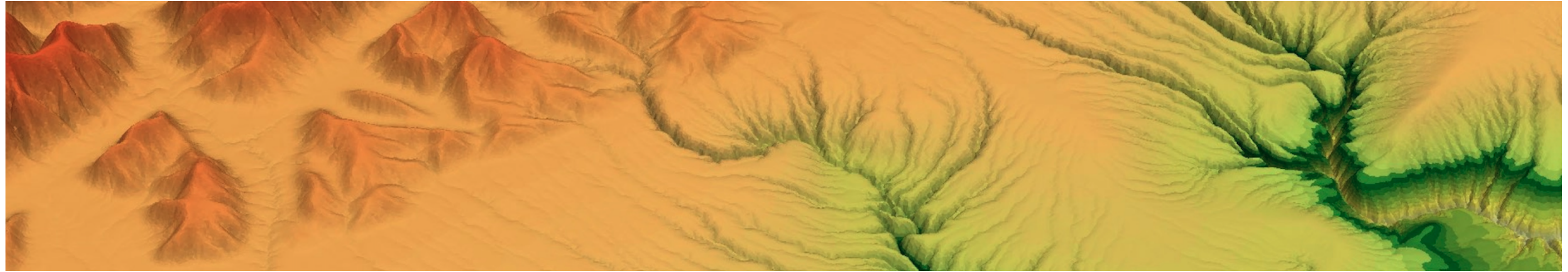


EOS 423 // EOS 518: Advanced Sedimentology and Stratigraphy



Lecture 1: Course Introduction | Jan 6, 2025

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. 13, 2025**)
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.



Who am I?

- Blake Dyer (he/him/his)
 - I prefer Blake over Dr. Dyer or Professor Dyer
- Undergraduate at Rice University 2006-2010
- PhD at Princeton University 2010-2015
- Postdoc at LDEO (Columbia University) 2016-2019
- Started in SEOS at UVic in Nov 2019
- Second time teaching EOS 423
 - Also teach Geochemistry, Marine Geology, and The Dynamic Earth



Bob Wright A419
blakedyer@uvic.ca



Research interests: the geologic history of climate and life



Research interests: the geologic history of climate and life



Course Outline, Brightspace, and Course Webpage

Brightspace: All important announcements, assignments, and grades will be managed through Brightspace.

Course Webpage: Lecture slides and other course materials can be found on the course webpage, updated shortly after each class. There is a link to this page under Course Materials on Brightspace.



1c. Introductions: who are *you*

- What do you hope to learn in EOS 423?
- What challenges do you anticipate?



1c. Introductions: who are *you*

- What do you hope to learn in EOS 423?
- What challenges do you anticipate?

```
In [1]: #let's get some help from Python for class introductions

import numpy as np
class_list=['Abbey', 'Benoit', 'Bronwen', 'Brooke', 'Byron', 'Clare', 'Claudia', 'Jacob', 'Kascia',
           'Kate', 'Jinfeng']

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
```



1c. Introductions: who are *you*

- What do you hope to learn in EOS 423?
- What challenges do you anticipate?

```
In [1]: #let's get some help from Python for class introductions

import numpy as np
class_list=['Abbey', 'Benoit', 'Bronwen', 'Brooke', 'Byron', 'Clare', 'Claudia', 'Jacob', 'Kascia',
            'Kate', 'Jinfeng']

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
```

```
In [13]: 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, such as model building and introductory time-series analysis. Pre-requisites: EOS 325, EOS 201.



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, such as model building and introductory time-series analysis. Pre-requisites: EOS 325, EOS 201.

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



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, such as model building and introductory time-series analysis. Pre-requisites: EOS 325, EOS 201.

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 in B119 on Fridays to work on the weekly assignment.



2b. Course outline

Course structure: The course will meet twice a week (M/Th) for lectures and in B119 on Fridays to work on the weekly assignment.

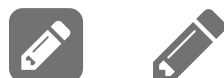
- On Monday some weeks will begin with a *flipped classroom*: I will randomly select, with python, at least two students to informally present their progress on the current weekly assignment.



2b. Course outline

Course structure: The course will meet twice a week (M/Th) for lectures and in B119 on Fridays to work on the weekly assignment.

- On Monday some weeks will begin with a *flipped classroom*: I will randomly select, with python, 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 formally track participation in lecture, I expect that the assignments and exams will be easier for those who participate.



2c. Course outline

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

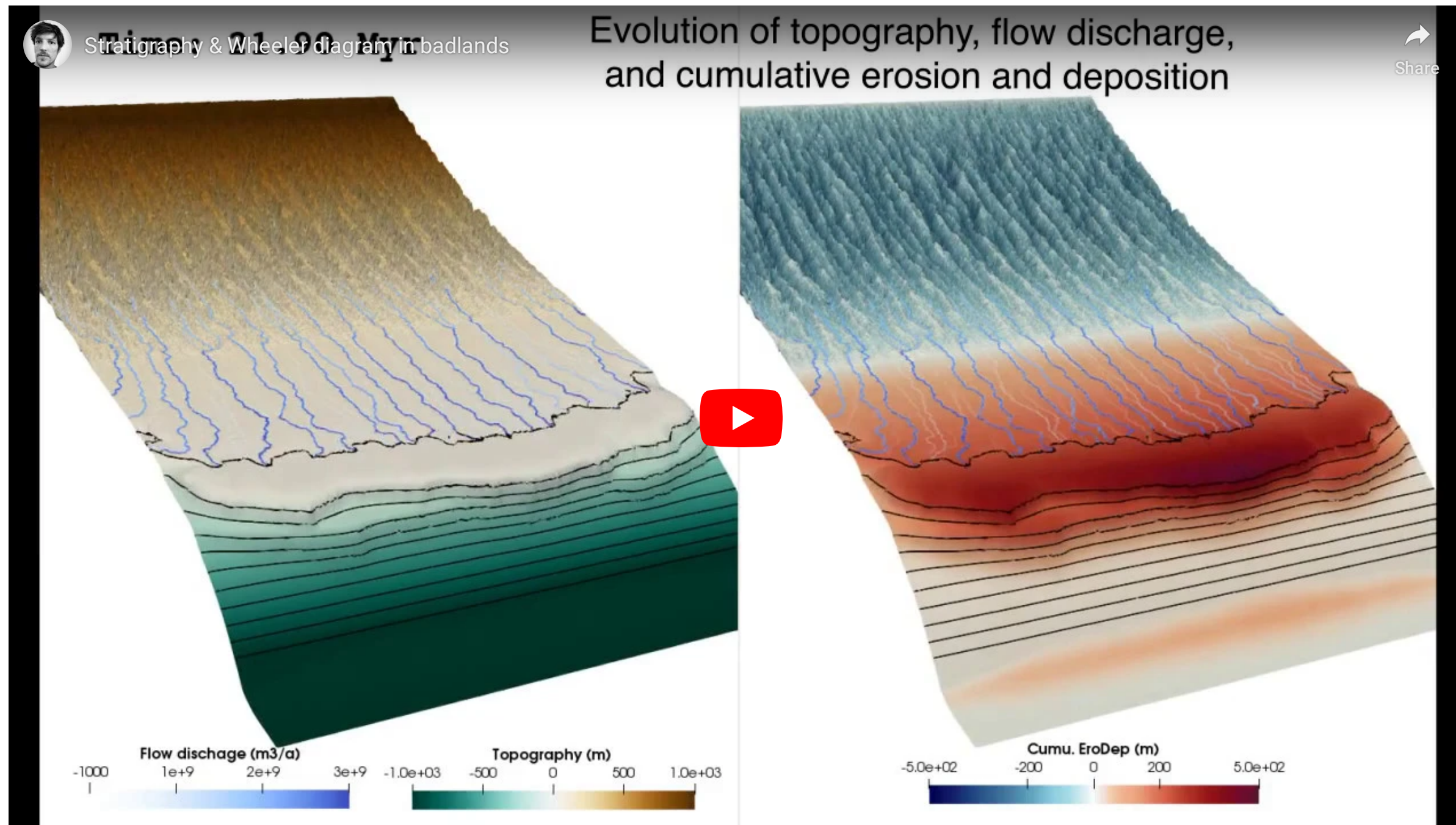
- Students enrolled in the graduate version of the course (EOS 518) will be expected to complete an alternative final assignment that includes a greater amount of self-direction.
- Below is a breakdown of the course assessment:

EOS 423 (Undergraduate Students)		EOS 518 (Graduate Students)	
6 Lab write-ups	40%	5 Lab write-ups	30%
1 Lab exam	20%	1 Lab exam	20%
Mid-term 1	15%	Mid-term 1	15%
Mid-term 2	15%	Final report	15%
Assignment presentations	10%	Assignment presentations	20%



3a. Sedimentary transport & building stratigraphy

Out [30]:





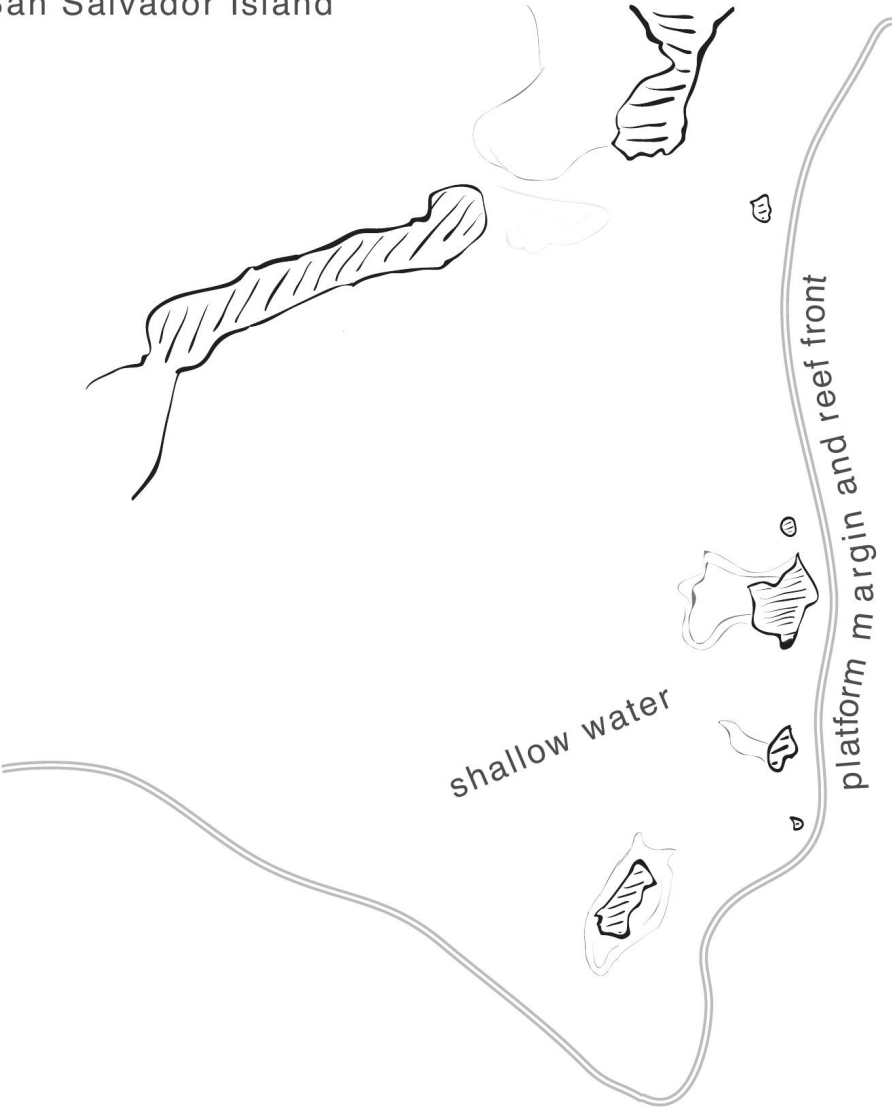
Late Carboniferous carbonates, Utah



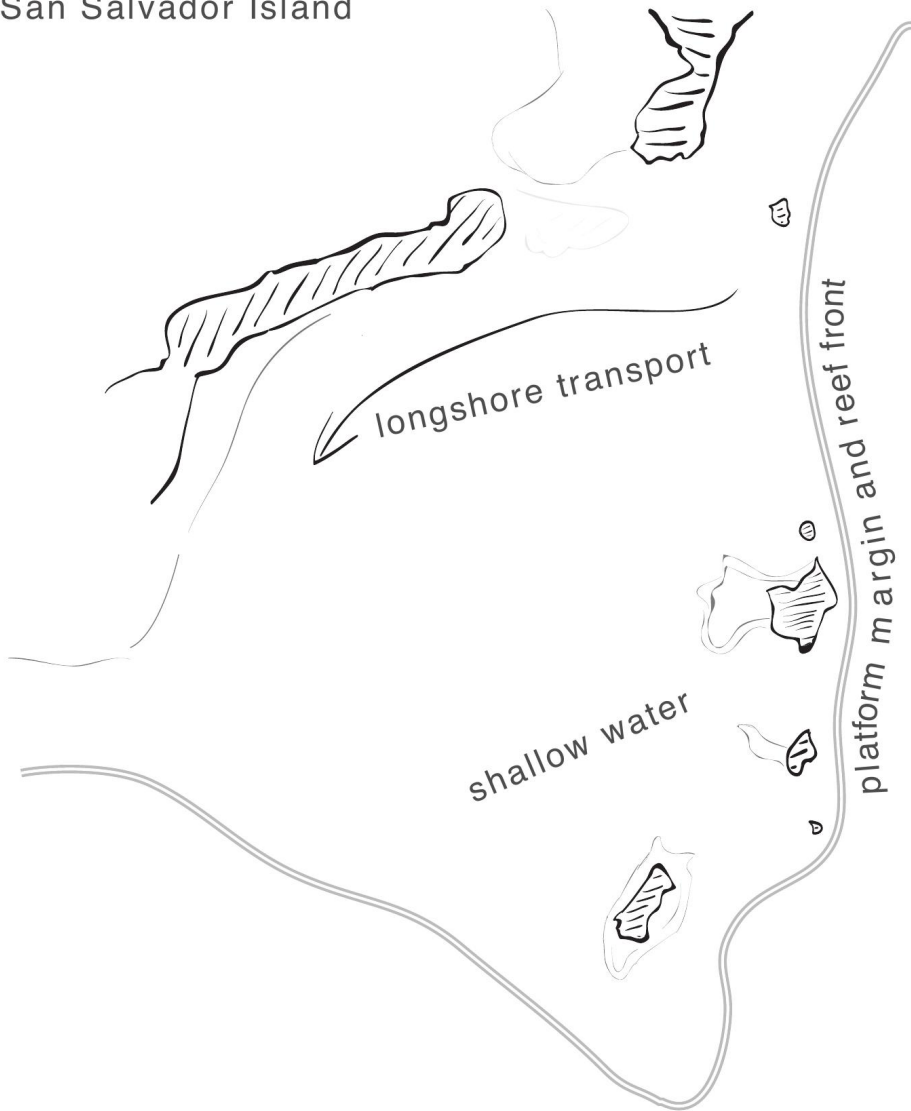
Sandy Hook, San Salvador Island



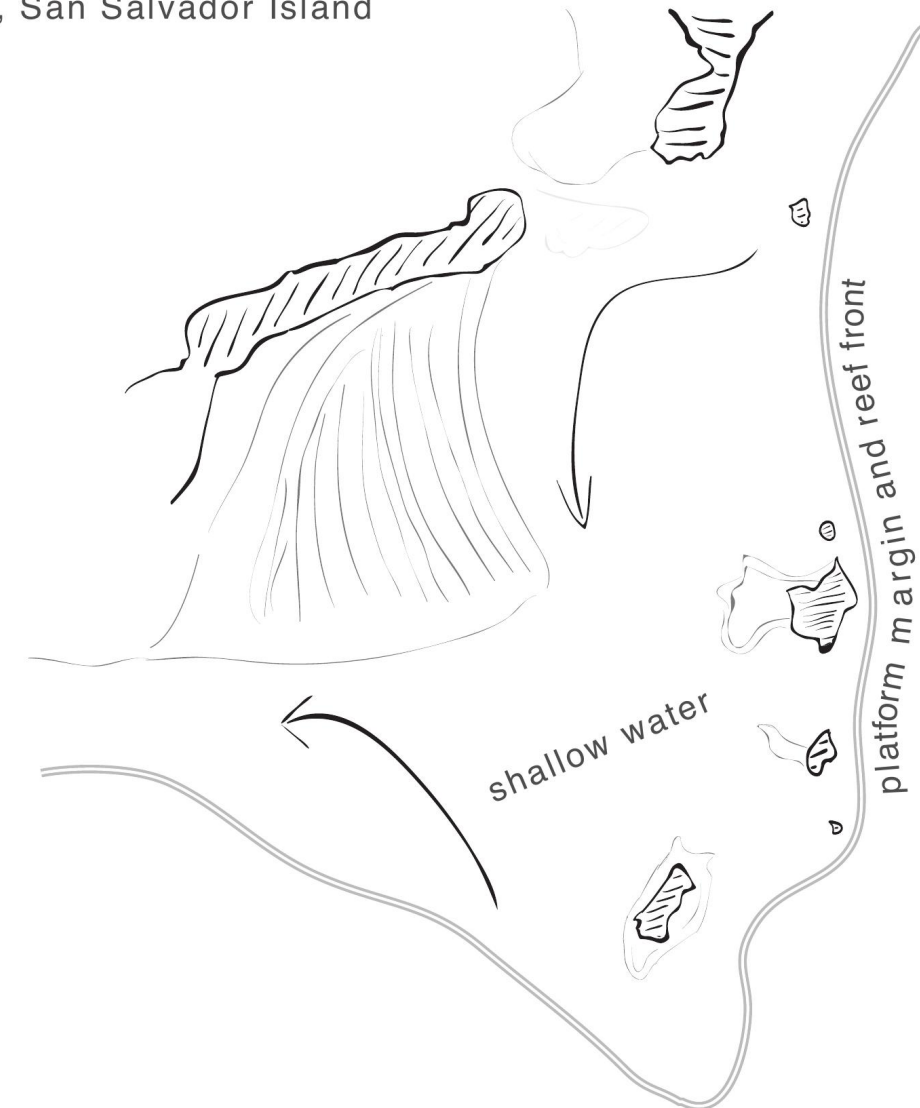
Sandy Hook, San Salvador Island



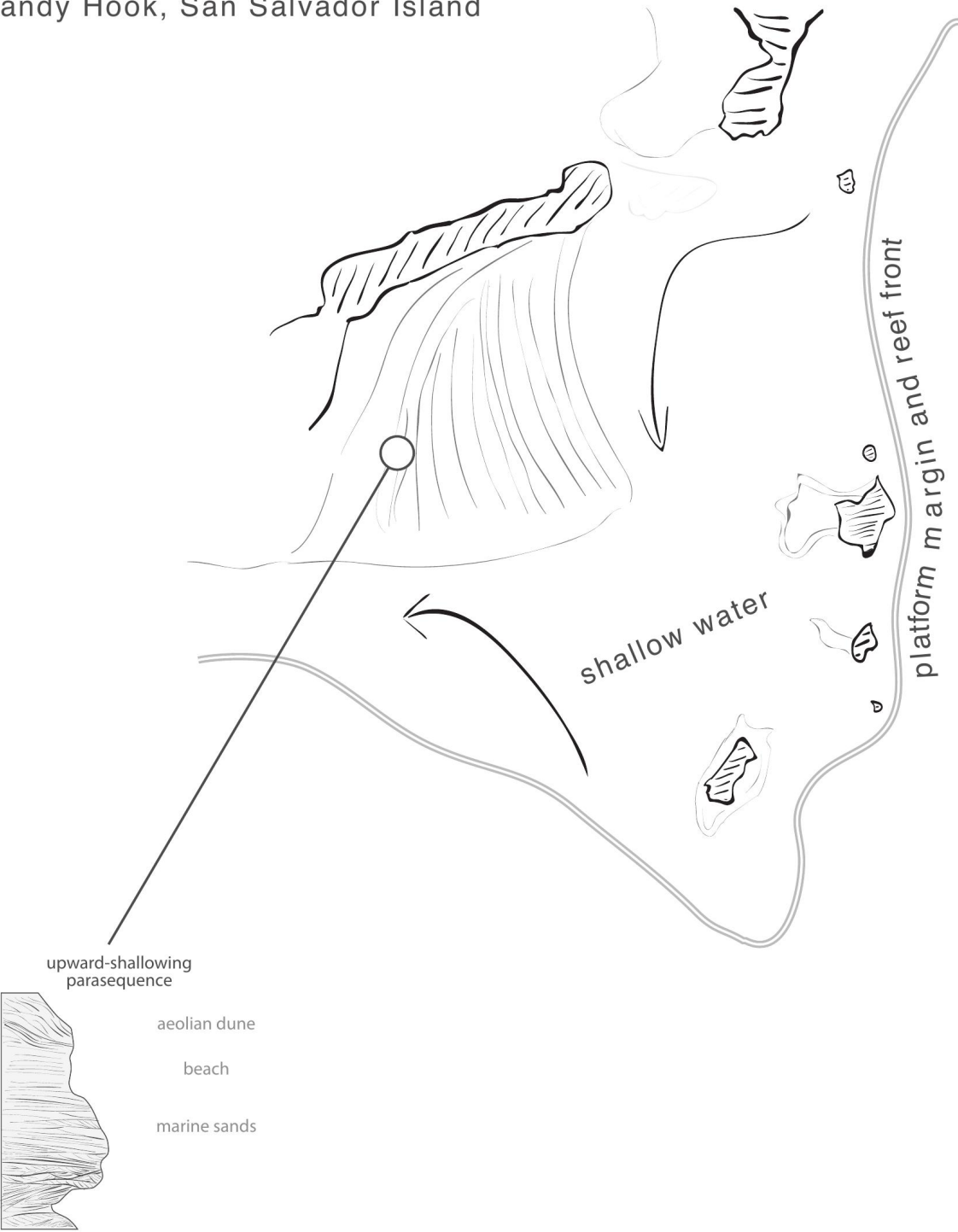
Sandy Hook, San Salvador Island



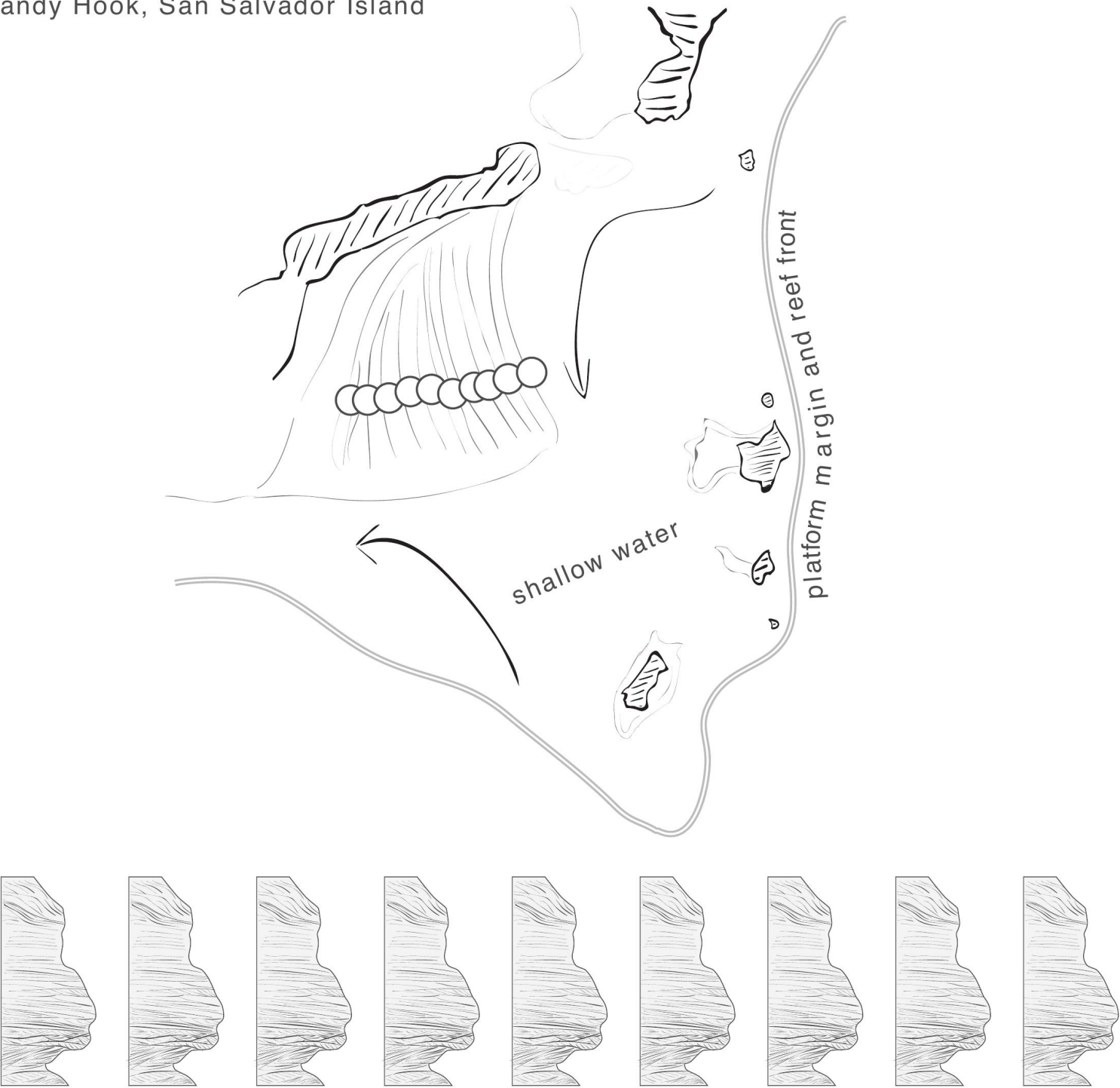
Sandy Hook, San Salvador Island



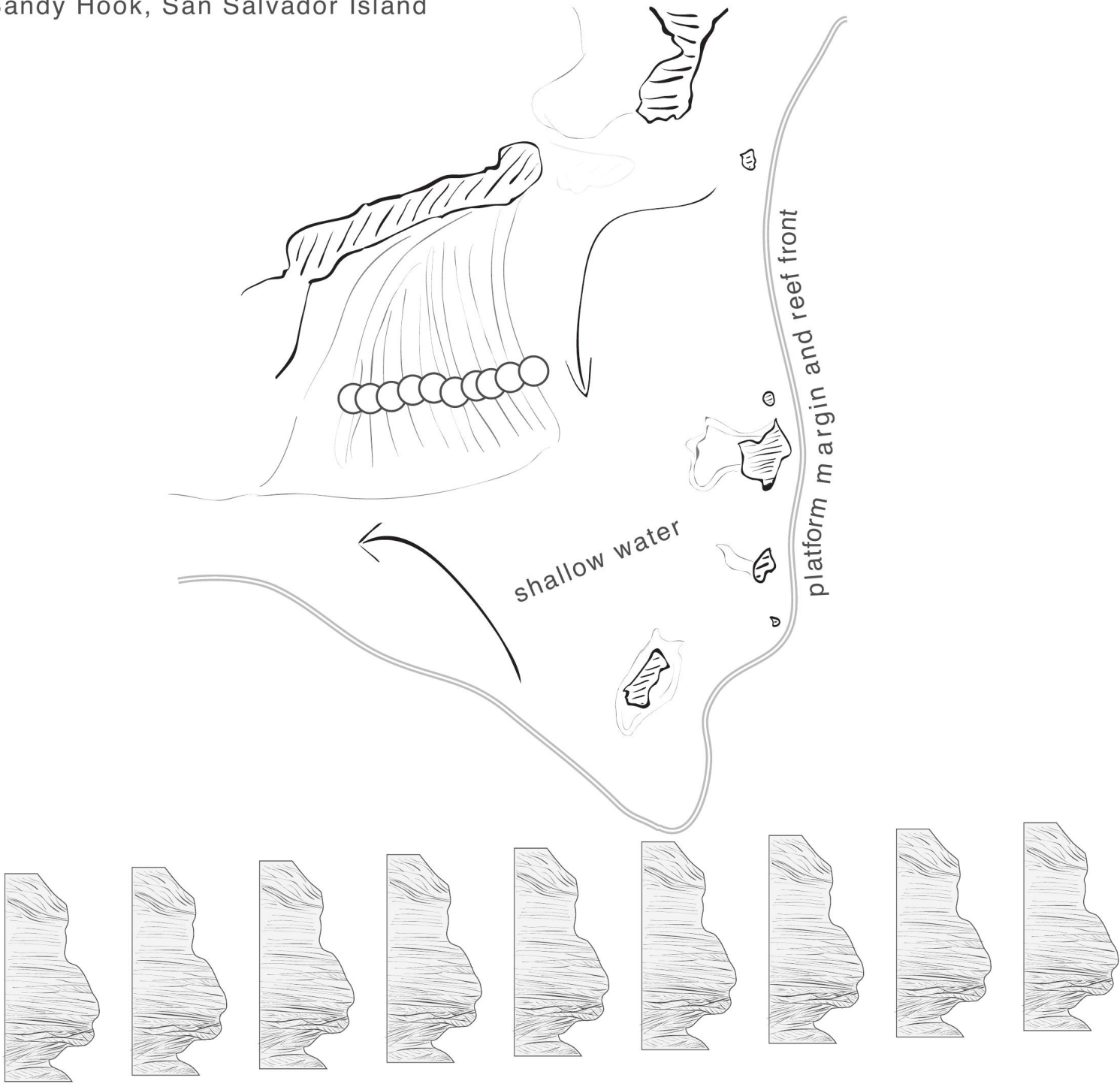
Sandy Hook, San Salvador Island



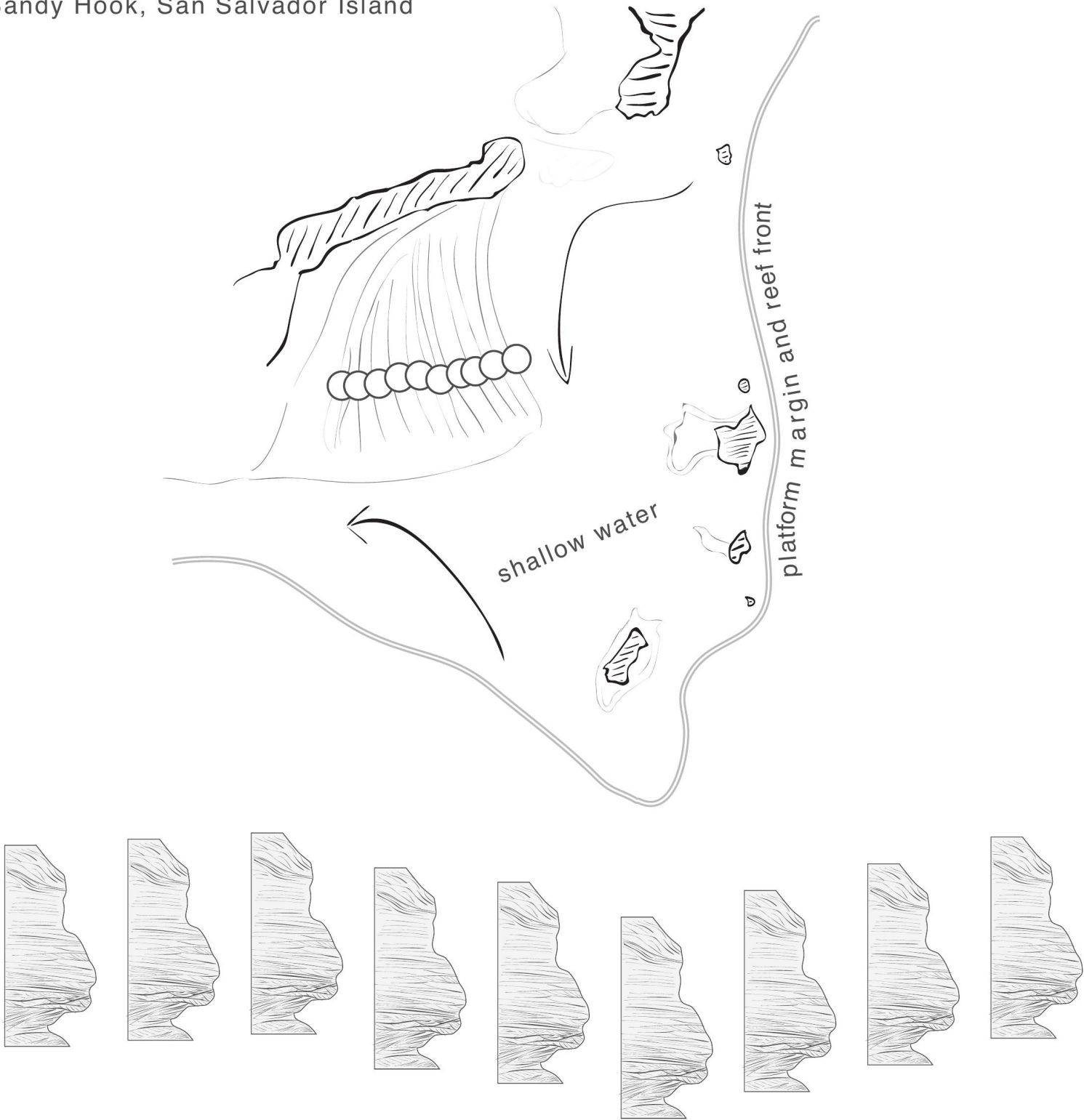
Sandy Hook, San Salvador Island



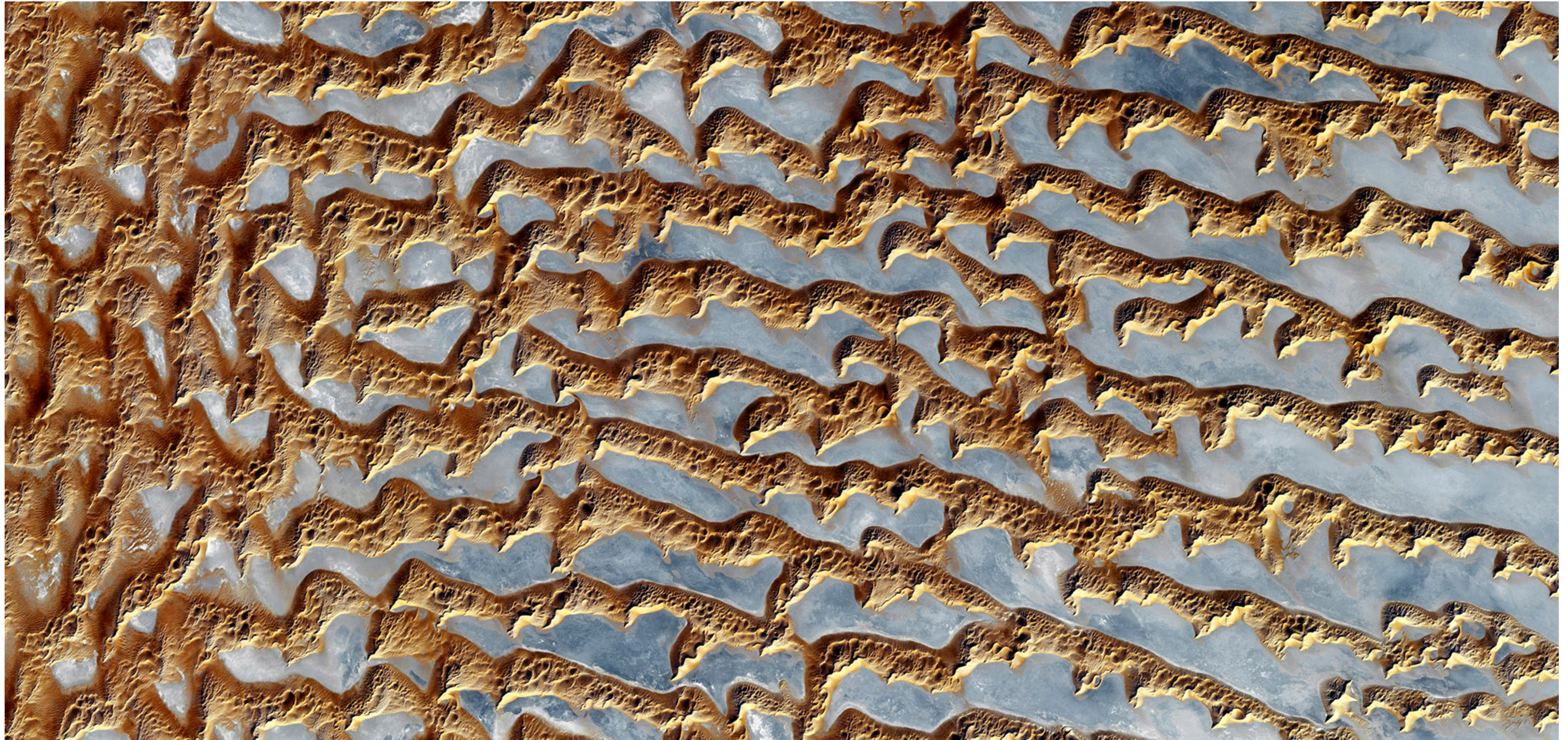
Sandy Hook, San Salvador Island



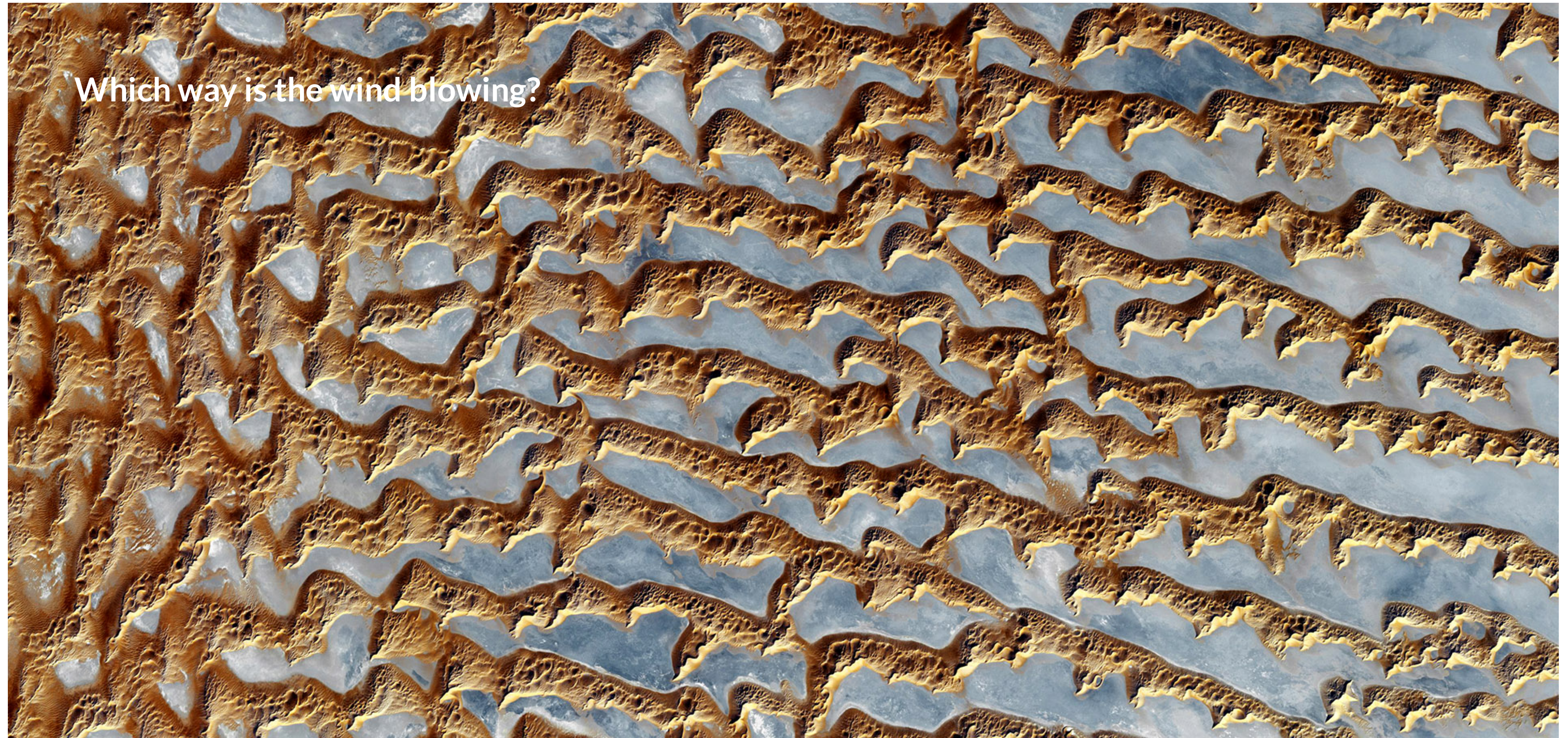
Sandy Hook, San Salvador Island

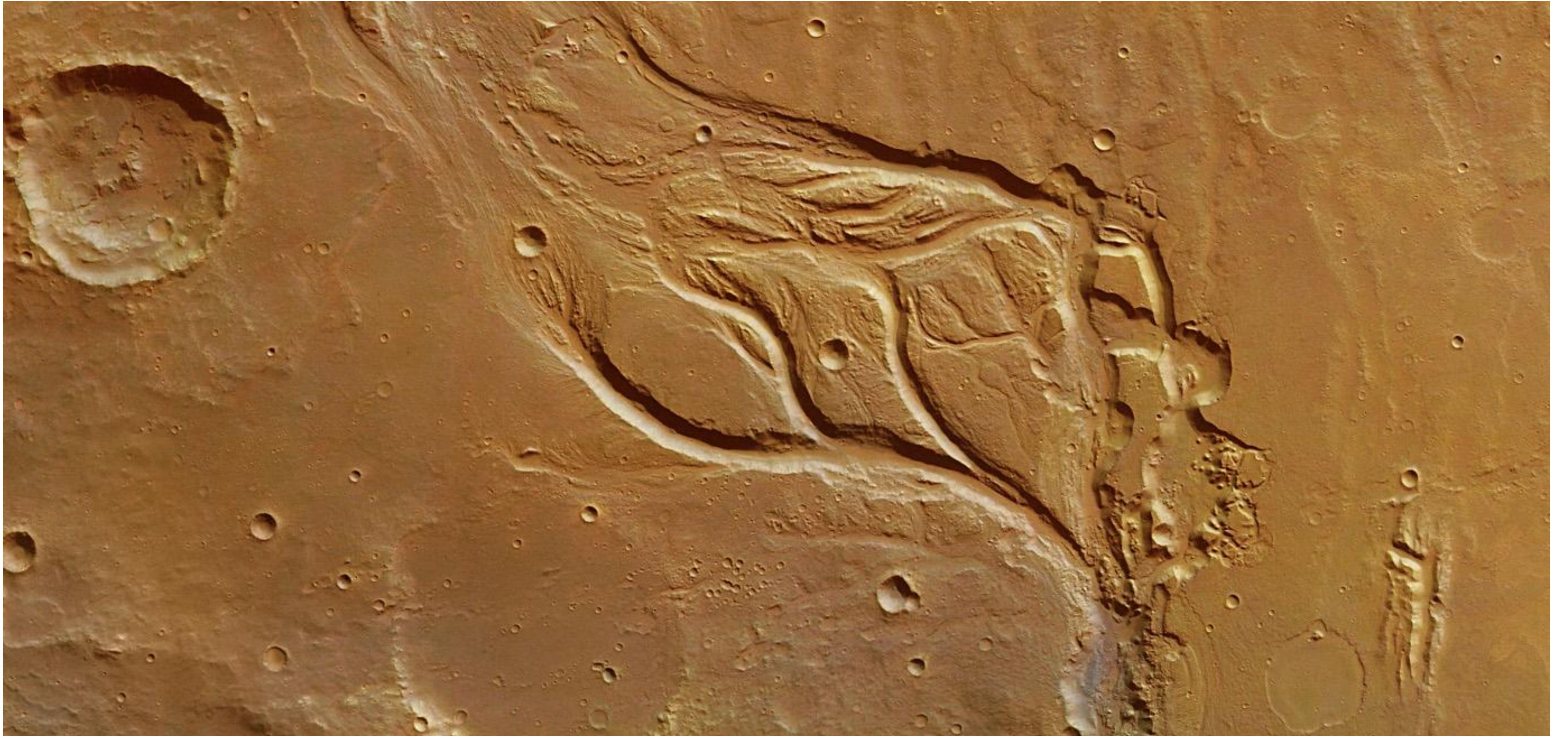


3b. Geospatial analysis & surface processes



3b. Geospatial analysis & surface processes



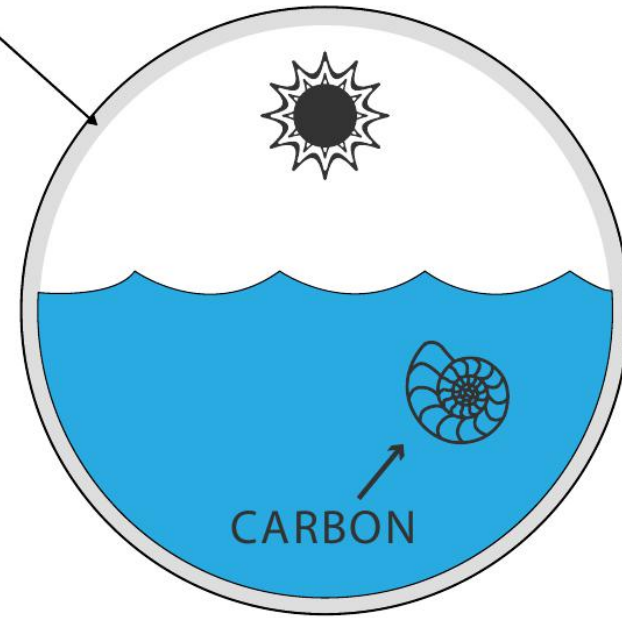




3c. Carbon systems & chemistry



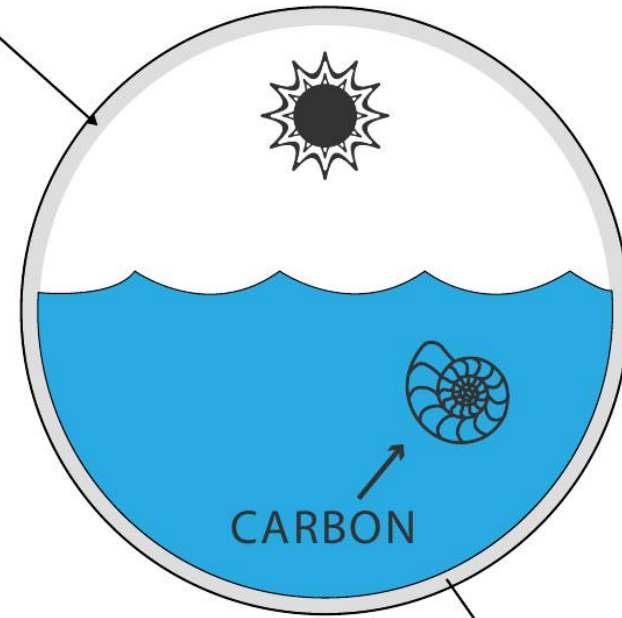
CO₂



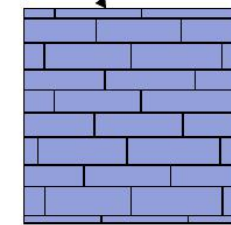
CARBON



CO₂



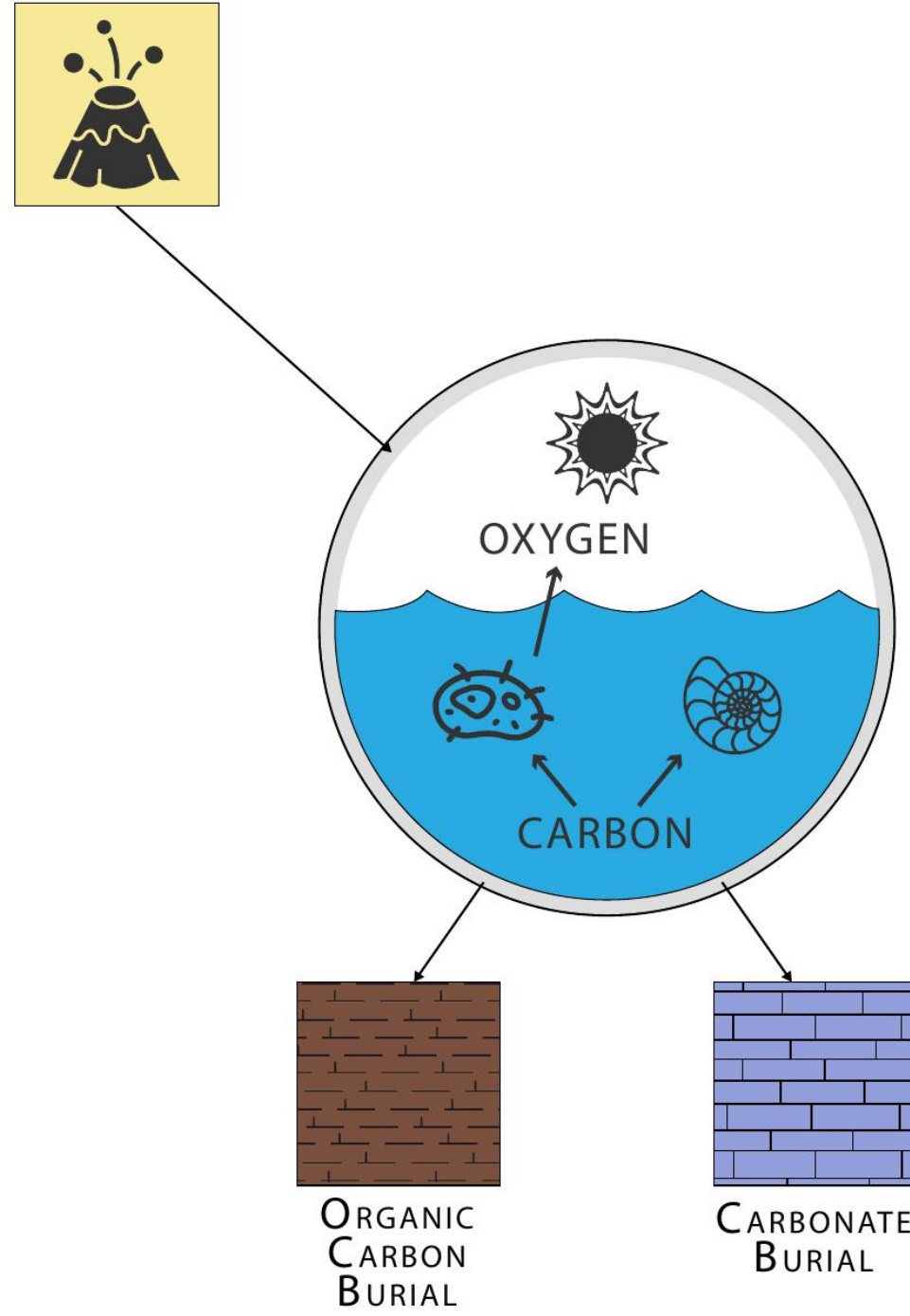
CARBON

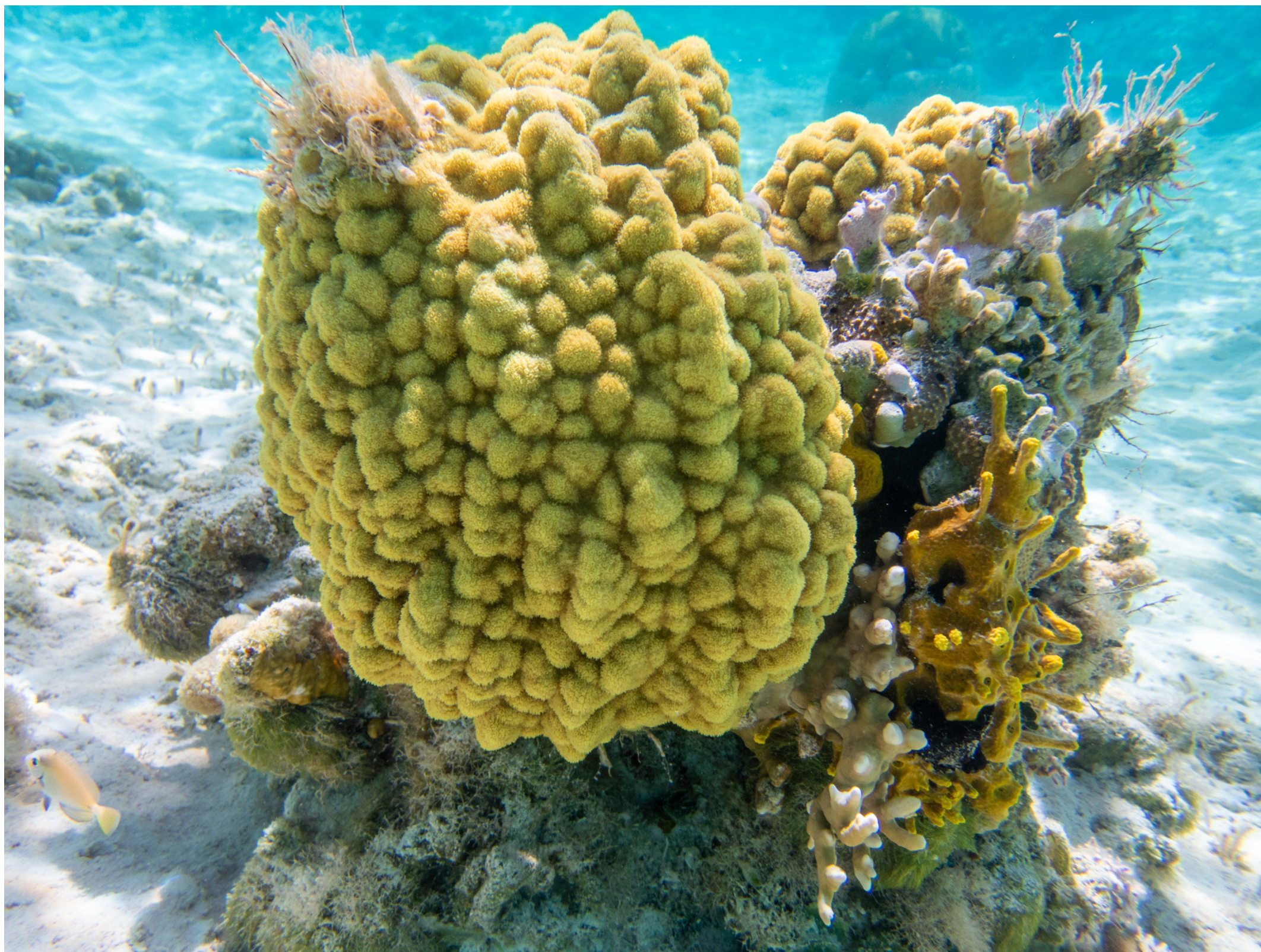


CARBONATE
BURIAL



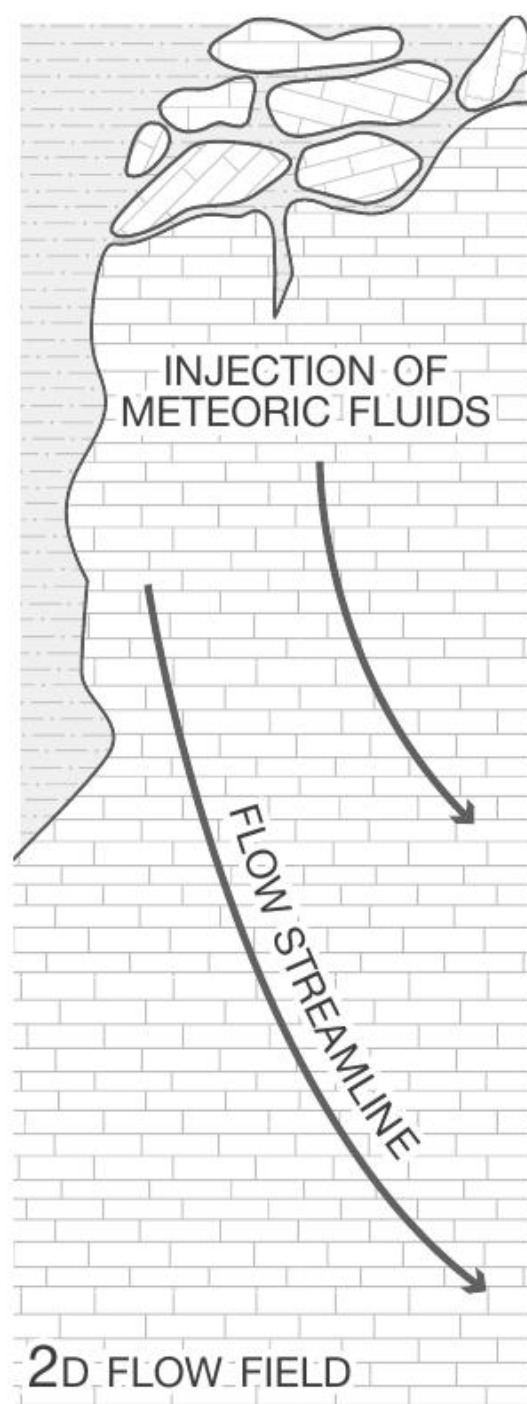
CO₂



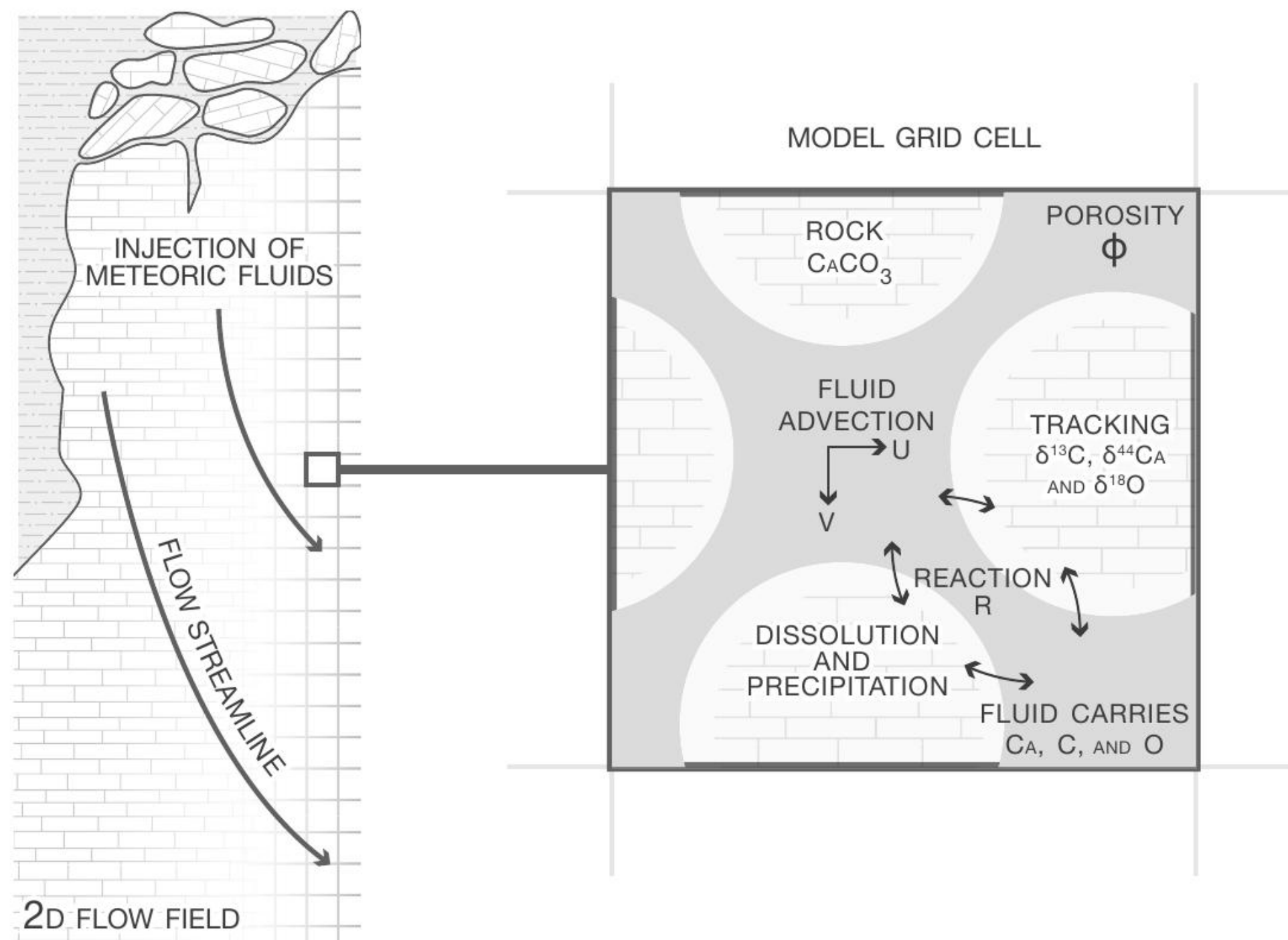




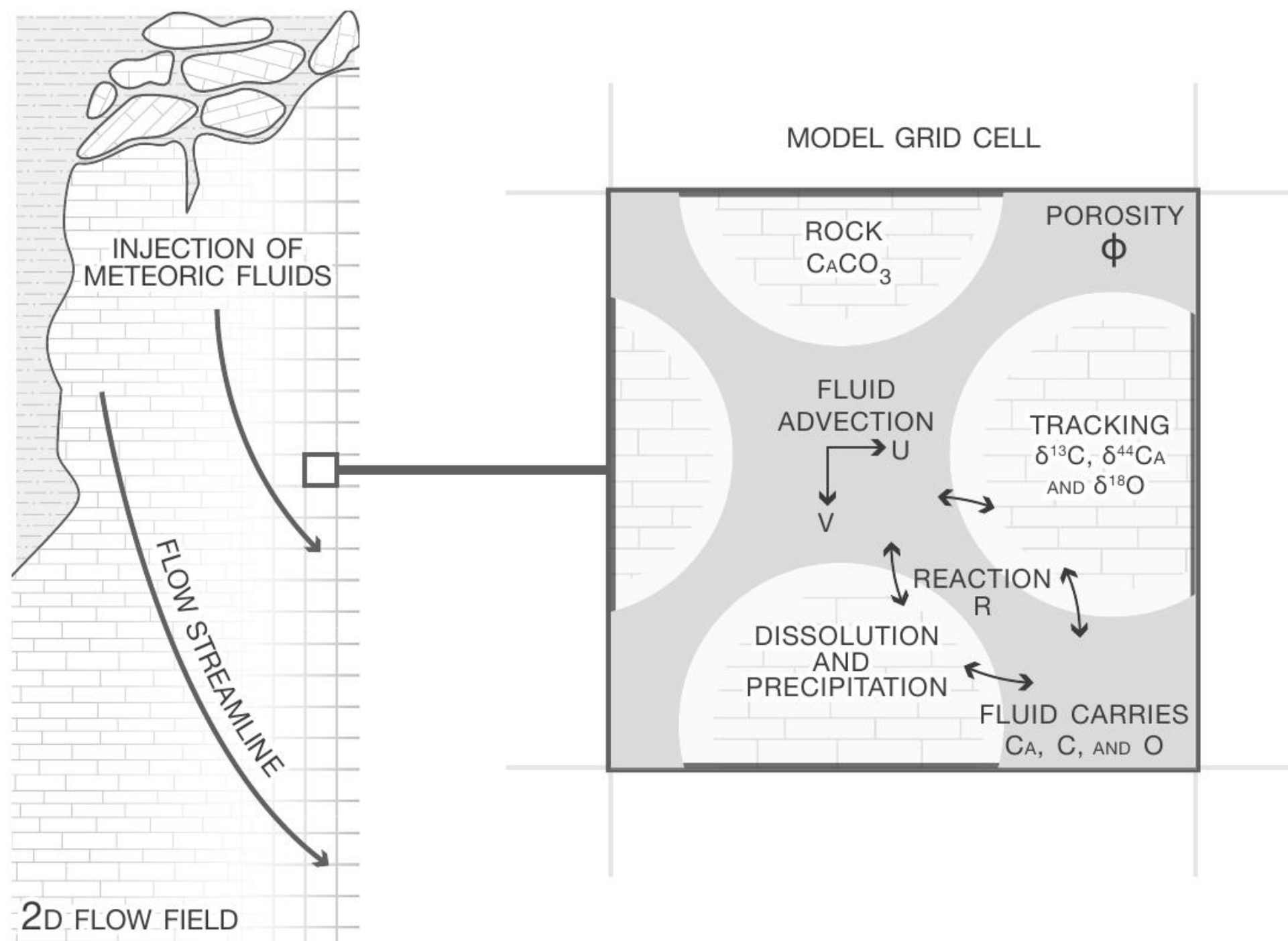
DIAGENETIC MODEL
SCHEMATIC



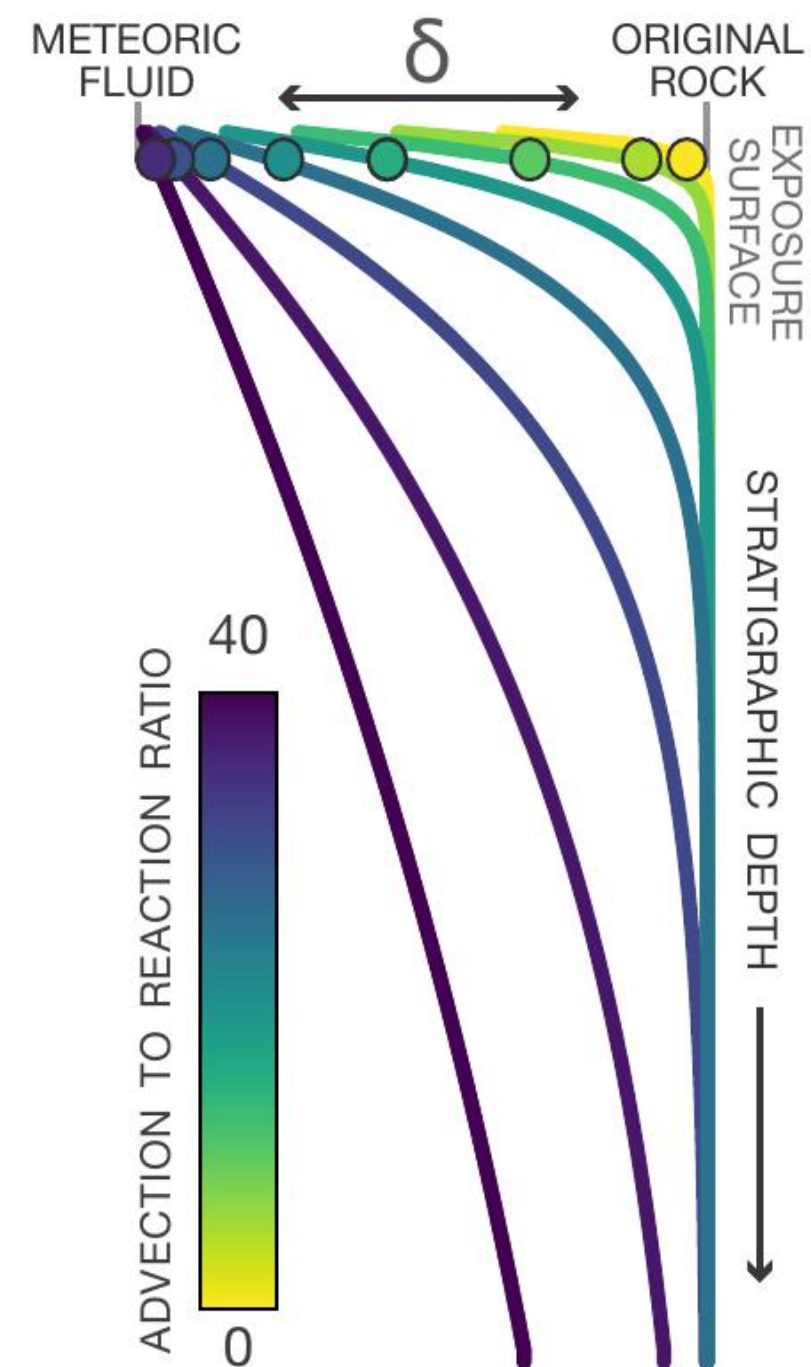
DIAGENETIC MODEL SCHEMATIC

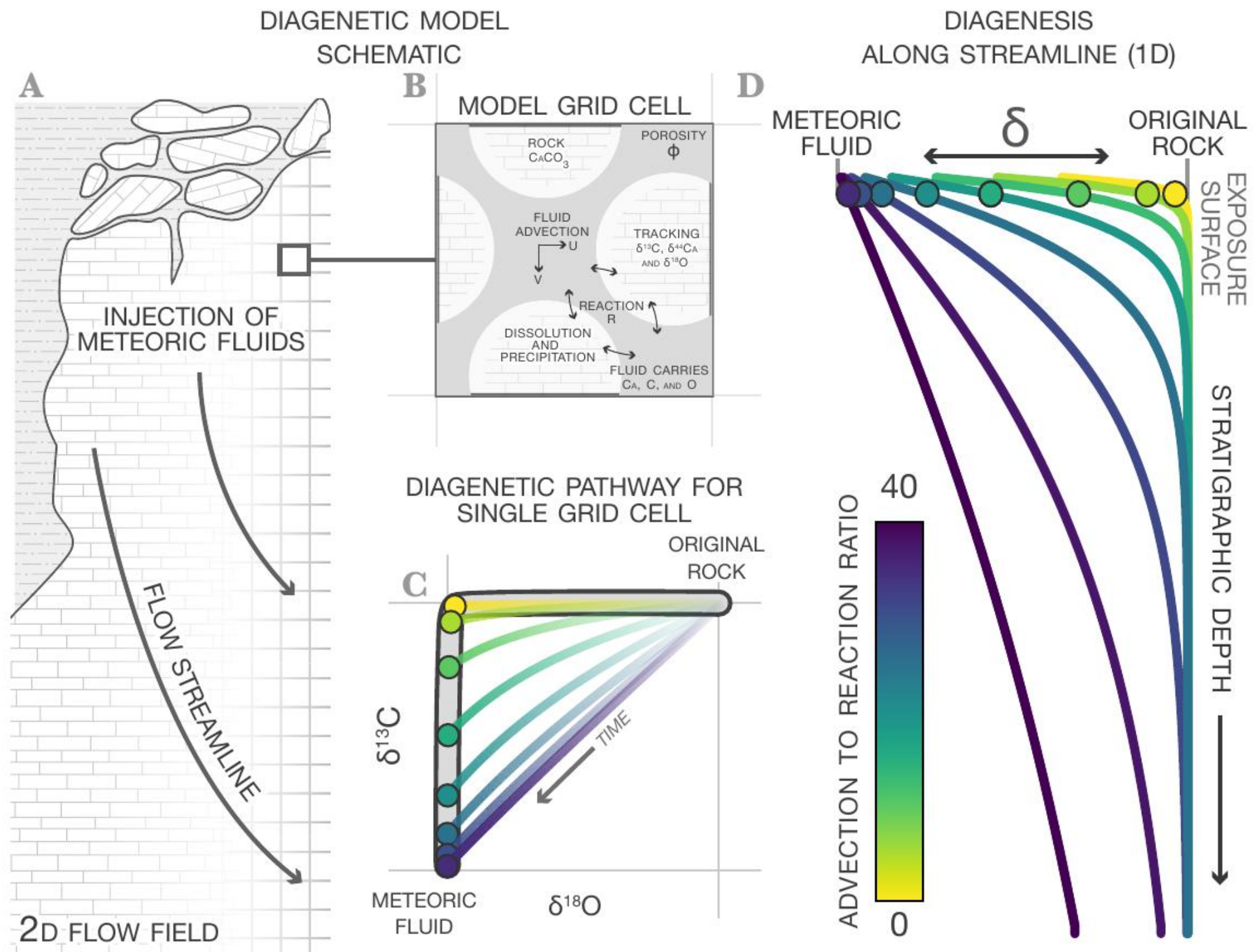


DIAGENETIC MODEL
SCHEMATIC

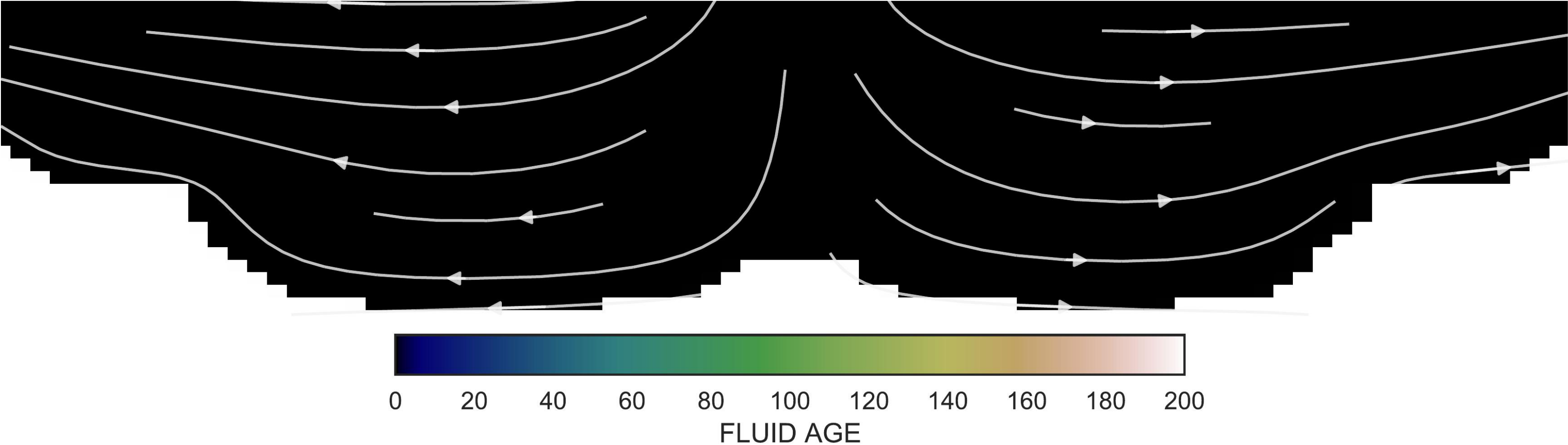


DIAGENESIS
ALONG STREAMLINE (1D)

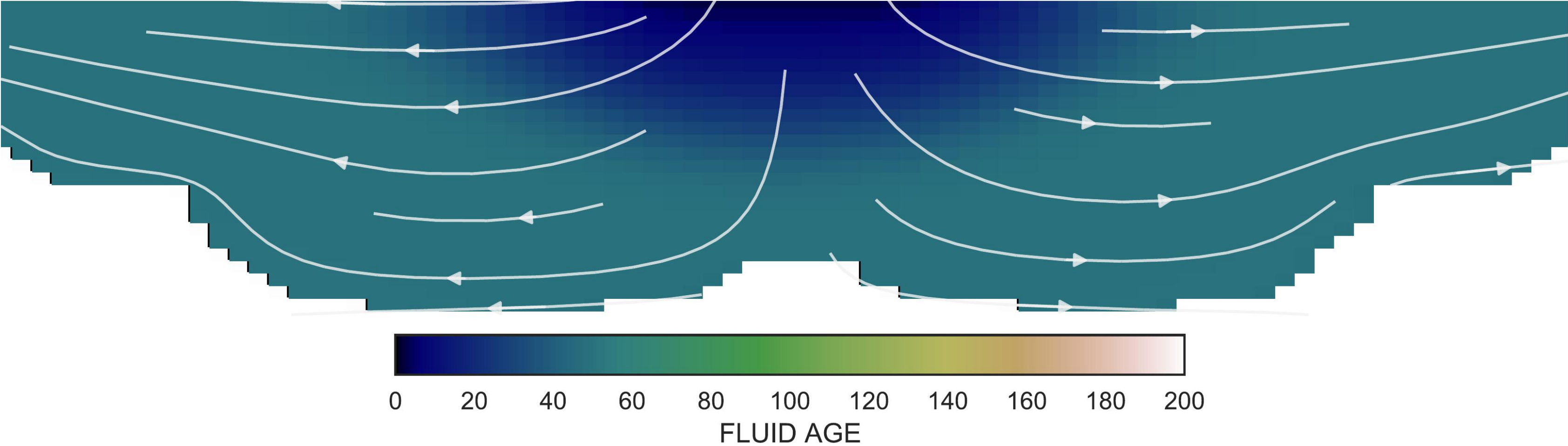




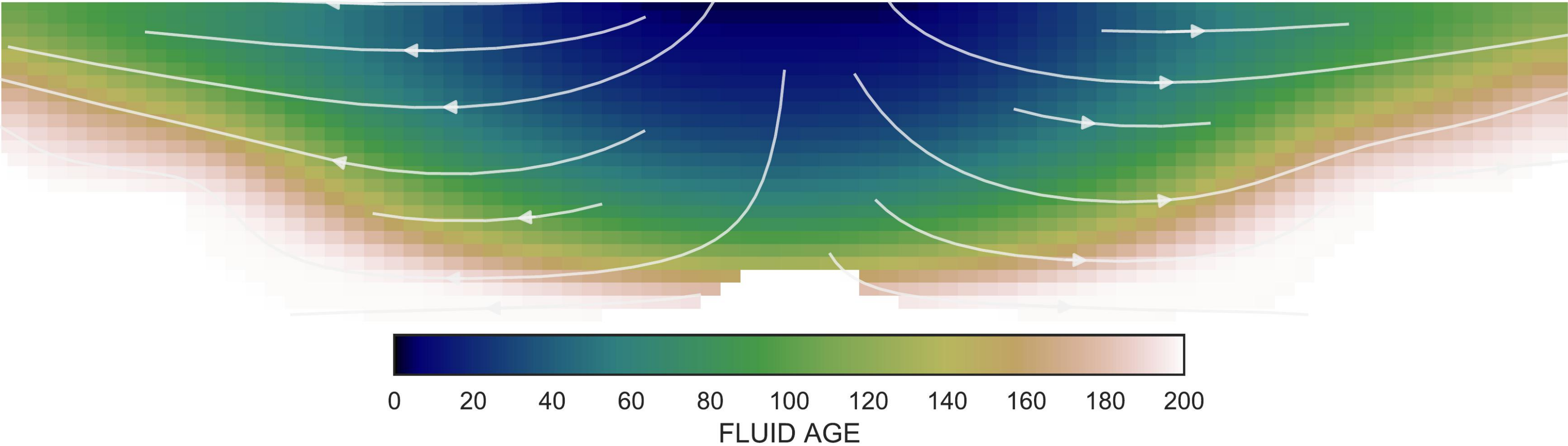
FRESHWATER LENS - 0 YEARS



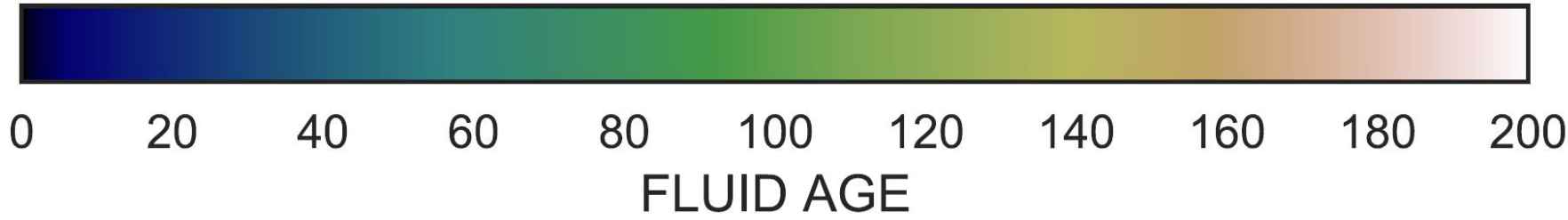
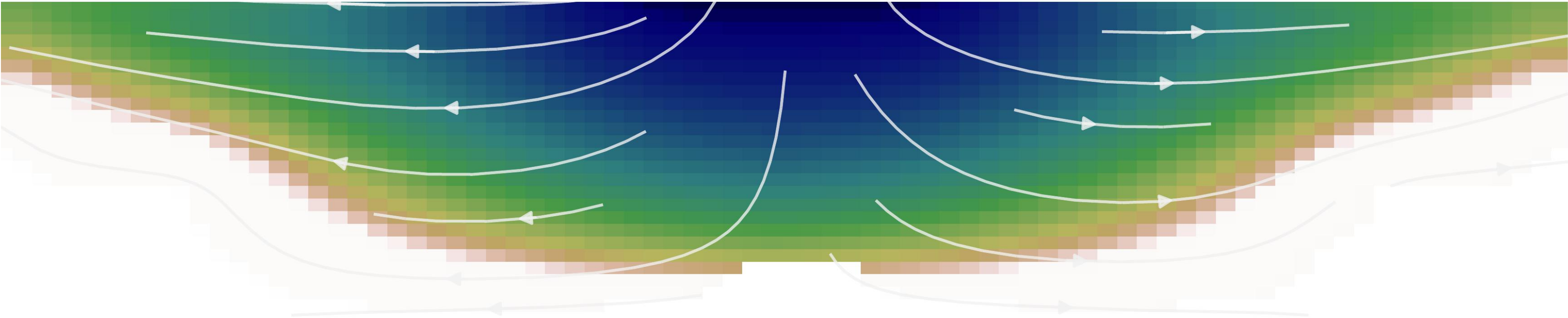
FRESHWATER LENS - 50 YEARS



FRESHWATER LENS - 200 YEARS

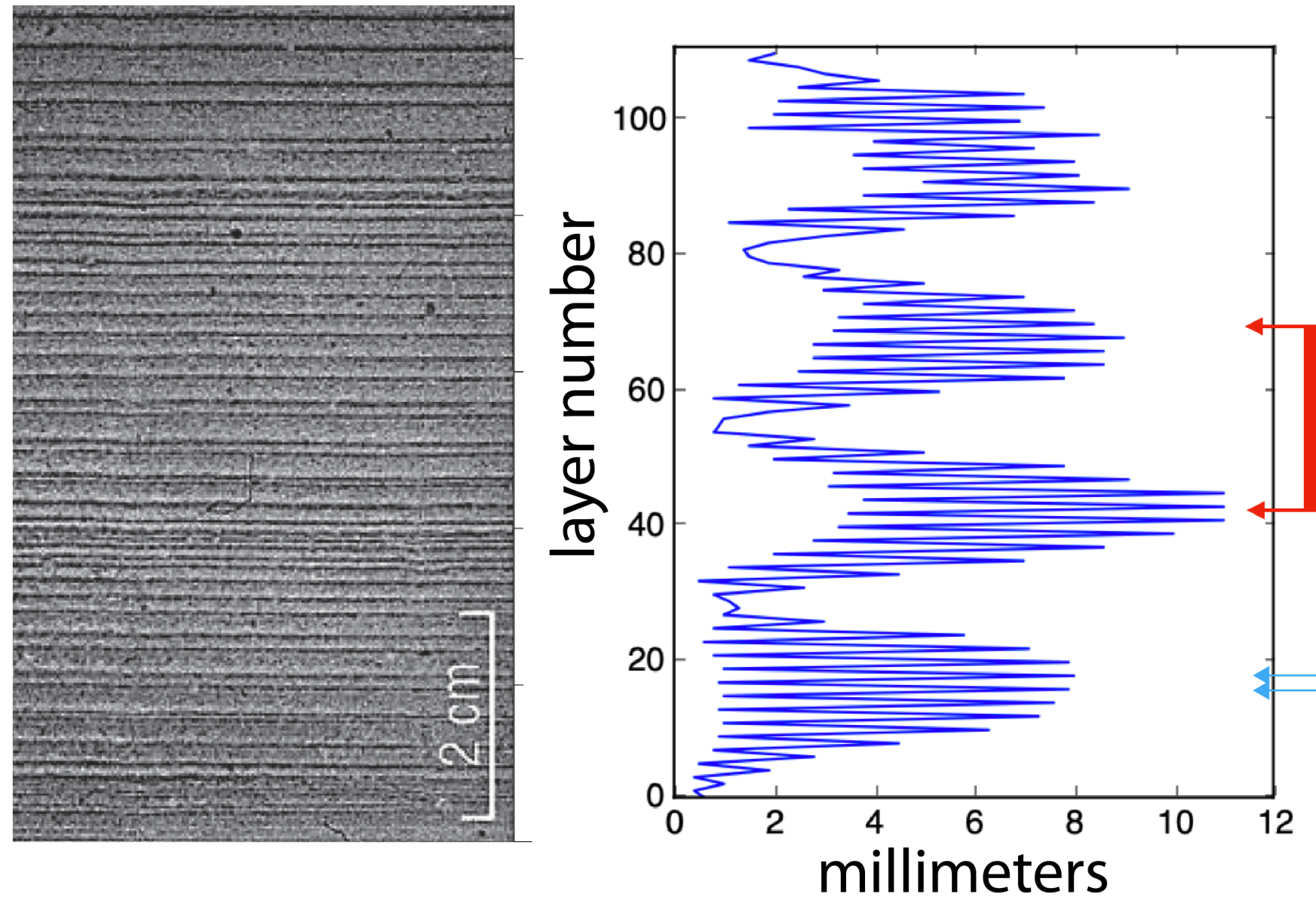


FRESHWATER LENS - 1000 YEARS



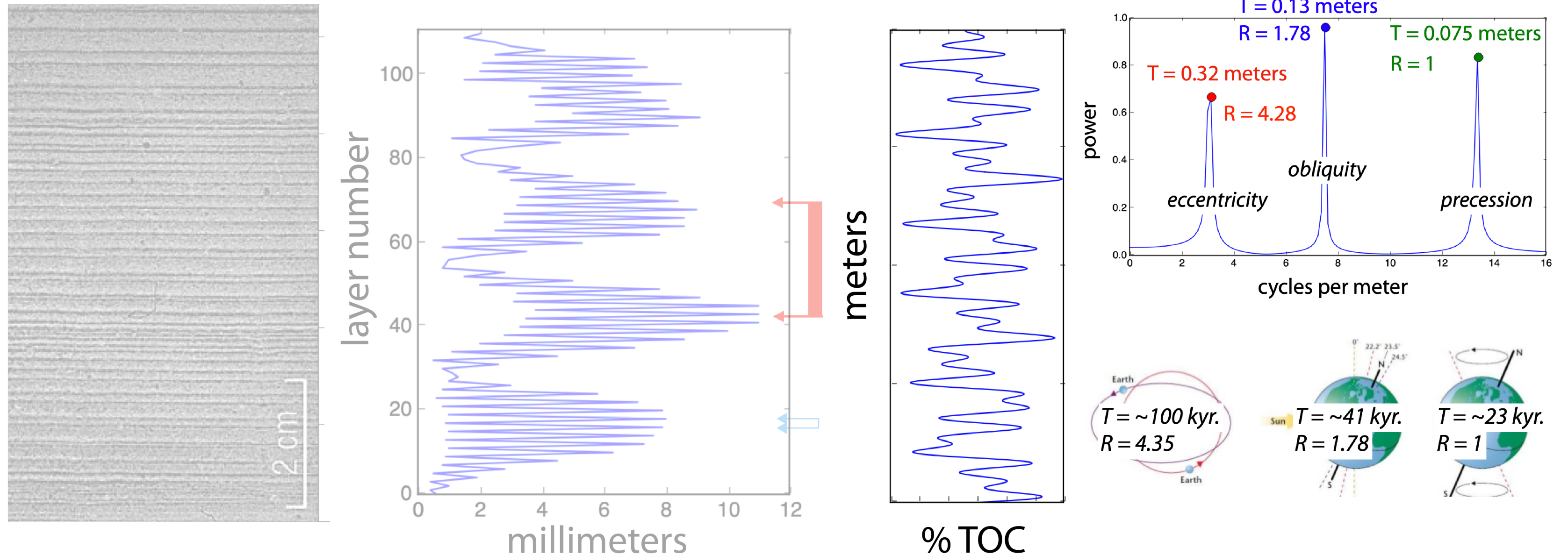
3d. Stratigraphic correlation

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



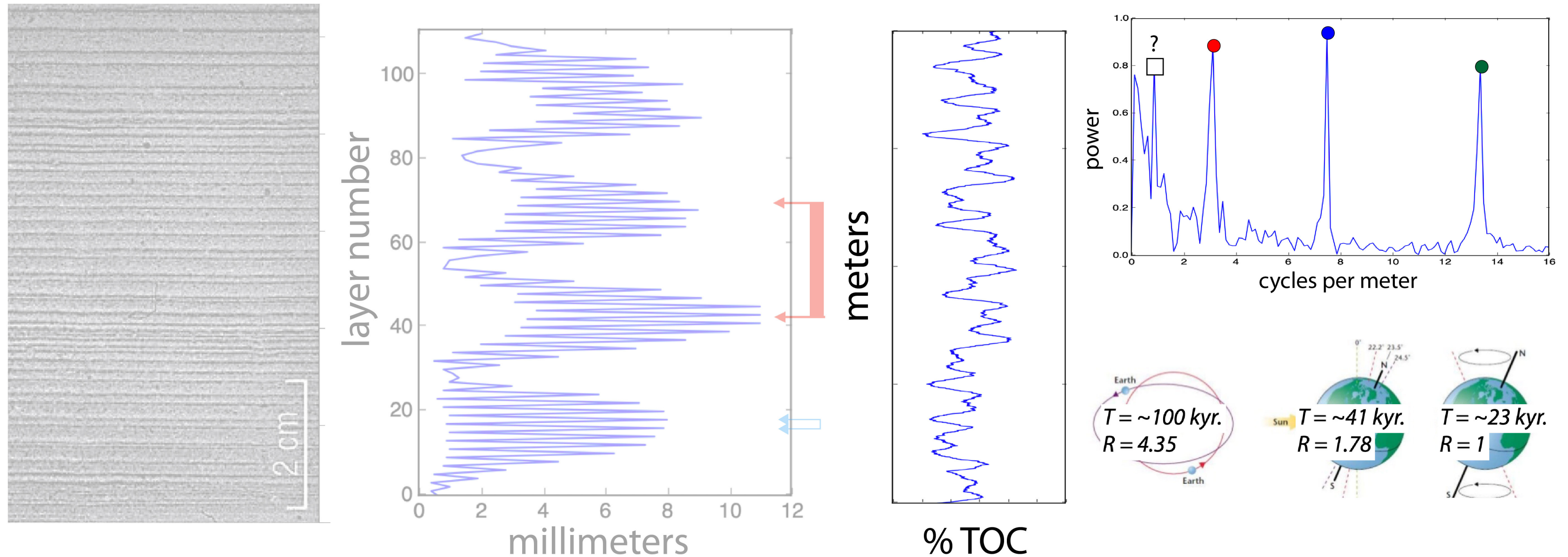
3d. Stratigraphic correlation

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



3d. Stratigraphic correlation

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

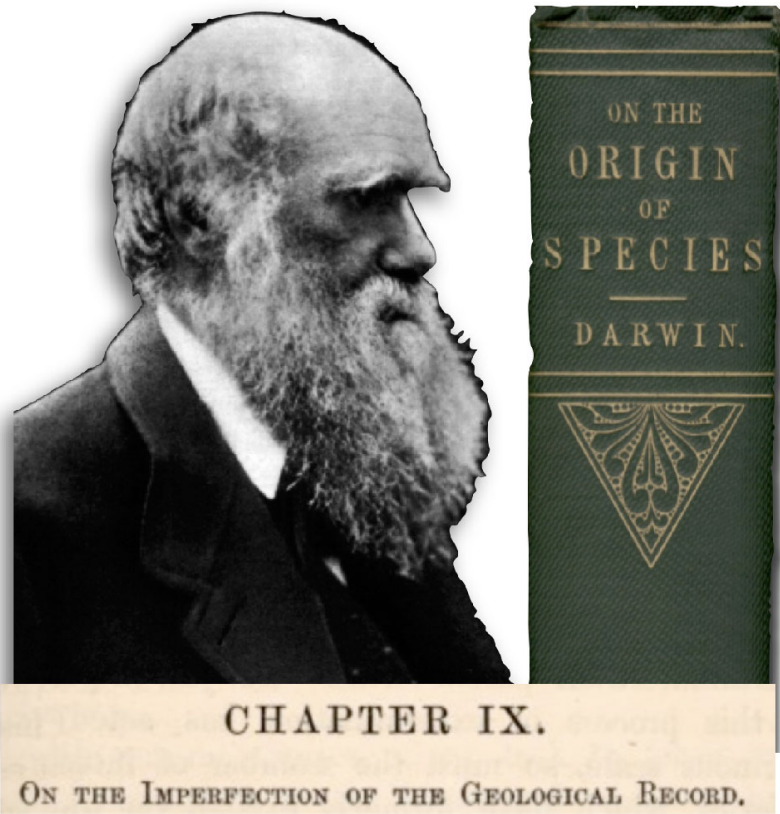


3e. Data synthesis & sediment cycling

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.*

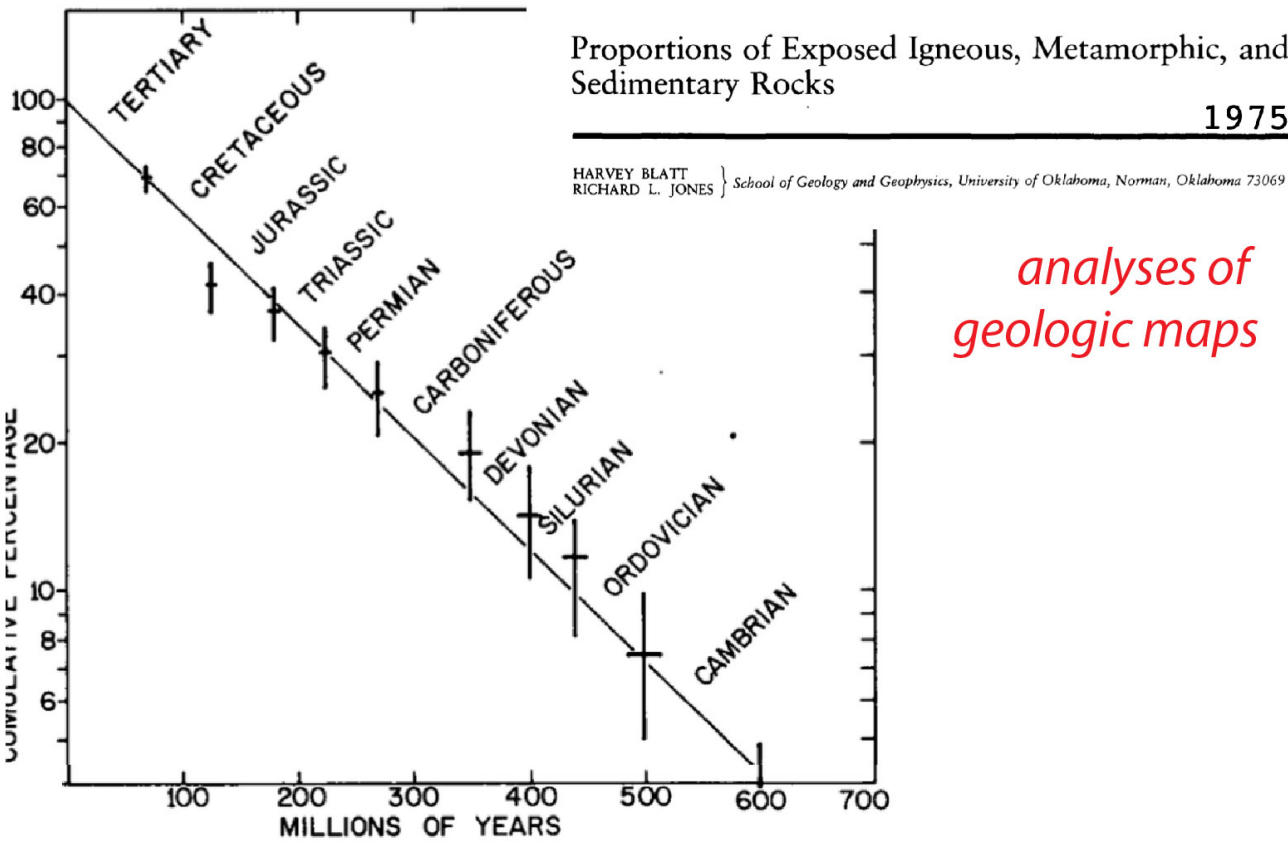
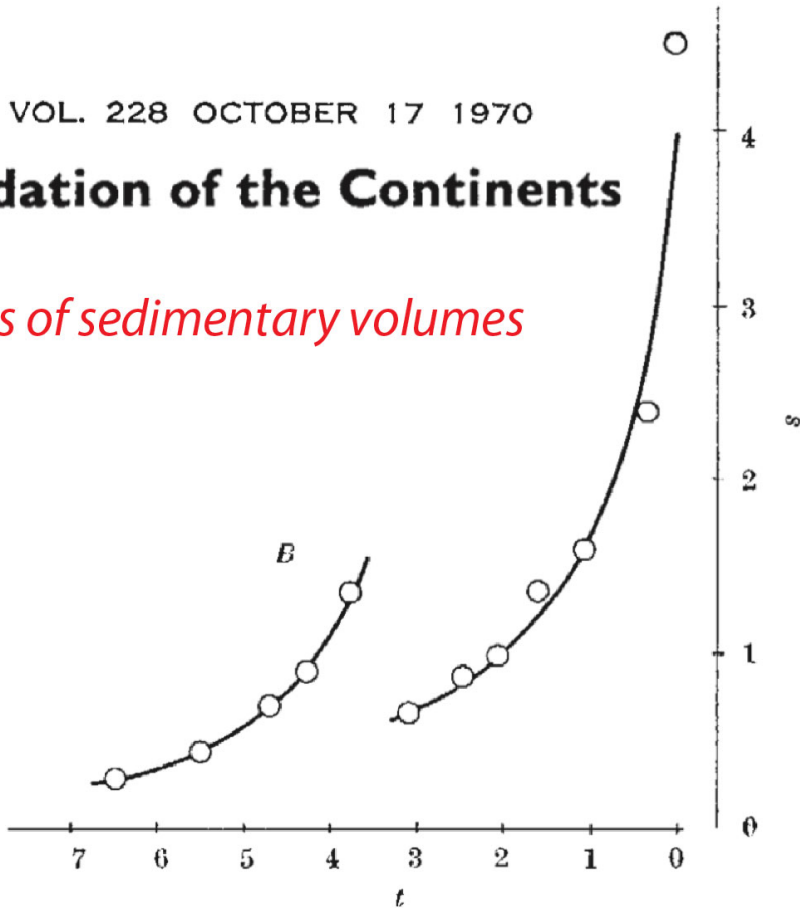
-- Charles Darwin



NATURE VOL. 228 OCTOBER 17 1970

Denudation of the Continents

analyses of sedimentary volumes



analyses of geologic maps



4. First assignment (due before next class):

Install Python on your computer (or other scripting language)

- One of the easiest ways to install and manage python on your local machine is through Anaconda:
<https://www.anaconda.com/products/individual>
- There are two versions of python, version 2 and version 3. *You should install Python 3.*
- Also: <https://uvic.syzygy.ca/>

