



GPlates

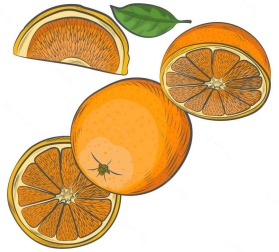


Interactive Tectonic Models

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May, 2024
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2. Downloading GPlates
3. Introduction to GPlates
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Introduction to learning outcomes

- Session 1
 - Introduction to theory
- **Session 2**
 - **Introduction to using GPlates**
 - **Practical guide to picking a plate reconstruction**
- Session 3
 - Using a plate reconstruction
- Assignment
 - Group task

<https://adamtkocsis.com/se3-gplates/>

Assignment

- Practical exercise with GPlates
- Short report (max. 3 A4 pages)
- Assignment can be written in German
- Due until the end of the lecture period (July 19) - necessary to pass the course

[The Assignment | GPlates for System Erde III. \(adamtkocsis.com\)](https://adamtkocsis.com)

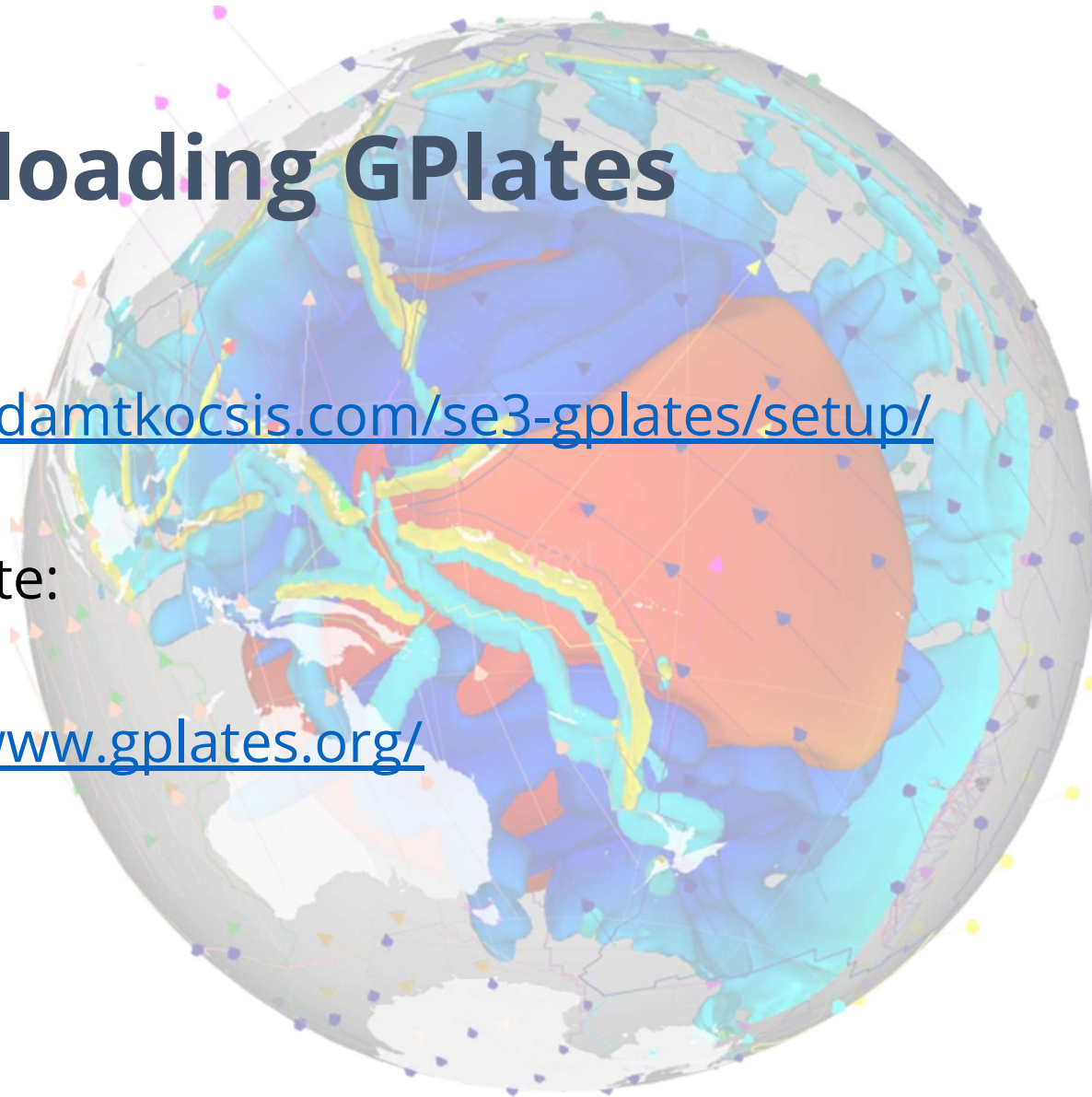
Downloading GPlates

Tutorial:

- <https://adamtkocsis.com/se3-gplates/setup/>

GPlates Site:

- [GPlates](https://www.gplates.org/)
- <https://www.gplates.org/>





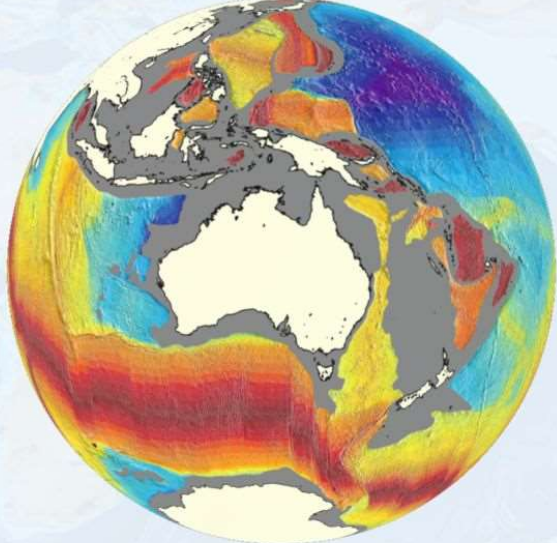
GPates

https://www.gplates.org

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GPates

GPates is a plate tectonics program. Manipulate reconstructions of geological and paleogeographic features through geological time. Interactively visualize vector, raster and volume data. PyGPates is the GPates Python library. Get fine-grained access to GPates functionality in your Python scripts.



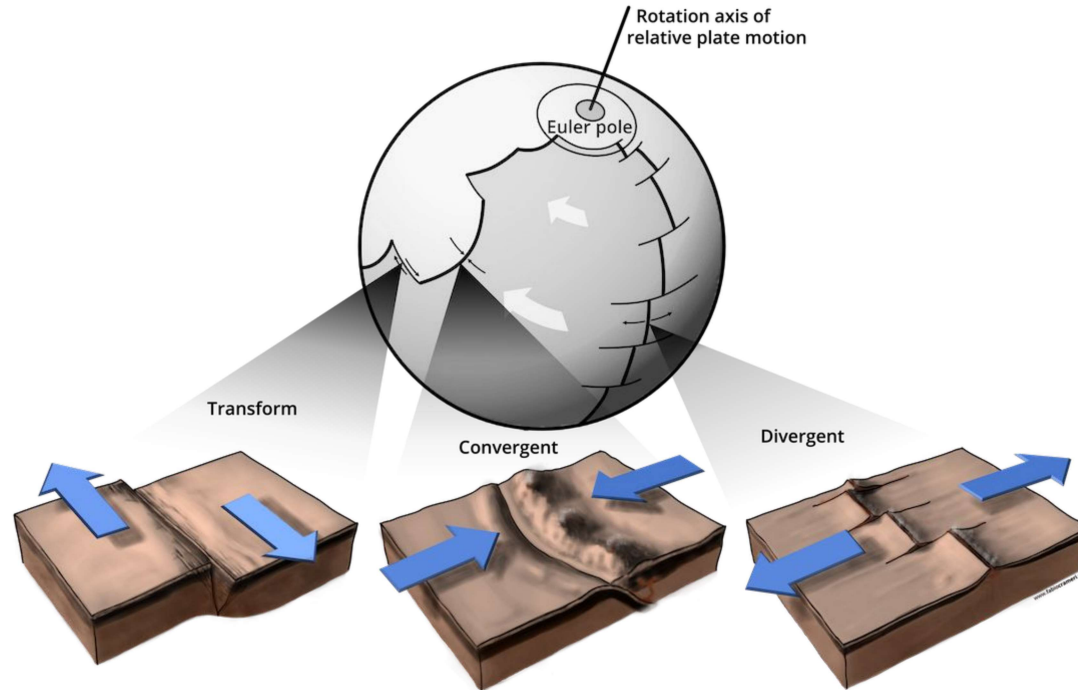
- [Latest GPates release v2.5](#)
- [Latest pyGPates release v0.36](#)
- [Latest GPlately release v1.3.0](#)

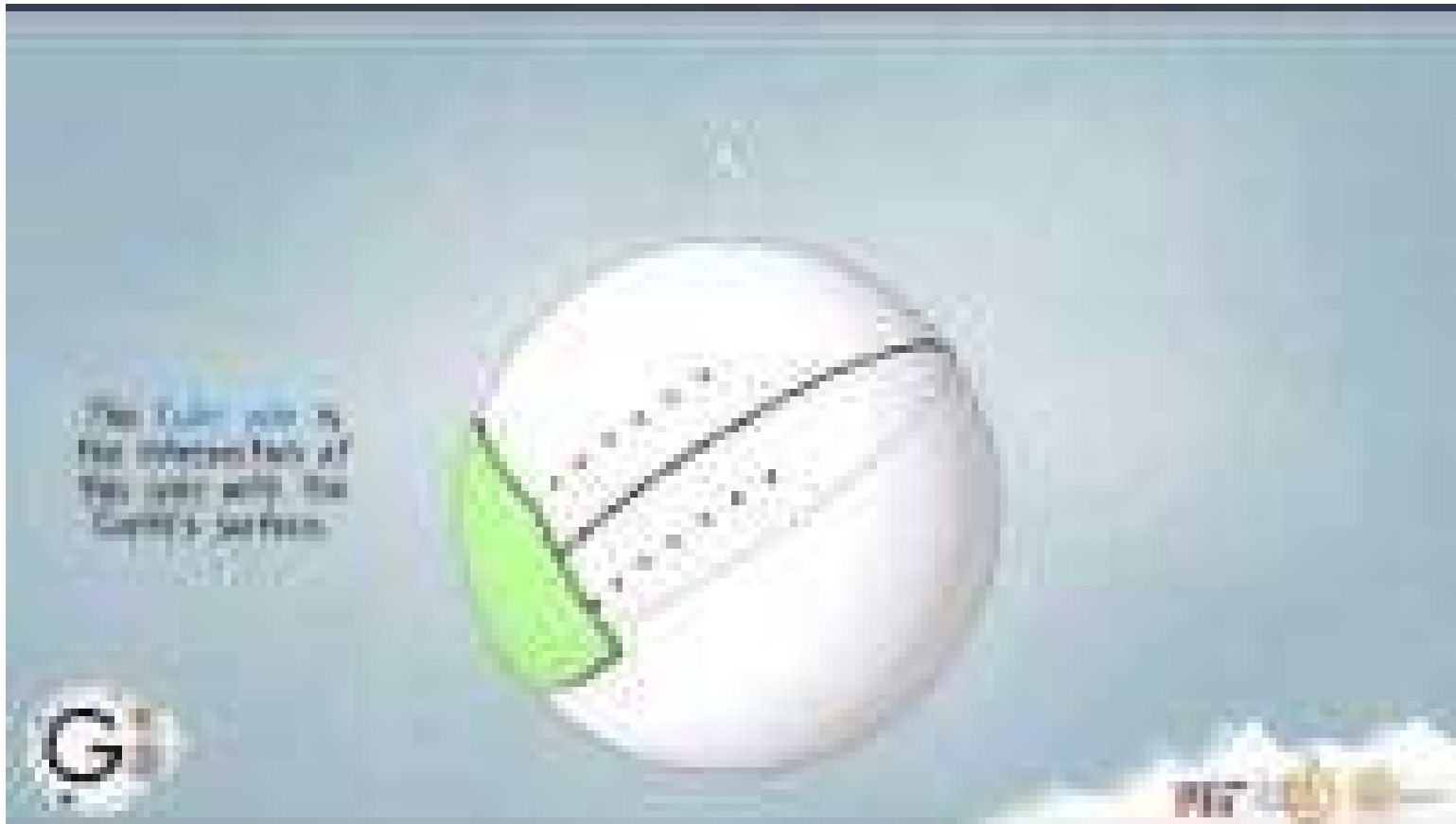
Please refer to the tutorial for a full pictural walkthrough :

Revision

- Plate tectonics is the theory that underpins plate reconstructions
- Plate Tectonics is the mechanistic theory that explains continental drift, sea floor spreading, subduction, orogeny, basin development etc.
- Oceanic crust (non-trapped) is no older than c.200 million years.
- Evidence includes: hot spots, palaeomagnetism, geometric fit of the continents, mid-ocean ridges, biogeography, facies distribution, GPS coordinates, amongst others.

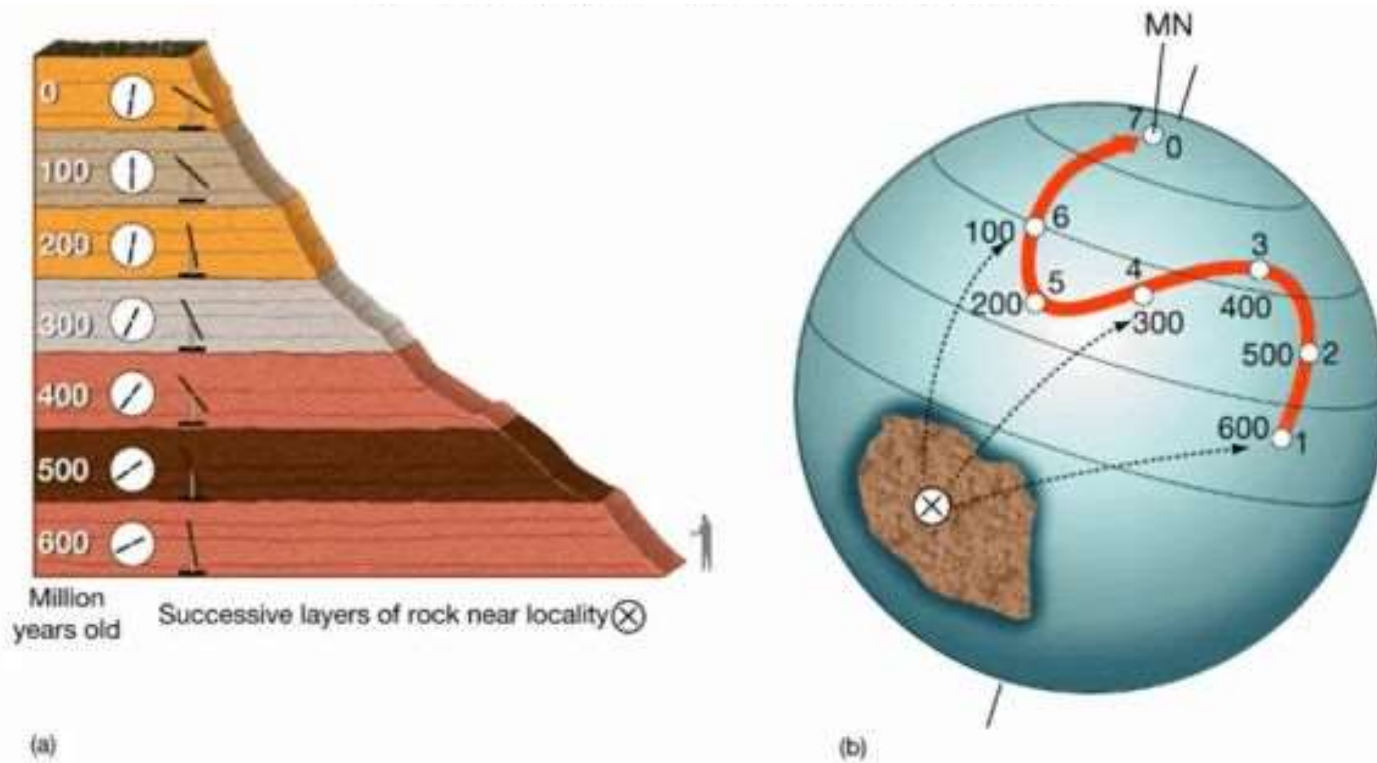
Rotation = movement according to Euler Geometry
Palaeolatitude = location from rock record





https://www.youtube.com/watch?v=_0mdH8NtjXE

Apparent Polar Wander



What is Gplates?

- GPlates is desktop software for the interactive visualisation of plate tectonics.
- GPlates offers a novel combination of interactive plate tectonic reconstructions, geographic information system (GIS) functionality and raster data visualisation. GPlates enables both the visualisation and the manipulation of plate tectonic reconstructions and associated data through geological time.



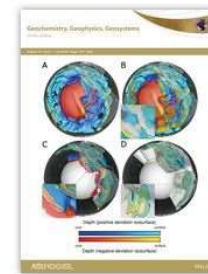
What is GPlates?

Geochemistry, Geophysics, Geosystems

Technical Reports: Methods | [Free Access](#)

GPlates: Building a Virtual Earth Through Deep Time

R. Dietmar Müller [✉](#), John Cannon, Xiaodong Qin, Robin J. Watson, Michael Gurnis, Simon Williams, Tobias Pfaffelmoser, Maria Seton, Samuel H. J. Russell, Sabin Zahirovic



Volume 19, Issue 7

July 2018

Pages 2243-2261

Developed by community effort

New Version released this year to include subduction arrows.

Current challenge: deformation!



NEW!

Version 2.5
April, 2024.

The screenshot displays the GPlates software interface. The main window shows a 3D map of tectonic plates with various boundaries highlighted in red, yellow, and blue. The interface includes a menu bar (File, Edit, View, Features, Reconstruction, Utilities, Tools, Window, Help), a toolbar with various icons, and a 'Current Feature' panel on the right. The 'Current Feature' panel shows details for a selected feature: Type: ml:TopologicalClosedPlateBoundary, Name: Australia, Plate ID: 801, Valid time: from 0.1 to future, Clicked geometry: gpml:boundary, and Feature collection: Zahirovic_etal_2022_Plate_Boundar. Below the map, there is a status bar showing the view (3D Orthographic), zoom (224%), and coordinates (lat: -0.04; lon: 118.95). At the bottom, a table titled 'Clicked Topology Sections' lists the clicked geometries.

Feature type	Plate ID	Name	Clicked geometry	Begin	End
gpml:TopologicalClosedPlateBoundary	801	Australia	gpml:boundary	0.1	future
gpml:TopologicalClosedPlateBoundary	604	Indochina	gpml:boundary	2	0
gpml:TopologicalNetwork	604	SEAsiaDeformNetwork	gpml:network	2	0

Clicked 3 geometries.

Tutorials (compatible with GPlates 2.x)

Getting Started

Tutorial 1.1: Loading and Saving Data

[View in browser](#) | [Download PDF](#) | [Download Sample Data](#)

Tutorial 1.2: Controlling the View

[View in browser](#) | [Download PDF](#) | [Download Sample Data](#)

Tutorial 1.3: Changing Colours

[View in browser](#) | [Download PDF](#) | [Download Sample Data](#)

Tutorial 1.4: Interacting with Features

[View in browser](#) | [Download PDF](#) | [Download Sample Data](#)

Tutorial 1.5: Creating Features

[View in browser](#) | [Download PDF](#) | [Download Sample Data](#)

Reconstructions

Tutorial 2.1: Plate Reconstructions

[View in browser](#) | [Download PDF](#) | [Download Sample Data](#)

Tutorial 2.2: Changing Rotations, Equivalent Finite Rotations, and Cross-

Overs

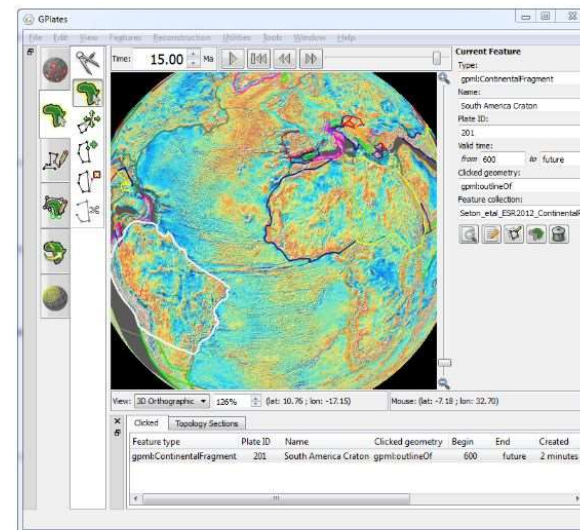
[View in browser](#) | [Download PDF](#) | [Download Sample Data](#)

Tutorial 2.3: Flowlines and Motion Paths

[View in browser](#) | [Download PDF](#) | [Download Sample Data](#)

Tutorial 2.4: Constructing a Plate Model from Scratch

[View in browser](#) | [Download PDF](#) | [Download Sample Data](#)



To download all the tutorials and associated data sets

in a single bundle, [click here](#) (zip file size 448 MB).

The live versions of the tutorials are hosted on Google servers. If you are in China or cannot access Google servers, the tutorial PDFs and related files may be downloaded from the archive found [here](#).

[Frequently Asked Questions](#)

[GPlates Tutorials \(google.com\)](https://sites.google.com/site/gplatestutorials/)

<https://sites.google.com/site/gplatestutorials/>

Tutorials (compatible with GPlates 2.x)

TODAY

Getting Started

Tutorial 1.1: Loading and Saving Data

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Tutorial 1.2: Controlling the View

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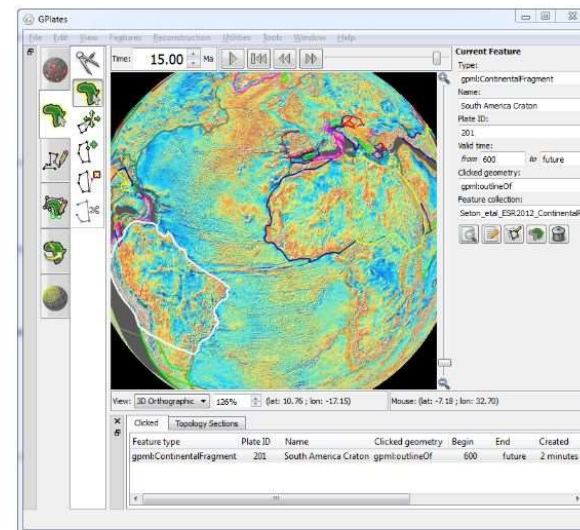
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[View in browser](#) | [Download PDF](#) | [Download Sample Data](#)

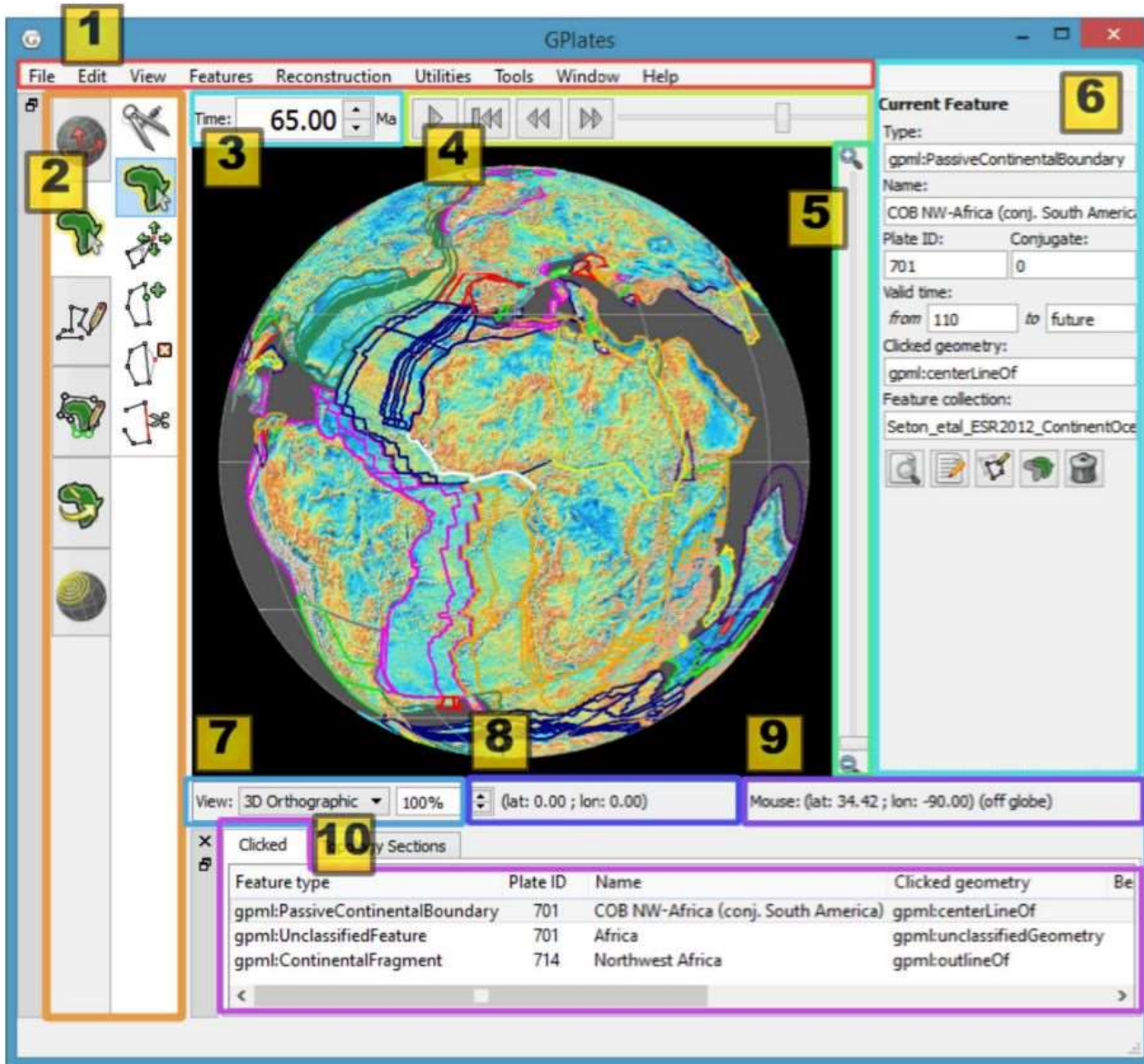


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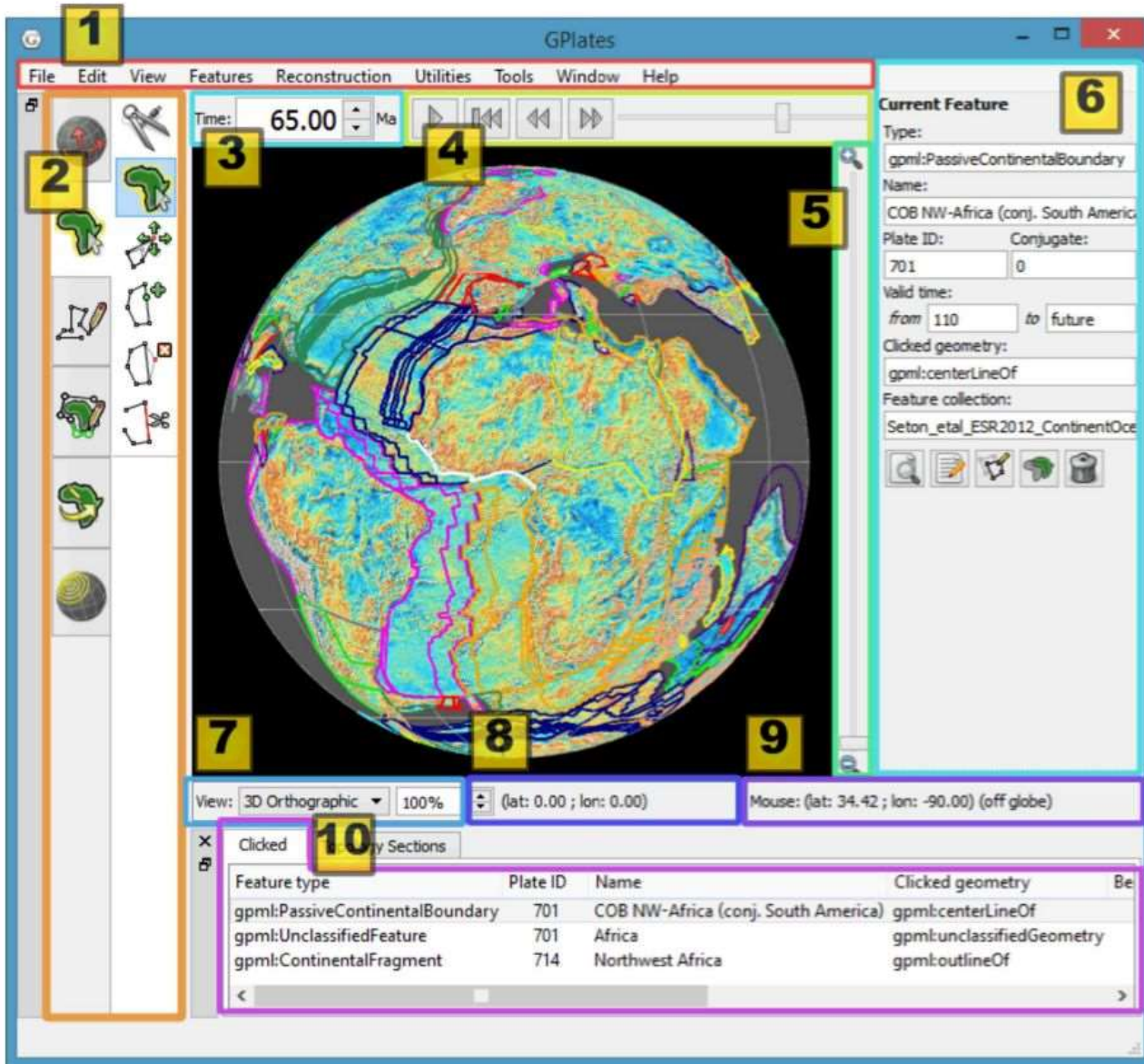
The live versions of the tutorials are hosted on Google servers. If you are in China or cannot access Google servers, the tutorial PDFs and related files may be downloaded from the archive found [here](#).

[Frequently Asked Questions](#)

Tomorrow



Item	Name	Description
1	Menu Bar	This region of the Main Window contains the titles of the menus.
2	Tool Palette	A collection of tools which are used to interact with the globe and geological features via the mouse pointer.
3	Time Controls	A collection of user-interface controls for precise control of the reconstruction time.
4	Animation Controls	A collection of tools to manipulate the animation of reconstructions.
5	Zoom Slider	A mouse-controlled slider which controls the zoom level of the Globe View camera.



Item	Name	Description
6	Task Panel	Task-specific information and controls which correspond to the currently-activated tool.
7	View Control	Controls which projection is used to display data and the exact zoom level as a percentage.
8	Camera Coordinate	An information field which indicates the current globe position of the Globe View camera.
9	Mouse Coordinate	An information field which indicates the current globe position of the mouse pointer.
10	Clicked Geometry Table	Displays a summary of each geometry or feature touched by the last mouse click.

Tutorial Options

System Erde III, ATK

- <https://adamtkocsis.com/se3-gplates/features/>

GPlates

- https://docs.google.com/document/d/1aaEBel2Ixszej5xMCxFD_F4Ucr9RiHCJ3cWZJVvDEKBA/pub

Standard Use : Important shortcuts

The **Window Menu** enables the user to control the windows GPlates opens to display aspects of your data, and includes the following options:

Open New Window. [Ctrl + N]

Creates a new instance of GPlates. Currently each instance created this way is completely separate with its own main window and dialogs. Any program state such as files loaded prior to selecting **New Window** is not transferred across to the new instance. This feature is useful mainly for macOS where it is not possible to run multiple instances of the same application from the *Finder*.

Show Layers. [Ctrl + L]

This option shows and hides the Layers window.

Show Bottom Panel.

This option allows you to show or hide the **Clicked Features** and **Topology Sections** tables.

Practical Guide to Picking a Model

[nature](#) > [scientific reports](#) > [articles](#) > [article](#)

Article | [Open access](#) | Published: 23 June 2023

Assessing plate reconstruction models using plate driving force consistency tests

[Edward J. Clennett](#) , [Adam F. Holt](#), [Michael G. Tetley](#), [Thorsten W. Becker](#) & [Claudio Faccenna](#)

Scientific Reports **13**, Article number: 10191 (2023) | [Cite this article](#)

1883 Accesses | **17** Altmetric | [Metrics](#)

Methods in Ecology and Evolution



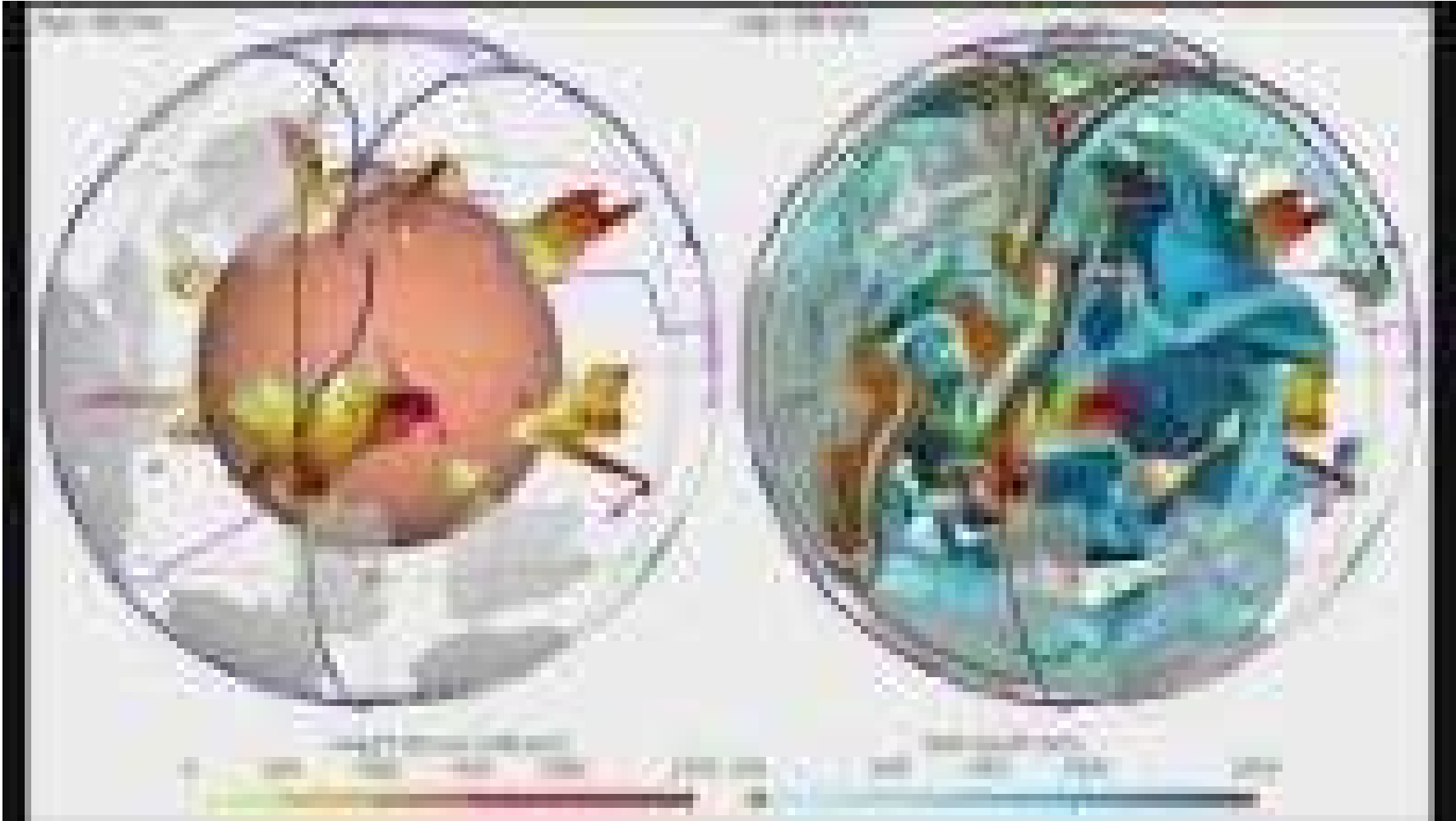
RESEARCH ARTICLE | [Open Access](#) | 

Mind the uncertainty: Global plate model choice impacts deep-time palaeobiological studies

[Lucas Buffan](#) , [Lewis A. Jones](#) , [Mathew Domeier](#), [Christopher R. Scotese](#), [Sabin Zahirovic](#), [Sara Varela](#)

First published: 20 October 2023 | <https://doi.org/10.1111/2041-210X.14204>

[Go here for SFX](#)



<https://youtu.be/swGDLBOCqBg>





I LIVE NEXT TO A WALL OF ROCK 20 MILES THICK. THERE'S NO WAY AROUND OR OVER IT. I'M TRAPPED ON THIS SIDE FOREVER.

I STUDY THE STUFF ON THE OTHER SIDE.



MANTLE GEOLOGY SEEMS LIKE THE MOST FRUSTRATING FIELD.

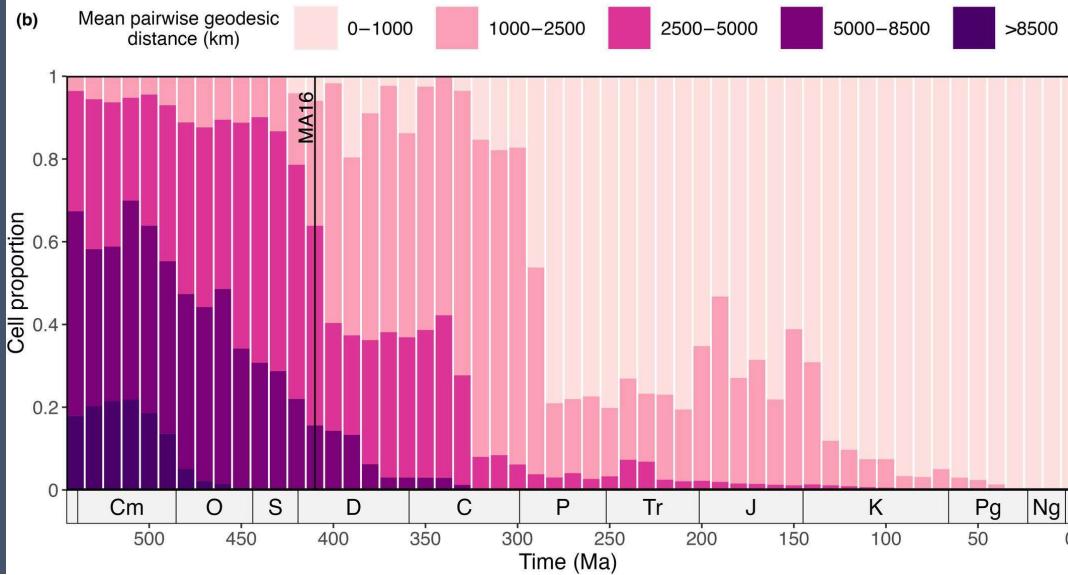
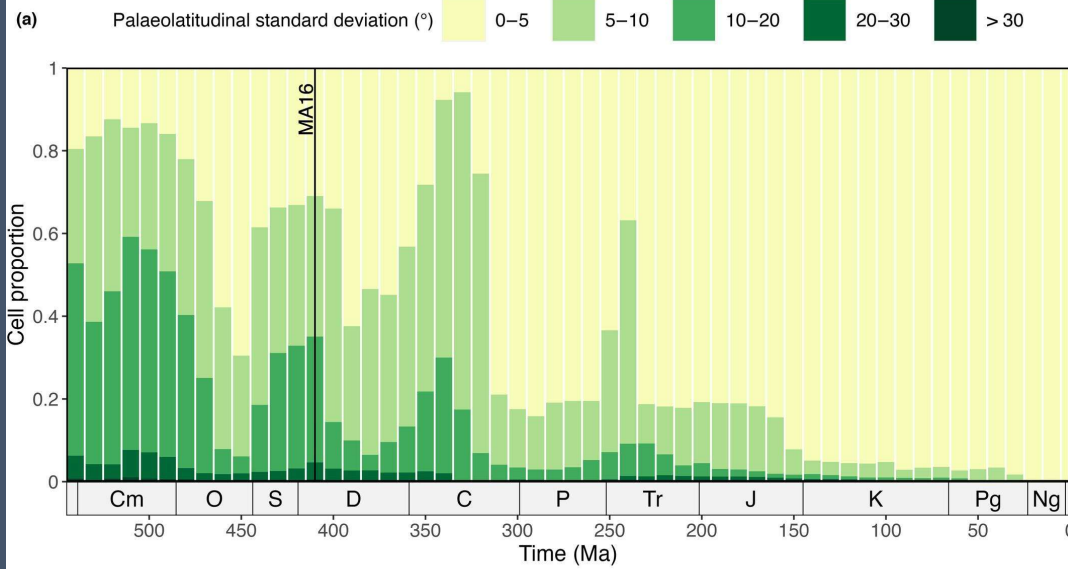


Mantle RF and Palaeomag RF



ALWAYS
use the PMRF for
Palaeontological
Data

Variation within the palaeomagnetic reference frame



Not all Plate Models are equal in all areas

- test against various models.

Tomorrow why must we use the PMRF?

- Gplates Tutorial 2: palaeocoordinates.