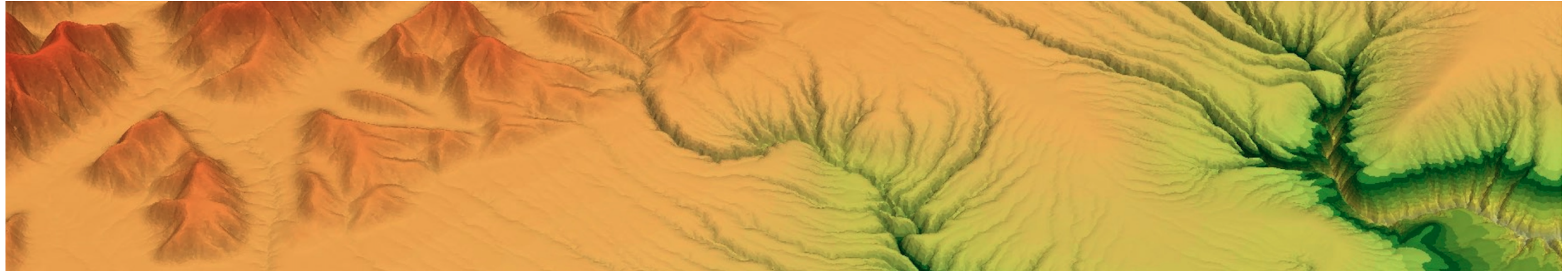


EOS 423 // EOS 518: Advanced Sedimentology and Stratigraphy



Lecture 1: Course Introduction | Jan 9, 2023

Welcome to Advanced Topics: Sedimentology and Stratigraphy! Here is the plan for today:

1. introductions
2. overview of course outline
3. overview of course content
4. first assignment:
 - make sure Python is installed on your computer (due **Jan. 12, 2023**)
5. surface transport

We acknowledge and respect the lək̓ʷəŋən peoples on whose traditional territory the university stands and the Songhees, Esquimalt and W̱SÁNEĆ peoples whose historical relationships with the land continue to this day.



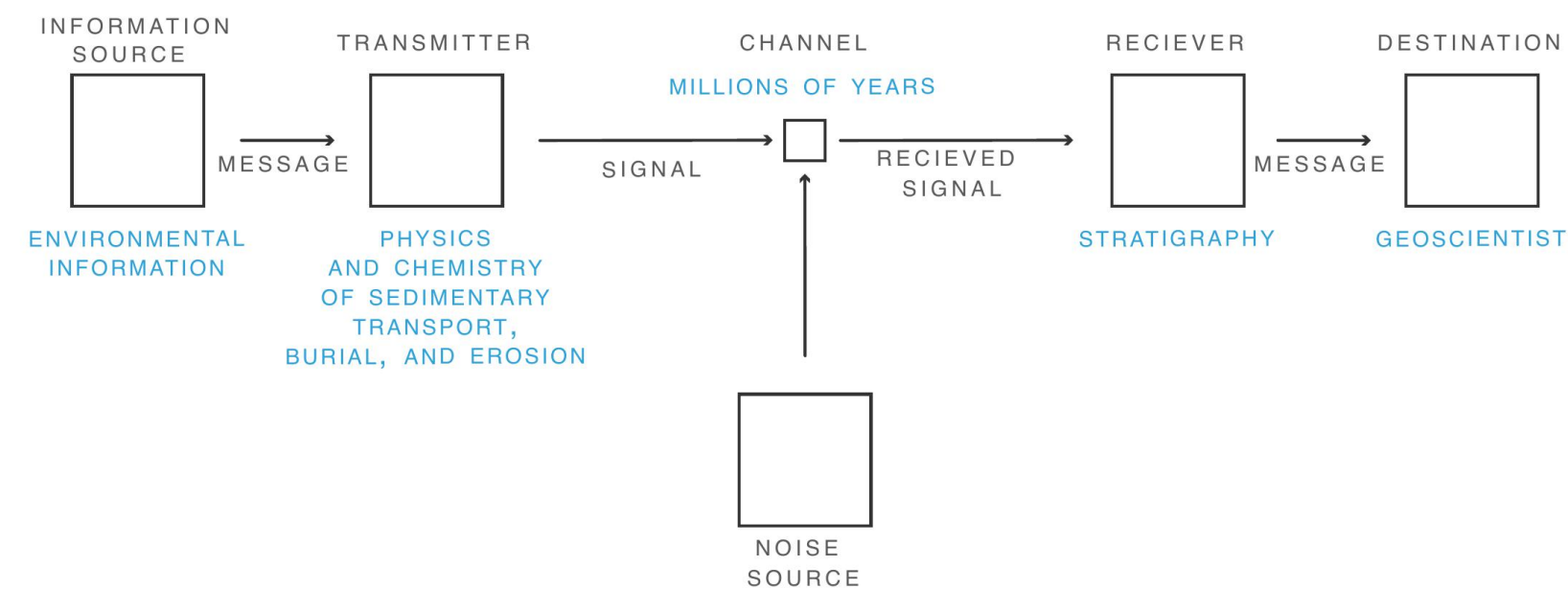
1a. Introductions: Blake Dyer

Interested in:

1. Earth history
2. Sea level and climate change
3. Isotope geochemistry of carbonates
4. Machine learning
5. Bayesian inversion



Bob Wright A433
blakedyer@uvic.ca



A Mathematical Theory of Communication
Claude Shannon 1948



1c. Introductions: who are *you*



1c. Introductions: who are *you*

```
In [33]: ▼ #let's get some help from Python for class introductions

import numpy as np
class_list=['Stacey','Kai','Kristyn','Grace','Andrea','Liam','Matthew','Noa','Matteo','Izzy','Rhys','Felix']

▼ def pick_someone(class_list):
▼     if len(class_list)>0:
        person=np.random.choice(class_list)
        toprint="%s, please introduce yourself!" % person
        toprint='####\n'+toprint+'\n####\n'
        print(toprint)
        class_list.remove(person)
    return class_list
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```

```
In [46]: class_list=pick_someone(class_list)
```



2a. Course outline

Course description and objectives: In this course, we will explore how geologic and Earth surface processes, including tectonic, sea level and climate changes, are recorded and preserved in the stratigraphic record. Focus will be on modern and ancient case studies, with topics including basin analysis, cyclostratigraphy, process sedimentology and paleo-environmental reconstruction. Problem sets emphasize computational skills, including introductory time-series analysis, geospatial analysis and remote sensing. Pre-requisites: EOS 225, 201.



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If someone does not have one of these pre-reqs, please contact Blake ASAP!



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If someone does not have one of these pre-reqs, please contact Blake ASAP!

Course Materials: There is no required textbook. Readings will be made available through the course website. Students are required to have a computer work on assignments.



2b. Course outline

Course structure: The course will meet twice a week (M/Th) for lectures and on Fridays to work on the weekly assignment.



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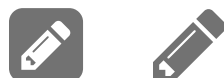
- On Monday each week we will begin with a *flipped classroom*: I will randomly select at least two students to informally present their progress on the current weekly assignment.



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Course structure: The course will meet twice a week (M/Th) for lectures and on Fridays to work on the weekly assignment.

- On Monday each week we will begin with a *flipped classroom*: I will randomly select at least two students to informally present their progress on the current weekly assignment.
- Any remaining time on Monday and all of Thursday will be used for lectures on new material or guided group discussions of assigned readings.



2c. Course outline

Grading: Your grade will be determined primarily by your performance on assignments. Although I will not track participation in lecture, I expect that the assignments will be significantly easier to complete for those who participate.



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- Students enrolled in the graduate version of the course (EOS 518) will be expected to complete an alternative final assignment that includes a greater amount of self-direction.
- Below is a breakdown of the course assessment:

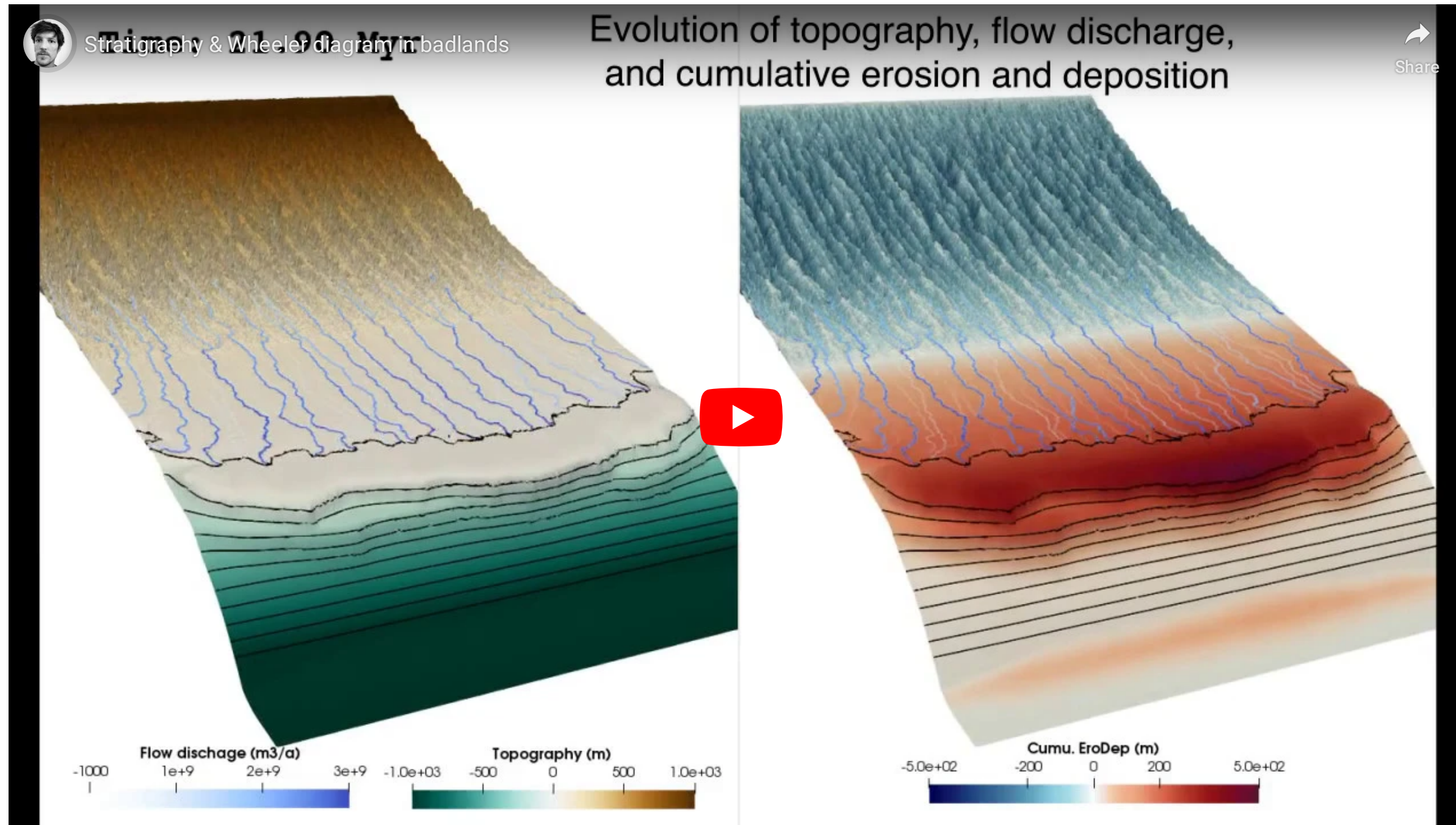
EOS 491 (Undergraduate Students)		EOS 518 (Graduate Students)	
Assignments	60%	Assignments	60%
Assignment presentations	10%	Assignment presentations	10%
Final assignment	30%	Final project	30%



3a. Sedimentary transport & building stratigraphy



Out [30]:





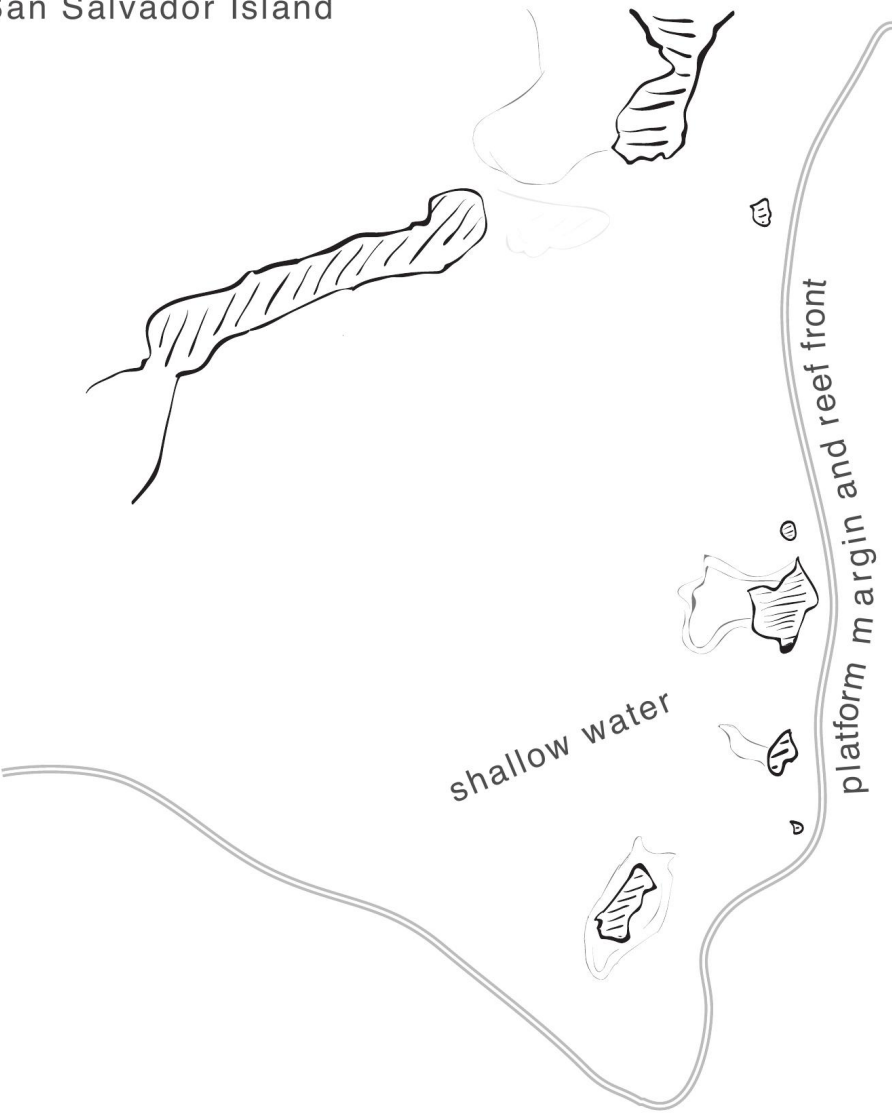
Late Carboniferous carbonates, Utah



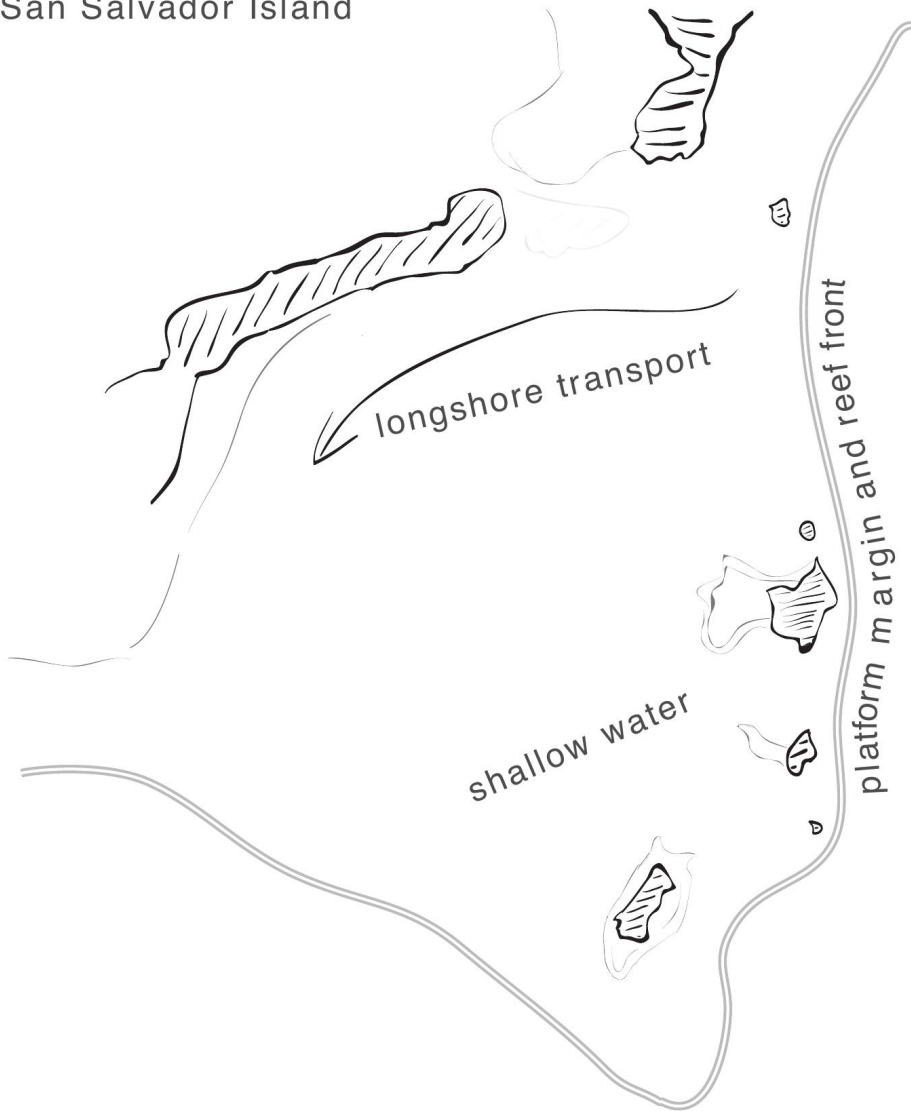
Sandy Hook, San Salvador Island



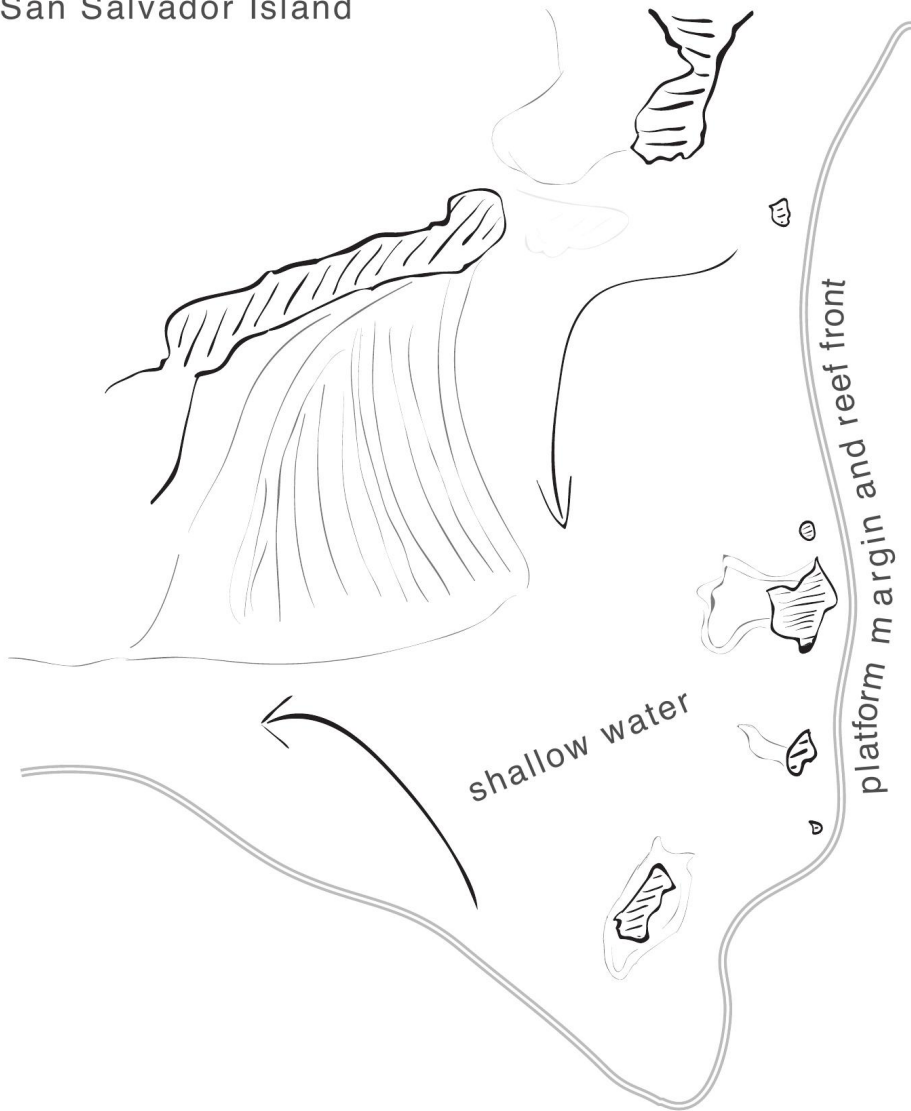
Sandy Hook, San Salvador Island



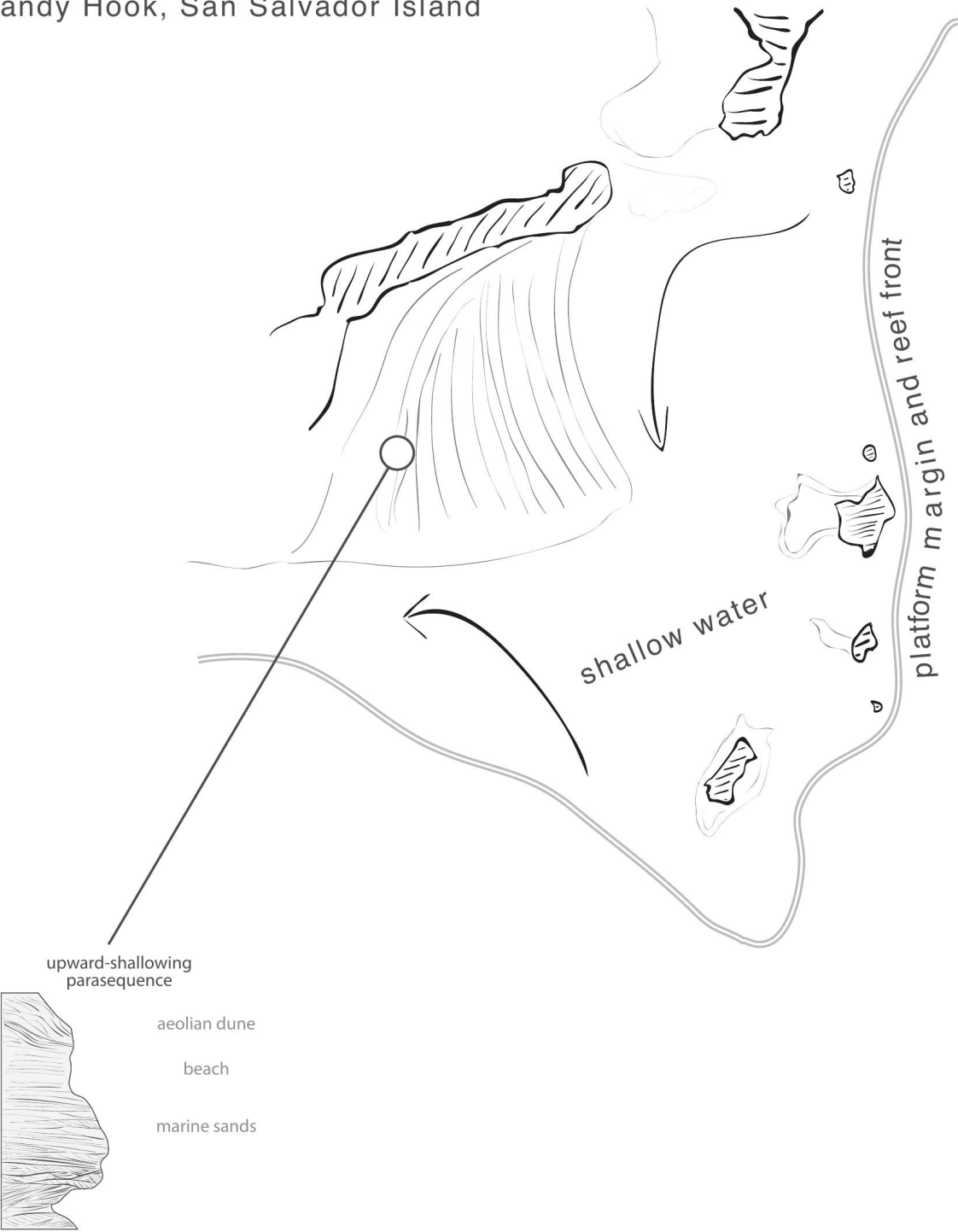
Sandy Hook, San Salvador Island



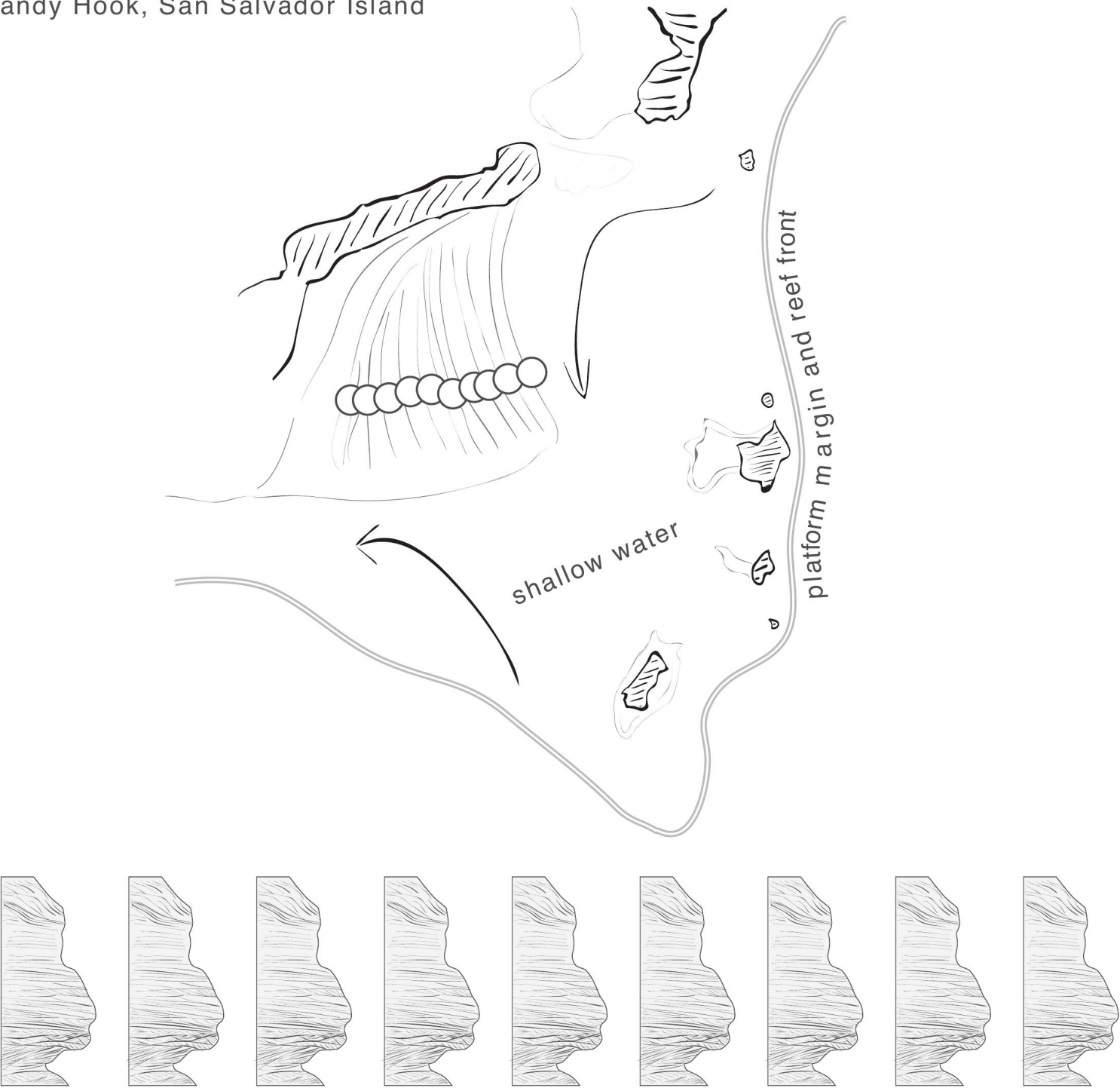
Sandy Hook, San Salvador Island



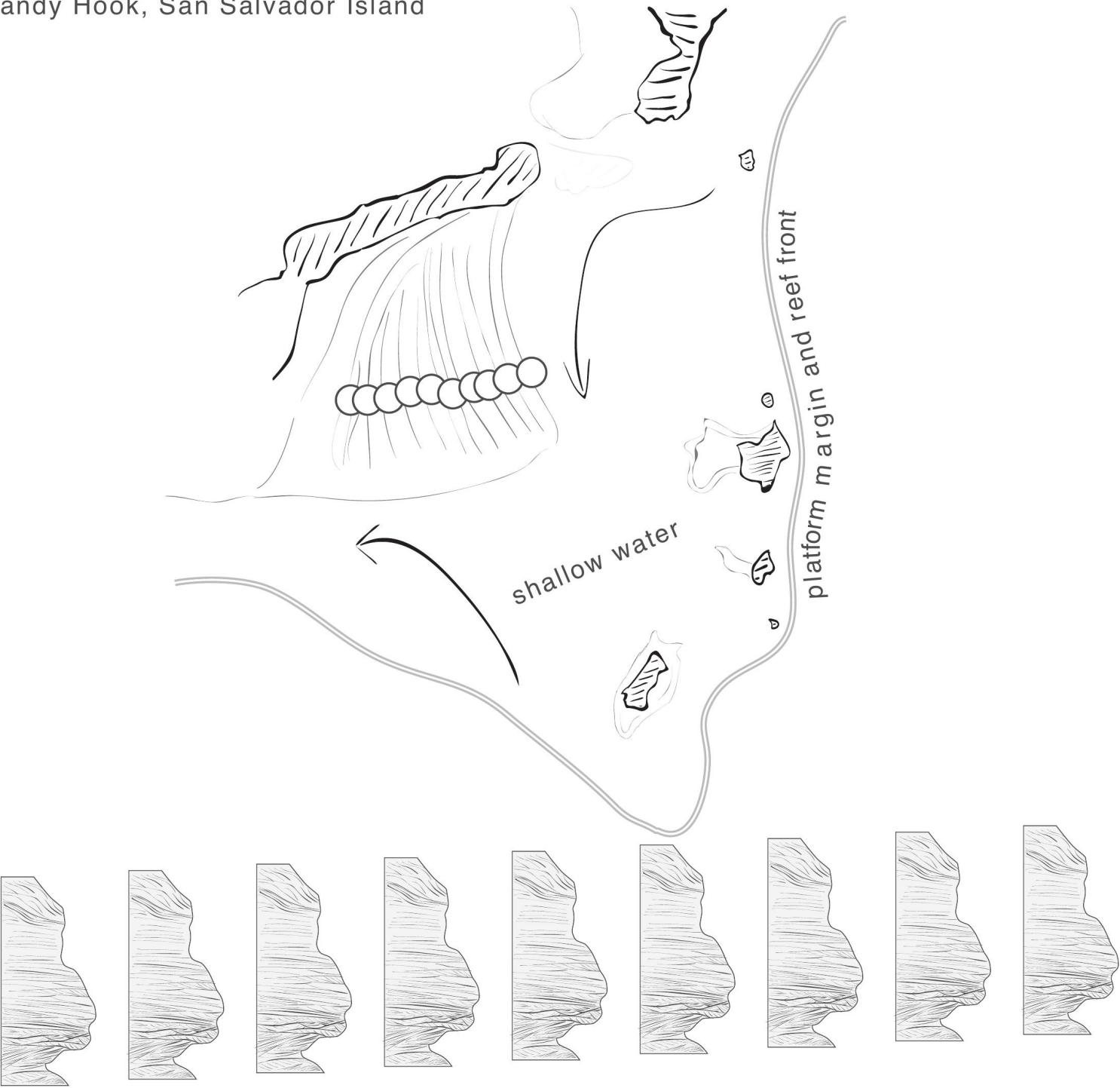
Sandy Hook, San Salvador Island



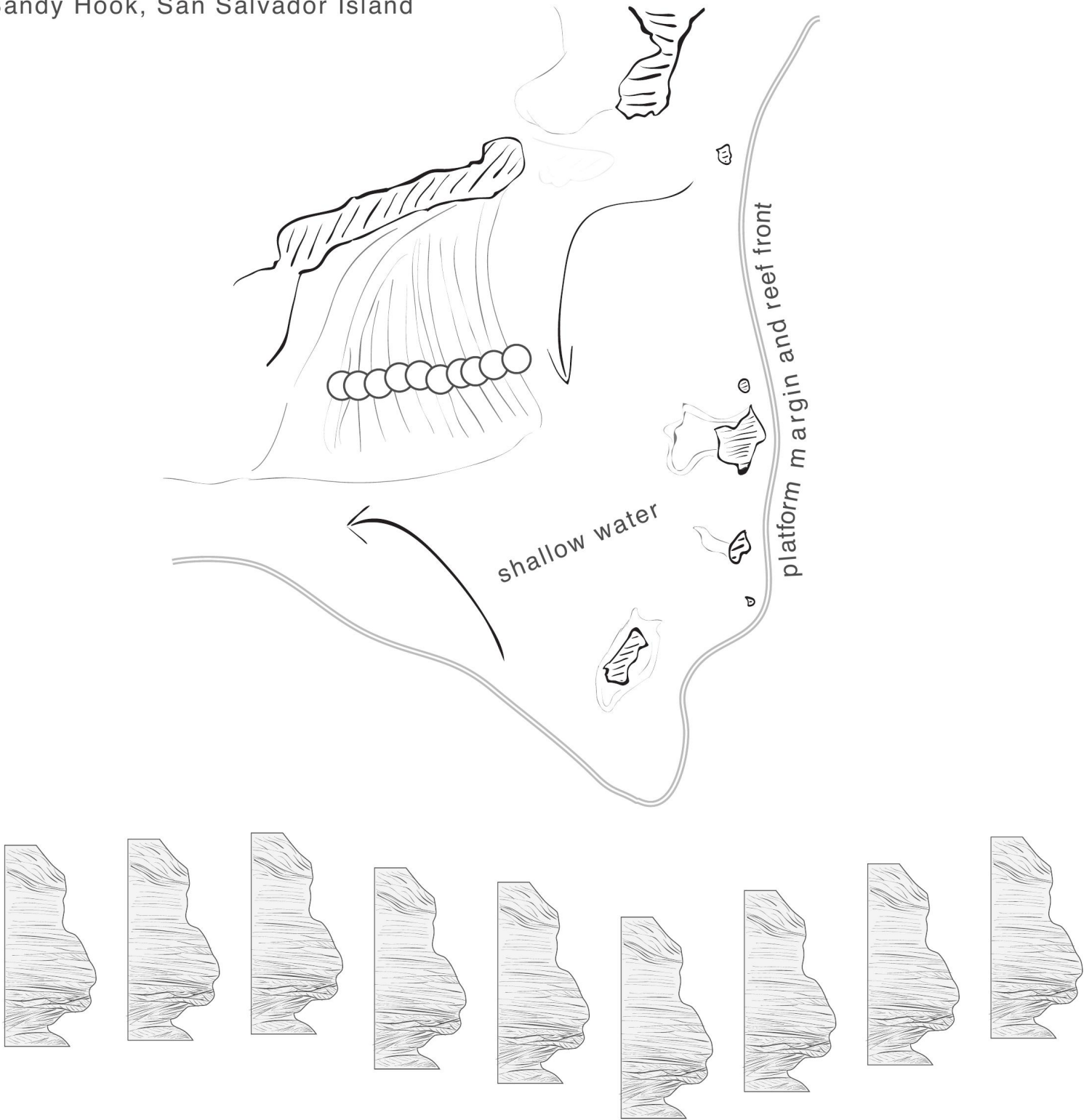
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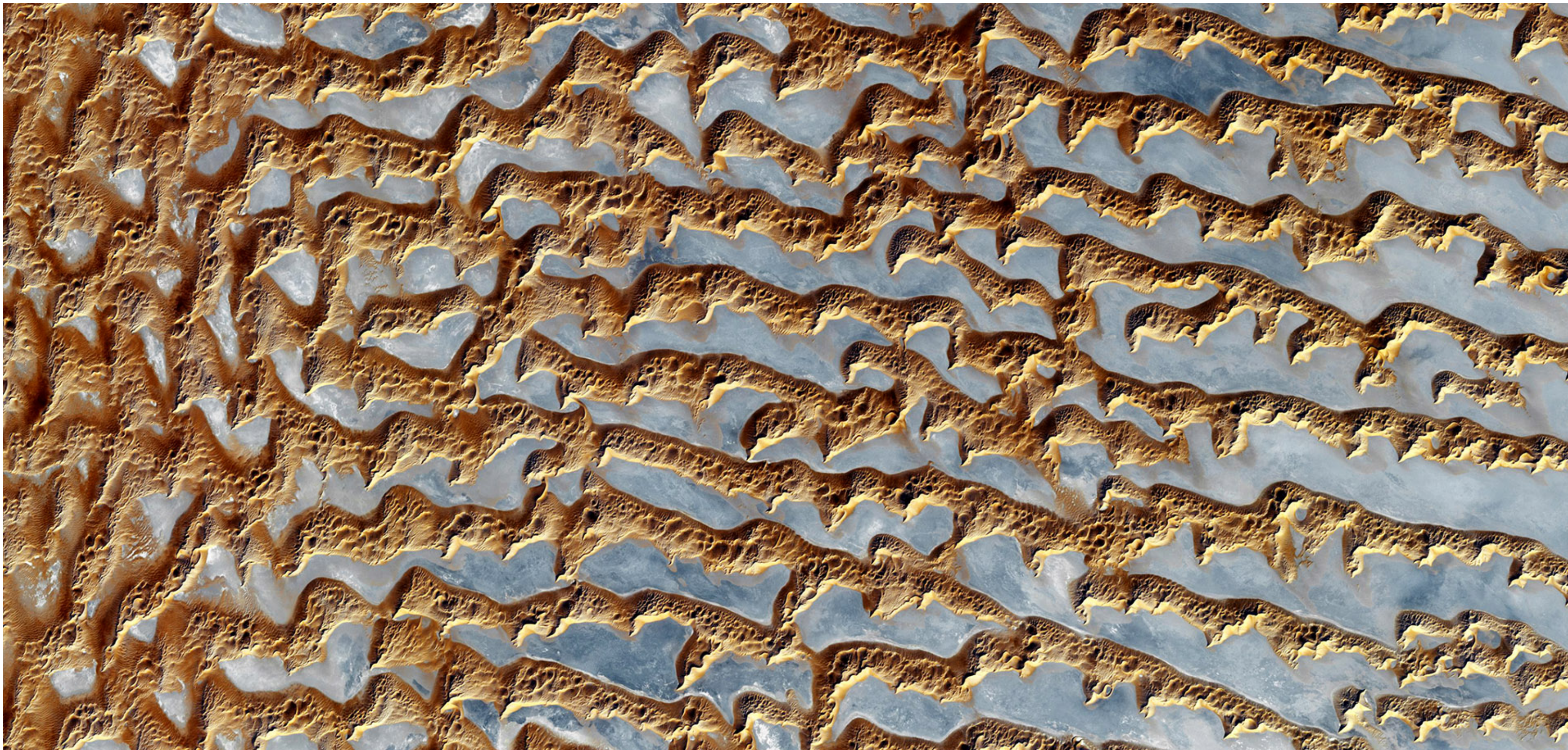


Sandy Hook, San Salvador Island

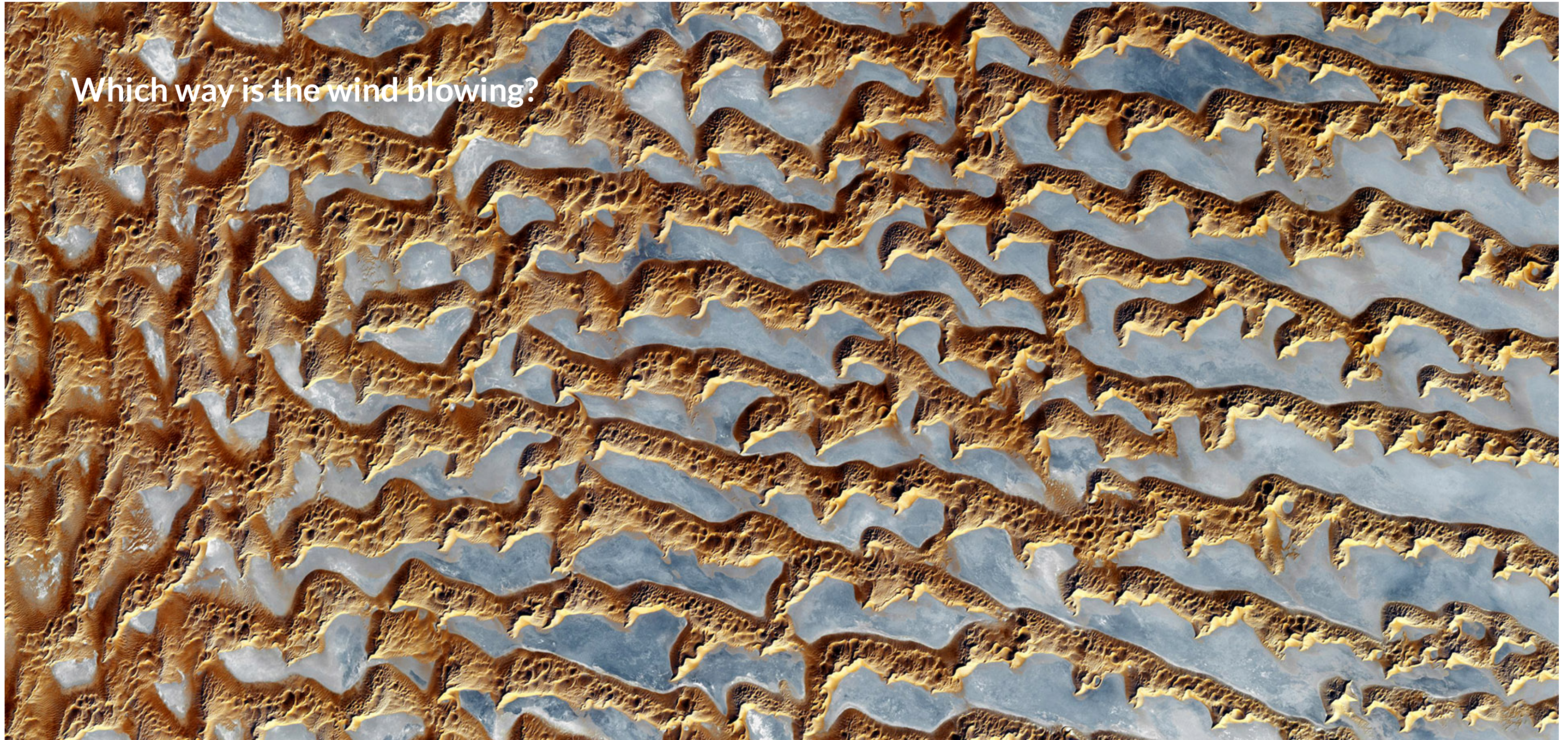


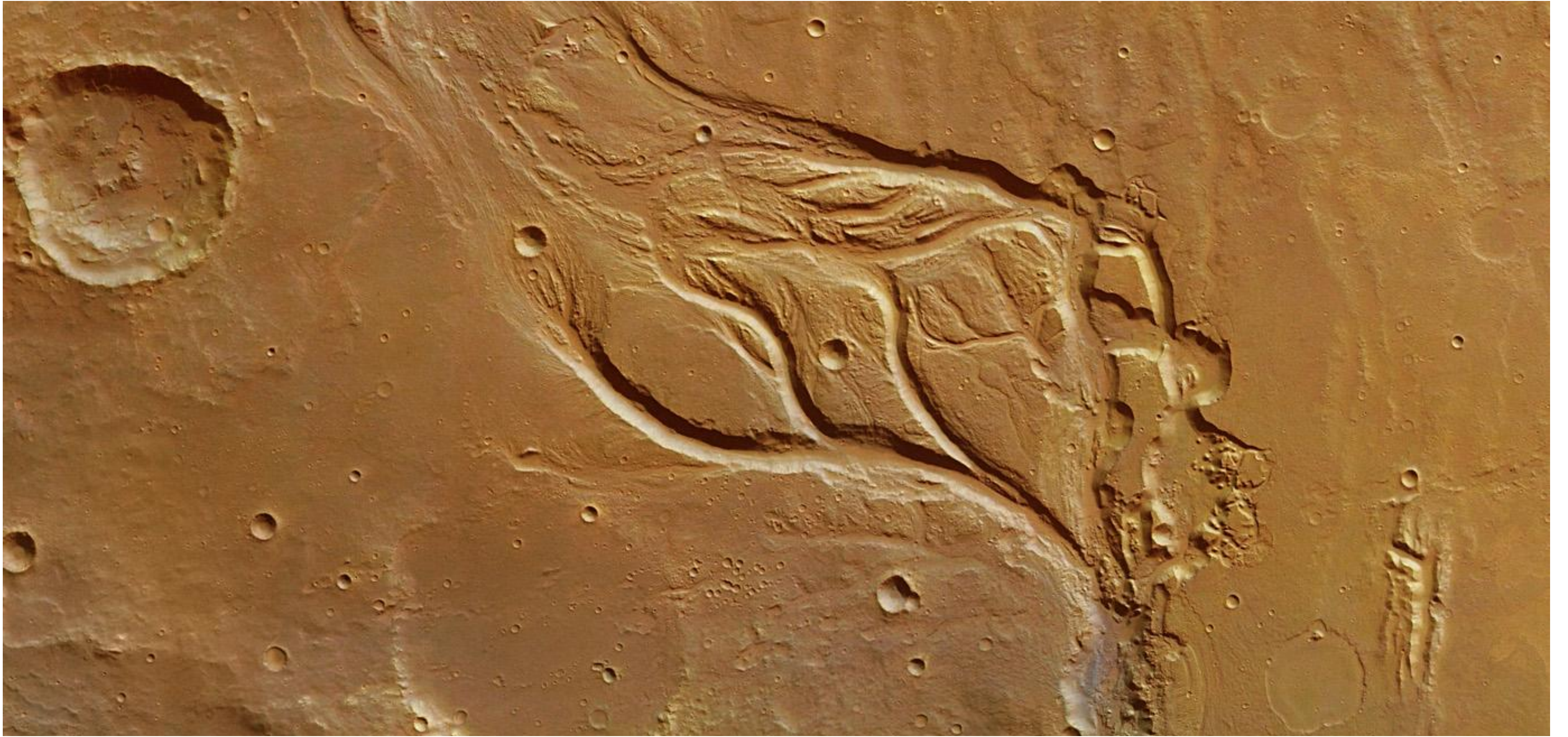
3b. Geospatial analysis & surface processes





Which way is the wind blowing?



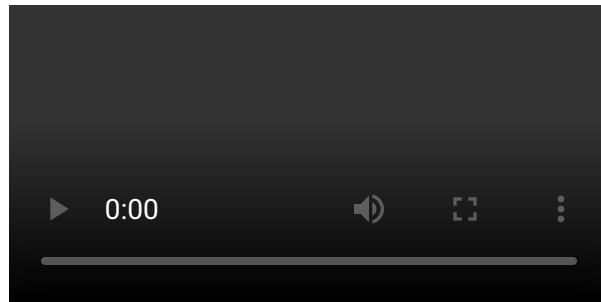





```
In [31]: from IPython.display import HTML

HTML("""
    <video alt="test" controls>
        <source src="images/learning.mp4" type="video/mp4">
    </video>
""")
```

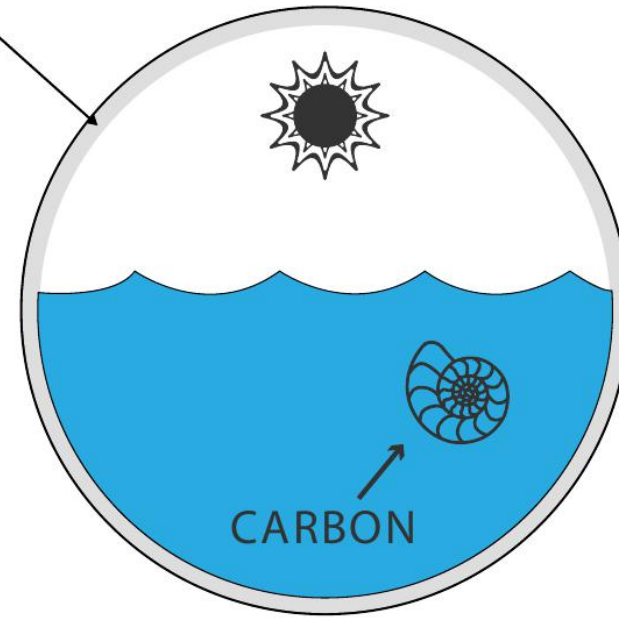
Out[31]:



3c. Carbon systems & chemistry



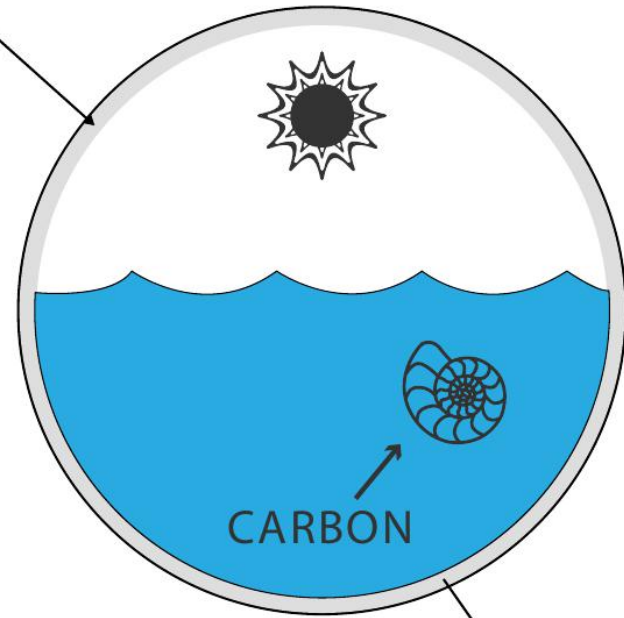
CO₂



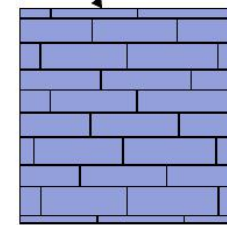
CARBON



CO₂



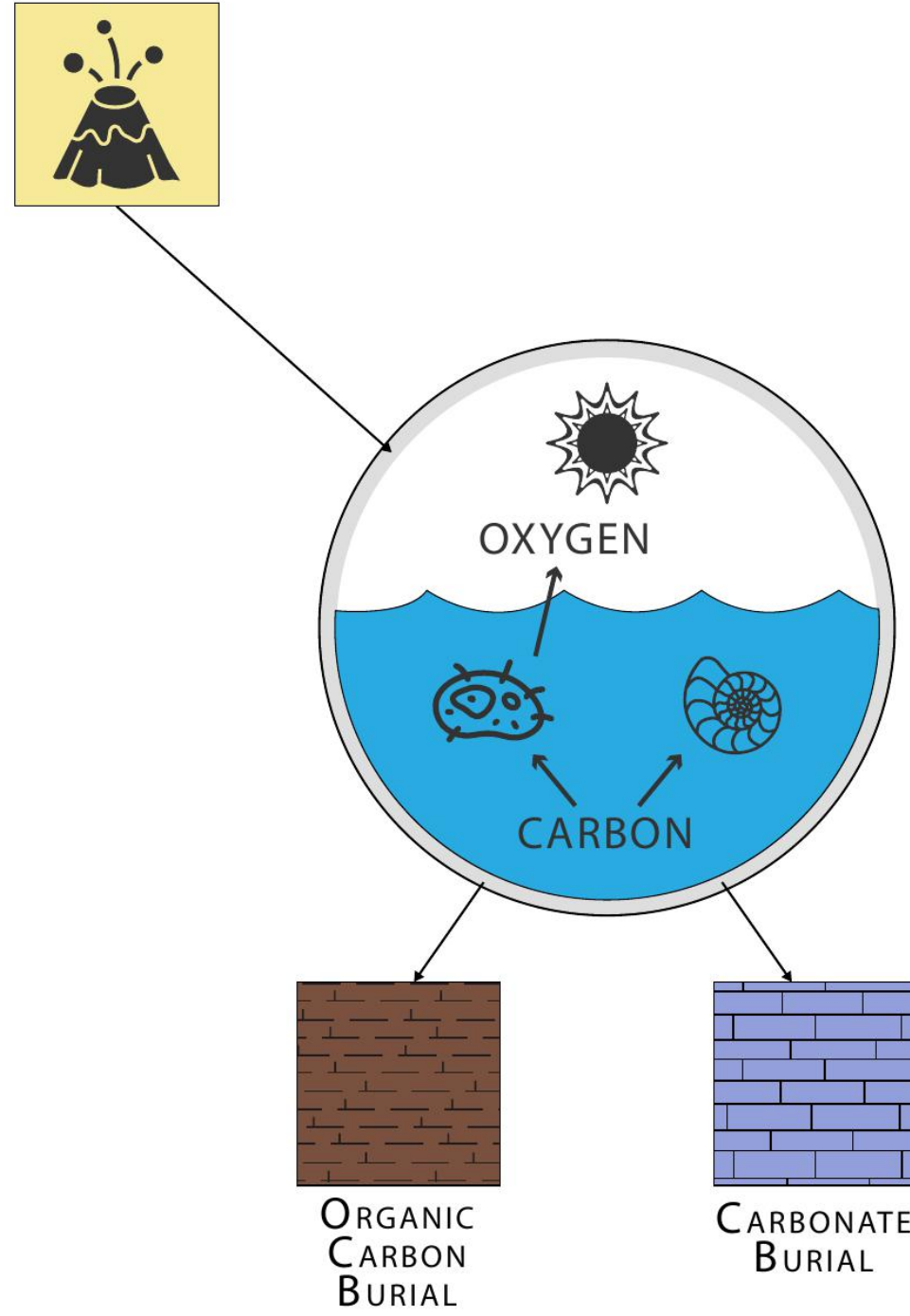
CARBON

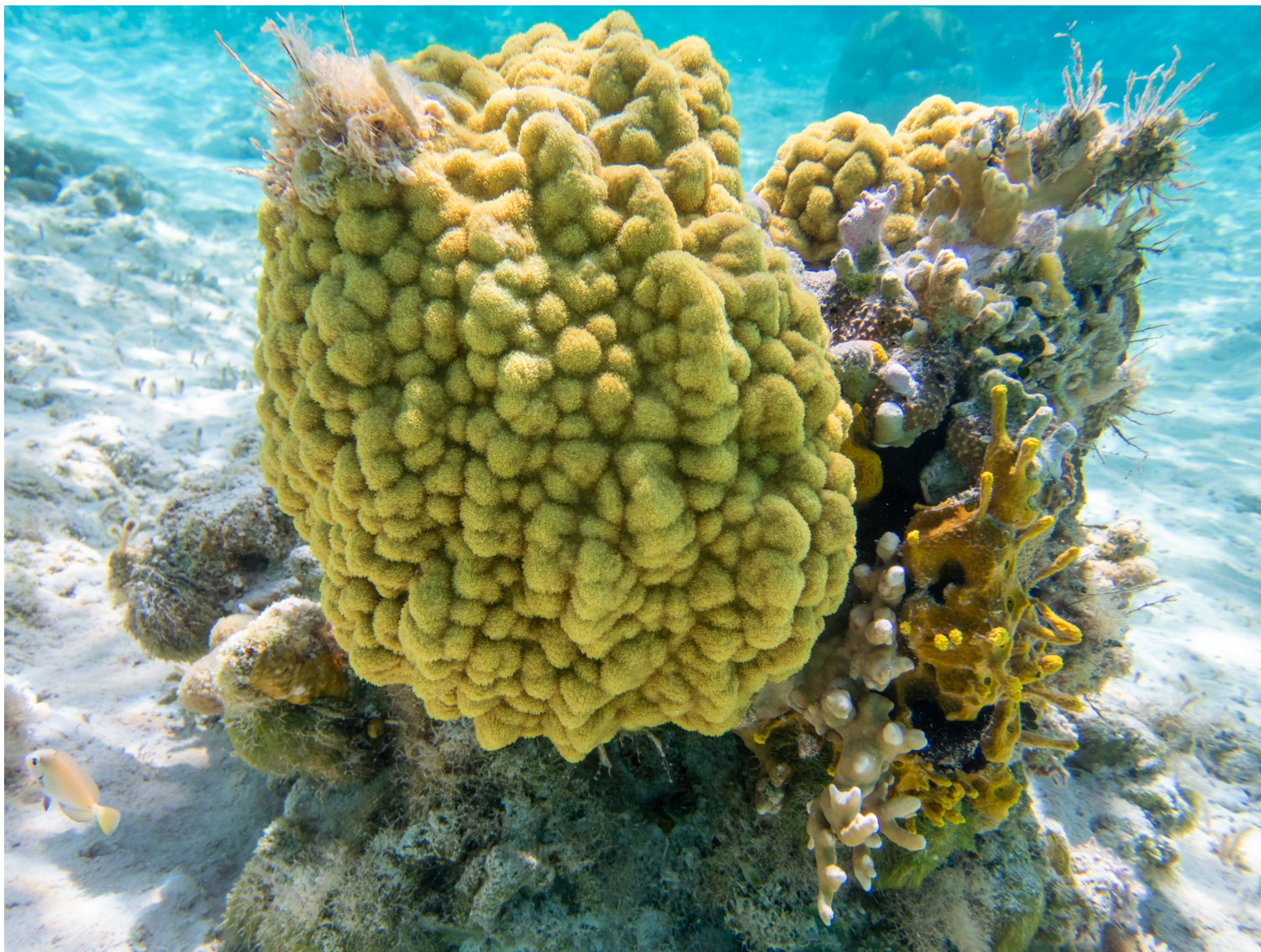


CARBONATE
BURIAL



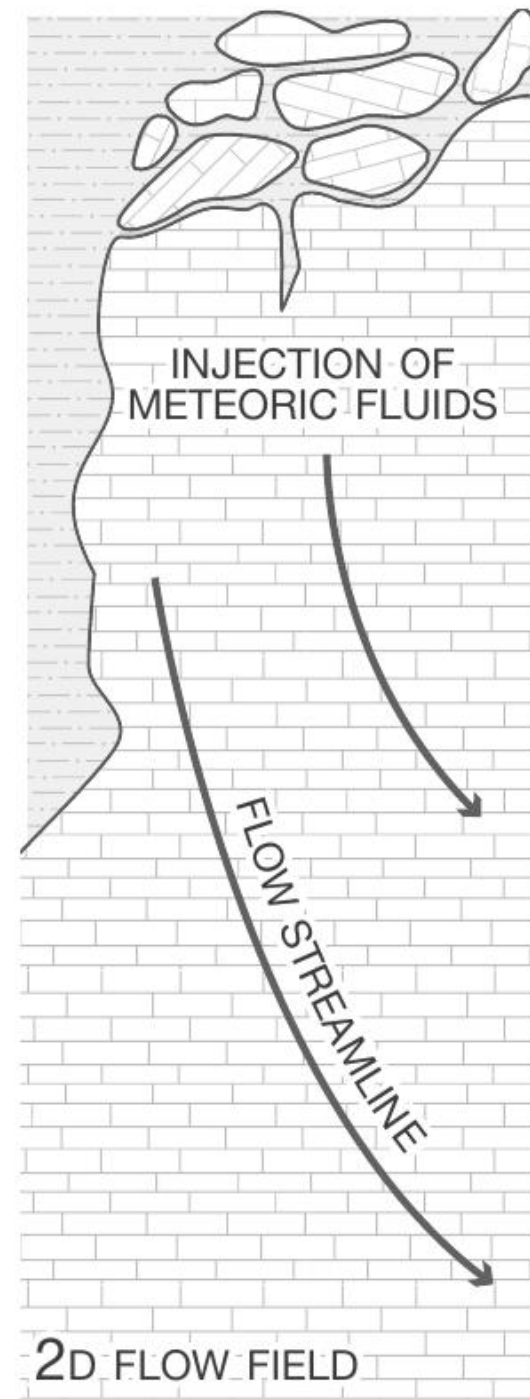
CO₂



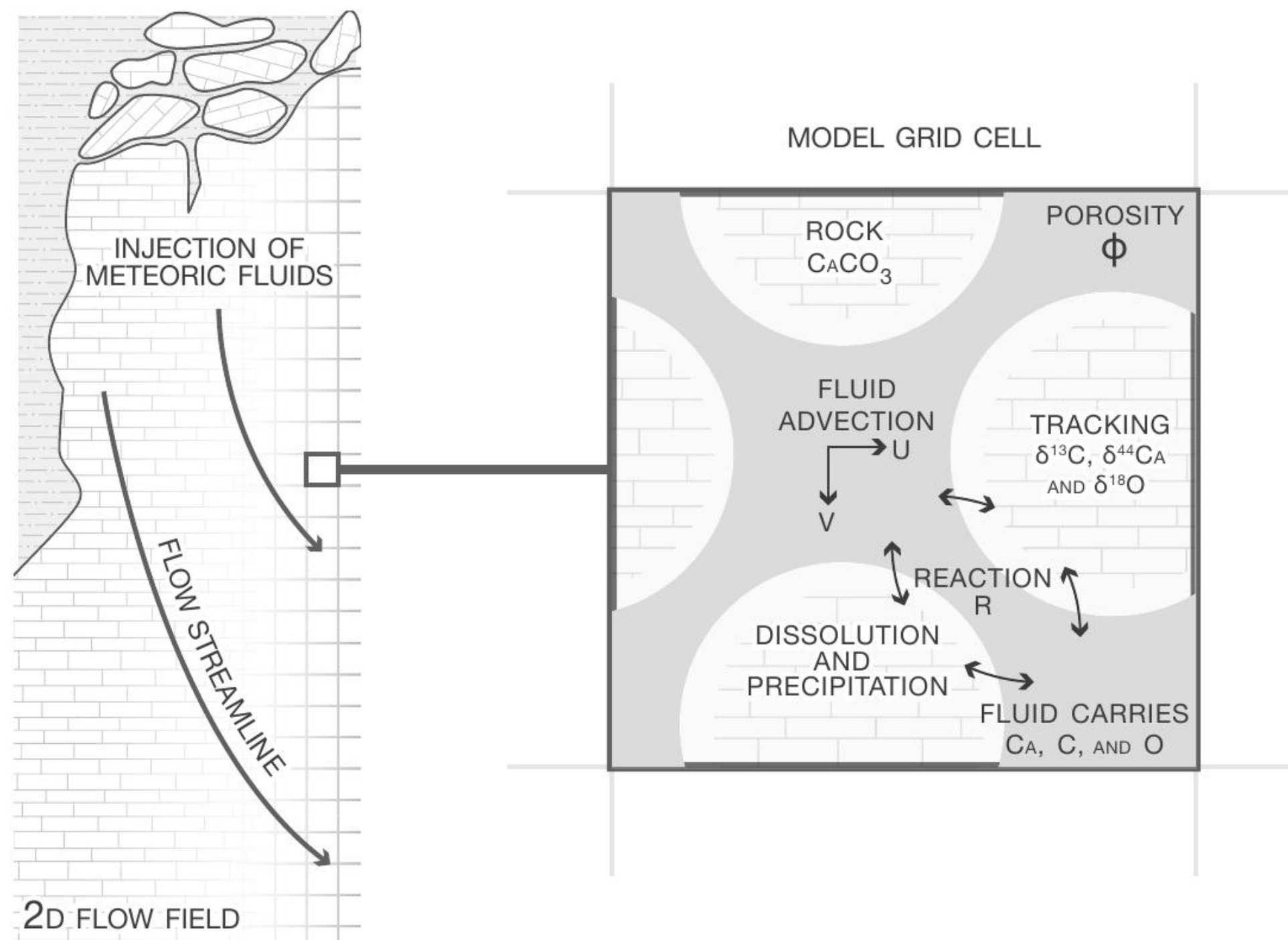




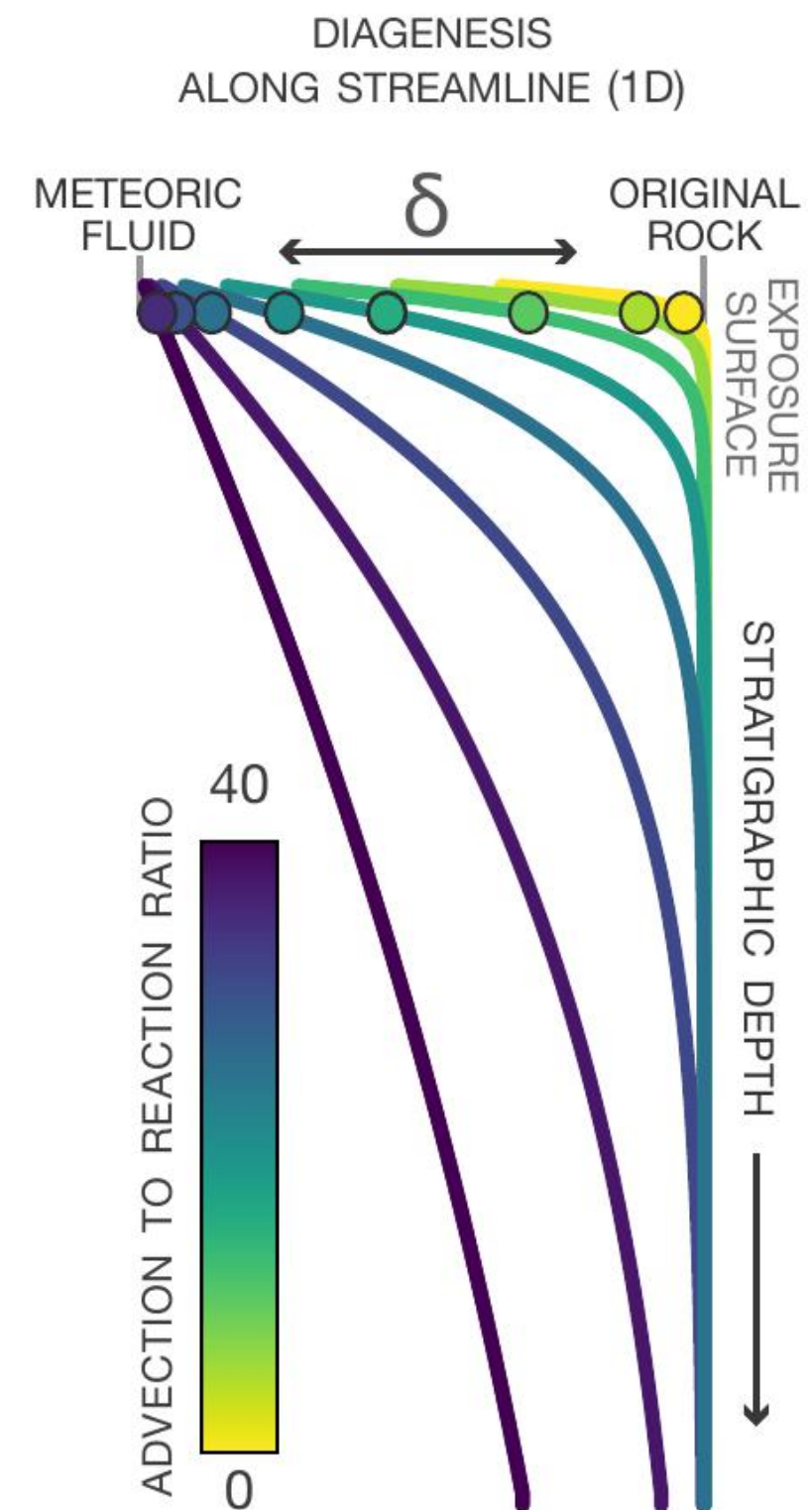
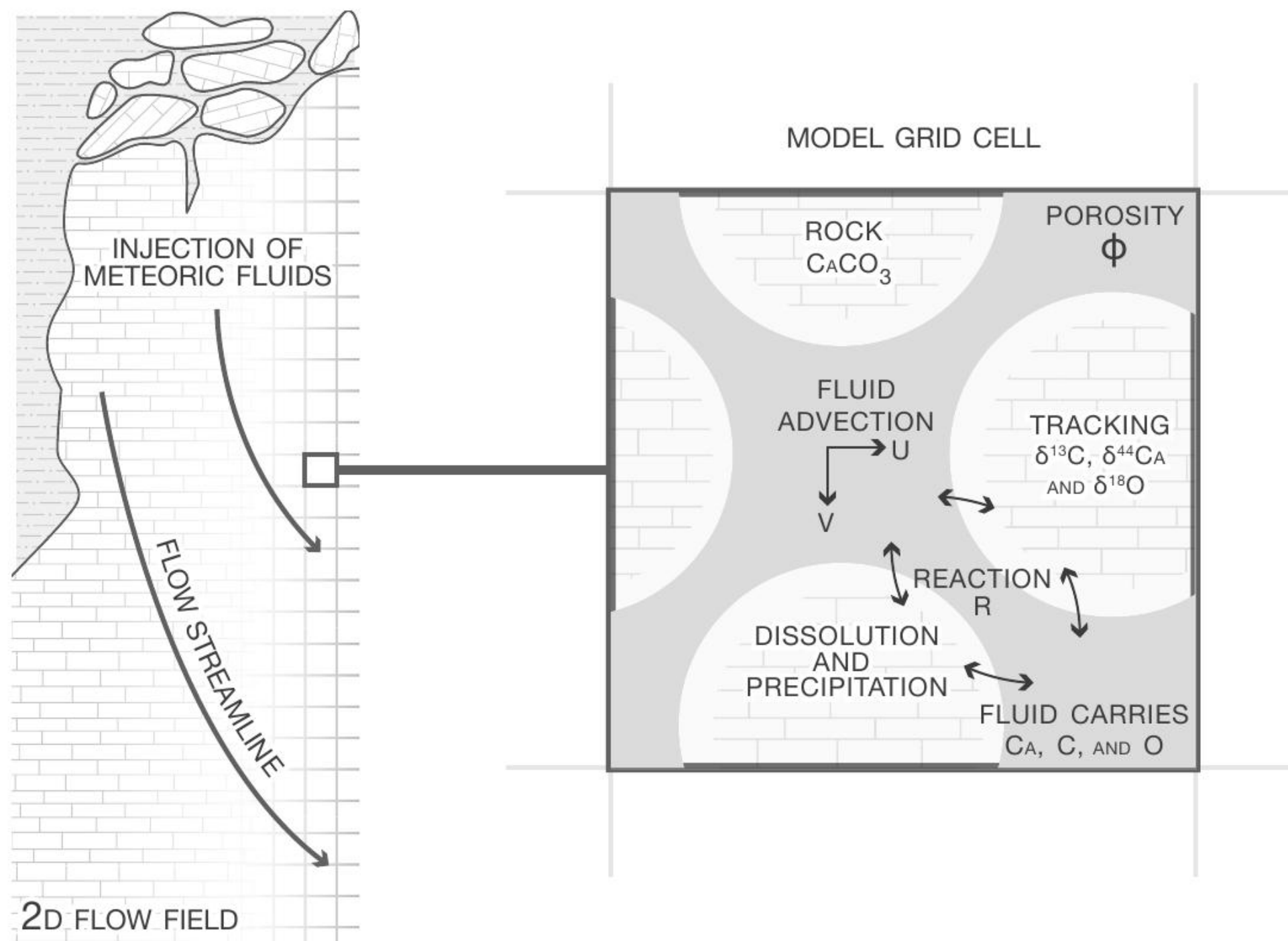
DIAGENETIC MODEL SCHEMATIC

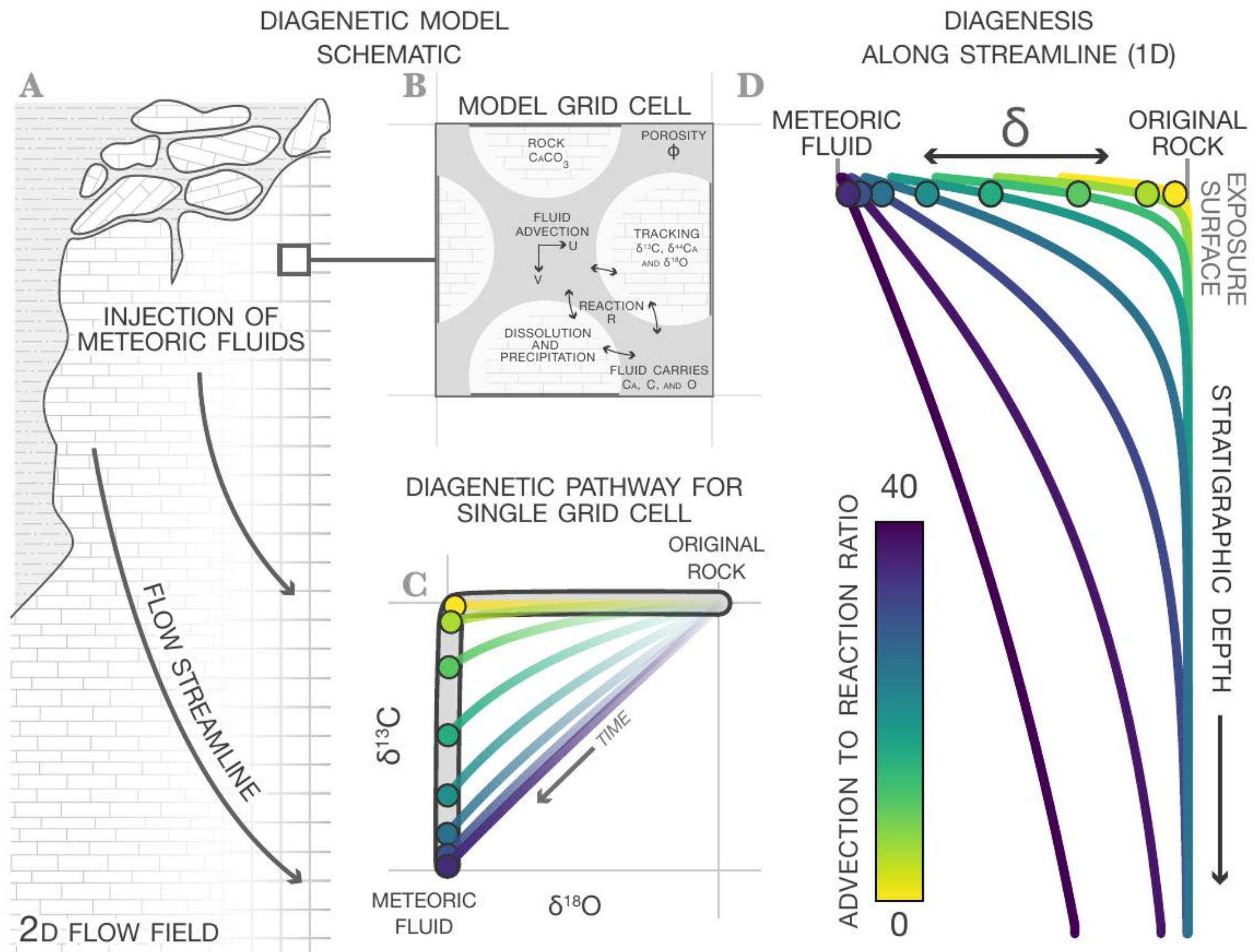


DIAGENETIC MODEL SCHEMATIC

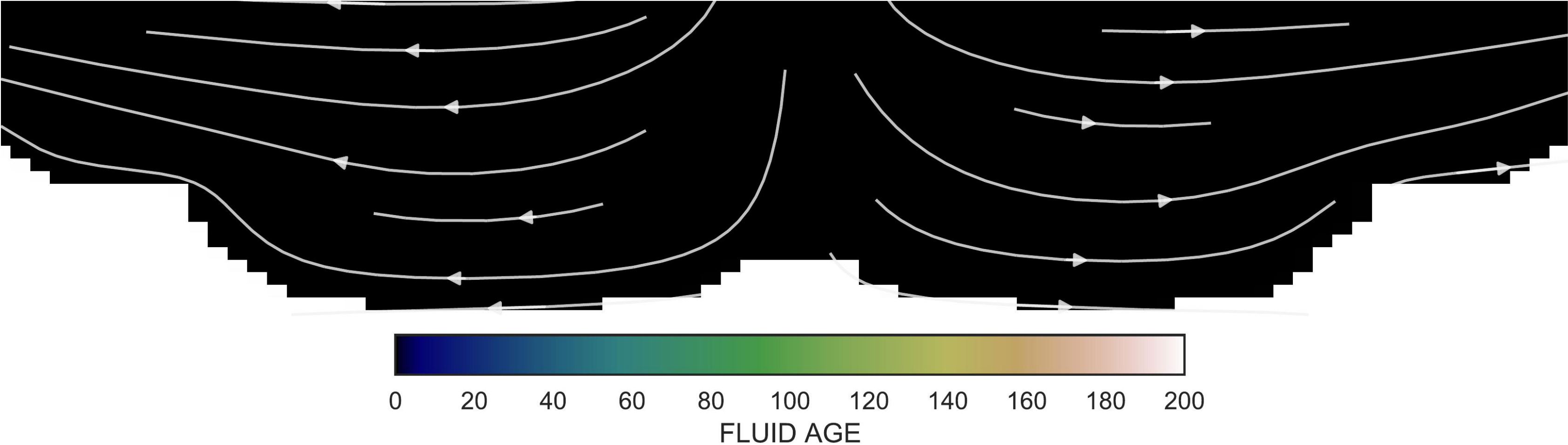


DIAGENETIC MODEL
SCHEMATIC

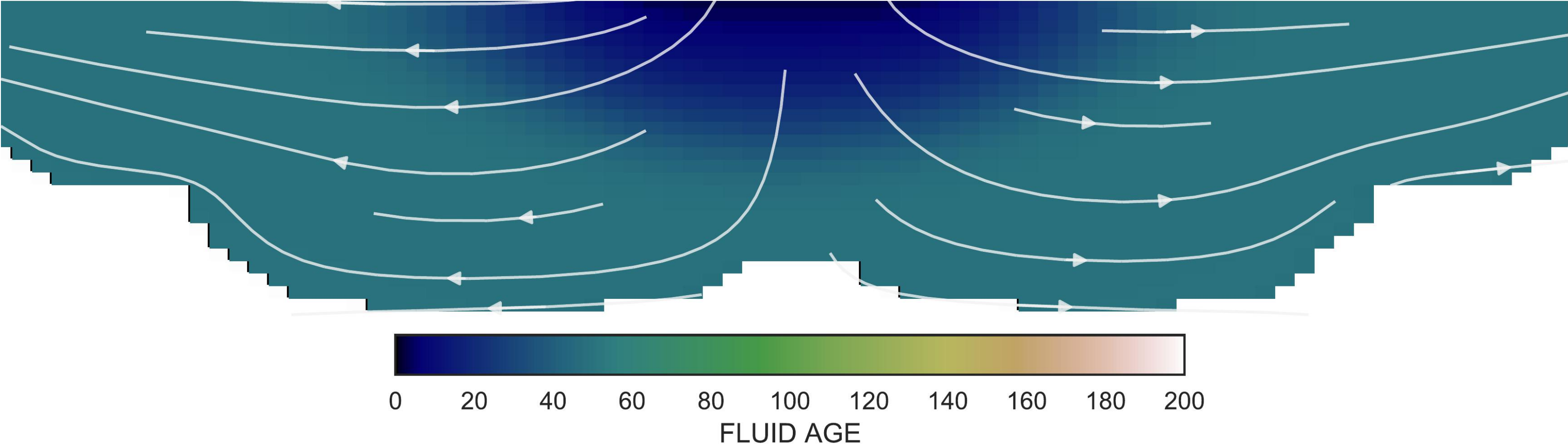




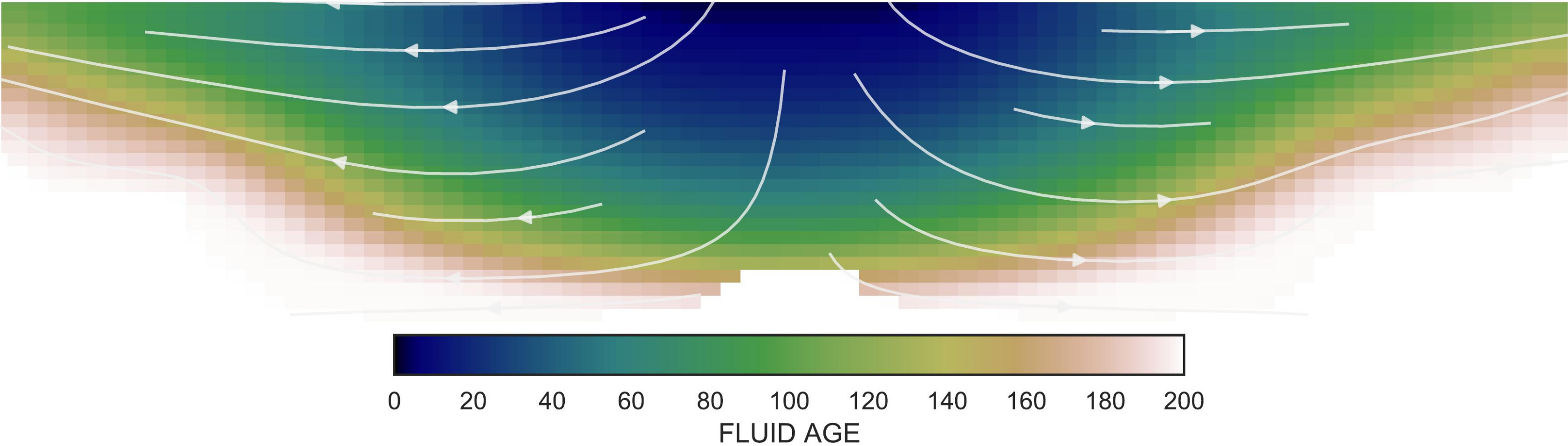
FRESHWATER LENS - 0 YEARS



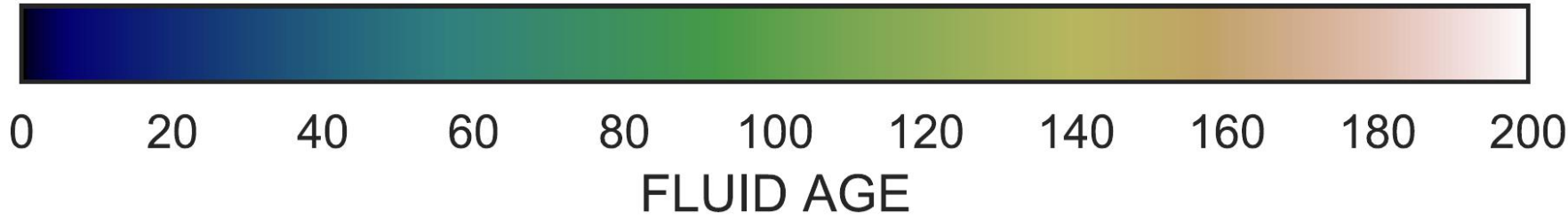
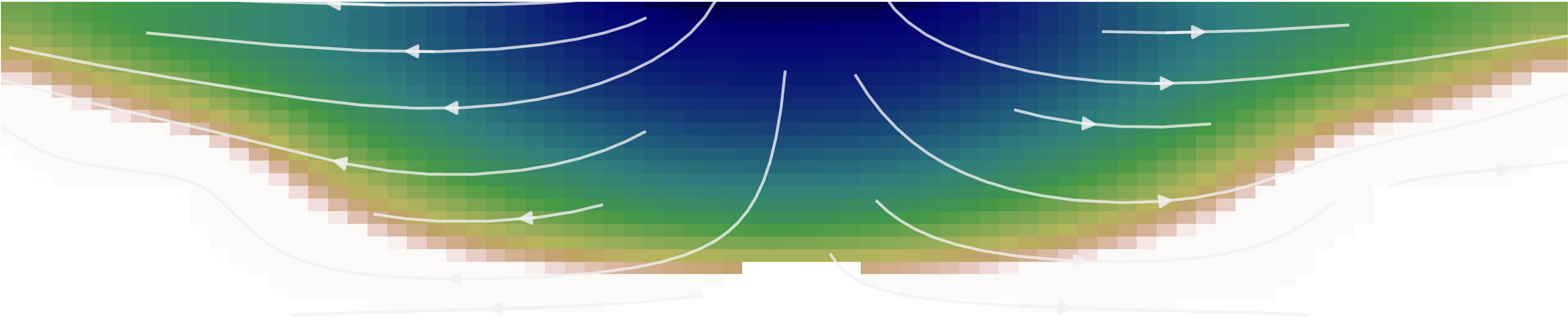
FRESHWATER LENS - 50 YEARS



FRESHWATER LENS - 200 YEARS

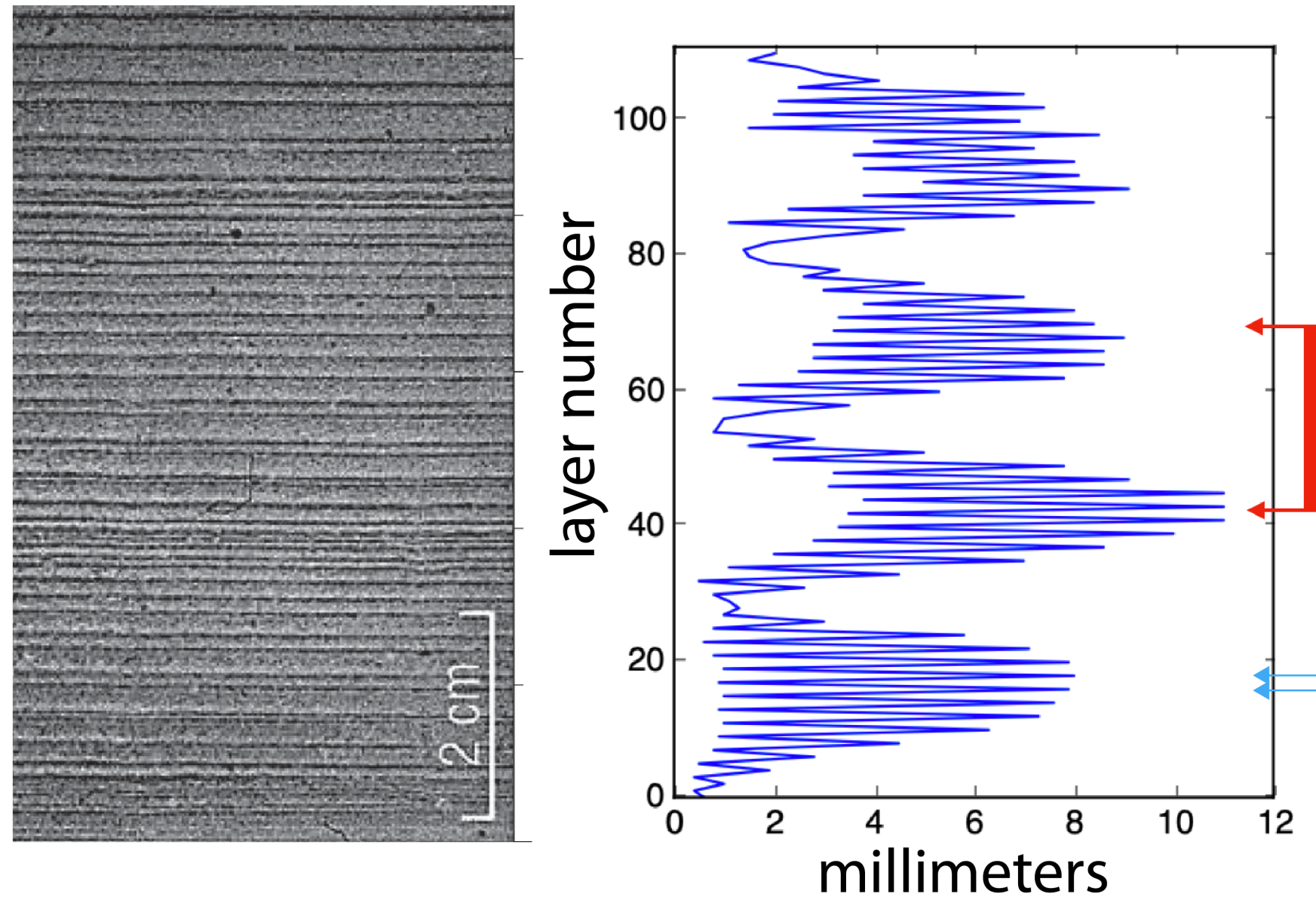


FRESHWATER LENS - 1000 YEARS



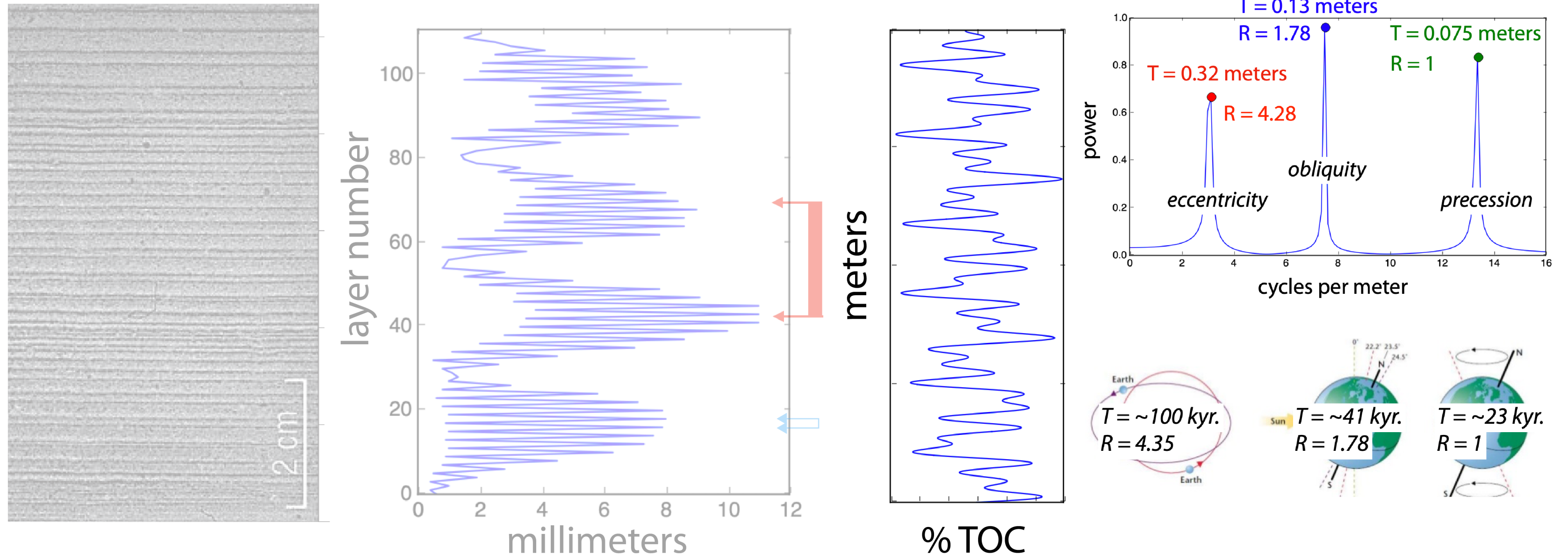
3d. Stratigraphic correlation

- correlation = building age models
- how is time distributed in sedimentary rocks?



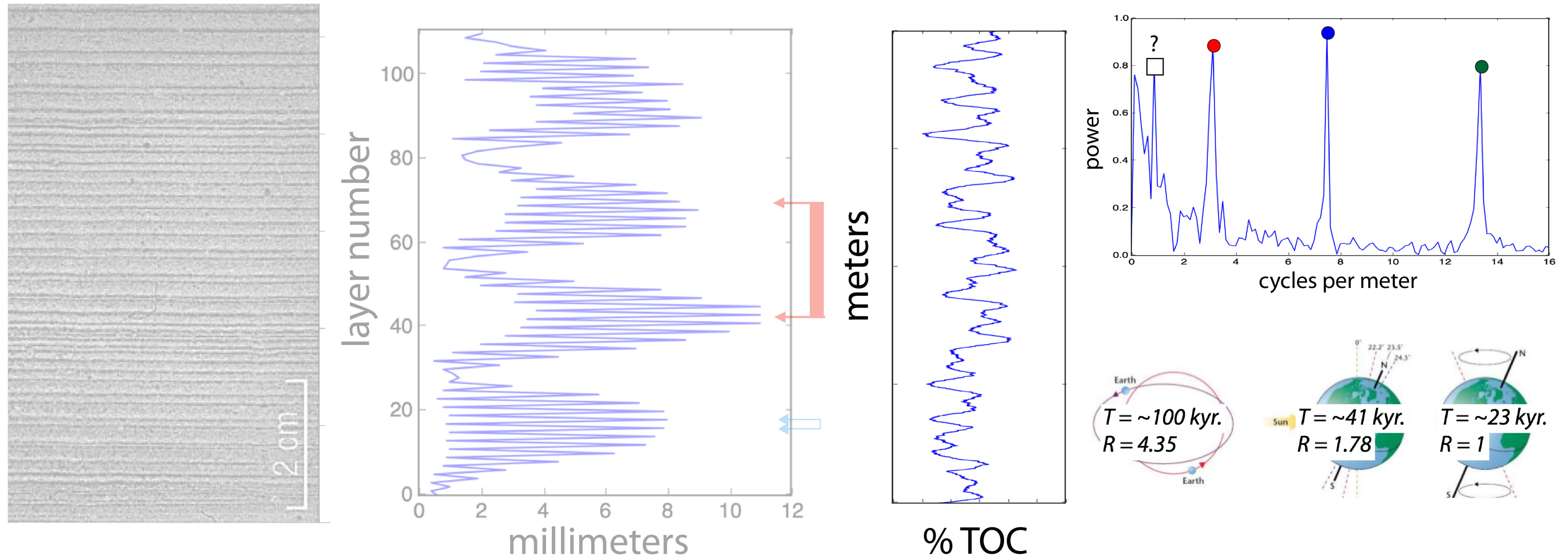
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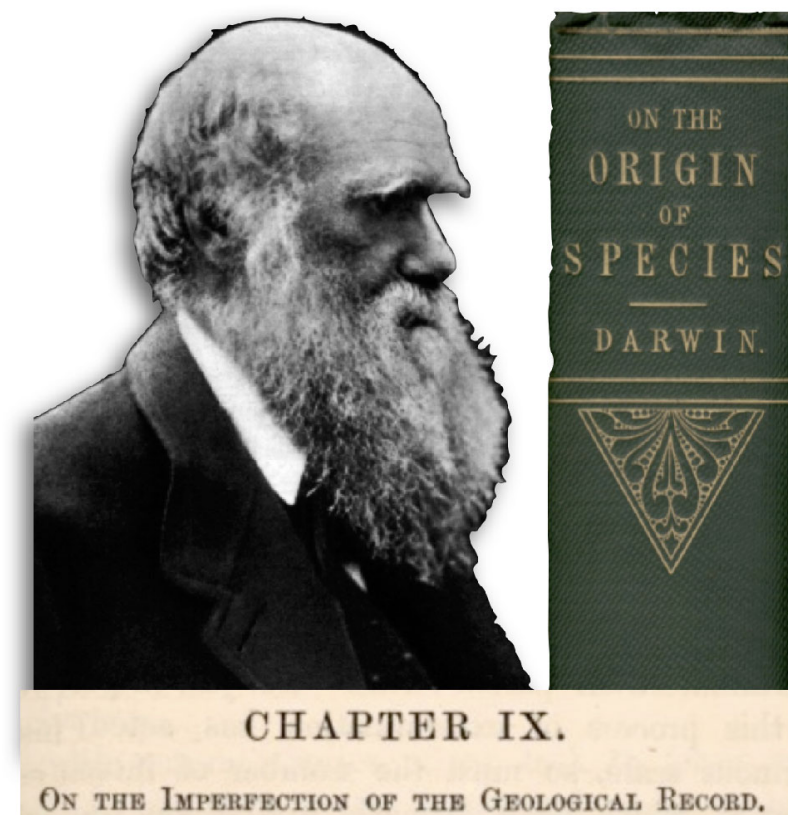


3e. Data synthesis & sediment cycling

a decaying rock record?

*I look at the natural geological record, as a history of the world imperfectly kept, and written in a changing dialect; of this history we possess the last volume alone, relating only to two or three countries. **Of this volume, only here and there a short chapter has been preserved**; and of each page, only here and there a few lines.*

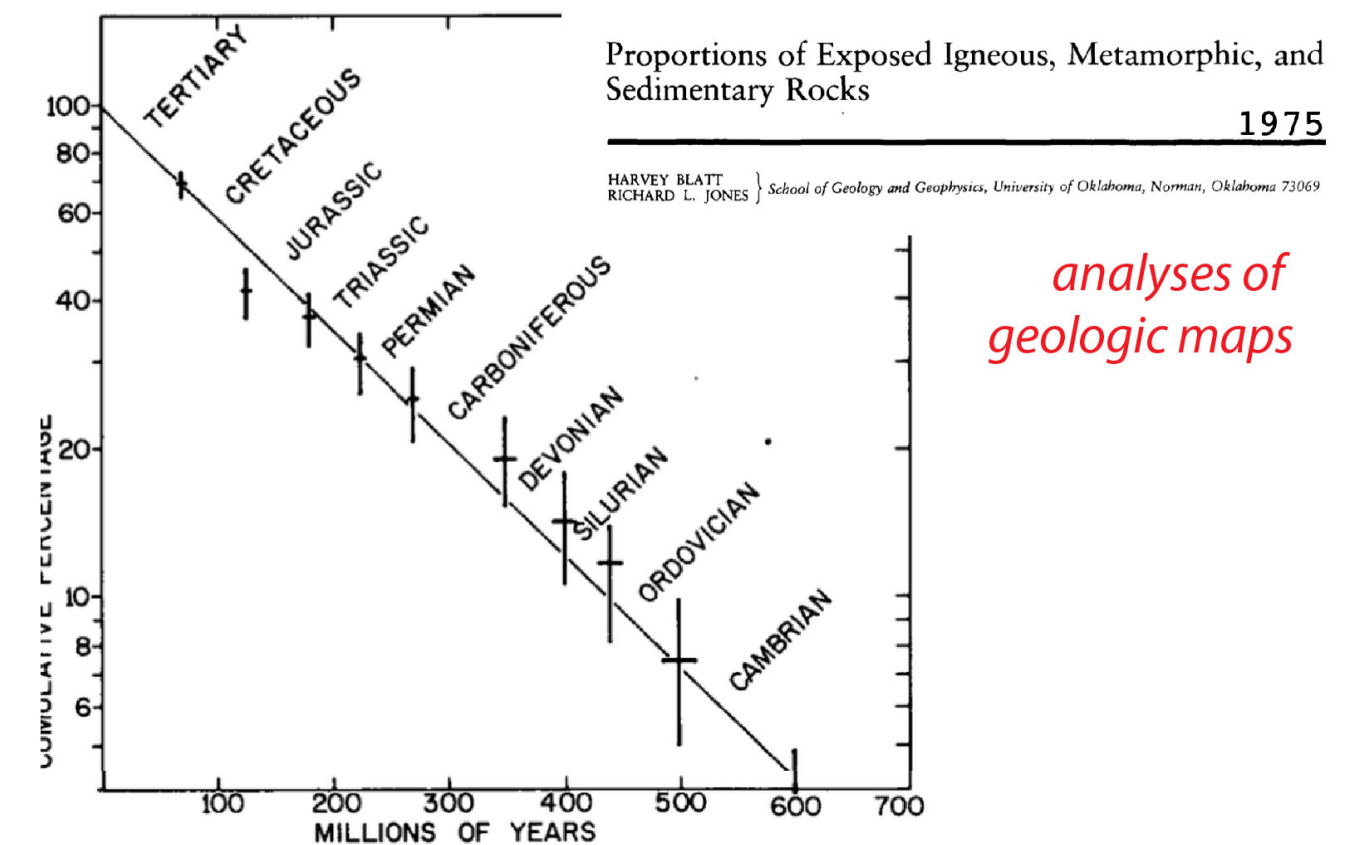
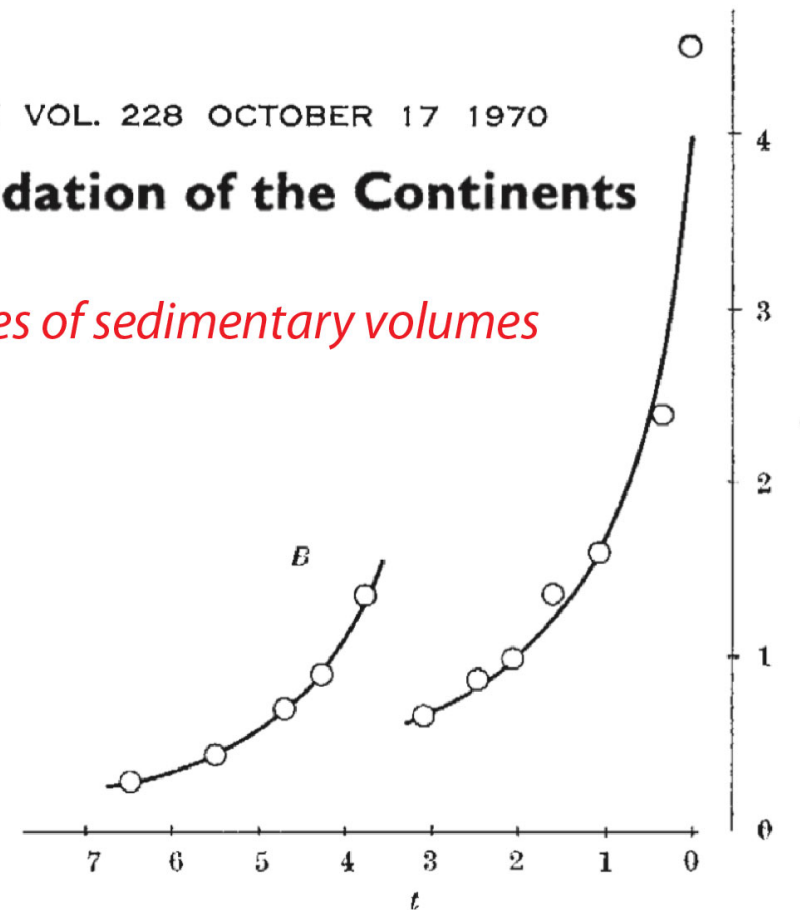
-- Charles Darwin



NATURE VOL. 228 OCTOBER 17 1970

Denudation of the Continents

analyses of sedimentary volumes



4. First assignment (due before next class):

Install Python on your local machine

- One of the easiest ways to install and manage python on your local machine is through Anaconda:
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- sediment supply to the basin
- transport of sediment within the basin
- available space (accomodation space)

