Session ESSI 2.12
MATLAB-based programs, applications and technical resources for Geoscience Research
Abstract EGU2020-8825

Quantitative analysis for compaction trend and basin reconstruction of the Perth Basin, Australia: Limitations, uncertainties and requirements

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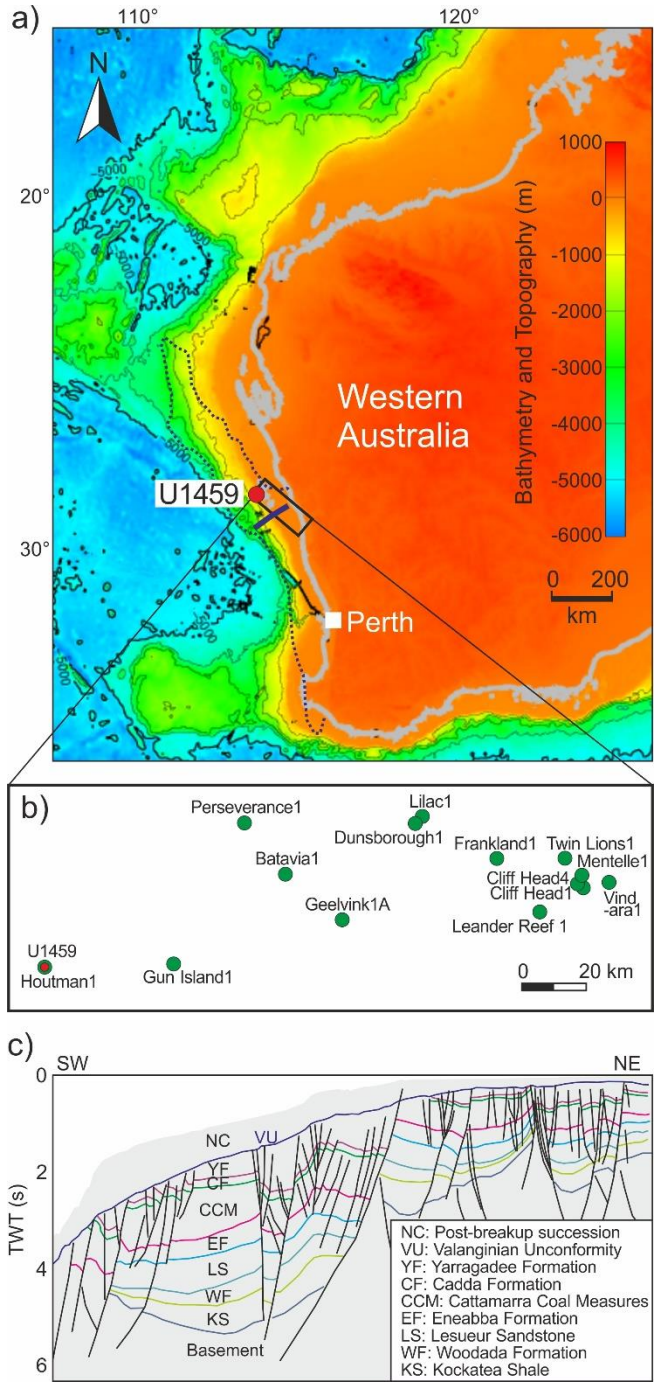
Study background

- Study area: Perth Basin on the southwestern Australia
- Target interval: Jurassic clastics to Cenozoic carbonates
- Data sites: IODP Site U1459 and industrial wells
- Data analysis and visualization using BasinVis 2.0

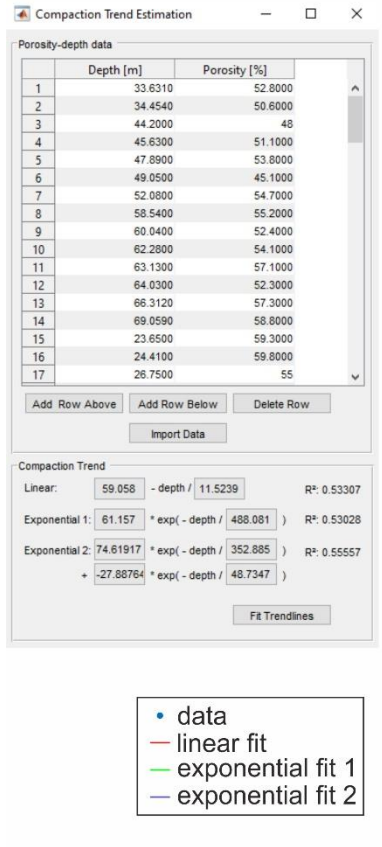
- Part of this study was published in a paper;

Lee et al., 2020. Compaction trend estimation and applications to sedimentary basin reconstruction (BasinVis 2.0). Applied Computing and Geosciences 5, 100015. https://doi.org/10.1016/j.acags.2019.100015

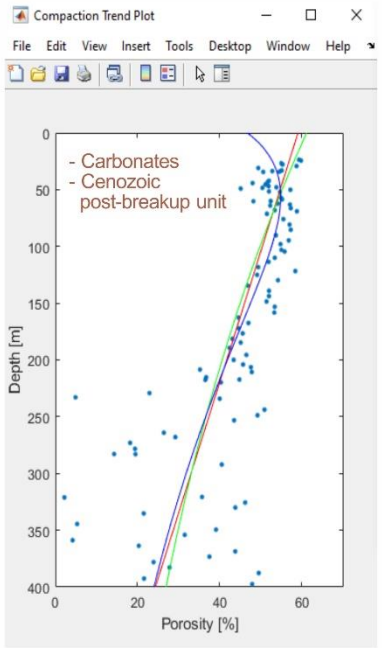


Compaction trend estimation

A) Interface

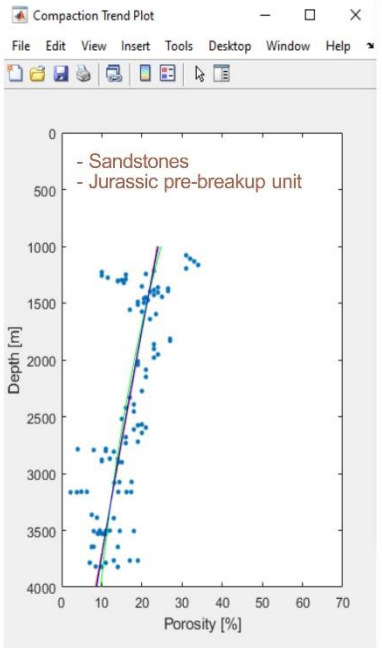


B) Site U1459



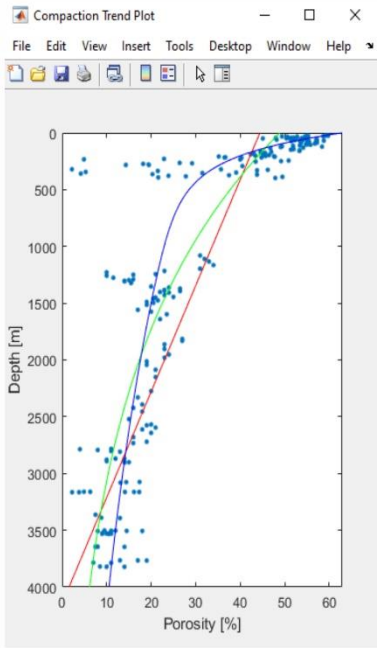
linear: ø=59.1-y/12
R^2 0.53
exp.1: ø=61.2exp(-y/488)
R^2 0.53
exp.2: ø=74.6exp(-y/353)
-27.9exp(-y/49)
R^2 0.56

C) Houtman-1



linear: ø=29.0-y/195
R^2 0.49
exp.1: ø=33.9exp(-y/3200)
R^2 0.49
exp.2: ø=8158.2exp(-y/25463)
-8128.2exp(-y/25863)
R^2 0.49

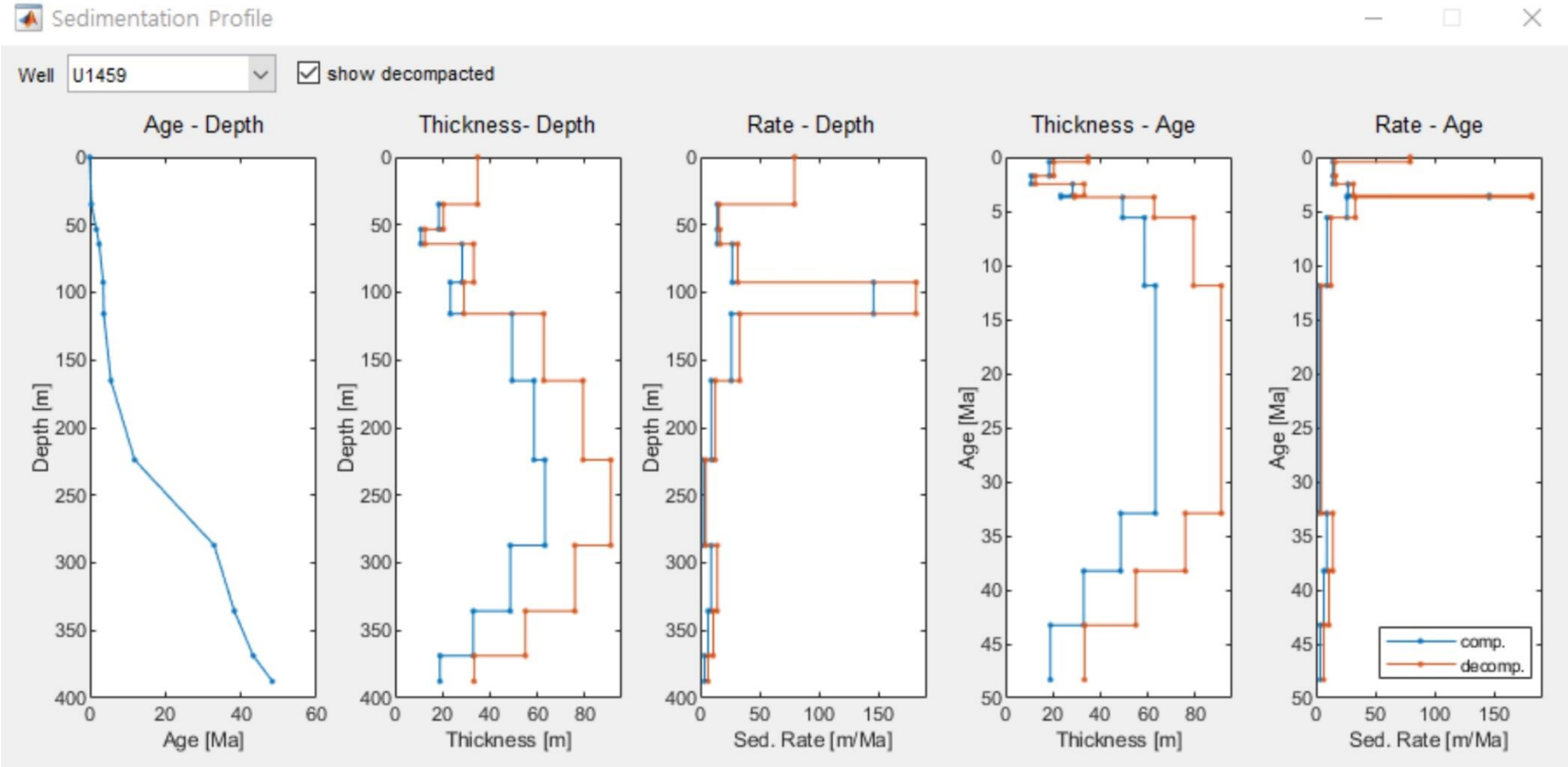
D) Site U1459 + Houtman-1



linear: ø=44.4-y/93
R^2 0.66
exp.1: ø=48.9exp(-y/1932)
R^2 0.74
exp.2: ø=29.3exp(-y/3911)
+33.6exp(-y/199)
R^2 0.82

from Lee et al., 2020

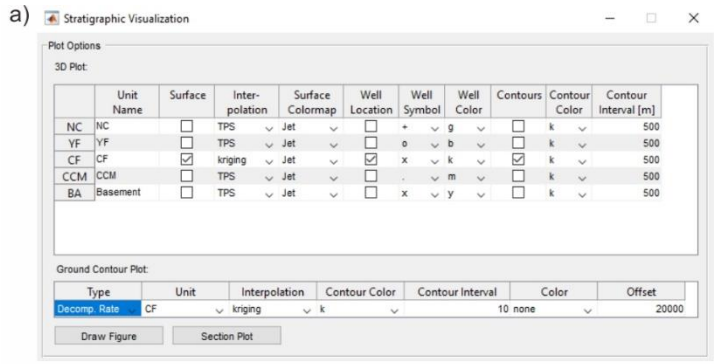
Sedimentation Profile of Site U1459

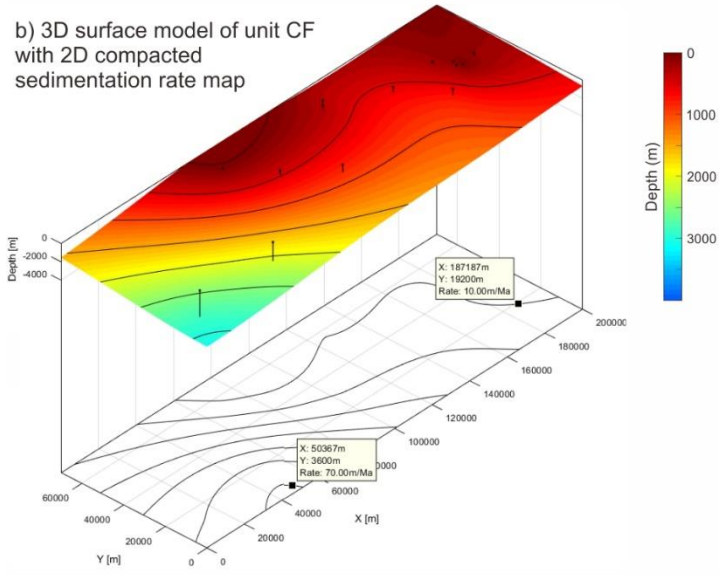


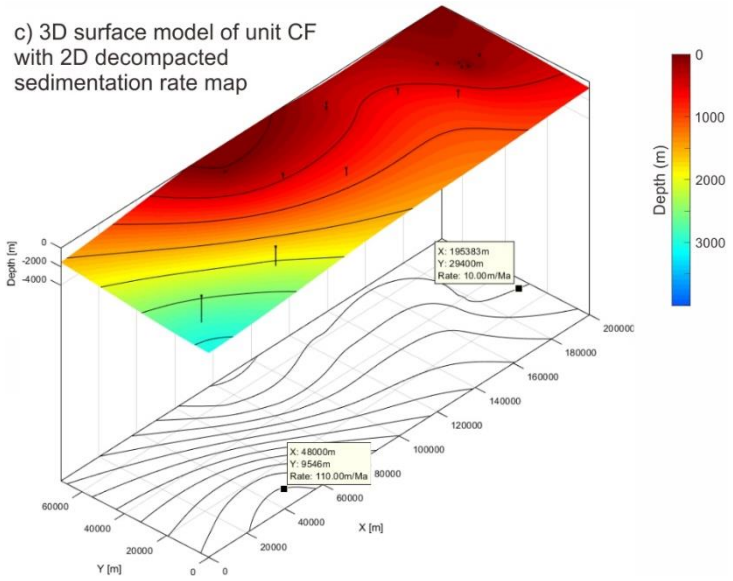
from Lee et al., 2020

Subsurface visualization

a)



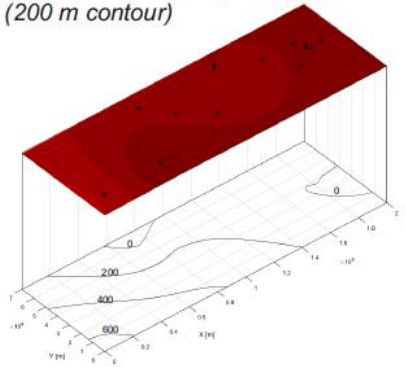




VISUALIZATION OF SEDIMENTATION SETTING

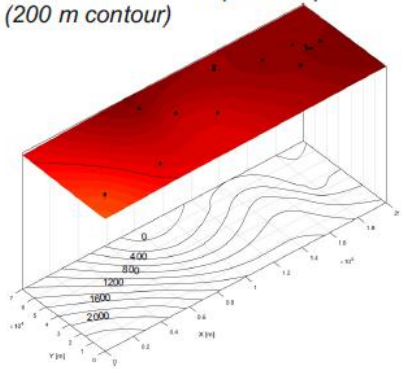
Post-breakup Suc.

3D surface model (seafloor) and 2D thickness isopach map (200 m contour)



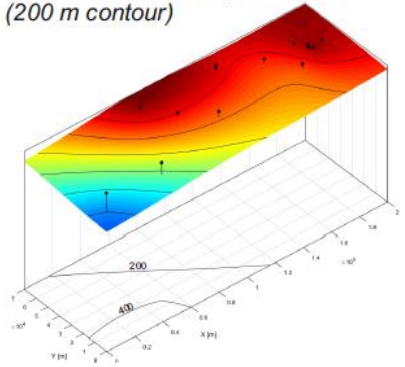
Yarragadee Formation

3D surface model (500 m contour) and 2D thickness isopach map (200 m contour)



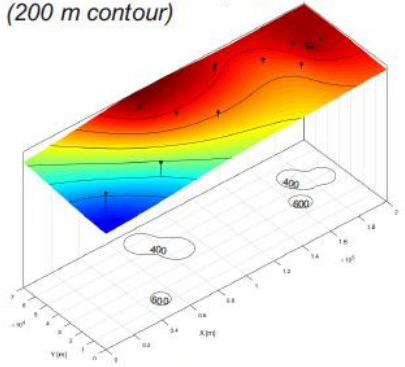
Cadda Formation

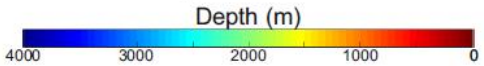
3D surface model (500 m contour) and 2D thickness isopach map (200 m contour)



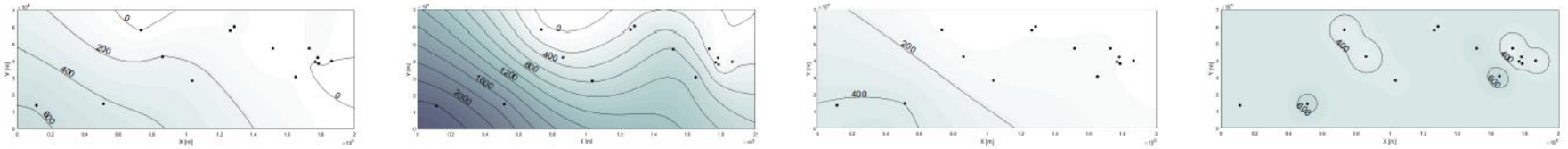
Cattamarra Coal M.

3D surface model (500 m contour) and 2D thickness isopach map (200 m contour)

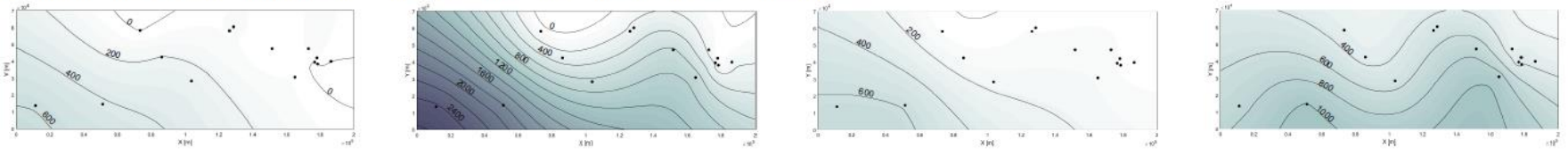




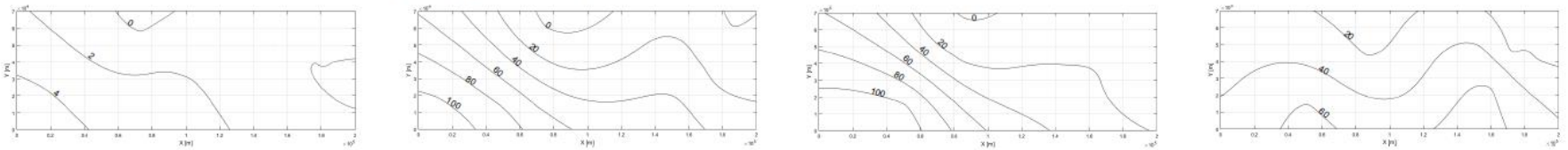
2D isopach map (200 m contour) based on present (compacted) thickness of each unit.



2D isopach map (200 m contour) based on original (decompacted) thickness of each unit.



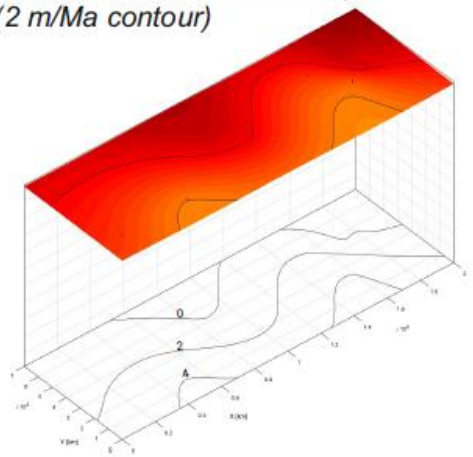
2D sedimentation rate (m/Ma) map based on original (decompacted) thickness of each unit.



VISUALIZATION OF SUBSIDENCE

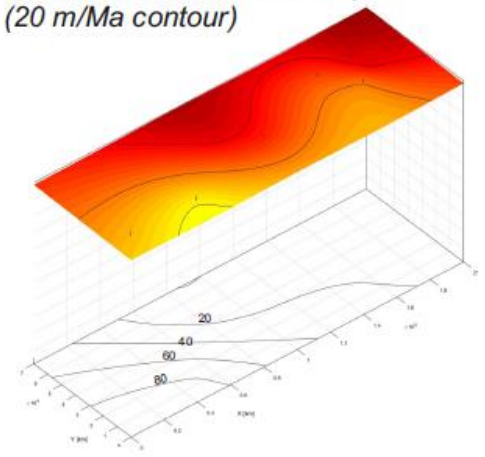
~174.1 Ma

3D subsidence depth model (relative to seafloor; 500 m contour) and 2D subsidence rate map (2 m/Ma contour)



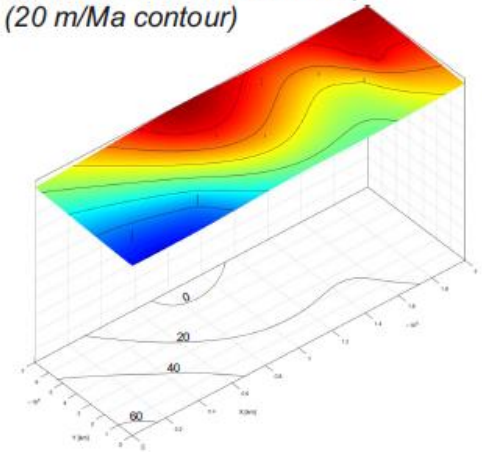
~168.3 Ma

3D subsidence depth model (relative to seafloor; 500 m contour) and 2D subsidence rate map (20 m/Ma contour)



~132.9 Ma

3D subsidence depth model (relative to seafloor; 500 m contour) and 2D subsidence rate map (20 m/Ma contour)



~0 Ma

3D subsidence depth model (relative to seafloor; 500 m contour) and 2D subsidence rate map (20 m/Ma contour)