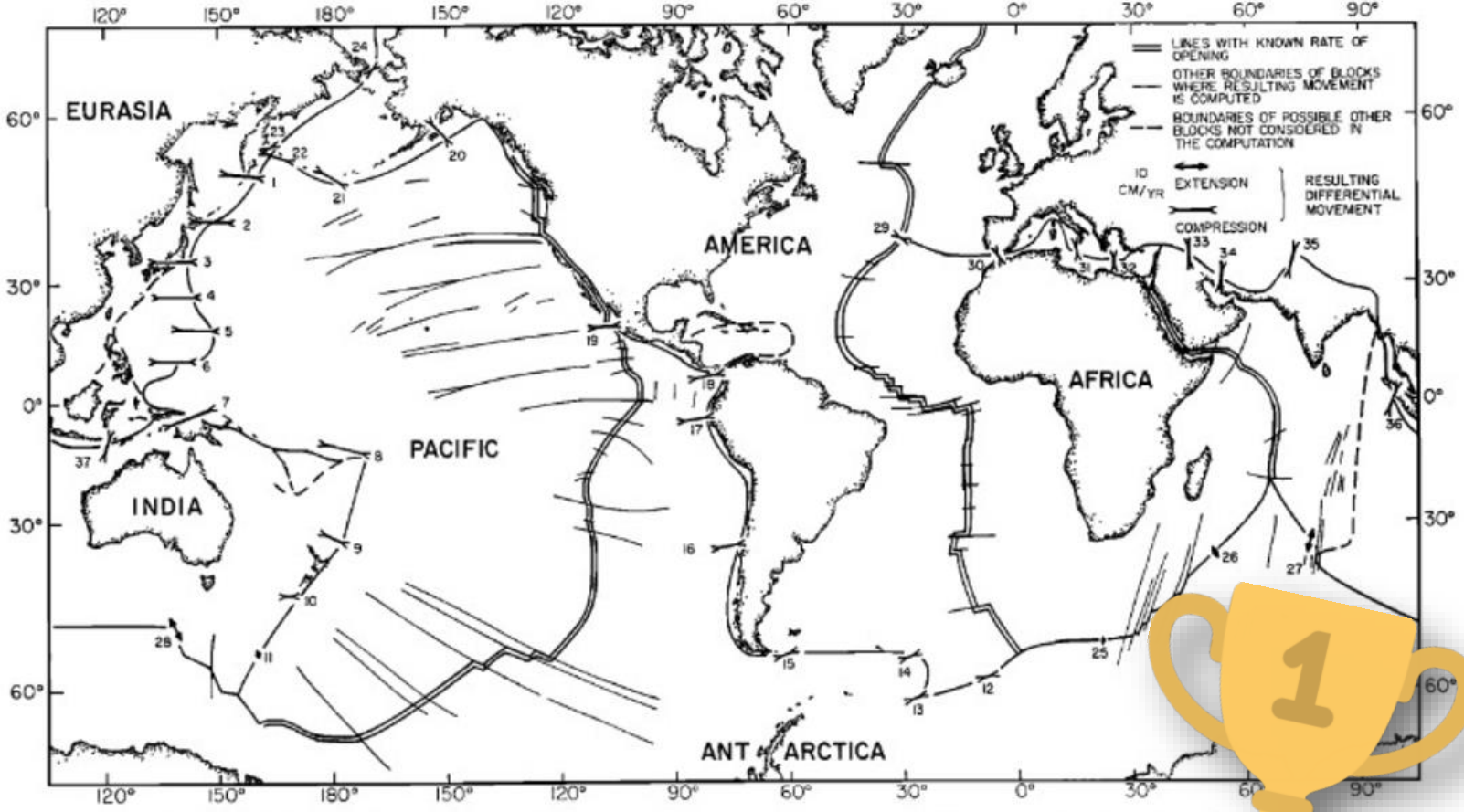


Fig. 6. The locations of the boundaries of the six blocks used in the computations. The numbers next to the vectors of ...tial movement refer to Table 5. Note that the boundaries where the rate of shortening or slippage exceeds about 2 cm/yr account ... world earthquake activity.

DID THIS REALLY HAPPEN?

CATEGORY: STRIPS

PRETTY FACE

06/04/2018

1 Comment

- WHO ARE WE? -

Our Story

Team

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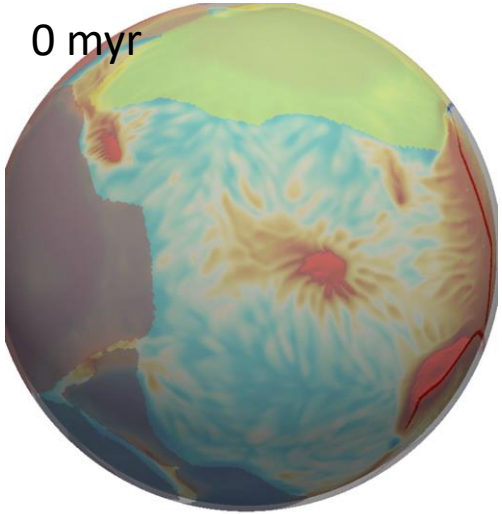
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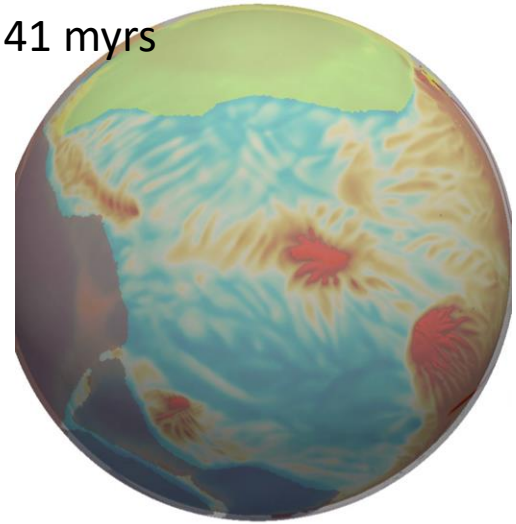
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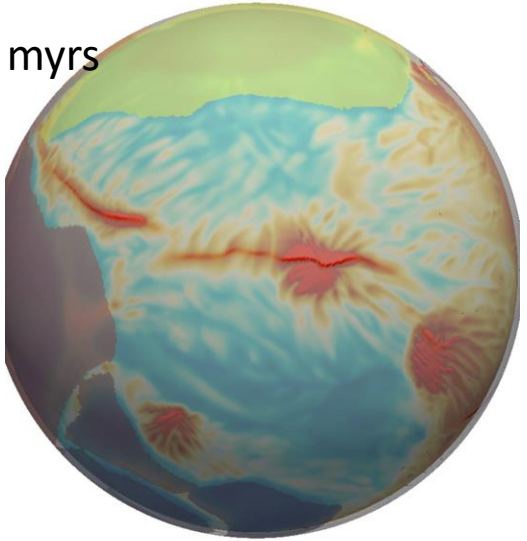
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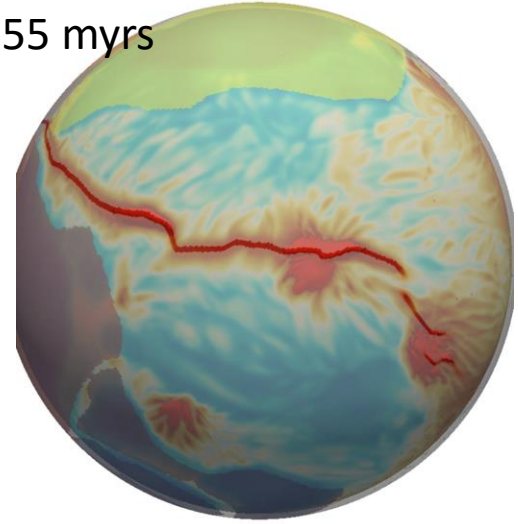
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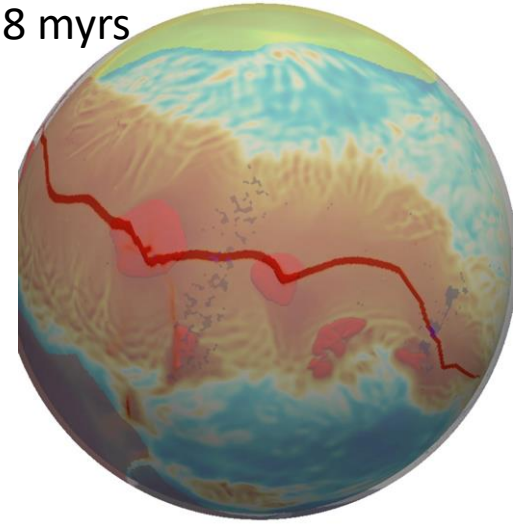
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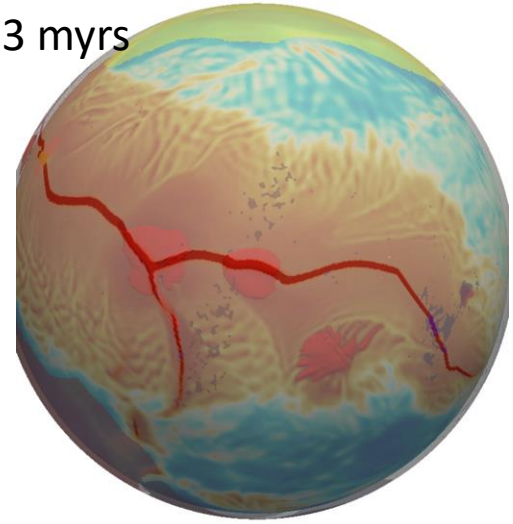
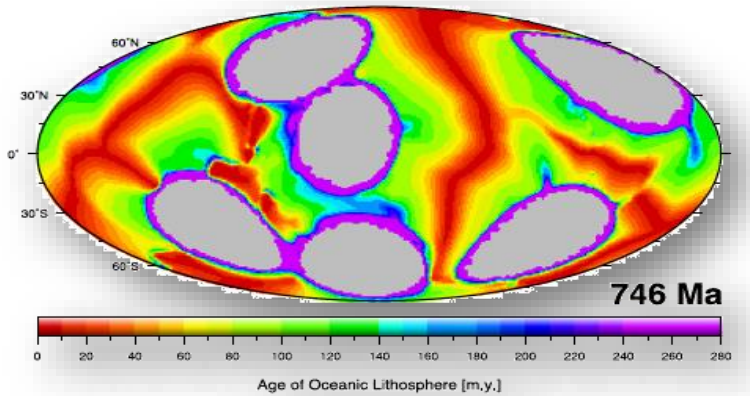
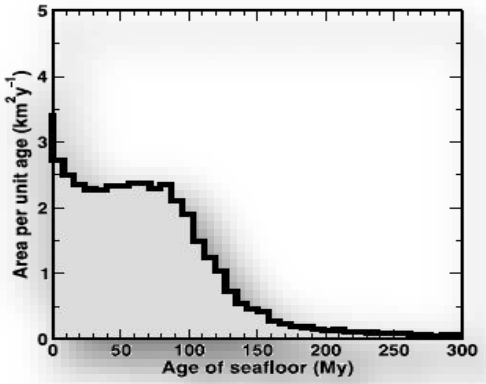
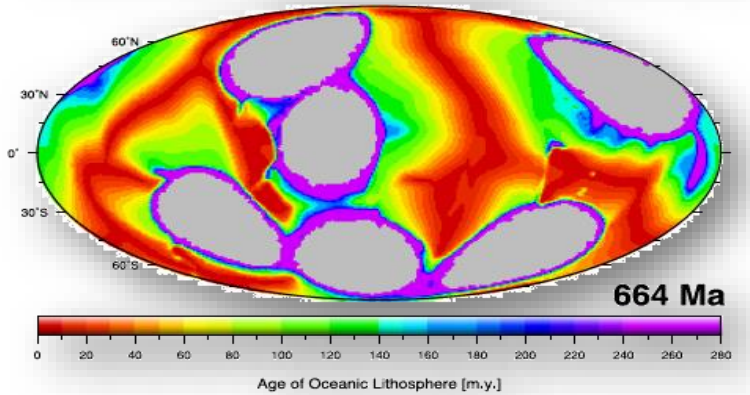
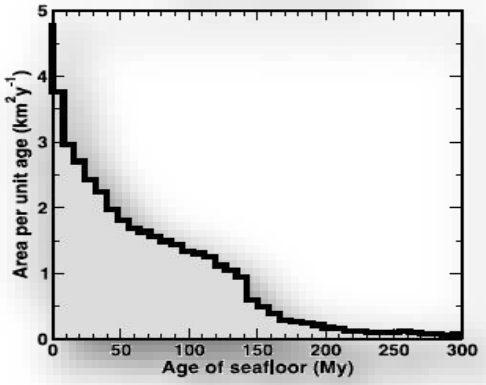

83 myrs

Seafloor age distribution



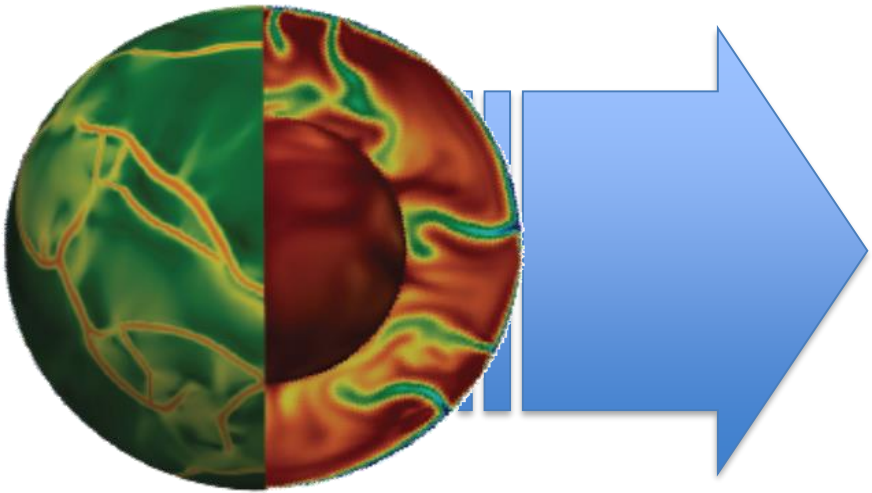


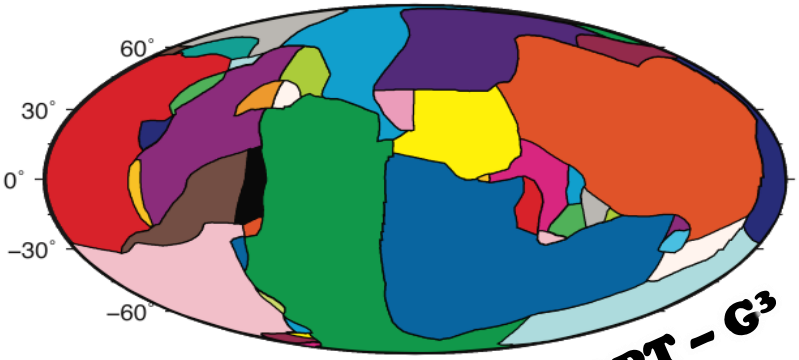




Coltice et al. (2012, 2013)

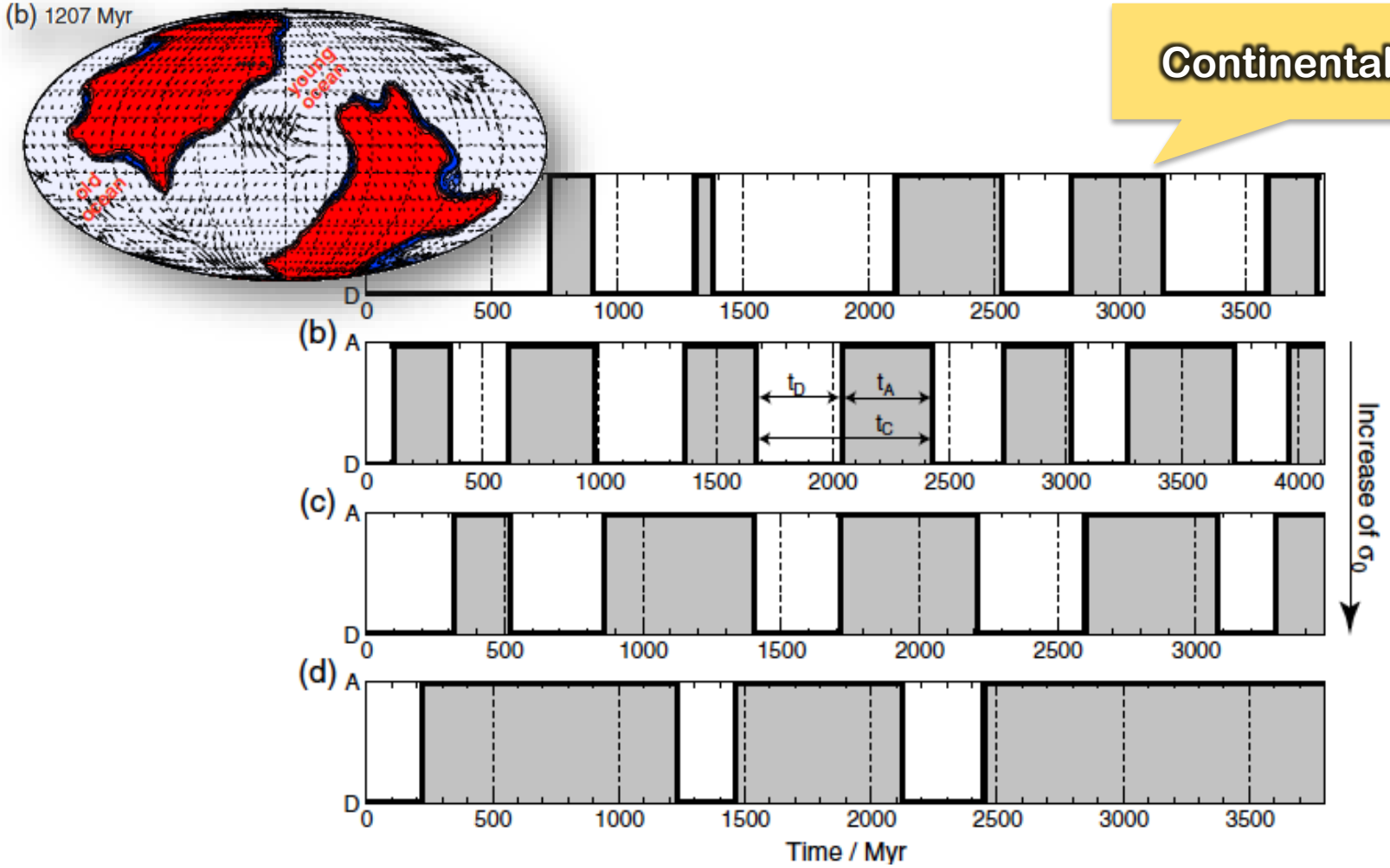
Plate size distribution





ADOPT – G³

Mallard et al. (2016, 2017)



Rolf, Coltice & Tackley (2014)