II. — VOLCANISME SOUS-MARIN

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OF ROYAL VESUVIAN OBSERVATORY

Breakages of Telegraphic Cables and other Submarine Phenomena due to Sismo-Volcanic action.

In reply to the Circular letter sent by the " Ufficio Internazionale di Vulcanologia „ to the Admiralties of the Nations which joined the G. & G. Union (see *Bulletin Vulcanologigue* N. 1, page 112), Mr. P. A. SOMERS-COCKS, British Consul General at Naples, has sent to this Office on behalf of his Government, a list of the breakages of Submarine Cables belonging to the " Eastern Telegraph Co. „ from 1913 to 1924, and has promised to forward similar information regarding the " Halifax and Bermuda Telegraph Co. „ and the " West India and Panama Telegraph Co. „ as soon as same can be prepared by the Companies who have been communicated with on the subject.

In addition, Mr. A. SIMSON, General Manager of the Meteorological Office, London (Air Ministry) has sent a list of Sismo Volcanic disturbances of Submarine origin experienced by steamers in navigation from 1922 to April 1925 (compiled by Mr. L. A. BROOKE-SMITH, Marine Division Superintendent), giving assurance that further similar information obtained from the reports received from the Mercantile Marine, will be sent to this Office during the month of April in every year.

The International Volcanic section of the G. & G. Union whilst they hasten tho express their thanks to the above mentioned British Authorities, who with such speedy courtesy have answered our appeal giving information of great

importance, is very desirous that other Countries belonging to the Union should follow the example set. This desire especially concerns those Nations owning important lines of Submarine Cables, i. e. Italy, France, Spain, Japan, Holland and the United States of America, whose information on the subject would be most valuable for the present volcanic investigations.

It would thus be possible in the future to construct a Map complete for the whole World of the zones disturbed by Submarine activity and to know with greater certainty the lines of Sismo-Volcanic activity of the Earth which at present cannot be traced in their entirety owing to the absence information regarding Submarine disturbances.

The information supplied has been tabulated in the following pages.

The abbreviations used in these pages are as follows:

n/m	=	nautical miles
fms	=	fathoms
s, st	=	stone
m	=	mud
cl, cly	=	clay.

Reports of Erthquake phenomena at sea

received in the Marine Division of the Meteorogical Office, London.

(Extracted for the Bureau Central International de Volcanologie, Naples)

Extract from Meteorological Log of S. S. " Highland Rover „ — Captain F. ASHBY GRAVES.

May 10th 1922, 9,25 p.m. in Latitude 26° 30' S. Longitude 45° 46' W. (approx.) experienced what appeared to be a small tidal wave coming up from the South. The front of which was almost perpendicular, the height about 30 feet from trough to crest curling over and breaking a little. The vessel rose to it, but shipped a quantity of water forward, also aft. After passing the ship seemed to drop bodily on to the next swell, giving the impression that the back of the wave was as steep as the front. The wind was light and from the South West and the swell before and after the occurrence was the same as had been experienced during the day.

Extract from Meteorological Log of S. S. " Empress of Russia „ — Captain A. J. HOSKEN, R. N. R.

September 24th 1922, 12,23 p.m. in Latitude 24° 21 ½' N. Longitude 121° 49 ½' E., felt ship tremble for about 5 seconds; position verified by cross bearings showed depth of approx. 400 fathoms (? slight earthquake shock).

Extract from Meteorological Log of S. S. " Highland Heather „ — Captain G. A. POWELL.

January 22nd 1923, 12,15 a. m. Latitude 40° 3' N. Longitude 124° 30' W. (approx.) slight shock felt aboard, compass deflected about 6°. 12,33 a. m. severe shock - violent concussions as if passing over submerged obstruction.

Extract from Lloyd's List, 5th April, 1923.=Tidal Wave from a calm Sea.

An account by the captain of the Steamer " Martha „ which has just returned to Coquimbo, Chile, from a lobster-fishing expedition to the uninhabited Islands of San Ambrosio and San Felix, which lie in the Pacific Ocean, about 300 miles West of the town of Chanaral, says, according to a Reuter message, that on March 4, when nearing San Felix, the " Martha „ met a tidal wave 35 metres high (about 113 feet) which rose from a calm sea. Arriving at San Felix, Captain CAMPBELL noticed that the island was much smaller than previously. Anchoring be found the water tepid and the rock bottom changed to sand. Heavy sulphur gases pervaded the air. On shore he found sea fowl dead in their nests, and thousands of dead fish covering the island.

Extract from Meteorological Log of Bque " Garthgarry „. Captain D. ROBERTS.

On June 17th 1923, at 9 p.m. ship's time, in Latitude 20° 40' S. Longitude 171° 22' W., a violent tremor passed throughout, the ship lasting about two to three minutes, shaking masts and hull severely and causing all hands to rush on deck thinking the ship had struck.

The sensation was similar to that of grinding over a reef or some submerged object.

A cast was taken and gave no bottom at 90 fathoms, and the ship has made no water since the occurrence.

A light to moderate W. S. W. breeze and smooth sea at the time.

Probably the tremor was caused by some subterranean disturbance.

Should there be any sign on the ship's bottom when she is dry docked advice will be sent to the M. O.

No notification of any marks on the ship's bottom have been received.

The following is a report from Captain W. J. YOUNG *of* S. S. " LADY BRENDA „.

At 13.20 G. M. T. on 29th September, 1923, in Latitude 52° 10' N. Longitude 33° 30' W. I experienced two severe earth-

quake shocks, one of thirty seconds duration and another of ten seconds with an interval between of thirty seconds.

These shocks were of such a nature that they shook the vessel violently causing everybody who was asleep at the time to rush on deck immediately.

My first impression was that we had struck some submerged wreckage and I sent out a wireless signal as follows: " Fear that we have struck submerged wreckage Lat.... Long.... „.

The steamer " Manchester Brigade „ which was in the vicinity at the time also experienced similar shocks and on receipt of my signal was in a position to understand what was happening. He reported later that the shocks had been very severe and caused his vessel to vibrate heavily

The prevailing weather conditions at the time of the shocks were as follows:

Wind S. W. force 3.
Sea slight with moderate N. E. swell.
Barometer 1022.7 mbs. (30,20 ins.) rising.
Thermometer 55°
Sea 52°

During the shocks there was no apparent disturbance of the sea or in the conditions generally.

Extract from Lloyd's List, 22th October, 1923.
An Atlantic Earthquake.

The following interesting report on what appears to have been a sub-Atlantic earthquake has been received from Captain C. H. STOTT, Master of the " Manchester Brigade „.

" On September 30th at 1.20 (G. M. T.) the vessel began to vibrate heavily from stem to stern for about 20 seconds. Thinking we had struck some submerged wreckage, I was just on the point of stopping when the vessel began to vibrate again, more heavily than the first shock. This lasted for about 30 seconds: then I put it down to earth vibration or earthquake shock.

While working out position to send out by wireless we got a message from the S. S. " Lady Brenda „: " Fear struck submergcd wreckage „. Sent out my message: " 1.20 G. M. T. Lat. 52° 42' N. Long. 35° 05 ' W. felt two severe

shocks, causing ship to vibrate heavily, think must be earthquake shocks. STOTT „.

Received another message from S. S. " Lady Brenda „ " 1.20 G. M. T. Lat. 52° 10 ' N. Long. 33° 30 ' W. felt two distinct shocks making vessel vibrate heavily for periods of 30 and 10 seconds respectively, which resembled contact with submerged wreckage, but must have been earthquake shocks, as ships in vicinity also report similar experience „. At 2.7 G. M. T. had another shock causing ship to vibrate heavily, but only for a few seconds. Again at 11,18 a. m. G. M. T. September 30th, had another shock, causing ship to vibrate for about 10 seconds, position then being 53° 28' N. 31° 53' W.

The distance between the ships when first shocks were felt was about 70 miles. A little to the north of our position at 1.20 G. M. T. are three peacks, with 630, 730 and 833 fathoms of water over them. One of these may have been in eruption.

The depth of the soundings around the peaks are from 1300 to 2200 fathoms. See Chart 2060 A. North Atlantic Ocean Eastern Portion „.

The following report has been received from the ship " S. F. Tolmie „ — Captain J. C. STEWART, *Vancouver to Brisbane.*

" February 2lst 1924, 4.35 a.m. in Latitude 40° 32' N. Longitude 126° 38' W. approx. Calm, clear weather, full moon, heavy W. S. W. swell running. Experienced a violent earthquake tremor accompanied by a roar similar to that caused by a heavy squall of wind.

The vessel was shaken from stem to stern, masts and rigging jumping, lamp glasses and crockery rattling, those below could hear the ship's timbers creaking and straining.

Sea surface very much disturbed.

The tremor was variously estimated to last from 15 to 20 seconds.

10.10 a.m. Another tremor of less force and accompanied by noise as before.

1.46 p.m. Another slight tremor lasting 10 seconds.

5,25 p.m. Another tremor, more severe than last, same noise.

9,50 p.m. Slight tremors felt, three in succession, sea surface disturbed.

A good lookout was kept for any heavy sea or seismic wave but none was observed. „

Extract from Lloyd's List, 17th June, 1924.

Tampico, May 30.—The Master of the steamer " El Oso „ states that heavy reports were heard at 3,30 a.m. on May 17th when in Latitude 36° 07' N. Longitude 37° 59' W. and again at 3.50 a.m. as if the vessel had struck some obstruction, or encountered an earthquake, causing her to vibrate greatly. The weather was partially overcast, but clear, with light breeze and smooth sea. The master is inclined to think that the shocks were due to earthquake.

Extract from Lloyd's List, 5th September, 1924.

Christchurch (N. Z.), August 2.—Steamer " Tees „ which arrived at Lyttelton last night, reports having encountered a tidal wave on July 21st while on a voyage to the Chatham Islands. The top of the high pressure cylinder was cracked, and it was decided to proceed on the low pressure and intermediate. On the night that the " Tees „ was disabled, the same tidal wave struck the islands and considerable damage was done.

The following is an extract from the Meteorological Log of S. S. " Empress of Australia „, Captain A. J. HAILEY, *Victoria B. C. to Yokohama.*

September 16th 1924, 3,15 p.m. Latitude 51° 50' N. Longitude 167° W. (approx.).—Experienced severe shakes (2) on board. Nothing on board to cause same — thought to be earthquake shocks, being same as felt in Yokohama, September 1st 1923. „

Marine Division, 14 apr. 1925.

L. A. BROOKE - SMITH
Marine Superintendent

EASTERN TELEGRAPH COMPANY

INTERRUPTIONS DUE TO

REGION:

SECTION	Date of Interruption	Position n/m.	Approx: Lat.	Approx: Long.
Porthcurnow - Carcavellos. No. 1. . .	13-3-1913	440 fr: Pk.	44.8 N	8.47 W
Porthcurnow-Gibraltar. No. 2. . . .	6.30 a. m. 14-12-1919	730 fr: Pk.	39.38 N	10.48 W
Vigo-Gibraltar . .	12-6-1919	190 fr: Vigo	39.56 N	10.32 W
	2-12-1919	200 fr: Vigo	39.40 N	10.30 W
	7-1-1920	210 fr: Vigo	39.33 N	10.22 W
Carcavellos-Madeira No. 1.	12-4-1915	5 fr: Mad.	32.34 N	16.51 W
San Miguel-Fayal .	8.10 p. m. 26-2-1903	79 fr: Fayal.	38.6 N	27.28 W
San Miguel-Fayal .	6.14 p. m. 29-2-1904	168 fr: Fayl.	37.41 N	25.49 W
San Miguel-Fayal .	8 p. m. 4 - 1 - 1908	139 fr: Fayal.	37.49 N	26.26 W
San Miguel-Fayal .	11.5 a. m. 21 - 10 - 1915	75 fr: Fayal.	38.4 N	27.24 W

AND ASSOCIATED COMPANIES

SUBMARINE DISTURBANCES

North Atlantic

Depth. Fms.	(REMARKS extracted from Ships' reports on repairs).
600 St. & rock.	As many drives were made without getting any signs of cable and as the strain on our first hook when the cable parted, was very high, we think that in all probability there has been a landslide and that the cable was deeply buried.
2300 cl. m.	Many badly crushed places came inboard during picking up operations. A length of 200 fms was recovered in an extraordinary condition. In places it was crushed flat: there were numerous places where a few wires were crushed into the core as if a pick-axe had been used on it; there were numerous broken wires, with ends that looked as if they had been hammered out flat. There must have been a landslide or a heavy fall of rock on to the cable (Note: This cable was only completed 7. 12-1919.).
2000 s. cly. 1900 m. cly. 2200 m. cly.	Cable at these positions running in a Gully which is some 1800 feet deeper than the surrounding bottom and this may cause landslide causing the cables to slip. The only other suggestion is, that there have been occasional seismic disturbances in this vicinity.
800 m. Rock.	The fault was due to one or more kinks and the kinks apparently must have been caused by a landslide or some seismic disturbance as all the cable was crushed and dented and in some cases bore the appearance of being hooked and strained; apart from this the cable appeared in very good condition.
650 Rock.	Break caused apparently by seismic disturbance. (Seismic disturbance having been noted by the observatories at Fayal and San Miguel on the night the cable broke).
340 Rock.	Break apparently due to landslide, no indication of chafe or corrosion.
750 Rock.	Break undoubtedly due to landslide.
700 Rock.	Probably caused by seismic disturbance ?

SECTION	Date of Interruption	Position n/m.	Approx: Lat.	Approx: Long.
Mossamedes-Benguela	7 a. m. 19 - 9 - 1911.	14 fr: Moss.	15. 3S	12. 0E
			REGION :	**Mediter**
Malta-Zante . . .	11.20 p. m. 28 - 12 - 1908	68 fr: Mal.	36.14N	15.50E
	3.15 p. m. 28 - 12 - 1908.	113 „	36 26N	16.29E
	26 - 2 - 1909	167 „	36.38N	17.16E
Gibraltar-Malta. No.1.	2.30 p. m. 24 - 6 - 1910.	518 fr: Gib.	37.04N	3.59E
Milazzo-Lipari . .	January 1909.	10 fr: Lipari.	38.22N	15.06E
Messina-Straits. No.5.	Sept. 1905.	2 fr: Bagnara	38.17.30N	15.46E
„ „ „	January 1909.	1 „ „	38.17.30N	15.47E
„ „ No.1.	8 a. m. 26 - 9 - 1915	8 „ „	38.16.30N	15.46.30E
„ „ No.3.	8 a. m. 26 - 9 - 1915.	3 „ „	38.17. 0N	15.46.20E
Patras-Corinth No.1.	7.45 a. m. 30 - 5 - 1909.	37 fr: Patras.	38.10. 0N	22.21E
„ „ „	28 - 8 1909.	52 „ „	38. 6. 0N	22.36E
„ „ „	7,40 a. m. 30 - 10 - 1918.	53 „ „	38. 6.20N	22.36.30E

South Atlantic

Depth: Fms.	(REMARKS extracted from Ships' reports on repairs).
420 m.	Break due to landslide. The last 150 fms recovered had been drawn from underneath some heavy weight which had fallen on the cable and caused the break.

ranean & Levant

1800 1900	Breaks due Seismic disturbance. (Time of the destruction of Messina).
1900	Fault due Seismic disturbance probably started by the Messina disturbance.
1200 m.	Break due Seismic disturbance. " Malta reported to ship that at the same time as this cable was interrupted a Seismic disturbance was registered 700 n/m away ". (Breaks occurred on or about this position in 1900, 1904, 1905, 1907, and 1908).
60	Break due to Seismic disturbance.
235	Break due to Seismic disturbance.
120	" " " " "
61	" " " " " Landslide.
150	" " " " " "
390 m.	Break due to Seismic disturbance. Strong shock felt at Patras on day of interruption.
270 m. cl.	Fault. (Cable badly damaged and flattened at position of fault, the core being forced out between the skeathing wires) Seismic disturbance probably caused by landslide of a heavy mass of hard clay on cable.
360 m. cl.	Break seismic dusturbance, landslide, cable deeply buried.

SECTION	Date of Interruption	Position n/m.	Approx: Lat.	Approx: Long.
Patras-Corinth. No. 1.	4.30 a. m. 18 - 12 - 1920.	50 fr: Patras.	38. 7. 0 N	22.34. 0 E
„ „ „	7 - 12 - 1921.	54 „ „	38. 7. 0 N	22.36. 0 E
„ „ No. 3.	1.30 p. m. 14 - 5 - 1908.	49 „ „	33. 6.30 N	22.34 E
„ „ „	4.30 p. m. 18 - 9 - 1910.	37 „ „	38.11. 0 N	22.22 E
„ „ „	18 - 1 - 1914.	39 „ „	38.12. 0 N	22.22 E
„ „ „	9.50 p. m. 20 - 10 - 1919.	55 „ „	38. 6. 0 N	22.37 E
„ „ „	December 1921.	55 „ „	38. 6. 0 N	22.37 E
			REGION: **East**	
Zanzibar - Mozambique. No. 1. . . .	13 - 12 - 1910.	319 fr: ZR.	10.27 S	10.31 E
	3 p. m. 13 - 12 - 1910.	537 „ „	13.32 S	40.48 E
Zanzibar - Mozambique. No. 2. . . .	13 - 12 - 1910.	332 „ „	10.0 S	41.7 E
	2 p. m.			
Mozambique-Durban	13 - 12 - 1910.	27 „ MZ.	15.20 S	41.2 E
	„	19 „ „	15.14 S	40.56 E
	3 p. m.			
Mozambique-Beira .	13 - 12 - 1910.	11 „ „	15.9 S	40.47 E
			REGION: **West Coast**	
Chorillos-Mollendo .	1 - 8 - 1913.	480 fr: Chorillos.	16.50 S	72 54 W
	„	460 - 474 fr: Chorillos.	16.42 S 16.49 S	73.7 Wa 72.55 Wb
	„	370 - 405 fr. Chorillos.	16.8 S 16.31 S	74.8 Wa 73.31 Wb

Depth. Fms.	(REMARKS extracted from Ships' reports on repairs).
373 m.	Break, Submarine landslide.
355 m. cl.	Break, „ „ NOTE. Extract from Report dated 29.9 to 25th October repairs to Patras Corinth I. (This particular part of the Gulf of Corinth as wo learn is frequently the scene of earthquakes of a light nature).
260 m.	Break due to Submarine disturbance. Landslide. Cable buried.
380 m.	„ „ „ „ „ „ „
420 m.	„ „ „ „ „
70 m.	„ „ „ „ „ „ „
95 m.	„ „ „ „ „

Coast of Africa

182	Break seismic disturbance.	On Dec: 13th 1910. The C. S. " Sherard Osborn „ was preparing to leave Durban for the North; information was received about 2,30 p. m. that there had been an earthquake shock at Zanzibar and at 3 p. m. communication ceased with all cables with Mozambique (North and South).
700 m.	„ „ „	
1580 cly.	„ „ „	
1100	„ „ „	
900	„ „ „	
500	„ „ „	

of South America

300	August lst during the evening a short but severe shock was felt at Mollendo and cable failed. (1) One break.
300	(2) Two breaks removed between positions marked a & b.
325	(3) Great difficulty was experienced in hooking owing to the mutilated state of the cable consequent on earthquake shocks; (4 breaks removed) between positions a′ & b′ bracketed.

SECTION	Date of Interruption	Position n/m.	Approx: Lat.	Approx: Long.
Antofagasta-Serena .	11 - 11 - 1922.	331 fr: AF.	28.18 S	72.00 W
„ „	11 - 11 - 1922.	337 fr: AF.	28.21 S	71.20 W
Serena-Valparaiso .	16 - 8 - 1906.	7 - 17 fr: VO	32.44 S	71 40 W a
„ „	16 - 8 - 1906.		32.55 S	71.40 W b
„ „	2 p. m. 9 - 10 - 1911.	30 fr: Serena.	30.5 S	71.38 W
„ „	„	34 fr: Serena.	30 7.30 S	71.42 W

REGION:

Banjoewangie - Port Darwin No. 1.	1888 July	227 fr: BW.	9.17 S	117.16 E
Banjoewangie - Port Darwin. No. 2. .	1888 July	194 fr: BW.	9.13 S	117.17 E
Banjoewangie - Port Darwin. No. 1. .	1917 9 a.m. 21st. Jan:	100 fr: BW.	9.13 S	115.21 E
Banjoewangi - Port Darwin. No. 2. .	1917 8 a.m. 21st. Jan:	82 fr: BW.	9.2 S	115.17 E
Banjoewangie - Port Darwin. No. 2. .	1913. 12.5 a. m. 14th Aug:	158 fr: BW.	9.5 S	116.24 E

of South America

Depth. Fms.	(REMARKS extracted from Ships' reports on repairs).	
300	(1) Break seismic disturbance.	At midnight on the 10 th a strong earthquake shock was felt at Chanaral and this Section failed also both the all American Cables x Position 26 n/m S of Break.
260	(2) Break seismic disturbance. A clean break no signs of chafe.	
	(1) Break seismic disturbance.	Both these breaks were undoubtedly caused by the strong earthquake noticed on the 16th August at Valparaiso.
	(2) " " The two breaks removed between positions marked a&b.	
400	Break	These two breaks undoubtedly due to landslide, as we found the cable deeply buried at both positions.
400	"	

The Far East

1000 m. 900	These two cables failed at the same time due seismic disturbance cutting off all communication with Australia and New Zealand.
1200 1000	The two breaks in this locality must have been due to the volcanic eruption of considerable magnitude which took place in the Island of Baby.
200	Break was no doubt due to a submarine disturbance. The depth had shoaled to only about 200 fms whereas Chart showed about 800 fms (Position 1.5 n/m South of Lombok, a disturbed region).