

EXPLORATION OF THE SUBMARINE VOLCANIC REGION OF THE CATWICK ISLANDS.

UNDERTAKEN BY THE FRENCH HYDROGRAPHIC EXPEDITION
TO INDO-CHINA.

IN APRIL-MAY 1929

by

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I. *Extract from former Reports by the Hydrographic Expedition concerning the appearance of a volcanic island in 1923.*

During the month of February 1923, earthquake shocks made a fairly strong impression on the natives of the island of Poulo-Cecir-de-Mer. The reports made by the *Chef de Canton* of this island fixed the time of the shocks at about 8 a. m. on 10th February, towards noon on 12th February, 1 a. m. on 16th February, then on the following days at the rate of 3 or 4 disturbances by day and two or three at night until the phenomena ceased entirely on 22nd February.

Also, during the afternoon of 2nd March, the Japanese steamer *Wakasa-maru* observed a "violent volcanic disturbance in the sea" in about Lat. $10^{\circ} - 10'$ N. Long. $109^{\circ} - 00'$ E.

Then, on 9th March Messrs DOUGLAS & GRANT Ltd., Lloyds Agents at Fort-Bayard, received a message announcing the existence of a volcanic island of recent formation in this vicinity, *i. e.* about 20 miles south of the island of Poulo-Cecir-de-Mer. It was estimated that the island was about 450 metres long and 30 metres high; a heavy cloud of smoke usually hung over the island.

Finally during the night of 10th-11th March large quantities (estimated at a total of at least 500 cub. metres) of light volcanic matter were carried by the sea to the S. W. part of the beach at Poulo-Condore, about 170 miles from the volcanic eruption.

As soon as the existence of the new volcanic island was known, one of the vessels of the Hydrographic Expedition was sent to make a reconnaissance. This work took place from 15th to 17th March. On 15th March the island still showed signs of considerable volcanic activity, columns of heavy black smoke which reached a height of 100 metres escaping at times. During that day and the next, the vessel's activities were confined to taking soundings around the new island, observing its general aspect (*see* sketch attached, fig. 1.), and fixing the position. On 17th March it was possible to land on the island to collect various information and to draw a plan (*see* plan attached, fi. 1.).

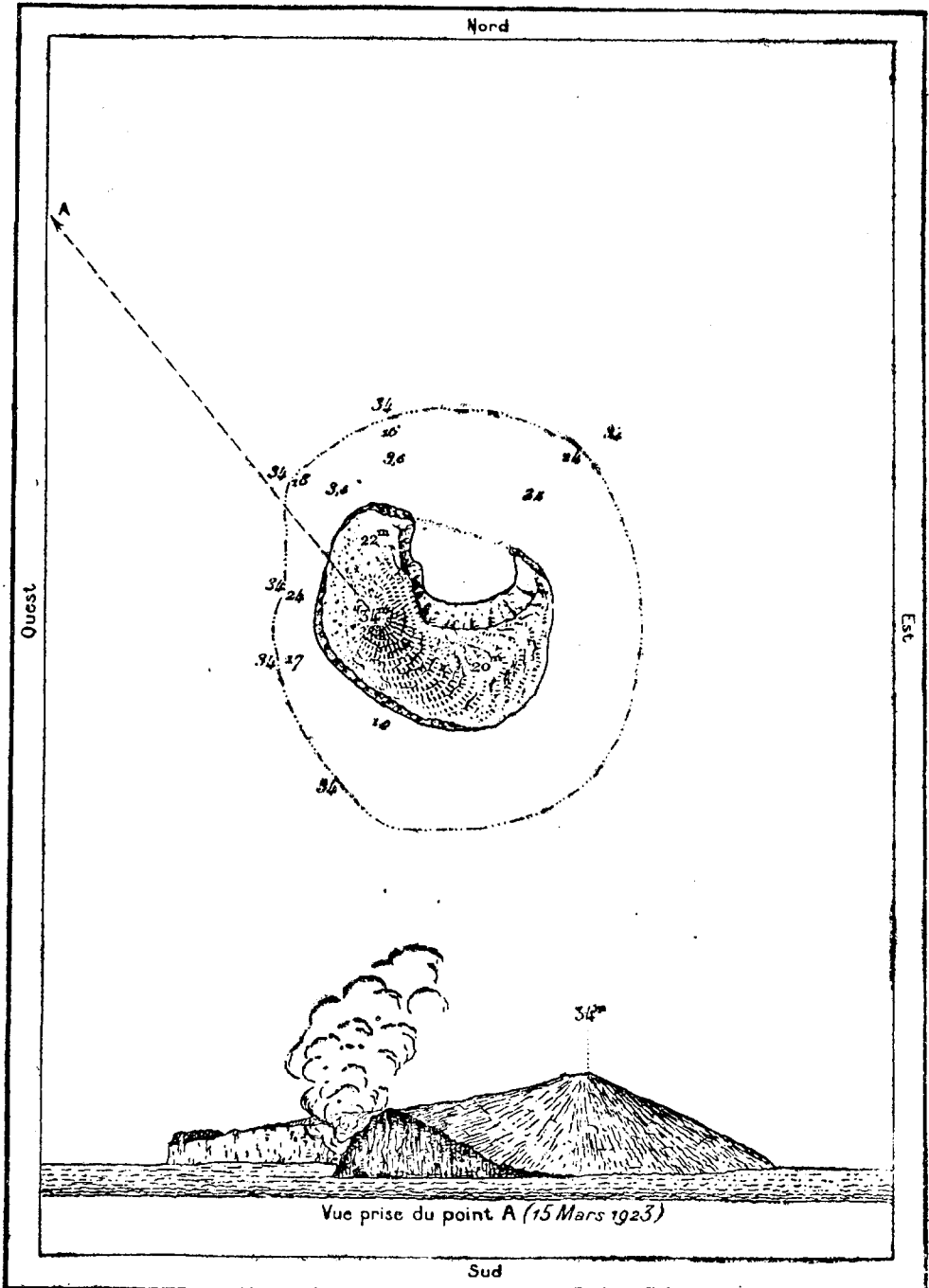


Fig. 1.

The island was found to consist of an accumulation of debris, generally in small pieces, of a black substance, which was light and porous: a few blocks only were of any appreciable size (0.50 m. to 0.75 m. in width). The crater from which this material had been discharged was clearly visible in the N. E. part of the island, the lack of symmetry of the latter doubtless

being largely due to the displacement of material to the S. E. by the winter monsoon, which is still strong at this season. The N. E. part of the crater had been everywhere broken down by the waves at that time.

Several weeks later the lighthouse tender of the Service Maritime of Cochin-China also reconnoitred the new island. The sea in undermining the foundation of the island had already made great changes in its appearance; the cliffs, which had been gradually eroded by the action of the waves, revealed the different layers of material (all finely pulverized) of which the island was composed.

2. *Present state.*

The island disappeared completely a short while later. The constant action of the ocean swell, breaking first over the shoal, then even without breaking, continually displacing the material by alternate movements back and forth (which usually works it downward) soon levelled the crest of the shoal to about 25 metres below the surface of the water, this height being probably due to the length of the prevailing ocean swell, which determines the depth at which matter of certain dimensions will remain practically stationary — and the size of the grains of scoriae of which the shoal was composed.

At present (1929), the summit of the shoal is absolutely flat and should be marked 26 metres below the zero of the charts and 27 metres below the mean level of the sea. The shoal is still covered with small particles of black scoriae (of the order of 1 centimetre down to 1 millimetre) and it appears to be practically circular in shape. Its summit has a diameter of about 200 metres; its sides which are doubtless natural slopes of small grains of scoriae, have a large inclination to the horizontal, in places reaching 45°. Its base is about 800 metres in diameter and depths of about 100 metres are all around the mound.

The shoal is fairly difficult to find. However, from its position the three islands of Poulo-Sapate, Great-Catwick and Poulo-Cecir-de-Mer (high peak) may be seen at the same time in clear weather, and magnetic bearings of these islands make it easy to reach the vicinity of the shoal; but, in view of the great distance from the islands it is necessary to take sextant angles of the three islands to arrive exactly over the crest of the shoal. (*See* chart, drawn up by the Hydrographic Expedition in 1929, embracing Poulo-Cecir-de-Mer to the Catwick Islands inclusive, fig. 2.).

At about two kilometres (to the Eastward) from the shoal now marking the eruption of 1923 is another shoal of the same shape, same dimensions and same depth (26 metres). This is possibly the result of a similar volcanic disturbance which also caused the appearance of a flimsy island, which was destroyed by the action of the sea. The two shoals are differentiated firstly by the fact that the latter has a very sharply defined shelf at a depth of about 80 metres and, secondly, in that its crest is covered with vegetable growths and coral — the latter, owing to its light colour, permitting the bottom to be seen, when the sun is high above the horizon. This is not

the case with the shoal due to recent volcanic activity, which is covered with black material.

Several kilometres to the southward there are two other shoals, with depths of from 20 to 25 metres, which are probably older volcanoes also.

Profil des profondeurs rencontrées par les bâtiments franchissant successivement les deux volcans sous-marins voisins dont le plus Ouest eut donné lieu en 1923 à l'apparition d'une île nouvelle

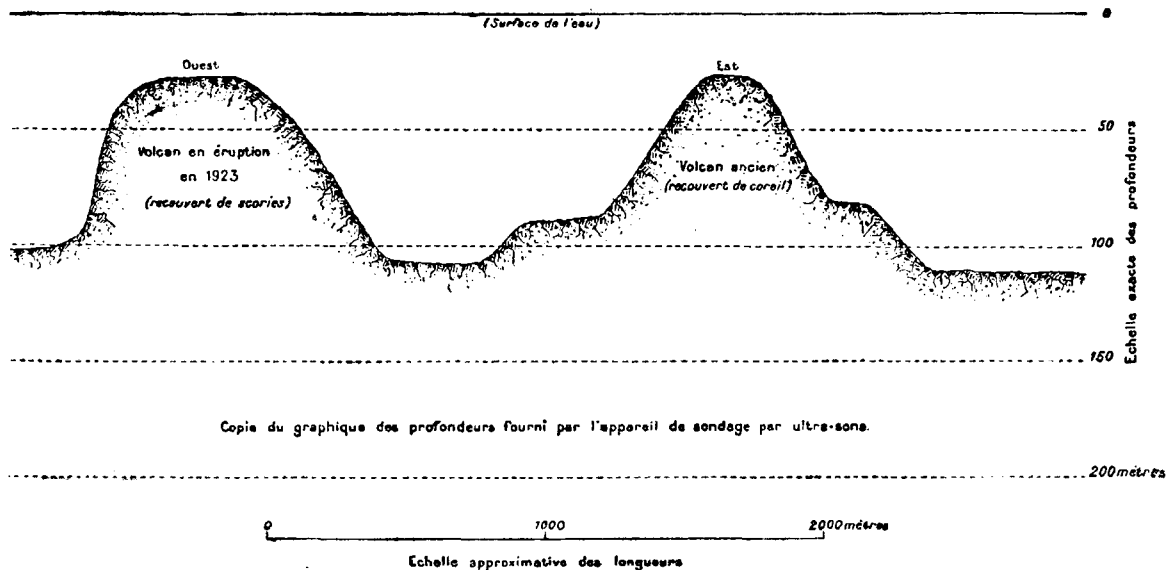


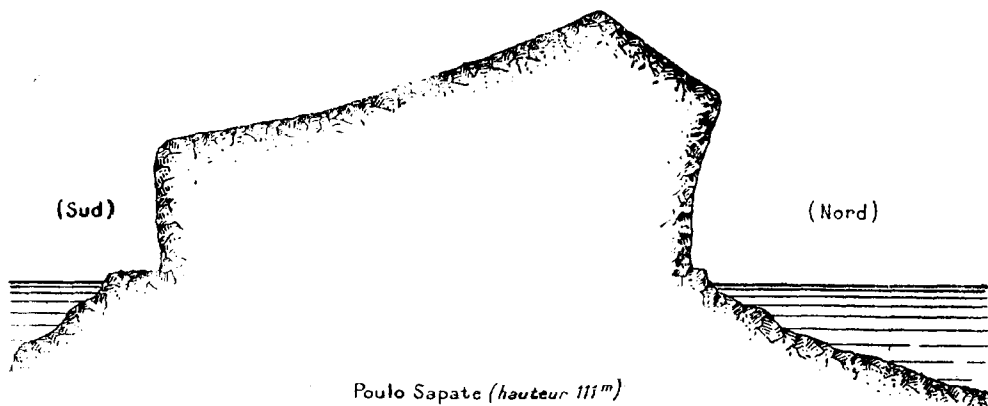
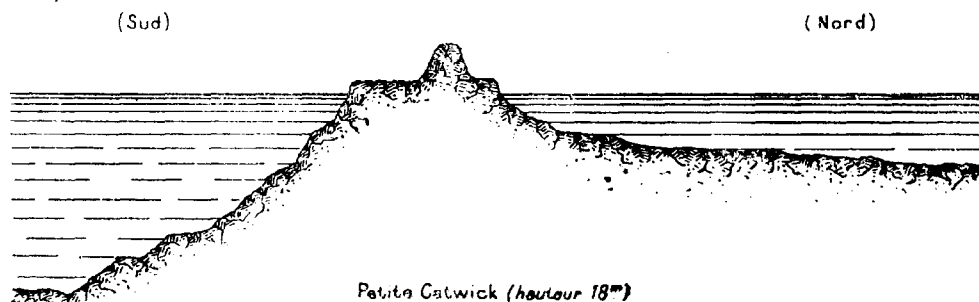
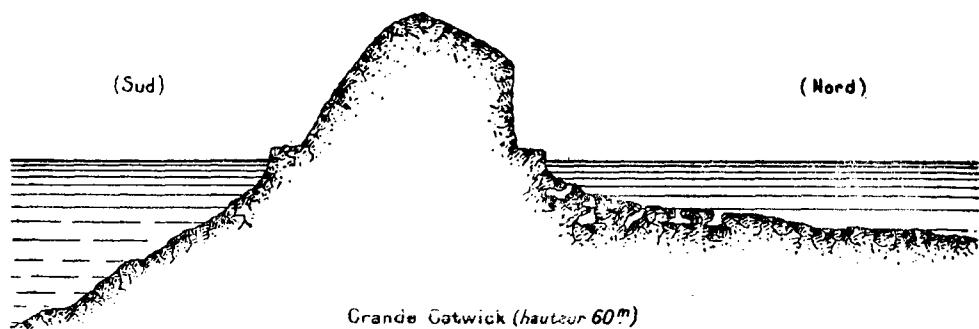
Fig. 3.

The very small areas of these shoals have made their investigation difficult. The work was carried out solely by means of the super-sonic sounding apparatus which automatically gives the profile of the depths encountered while the vessel is under way (*see* the profile obtained by the passage of the vessel over the first two submarine volcanoes mentioned above, fig. 3). Having but a limited time to devote to this investigation (1st April to 15th May, which is the only period of the year during which a reasonable proportion of suitable weather conditions may be expected in these parts), the Expedition cannot guarantee to have found all of the shoals of this kind; nor to have found the exact depths on the summits. However various reasons point to the conclusion that none of the shoals reach such an altitude as to become a danger to the usual shipping.

The fault in the earth's crust in which these four submarine volcanoes are located appears to run nearly in a straight line towards S 20° E and comprises, from North to South, the group of Poulo-Cecir-de-Mer (*i. e.* the High Rock, the large island of Poulo-Cecir-de-Mer and its southern islet), several shoals of from 30 to 40 metres' depth, the rock Yusun (7 metres below the chart datum), the group of submarine volcanoes mentioned above, the group of the two rocks Poulo-Sapate and Little Catwick, the rock Julia (6 metres below chart datum) and finally several shoals situated still further south, and which are probably also submarine volcanoes; one of them, depth 27 metres,

was the origin of a danger shown up to now on Chart N° 1271 with the notation: *Veteran*, not found by the *Cleopatra* and placed several miles too far to the southward. Several shoals, also doubtless of volcanic origin, exist elsewhere off this straight line. Particular mention may be made first of a shoal, depth 19 metres, at some distance S. W. of Poulo-Cecir-de-Mer, and second, of the group of islands of Great Catwick and La Paix Reef.

Profiles schématiques des trois îles Catwick en direction Nord-Sud



Remarque: Les hauteurs sont amplifiées environ 2 fois

Fig. 4.

3. *Special information regarding the Catwick Islands.*

All three rocks known as the Catwick Isles appear to be of volcanic origin; they are composed of a friable accumulation, made of layers of coarse sand alternating with layers of scoriae; enclosed in this mass are pieces sometimes large of hard black stone.

Near sea level, shell-fish have built up a hard calcareous carapace which protects it from the destructive action of the waves, but the sea has succeeded in undermining this hard crust and washing out the more or less voluminous caverns which make of the mass an enormous sponge. In fair weather the dark entrances of some of these caverns may be seen on the ocean bed in the northern and eastern part of Great Catwick Islet - (See diagrammatic section of Great Catwick, fig. 4).

Elsewhere, above the level of protecting shell-fish life, the rain and high seas have worn away the mass, which gives rise to a ledge completely surrounding the islets. Great and Little Catwick have remarkable regular ledges (see diagrammatic sections of Great and Little Catwick attached, fig. 4).

Finally, being inhabited by large colonies of sea-birds (the number of gulls which pass the night may be estimated at 5,000 for Great Catwick, 10,000 for Poulo Sapate, while the terns are even more numerous), the upper parts of the islands are covered with a thick layer of guano. This substance soaks into the surface of the mass and by preventing its disintegration by rain, helps to preserve the structure. However, on Poulo-Sapate, since the upper part only is well protected by guano, the rain and heavy seas have succeeded in eroding the cliffs under the more resistant carapace thus giving the rock, almost all around, a shape which makes it practically inaccessible (see the diagram of Poulo-Sapate).

The surroundings of the Catwick Islands abound in fish but, owing to the geographical position (at the extremity of the Annam Ridge) they are usually exposed to very strong winds and are inhospitable. Rarely a few sampans (8 or 10 at most) are seen coming from Poulo-Cecir-de-Mer when the weather is favorable for fishing. The birds which inhabit the islands spread out over the entire region during the day; they are usually found in the proximity of the shoals where the fish are to be found. The birds thus revealed the existence of certain submarine volcanoes and the positions of their summits to the Expedition.

Very strong currents sometimes occur in the vicinity of the Catwick Isles. These currents are generally due mostly to the tides and vary with the tides. When the current is strong, the shoals of 20 to 30 metres depth give rise to fairly noticeable eddies, which facilitate the search for them.

