O-II4

FIRST RESULTS OF THE TIDEGAUGE NETWORK IN THE STRAIT OF GIBRALTAR

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SUMMARY

Tidal heights were recorded in several locations of the strait of Gibraltar (see location map) during 1984 and 1985 by means of Aanderaa water pressure sensors installed at the sea bottom.

The long series of tidal data allowed us to resolve the more important harmonic constants for each specie (see Table). Tides of wholly semidiurnal character are determined by the behaviour of the component M_2; lines of equal amplitude or cotidal lines are represented in cm; lines of equal phase in degrees are referred to the Greenwhich meridian.

The main aspects of these tides are the fast increase of the tidal amplitude as we proceed to the west, this is a characteristic of the antinode of the stationary wave typical of the Western Mediterranean Sea.

This increase of amplitude is not uniform, presenting a maximum gradient at the sill of the Strait of Gibraltar. At the sill, phase is greatly distorsioned giving rise to more than 40 minutes delay of the high water level between Ceuta and the bay of Tanger.

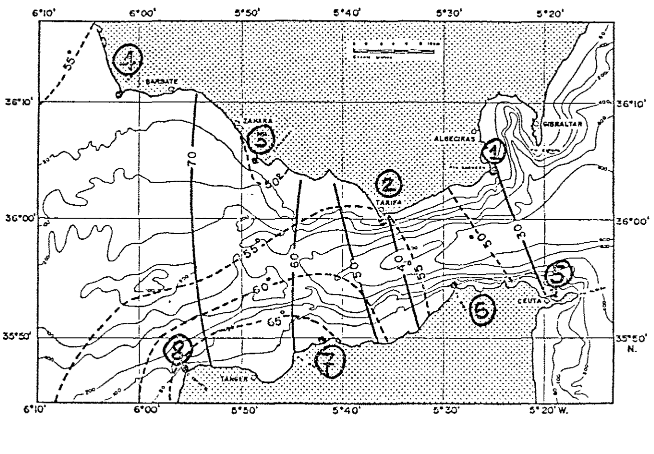
The physical mechanism of such a distornioned tide is not quite clear, possibly friction is playing an important role as evidenced in the relative importance of the non linear components (shallow water tides) in this area.

The Strait of Gibraltar behaves as a nodal line for the diurnal species (mainly K_1 and O_1), particularly for the second one, which changes its phase almost 180° inside the Strait. Nevertheless the small amplitude of the various components of this species, makes them rather uninteresting.

In location 8 (cap Espartel) greater amplitudes of tides are evident and the diurnal inequality is clearly exhibited.

PUNTO	ESPECIE 1				ESPECIE 2								ESPECIE 3		ESPECIE 4	
	K_1		O_1		M_2		S_2		N_2		K_2		M_3		M_4	
1	2.30 (0.21)	145.0 (0.5)	0.73 (0.22)	181.0 (17.0)	31.11 (0.21)	47.5 (0.5)	11.45 (0.22)	71.0 (1.0)	6.99 (0.22)	35.0 (2.0)	3.39 (0.22)	63.0 (4.0)	0.31 (0.22)	200.0 (43.0)	1.32 (0.21)	165.0 (10.0)
2	2.24 (0.20)	131.0 (5.0)	0.48 (0.21)	165.0 (25.0)	41.53 (0.20)	57.0 (0.5)	14.18 (0.20)	85.0 (1.0)	7.99 (0.20)	52.0 (2.0)	3.86 (0.20)	77.0 (3.0)	0.30 (0.21)	242.0 (48.0)	4.15 (0.20)	153.0 (3.0)
3	3.75 (0.22)	75.0 (4.0)	1.84 (0.23)	313.0 (8.0)	64.90 (0.22)	49.0 (0.5)	22.30 (0.22)	74.0 (1.0)	12.35 (0.21)	44.0 (1.0)	6.07 (0.22)	66.0 (2.0)	0.60 (0.23)	234.0 (22.0)	2.22 (0.23)	138.0 (6.0)
4	2.74 (0.24)	59.0 (5.0)	2.47 (0.25)	298.0 (6.0)	76.22 (0.25)	53.5 (0.5)	27.94 (0.25)	77.0 (0.5)	15.99 (0.25)	37.0 (1.0)	7.86 (0.25)	72.0 (2.0)	0.55 (0.25)	230.0 (28.0)	1.31 (0.24)	127.0 (12.0)
5	3.83 (0.21)	138.0 (3.0)	1.92 (0.22)	94.0 (7.0)	29.88 (0.21)	47.5 (0.5)	11.20 (0.21)	72.0 (1.0)	6.33 (0.21)	34.0 (2.0)	3.29 (0.22)	63.0 (4.0)	0.38 (0.22)	203.0 (32.0)	2.50 (0.21)	157.0 (6.0)
6	3.23 (0.21)	133.0 (4.0)	1.21 (0.21)	81.0 (10.0)	36.36 (0.21)	46.5 (0.5)	14.08 (0.21)	74.0 (1.0)	7.63 (0.21)	38.0 (2.0)	3.95 (0.22)	66.0 (3.0)	0.45 (0.21)	220.0 (28.0)	2.38 (0.21)	150.0 (6.0)
7	4.56 (0.40)	68.0 (5.0)	2.90 (0.40)	343.0 (8.0)	51.81 (0.40)	69.0 (0.5)	20.05 (0.41)	90.0 (2.0)	9.37 (0.40)	54.0 (3.0)	5.45 (0.41)	82.0 (4.0)	0.66 (0.41)	226.0 (37.0)	3.10 (0.40)	128.0 (8.0)
8	6.07 (0.30)	60.0 (3.0)	4.79 (0.30)	324.0 (4.0)	75.83 (0.30)	67.0 (0.5)	25.68 (0.29)	92.0 (1.0)	14.18 (0.29)	52.0 (1.5)	6.75 (0.30)	84.0 (3.0)	0.55 (0.29)	240.0 (36.0)	2.13 (0.29)	123.0 (8.0)

Several of the most important tidal components at the various locations of the study. The first column is the amplitude (cm) and the second one is the phase (degrees). Under each value and in brackets the estimated error is shown. The instrument precision is of ±1 cm, so amplitudes less than that value should be considered cantiously.



O-II5

CURRENT MEASUREMENTS IN THE SICILY CHANNEL

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Three current-meter chains were deployed in the Sicily Channel approximately along 13 E.

The nominal instrument depths were thoght to be 75, 250, 450 m, which were considered a good choice in order to study the surface water fluctuations, the core of the Levantine water and the dense water below. The high variability of the bottom topography permitted to deploy just one chain at the programmed depth.

Sea level and pressure gauges were deployed along and across the channel, while a meteorological station was functionning aboard a ship anchored in the middle of the Sicily Channel.

Oscillations of about 20 minutes were occurring during November 85 and were interpreted as oscillations of the Sicilian shelf (the so called Marrobbio phenomenon). Sea level and bottom pressure showed the same low frequency oscillazions having a period of about 15 days, surely related to atmospheric fluctuations.

The flow seemed higly influenced by the bottom topography andwas more stable in the northern part of the channel. In the middle and southern part the Levantine water showed long periods of eastward flow. Close to the bottom the water fluxes were predominantly eastward too.

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