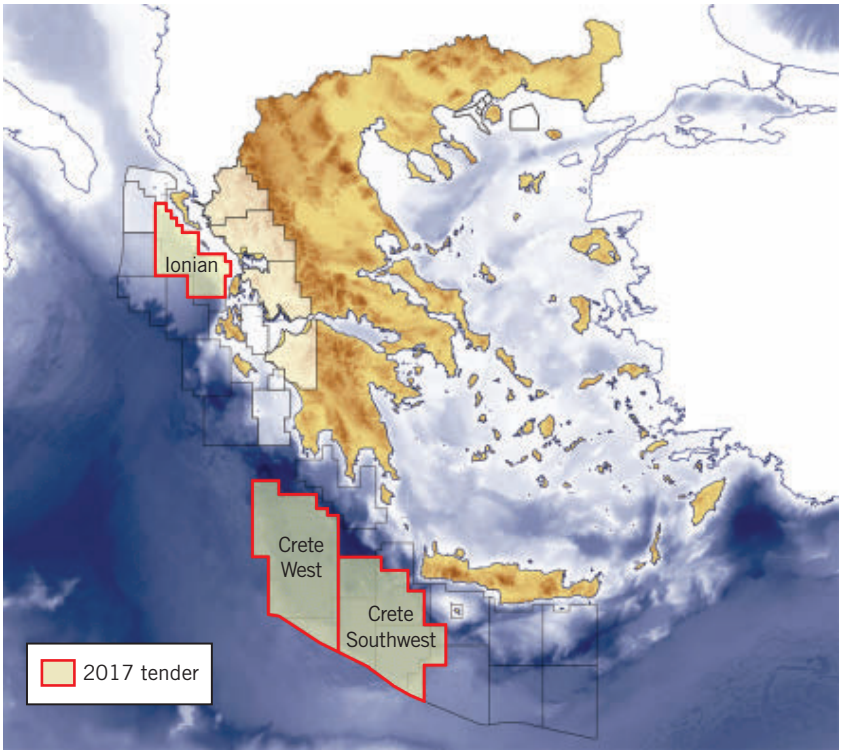
Greece offers new offshore exploration opportunities

Kostis Oikonomopoulos
George Makrodimitras
Yannis Bassias
Hellenic Hydrocarbon
Resources Management SA
Athens, Greece

Western Greece is characterized mainly by carbonate rocks and this mineralogical composition reduces the ability to clearly image deep structures even more when they are covered by salt strata. Since November 2016, the Hellenic Hydrocarbon Resources Management State Company (HHRM) focused its commercial action on promoting larger surface concessions. The primary purpose was to increase the chances of hydrocarbon exploration and discovery below the evaporites which cover a large part of the offshore area south and west of Crete and to a lesser extent in the Ionian Sea. In early

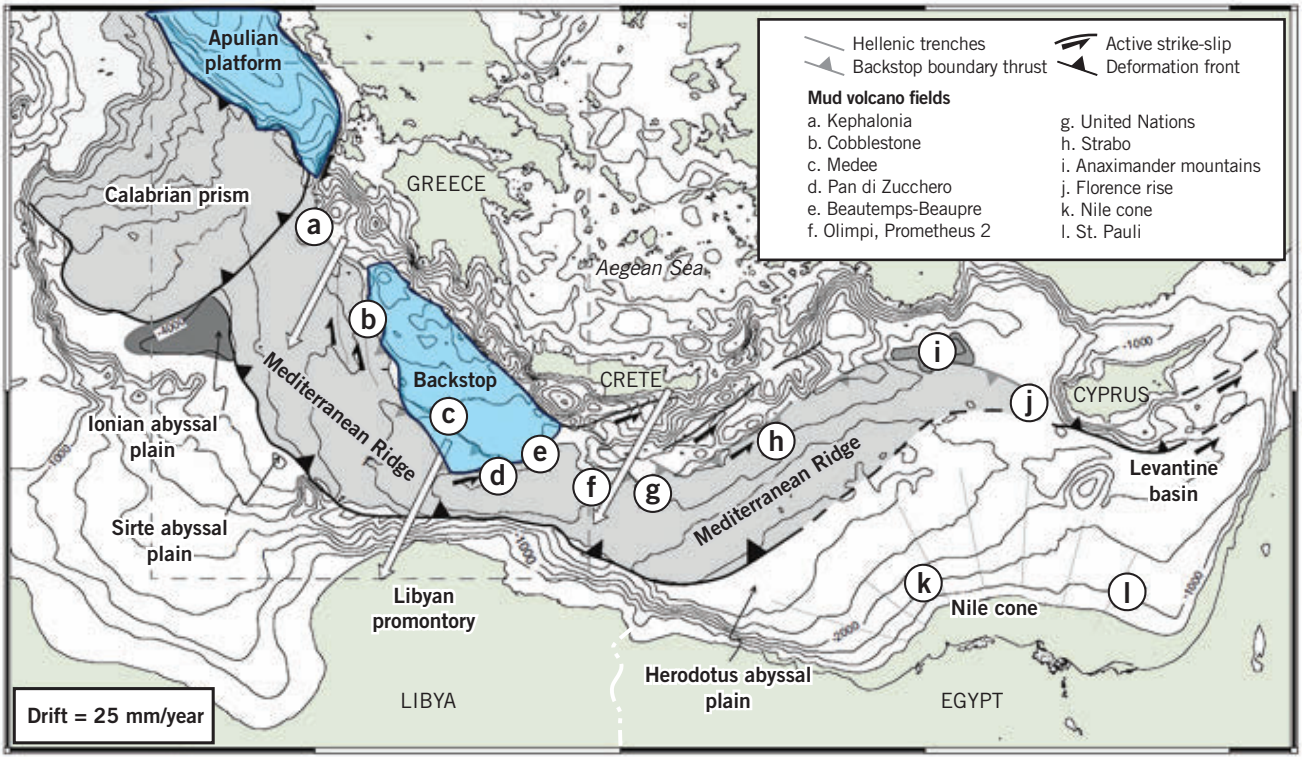
GREECE'S OFFSHORE TENDER

FIG. 1



PRESALT POTENTIAL OFFSHORE GREECE

FIG. 2



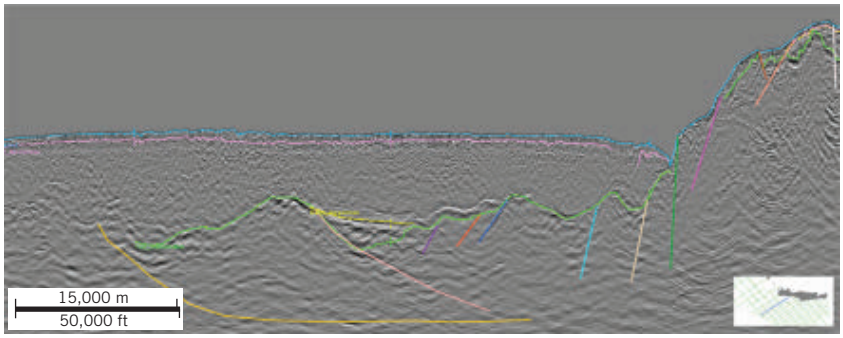
December 2017 the Official Journal of the European Union opened the international tender for the exploration of three offshore blocks in the Ionian Sea and west and southwest of Crete (Fig. 1), which is open for application until the end of February 2018. After the completion of the tender process these basins should be studied carefully for the evaluation of their hydrocarbon potential.

Presalt potential

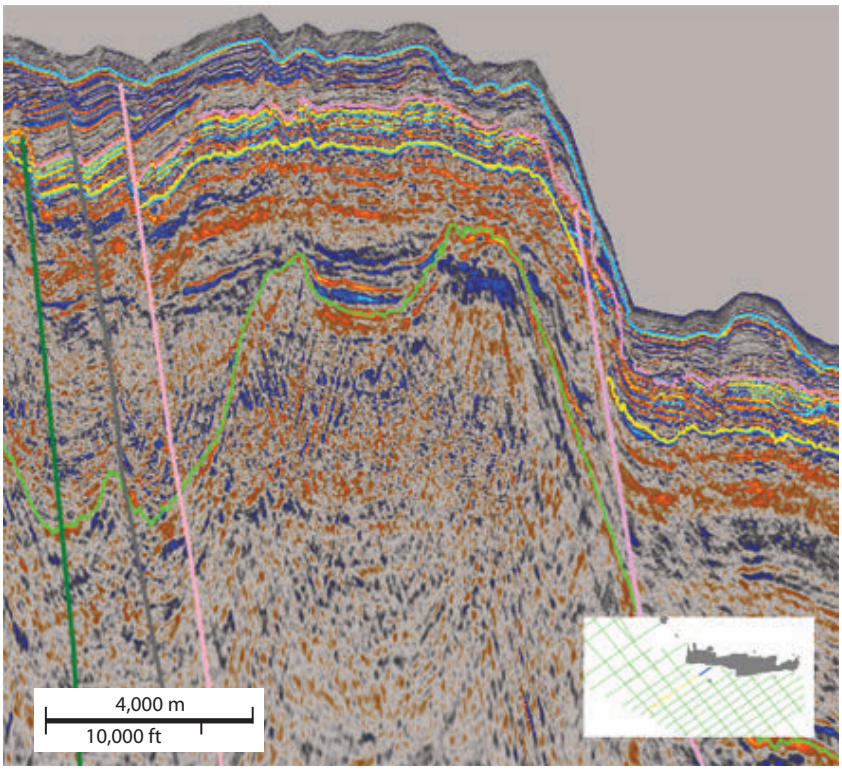
Forearc basins result from plate convergence. These basins are situated offshore between an outer-arc high and the mainland. These regions have not been considered important petroleum provinces, partly because low heat flow may limit thermal hydrocarbon generation. The Backstop area west of Crete bounded to the east by the Hellenides thrust-and-fold belt (TFB) and to the west by the Mediterranean Ridge presents similar settings with the Apulian platform to the North, which is also bounded by the Hellenides TFB and the Calabrian prism to the east and the west, respectively (Fig. 2).[1] The area does not have conventional forearc geometry and it is covered by a thick salt blanket that conceals an older mountain chain (Fig. 3). This chain of limestones and clastic rocks is characterized by many highs. Some of these highs probably underwent subaerial exposure or developed Mesozoic pre-salt build-ups (Fig. 4). In some cases, the post-Messinian-salt sediments could also act as reservoirs, a petroleum model that was studied and tested in other forearc settings.[2]

Multichannel seismic data, acquired in 2012, exhibit bright spots in these carbonate build-ups probably associated with gas-bearing sediments. Amplitude versus offset analyses will be necessary for gas exploration, while modelling will help in evaluating thermal hydrocarbon generation. Heat flow ranges between 40 and 60 milliWatts (mW) per sq m.[3] Palaeozoic mudstones and shallow marine carbonates, Cretaceous shales, and Neogene sapropels and mudstones are three possible source rocks where oil and gas generation is possible within and below the main depocenters of the basin where deep burial (>5 km) can compensate for low heat flow.

BACKSTOP AREA'S PRESALT MOUNTAIN CHAINS FIG. 3



CARBONATE BUILDUPS FIG. 4



Carbonate platform

The northwest Ionian Sea is subdivided into three distinct geological areas; to the east, the external parts of the Hellenides TFB, the central area of the south Adriatic basin, and to the west the Apulian carbonate platform (Fig. 5). The Ionian Block (2017 offshore tender round) lies over the central and western areas of the northwest Ionian Sea. Only its eastern border is covered by thrusts. The south Adriatic basin is a transition between the Apulian platform and the deepwater basin in front of the Hellenides TFB. The main reservoirs in this area include shallow water bioclastic carbonate build-ups along the platform edge, redeposited carbonates

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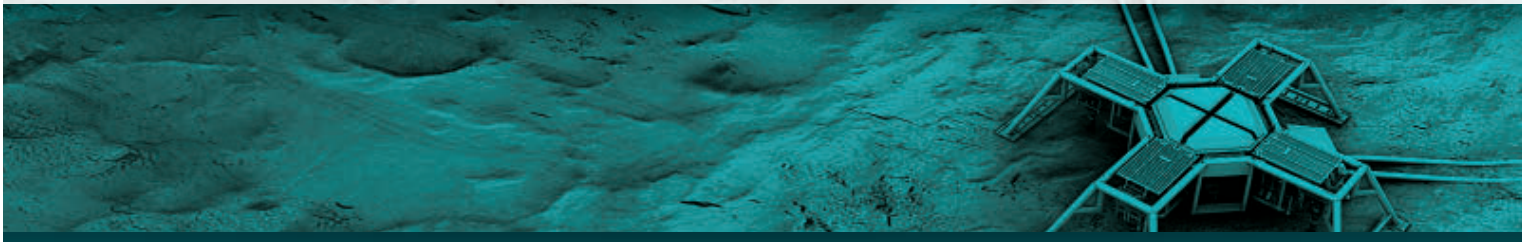

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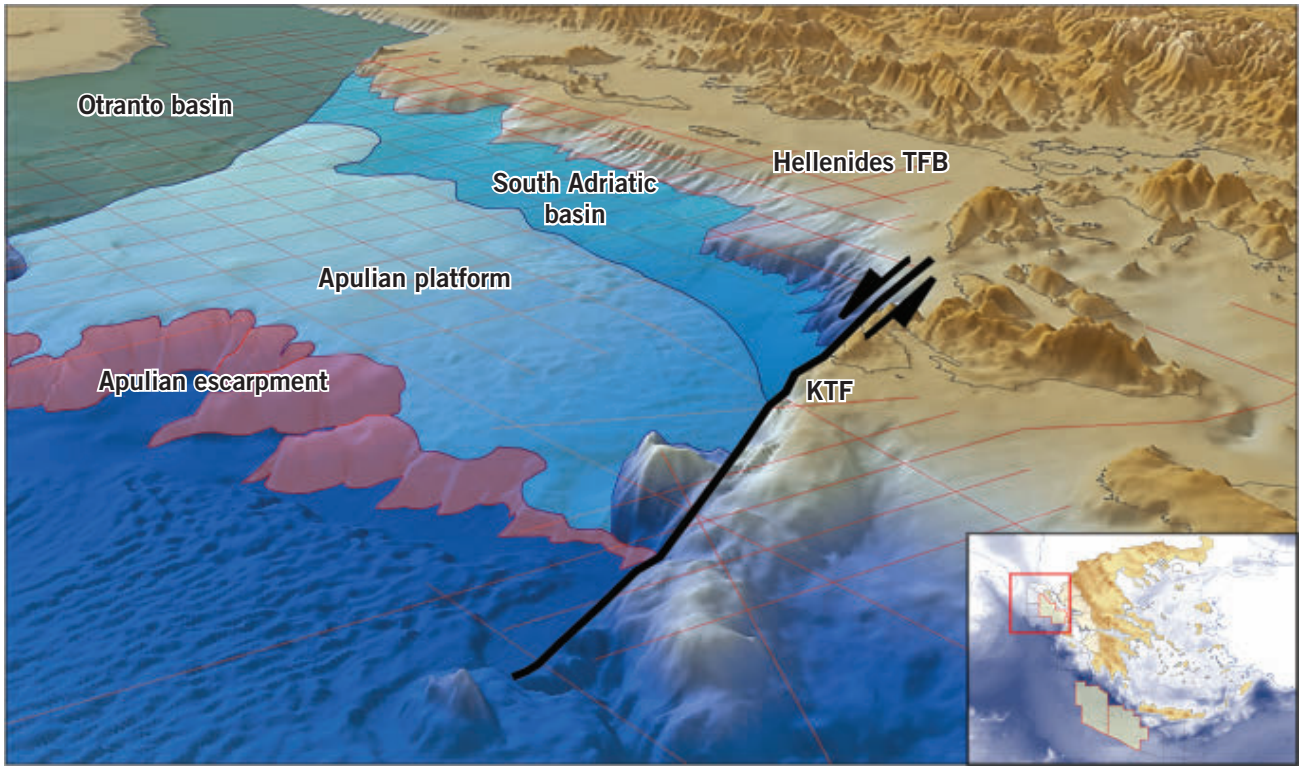
NORTHWEST IONIAN SEA GEOLOGY

FIG. 5



(calciturbidites) along the base of the platform slope and Oligocene-Miocene sandy layers belonging to the flysch series deposited at the front of the main Hellenides thrusts. The Messinian evaporites, where present, along with the mudstone beds (marls, clays, and shales) of the flysch deposits and the Pliocene shales seal the reservoirs in this area. The western parts belong to the Apulian shallow-water carbonate platform. The reservoirs in this area are karstified carbonate rocks, sealed by the argillaceous Pliocene deposits.[4]

The hydrocarbon charge in this area is characterized by the proven hydrocarbon generation from Late Triassic source rocks (sabkha or lagoonal environments), Early Liassic intraplatform basin deposits, and lacustrine organic-rich facies offshore Apulian platform deposited during the Turonian unconformity event.[5] The oil and gas discoveries offshore Albania and Italy are valid indicators of a working petroleum system in the northwest Ionian Sea. OGJ

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The authors

Kostis Oikonomopoulos (k.oikonomopoulos@greekhydrocarbons.gr) is a geoscientist for the Hellenic Hydrocarbon Resources Management Co. (HHRM SA). Prior to joining HHRM in 2017, he was business development associate for Spectrum Geo Ltd, UK, overseeing projects in the Mediterranean Sea and sub-Saharan Africa between 2012 and 2016. He has also worked for Hellenic

Petroleum SA, Greece, from 2007 to 2011 as a petroleum geologist. He holds a Master's degree from the University of Aberdeen, UK.

George Makrodimitras (g.makrodimitras@greekhydrocarbons.gr) is a sedimentologist-reservoir geologist. He is part of the geoscience team of the Hellenic Hydrocarbon Resources Management Co. (HHRM SA), where he focuses on integration of log and sedimentological data with seismic data to build geological models. On his previous appointment with Badley Ashton and Associates Ltd, UK, (2012-2017) he worked mainly on reservoir quality analysis projects on Middle East (Oman, Kuwait). He holds a PhD (2011) from the University of Patras, Greece.

Yannis Bassias (y.bassias@greekhydrocarbons.gr) is president and CEO of the Hellenic Hydrocarbon Resources Management Co. (HHRM SA), the regulator for oil and gas exploration and production in Greece. He also served as president and CEO of Georex oil and gas services group from 1997 to 2012 and president of Poros SAS between 2007 and 2012, overseeing exploration assets in the Paris basin and Tunisia. He held academic positions in Berlin and Paris before joining the industry in 1991. He holds a PhD (1984) from the University Pierre et Marie Curie in Paris.