

## CV ARTHUR DE GRAAUW

Arthur de Graauw is a French/Dutch coastal engineer employed by a French Consulting firm, SOGREAH (now [ARTELIA](#)) until the end of 2015.

His main achievements are the reconstruction of Sogreah's Hydraulics Lab (1987), the initial project for offshore extension of Beirut Central District (1991), the extension of Port Revel (2009), the Catalogue of ancient ports (since 2011), the discovery of the southern Phoenician port of Tyre (2019).

He graduated from Delft University of Technology in 1976 in civil engineering of coastal structures and areas. He was employed by Delft Hydraulics Laboratory (now [DELTA RES](#)) from 1976 to 1983 before joining SOGREAH. He used many hydraulic scale models and mathematical models in his work. He worked on numerous projects related to coastal erosion, industrial ports and marinas in the Mediterranean area including Lebanon, Gaza, Egypt, Libya, Tunisia and France.

From 2002 to 2015, he managed the [Port Revel](#) ship handling training centre using manned models where maritime pilots from all over the world come for training. This led him to work with the Panama Canal extension.

He has been active on ancient ports since 1998 and created a new catalogue of ancient ports encompassing nearly 6000 places. He is the webmaster of [www.AncientPortsAntiques.com](http://www.AncientPortsAntiques.com) focusing on many technical aspects of ancient ports. He became a Research Associate at Lyon 2 University in 2021.

## PUBLICATIONS ARTHUR DE GRAAUW

"THE Catalogue of ancient ports", <http://AncientPortsAntiques.com> , updated continuously as from 2011.

"Reconstructing the plurisecular trajectory of an exemplary hybrid urban delta (Tarragona-Francolí system, Spain): Towards the end of a delta?", *Geomorphology*, Volume 462, Elsevier, published online on: <https://doi.org/10.1016/j.geomorph.2024.109344> , July 2024.

"[L'aménagement des zones portuaires en Méditerranée romaine](#)", conference on ancient port structures at "Escale en Méditerranée romaine" exhibition at NarboVia Museum, June 2024.

"Where is the Phoenician harbour of Tyre?", published online on: <https://archeorient.hypotheses.org/26907>, January 2024.

"Growth of the sandy isthmus of Tyre and ensuing relocation of its harbors", *Quaternary Science Reviews*, Vol 324, Elsevier, published online on: <https://www.sciencedirect.com/science/article/pii/S0277379123005115> , January 2024.

"La subsidence des sites côtiers en Méditerranée", published online on: <https://archeorient.hypotheses.org/25374>, October 2023.

"Décrire le monde - La carte à la conquête du territoire", published online on: <https://www.herodote.net/La+carte+a+la+conquete+du+territoire-synthese-3311.php> , May 2023.

"Les brise-lames portuaires antiques", published online on: <https://archeorient.hypotheses.org/22210>, February 2023.

"Ancient Port Structures", PPT presentation at 1<sup>st</sup> International Conference on Mediterranean Harbour Cities, Aix en Provence, September 2022.

"Fish tanks and past Relative Sea Level variations in Tyre, Lebanon", J-P. Goiran, et al., PPT presentation at workshop on fish tanks, Santa Severa, September 2022.

"Ancient Port Structures, Parallels between the ancient and the modern", published online on: <https://journals.openedition.org/mediterranee/12715> , May 2022.

"Le port antique de Caesarea Maritima – Sebastos", published online on: <https://archeorient.hypotheses.org/18350> , April 2022.

"La cartographie antique", published online on <https://archeorient.hypotheses.org/17810>, March, 2022.

"Le catalogue des sites côtiers antiques", published online on <https://archeorient.hypotheses.org/17265>, February 2022.

"[Evolution of Sea Level at Tyre During Antiquity](#)", BAAL 21, 2021, (p 305-317).

"Infrared spectroscopic investigations of the northern mole of Portus, the ancient harbour of Rome. Insights for stratigraphy and provenance of raw materials for construction", S. Chapkanski, et al., Mediterranean Archaeology and Archaeometry, Vol. 21, No 2, (2021), (p 227-240).

Co-operation in "[Le génie maritime romain](#)", by G. Coulon and J-C. Golvin, Actes Sud/Errances, 2020.

"Mare Nostrum – Le cœur de l'empire romain", published online on [https://www.herodote.net/Mare Nostrum-synthese-2643.php](https://www.herodote.net/Mare_Nostrum-synthese-2643.php) , December 2019.

"Ancient Port Structures – An engineer's perspective", Portus Limen Project workshop, Rome, January 2019.

"Catalogue des abris et ports antiques de l'Arc Atlantique", Colloque "Les ports romains dans l'arc Atlantique et les eaux intérieures", Nantes, June 2018.

"From Amphora to TEU: Journey of a container – An engineer's perspective", Portus Limen Project workshop, Rome, January 2017.

"Catalogue of ancient potential ports and harbours in the Black sea." Méditerranée, N° 126: <http://journals.openedition.org/mediterranee/8326>, 2016.

"Port Revel Shiphandling Course Manual", editor, 2015.

"The long-term failure of rubble mound breakwaters." Méditerranée, Varia : <http://journals.openedition.org/mediterranee/7078>, 2014.

"Scaled Manned Models", in IMPA on Pilotage, Witherby Seamanship Intl., 2014.

"Where is my Pivot Point?", Seaways, March 2012

"Navigation antique dans les étangs narbonnais : quelques hypothèses pratiques", Les ports antiques de Narbonne, PCR 2011, 2012.

"Ancient Ports Geolocation – Zooming in with Google Earth", poster at the European Association of Archaeologists, Helsinki, September 2012.

"Safe operation and pilot training when using marine azimuth control devices", AZIPILOT project, 2012.

"Manoeuvring with podded manned models", AZIPILOT project, Intuitive operation and pilot training when using marine azimuthing control devices, Deliverable 4.5, 2011.

"La formation à la manœuvre des navires à Port Revel", La Revue Maritime, N° 470, 2004.

"Port Engineering aspects of the Magnus Portus in Alexandria". PIANC Bulletin 103, February 2000.

"Le point de vue d'un ingénieur du XXe siècle sur le Port Est d'Alexandrie" (The point of view of a 20<sup>th</sup> century engineer on the Alexandria Eastern Harbour) in "Alexandrie, les quartiers royaux submergés", by F. Goddio et al, Péripus Ltd, London, 1998.

"Comparaison des principales méthodes utilisées en ingénierie côtière pour estimer les houles extrêmes" (Comparison of the main methods used in coastal engineering for estimating extreme waves). 3e Journées Nationales Génie Civil - Génie Côtier, Sète, France, March 1994.

"Elsevier's Dictionary of Ports and Shipping", ed. J. van der Tuin, Delft Hydraulics, participation for French terms, 1993.

"Rubble mound breakwater stability with multidirectional waves". MAST-G6S, Final Workshop, Lisbon, November 1992.

"Non-linear wave propagation in the coastal zone: the MAST G6-M project". Third European Workshop on Coastal Zones, Paralimni, Cyprus, September 1990.

"Une nouvelle étape dans les moyens de modélisation des phénomènes hydrosédimentaires : les modèles hybrides" (A further step in modelling facilities for hydrosedimentary phenomena: hybrid models). Littoral 90, Eurocoast, Marseilles, June 1990.

"Near-future needs of numerical models of littoral processes". Second European Workshop on Coastal Zones, Loutraki, Greece, September 1988.

"SOGREAH : l'évolution des moyens d'essais" (Development of SOGREAH's testing facilities). La Revue des Laboratoires d'Essais, N° 15, May 1988.

"Prototype measurements to validate numerical models of coastal processes". Organisation and edition of proceedings of the Seminar held at SOGREAH, May 1988.

"Le nouveau laboratoire d'hydraulique de SOGREAH". (SOGREAH's new hydraulics laboratory). Travaux, N° 631, April 1988.

"Wave statistics based on ship's observations". Coastal Engineering, 10, Elsevier Publication, 1986.

"Design criteria for granular filters". J. Waterw., Port, Coast. and Ocean Eng., ASCE 110 (1984) 1. Delft Hydraulics Laboratory, Publication n° 287, 1984.

"Toplayer stability of overflow dams", 1983.

"The closure of tidal basins". Coastal Engineering, 6, Elsevier publ., 1982.

"Closure works in the tidal areas in relation with land reclamation". Korea-Netherlands Agricultural Seminar, Seoul, 1981.

"Model-prototype conformity of local scour in non-cohesive sediments beneath overflow-dam". XIXth IAHR Congress, New Delhi, 1981. Delft Hydraulics Laboratory, Publication n° 232.

"Bed protection adjacent to the Oosterschelde barrier". Symposium on Hydraulic Aspects of Coastal Structures, Delft, 1980.

Project: **PALAEOPORTOLOGY**  
**Ancient coastal settlements, ports and harbours,**  
**by Arthur de Graauw**

This project was started in 2010, aiming at collecting, identifying and locating ancient ports and harbours. It led to an extensive Catalogue including thousands of places. Much attention was also devoted from the onset to structural aspects as described by Vitruvius, and as resulting from modern coastal engineering such as design waves and harbour silting-up. Additional attention was devoted to ancient ships and sailing, as they define the harbour needs.

A harbour is a place where ships can seek shelter. The concept of 'shelter' has to include anchorages, landing places on beaches, and ports including structures such as access channels, breakwaters, jetties, landing stages, quays, warehouses for storing commodities and equipment, shipsheds and slipways. Shelters of interest for this catalogue include all places which may have been used by seafarers sailing over long distances. This means that villae maritimae are of interest, but shelters for the likes of local fishermen, who may have landed their boats on the beach in front of their homes, are of less interest. In another limitation, only maritime harbours and some river ports that could be reached by deep sea ships are considered.

The project is based on a study of around **100 ancient authors** and **hundreds of modern authors**, incl. the Barrington Atlas. The considered area spans from Iceland to Sri Lanka. This list includes around 220 Neolithic places, 40 Etruscan ports, 130 Minoan ports, 200 Mycenaean ports, 350 Phoenician ports and thousands of Greek and Roman ports. Around 170 "potential ancient harbours" from a nautical point of view, have been added, based on nautical guides/pilots used by modern sailors.

My aim is to guide researchers interested in specific coastal areas with links to relevant and freely accessible publications, as well as links to pages on Pleiades, DARE, Trismegistos, Topostext and Wikipedia (2 000 to 3 500 links to each of these websites). The database of nearly **6 000 ancient places** and is enriched almost daily by publications made available on Academia and Research Gate. It should be regarded as an unfinished collection, and the geolocation is sometimes a little speculative. Any further help is welcome: please do not hesitate to contact me with your comments or suggestions.

This work is reported in **4 volumes**, all available in [pdf versions](#), and most of it is reproduced on the web site ([www.AncientPortsAntiques.com](http://www.AncientPortsAntiques.com)) where the complete database can be downloaded as an xls spreadsheet containing a wealth of information on each site, as well as the kml files for viewing all the locations on Google Earth.

- **Volume I** gives the list of ports and a bibliography of ancient and modern authors. You can download the latest updated database as an [xls table](#).
- **Volume II** gives the French translations of the texts of the listed ancient authors.
- **Volume III** provides some notes on a few ancient ports, on ancient port structures, on potential ancient ports, on ancient ships and shipping, on ancient hubs and trade networks, and on ancient maps, ancient measures, ancient climate.
- **Volume IV** gives around twenty stories about ancient mariners.

### **Project publications on Ancient Ports**

(updated versions available on <http://www.ancientportsantiques.com/docs-pdf/> )

[Palaeoportology, Ancient Coastal Settlements, Ports and Harbours, Vol. I – List of ancient ports.](#)

A. de Graauw, 2024. This document is the base of the web site (EN, 343 p, 6 Mb).

An Excel version of this list of ancient ports was published by Harvard's DARMC (June 2013). Download the latest updated [xls table](#).

[Palaeoportology, Ancient Coastal Settlements, Ports and Harbours, Vol. II – Citations of ancient authors on ancient ports.](#)

A. de Graauw, 2024. Texts on ports by 98 ancient authors (FR, 837 p, 30 Mb).

[Palaeoportology, Ancient Coastal Settlements, Ports and Harbours, Vol. III – Ancient port structures.](#)

A. de Graauw, 2024. Some thoughts on the design of several ancient ports (Actium, Alexandria, Apollonia, the Bosphorus, Caesarea Maritima, Carthage, Centumcellae, Delos, El Hanieh, Leptis Magna, Marius' canal, Narbonne, the Nile Delta, Nirou Khani, Portus, Pisa, Puteoli, Sharm Yanbu-Charmothas, Thapsus, Tyre);

Some comments on ancient port structures, like Vitruvius' methods, failure of breakwaters and breakwater remains, design waves, reinforced concrete, pilae and arched breakwaters, pierced stones, defensive harbour chains, harbour silting-up, tombolos and salients;

A list of over 200 proposed locations for potential ancient harbours;

Some notes on ancient merchant ships and galleys, sailing techniques and Mediterranean sailing routes;

Some thoughts about ancient trade networks and intermodal hubs;

Some remarks on ancient maps, on ancient measures and ancient climate, including earthquakes and tsunamis. (EN, 508 p, 80 Mb).

[Palaeoportology, Ancient Coastal Settlements, Ports and Harbours, Vol. IV – Stories of ancient sailors.](#)

A. de Graauw, 2024. Twenty-four stories on ancient sailors (FR, 78 p, 3 Mb).

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[Reconstructing the plurisecular trajectory of an exemplary hybrid urban delta \(Tarragona-Francolí system, Spain\): Towards the end of a delta?](#), *Geomorphology*, Volume 462, Elsevier  
F. Salomon, et al., 2024. Transforming a river outlet into a major modern port (EN, 20 p, 28 Mb).

[L'aménagement des zones portuaires en Méditerranée romaine](#)

A. de Graauw, 2024, Scientific Committee member of "Escale en Méditerranée romaine" exhibition at NarboVia Museum, with conference on ancient port structures (FR, 29 p, 20 Mb).

[Where is the Phoenician harbour of Tyre?](#)

A. de Graauw, G. Brocard & J-P. Goiran, 2024. Major discovery of the Phoenician breakwater of the southern, so-called "Egyptian", harbour (EN, 6 p, 1 Mb).

[Growth of the sandy isthmus of Tyre and ensuing relocation of its harbors](#), *Quaternary Science Reviews*, Vol 324, Elsevier.

G. Brocard, et al., 2024. Geomorphological evolution of the Tyre isthmus and major discovery of the Phoenician breakwater of the southern, so-called "Egyptian", harbour (EN, 13 p, 12 Mb).

[La subsidence des sites côtiers en Méditerranée](#),

A. de Graauw & G. Brocard, 2023. Identifying ca. 250 submerged and ca. 80 uplifted Mediterranean port sites (FR, 6 p, 1 Mb).

[Décrire le monde - La carte à la conquête du territoire](#),

A. de Graauw, 2023. Overview of ancient mapping, with comments on Ptolemy's coordinates (FR, 15 p, 3 Mb).

[Les brise-lames portuaires antiques](#),

A. de Graauw, 2023. Overview of ancient breakwater structures (FR, 5 p, 1 Mb).

[Ancient Port Structures](#).

A. de Graauw, 2022. PPT presentation at 1<sup>st</sup> International Conference on Mediterranean Harbour Cities (EN, 18 p, 16 Mb).

[Fish tanks and past Relative Sea Level variations in Tyre](#), Lebanon.

J-P. Goiran, et al., 2022. PPT presentation at workshop on fish tanks, Santa Severa (EN, 21 p, 4 Mb).

[Ancient Port Structures, Parallels between the ancient and the modern](#),

A. de Graauw, 2022. Overview of ancient port structures and comparison with modern port engineering (EN, 56 p, 5 Mb).

[Le port antique de Caesarea Maritima – Sebastos](#),

A. de Graauw & G. Brocard, 2022. Some thoughts about the subsidence of the breakwaters (FR, 6 p, 1 Mb).

[La cartographie antique](#),

A. de Graauw, 2022. Overview of ancient mapping, with comments on Ptolemy's coordinates (FR, 5 p, 1 Mb).

[Le catalogue des sites côtiers antiques](#),

A. de Graauw, 2022. Genesis of the famous catalogue of ancient coastal settlements (FR, 5 p, 1 Mb).

[Evolution of Sea Level at Tyre During Antiquity](#),

J-P. Goiran, et al., 2021. New hypothesis about the local relative sea level rise and major discovery of the Phoenician breakwater of the southern, so-called "Egyptian", harbour (EN, 13 p, 3 Mb).

[Infrared spectroscopic investigations of the northern mole of Portus, the ancient harbour of Rome](#).

S. Chapkanski, et al., 2021, Mediterranean Archaeology and Archaeometry, Vol. 21, No 2, (2021), (p 227-240). Insights for stratigraphy and provenance of raw materials for construction.

[Ancient Port Structures](#) – An engineer's perspective,

A. de Graauw, 2019. Comparison of ancient and modern maritime structures (EN, 35 p, 14 Mb).

[From Amphora to TEU: Journey of a container](#) - An engineer's perspective.

A. de Graauw, 2017. Comparison of ancient and modern maritime logistics (EN, 22 p, 4 Mb).

[Potential Ancient Harbours](#).

A. de Graauw, 2017. List of more than 200 places that are potentially of interest for port archaeologists (EN, 15 p, 1 Mb).

[Remains of Ancient Breakwaters](#).

A. de Graauw, 2017. Collection of Google Earth and other pictures of ancient breakwater remains (EN, 52 p, 9 Mb).

[Stability of overtopped and submerged breakwaters](#).

A. de Graauw, 2014. Failure of rubble mound breakwaters in the long term (EN, 9 p, 6 Mb).

["Navigation antique dans les étangs narbonnais : quelques hypothèses pratiques"](#),

A. de Graauw, 2012. Les ports antiques de Narbonne, PCR 2011, 2012 (FR, 3 p, 1 Mb).

[Ancient Ports Geolocation, Zooming in with Google Earth](#),

A. de Graauw, 2012. Poster presented at the meeting of the European Association of Archaeologists in Helsinki, August 2012 (EN, 1 p, 2 Mb).

[Leptis Magna's North coast](#).

A. de Graauw, 2000. Description of the North coast of Leptis Magna, including quay structure and mooring stone (EN, 5 p, 1 Mb).

[Port Engineering aspects of the Magnus Portus in Alexandria](#).

A. de Graauw, 2000. Some thoughts on Alexandria's submerged structures, Publ. PIANC Bulletin 103, February 2000 (EN, 15 p, 1 Mb).

[Extra-ordinary ancient ships.](#)

A. de Graauw, 1998. Some data on Hellenistic hyper galleys and other very large ancient ships, prepared for Frank Goddio in "Alexandria – The Submerged Royal Quarters", Publ. Périplus Ltd, London, 1998 (EN, 3 p, 0.5 Mb).