Stratigraphic architecture, sedimentology and structure of the Corinth Canal (Greece) : a former strait

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Introduction & settings: A needed outcrop in the Corinth Rift

Straits are :

- Controlling connections between basins \rightarrow Regulate dynamics, base-level and exchanges
- Hard to be preserved in Rifts (tectonics, erosion, ...)
- Geologically ephemeral: few documentation on sedimentological processes
- Displaying specific sedimentological features linked to tidal amplification (Longhitano & Chiarella, 2020)

Corinth Canal:

6.4 km long, 21 m wide, 80 m high (central part)



Separates central Greece and Peloponnese

Corinth Rift:

- Most active European continental rift (1.5 cm/year; Briole et al., 2000)
- Connection at its westerner tip to the Ionian Sea: Rion-Antirion strait (Beckers et al., 2016; Ford et al., 2013; Perissoratis et al., 2000, Rubi et al., 2021).
- Older connections with Aegean Sea at the Corinth Isthmus, the strait architecture is visible in the Corinth Canal (Collier, 1990; Collier & Dart, 1991; Freyberg, 1973).

Methods: Outcrop and photogrammetric data

- Logged sections (facies scale)
- Drone survey for photogrammetric purposes (24 flights, 15,497 photos)



Sections of the Corinth Canal on the SW wall. A) Structural section, displaying all the features identified in the field or model. The faults are numerated from NW to SE and the location of the Isthmia graben and the horst is based on the section of Collier (1990; Figure 1). B) Section displaying the units identified with the logged sections and the 3D model. These units are regrouped in sequences with their age based on Collier (1990) and Collier & Dart (1991). C) Section of the FA, the logged sections and the identification of the numerated unconformity surfaces.

Results: Evidence of a former strait

8 facies associations (FA):

- 1-2-3: lacustrine (Corinth Marls) to shallow
 - **brackish** sediments \rightarrow sequence 1 (~4 Ma)
- 4-5: MTD and continental deposits \rightarrow sequence 2



Location of the logged sections along the Corinth Canal



Screenshot of the photogrammetric model of the Corinth Canal

- (~4 Ma ~300 ka)
- 6: conglomerate tidal dune strait; strait structures evidence (tidal dunes, herringbones) \rightarrow sequence 3
- (~300 ka)
- 7-8: **shoreface** and **continental** deposits (~200 ka) •

Strait architectures:

- Cross-stratification in conglomeratic beds
- Herringbone cross-stratification (facies and outcrop scale)
- **Compound dune** formation with alternated foreset
- Tidal amplification with current of 1 m/s to 2 m/s enhanced by tidal asymmetry

Outcrop of the logged section (II on section C) displaying FA2, FA3, FA4 and FA5. The numerated surfaces represent respectively the second, third and fourth unconformity surfaces.



Asymmetric herringbone cross-stratification with a main migration direction towards the NW. Width of lines represent their order (1st, 2nd, 3rd).

Conclusions: Evidence of a former connection and new strait dune deposits

Identification of 8 FA with (1) a transgression from a deep to a shallow marine environment, (2) a forced regression documented by the evidence of MTD and soils with karstification, (3) a second

transgression with conglomerate tidal dune facies. These deposits are the last records of a connection between the Aegean Sean and the Gulf of Corinth in the canal area (~300 ka). The evidence of

conglomeratic tidal dune may complete existing models for tidal straits (Longhitano & Chiarella 2020). (4) A third transgression record by upper shoreface to beach foreshore capped by a continental alluvial fan.

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