



H102
东海海区
EAST CHINA SEA

2009

潮汐表

TIDE TABLES



中国人民解放军海军司令部航海保证部
THE NAVIGATION GUARANTEE DEPARTMENT OF THE CHINESE NAVY HEADQUARTERS
2008 年

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中国人民解放军海军司令部航海保证部编制的《潮汐表》共分四册,包括黄、渤海海区(H101),东海海区(H102),南海海区(H103),太平洋西北部(H104)。

概述

潮汐表中刊载每日潮汐发生时间和高度的港口称为主港,通常为重要港口或能代表某类潮汐特征。如果两个港口的潮汐特征类似,其间有近似不变的潮差比和潮时差,并能利用其中一个主港的每日高、低潮预报,通过两港之间的差比关系推算另一港口的潮汐,则根据这种关系推算潮汐的港口称为附港。

在本表中,列出了主港每日高、低潮的潮高极值和时间,并对部分主港更详细地列出了每日正点潮高。表中日期下面的●☾○☾符号分别表示月亮的朔、上弦、望、下弦四种月相;S、N、E字母分别表示月亮的赤纬最南、最北、最小三个极值。

潮高基准面是潮汐表预报潮高起算面,海图深度基准面是海图水深的起算面。我部出版的《潮汐表》与海图,其潮高基准面和海图深度基准面是一致的,因此某一时刻的实际水深等于大比例尺海图上标注的水深与该时刻的潮高值之和。

如果发现潮高基准面与所使用的海图深度基准面不一致,实际计算水深时须加以订正:某地某时实际水深 = 当地大比例尺海图上标注的水深 + 该时预报潮高 + (当地海图深度基准面 - 潮高基准面)。

平均海面是一定时期内海水面的平均位置,用潮高基准面至平均海面的高度来表示。一般经过长时期的潮汐观测计算得来。

各港站所列时间均以各自所在地区的标准时为准。其中中国沿海各港站潮高预报及月赤纬极值、月相、月中天发生时间均采用北京标准时,即东8时区时。

正常情况下,《潮汐表》预报潮时误差在20~30分钟以内,潮高误差在20~30厘米以内。在预报值中不包括由于气象及其它随机因素而引起的误差,特殊情况下,如处在江、河口的预报点或有台风、寒潮、洪水等因素影响时误差较大,使用时请注意。

潮汐要素

海水由于受到月亮和太阳的引力作用而产生周期性的升降(涨落)运动的现象叫做潮汐。在潮汐升降的每一周期中,当海面涨至最高时为高潮,当海面降至最低时为低潮。从低潮到高潮的过程中,海面逐渐升涨为涨潮;从高潮到低潮的过程中,海面逐渐下落为落潮。相邻的高潮与低潮的水位高度差为潮差。从低潮时至高潮时所经历的时间为涨潮时间;从高潮时至低潮时所经历的时间为落潮时间。

在朔或望(农历初一或十五)后的2~3天达到半个月中的潮差最大为大潮;在上弦或下弦(农历初七、初八或廿二、廿三)后的2~3天达到半个月中的潮差最小为小潮。

潮汐类型

潮汐的性质可以分为四种类型:

1、半日潮:在一个太阴日内(约24小时50分钟),发生两次高潮和低潮,且相邻的高潮(低潮)的潮高大致相等,涨落潮持续时间亦很接近。

2、全日潮:在半个月中,一天出现一次高潮和一次低潮的天数超过7天,而其余天数为混

合潮性质。

3、不正规半日混合潮:它基本具有半日潮的特征,在一个太阴日内,有两次高潮和低潮,但相邻的高潮(低潮)的潮高相差很大,涨潮和落潮持续时间也不相等。

4、不正规日潮混合潮:在半个月中,一天出现一次高潮和一次低潮的天数不超过7天,而多数天为一天两次高潮和两次低潮的不正规半日潮。

海图潮信表

海图上刊载的潮信表为航海人员提供了部分主、附港的潮汐情况,对半日潮港列出了平均潮汐间隙和平均大(小)潮升等数据;对混合潮港和日潮港分别列出了回归潮期间的平均潮汐间隙和潮高及分点潮期间的平均潮汐间隙和潮高等数据。

高潮间隙就是某地月上(下)中天时刻至发生高潮时的时间间隔;低潮间隙就是某地月上(下)中天时刻至发生低潮时的时间间隔。平均大潮升即自深度基准面至平均大潮高潮面的高度,是大潮期间高潮的平均潮高;平均小潮升即自深度基准面至平均小潮高潮面的高度,是小潮期间高潮的平均潮高。

日潮不等就是两相邻高潮的潮高或两相邻低潮的潮高常有不平等的现象;回归潮就是当月球赤纬位于最北或最南附近时(月赤纬最大时),所产生的日潮不等为最大时的潮汐;分点潮则为当月球位于赤道附近时(月赤纬最小时),日潮不等很小,两相邻高潮或低潮的潮高约相等时的潮汐。

潮信表使用

根据潮信表提供的数据可以粗略地推算出该海区的潮时和潮高,但有一定的误差,有时甚至与实测水位相差较大,使用时请注意。现把推算方法介绍如下:

1、半日潮型潮信表

(1)求潮时

高潮时 = 月上(下)中天时 + 平均高潮间隙

低潮时 = 月上(下)中天时 + 平均低潮间隙

(2)求潮高

高潮高 = 大潮升 - (大潮升 - 小潮升) / 7 × 日数 (日数指与大潮时相隔天数)

低潮高 = 2 × 平均海面 - 高潮高

例:求厦门港 2009 年 8 月 8 日的大概潮时和潮高。

解:根据海图查得厦门港潮信表为

地 点	位 置	平均高潮间隙	平均低潮间隙	大潮升	小潮升	平均海面
厦门港	24°27'N 118°04'E	00h00min	06h12min	5.69m	4.66m	3.28m

从潮汐表中查知 2009 年 8 月 8 日的月上中天时刻为 01 时 13 分,月下中天时刻为 13 时 34 分。则:

(1)求潮时

第一次高潮时 = 01 时 13 分 + 00 时 00 分 = 01 时 13 分

第一次低潮时 = 01 时 13 分 + 06 时 12 分 = 07 时 25 分

第二次高潮时 = 13 时 34 分 + 00 时 00 分 = 13 时 34 分

第二次低潮时 = 13 时 34 分 + 06 时 12 分 = 19 时 46 分

(2)求潮高

从潮汐表中查知,8 月 8 日在大潮后的天数大约为 1 天,则:

$$\text{高潮高} = 569 - (569 - 466) / 7 \times 1 = 554 \text{ 厘米}$$

$$\text{低潮高} = 2 \times 328 - 554 = 102 \text{ 厘米}$$

2、混合潮型和日潮型潮信表

(1)求潮时

①当所求日期在月赤纬 0°或接近 0°时

$$\text{高潮时} = \text{月上(下)中天时} + \text{平均高潮间隙}$$

$$\text{低潮时} = \text{月上(下)中天时} + \text{平均低潮间隙}$$

②当所求日期在月赤纬最大或接近最大时

$$\text{高(低)高潮潮时} = \text{月上(下)中天时} + \text{平均高(低)高潮间隙}$$

$$\text{高(低)低潮潮时} = \text{月上(下)中天时} + \text{平均高(低)低潮间隙}$$

(2)求潮高

①当所求日期在月赤纬最大或最小时,则推算潮高为潮信表所列潮高;

②当所求日期在月赤纬最小(最大)与最大(最小)之间时,则分别用下列各式计算:

A、若所求日期在月赤纬最小与最大之间

$$\text{高(低)高潮潮高} = \text{月赤纬 } 0^\circ \text{ 的平均高潮潮高} - T \cdot \Delta h$$

$$\text{高(低)低潮潮高} = \text{月赤纬 } 0^\circ \text{ 的平均低潮潮高} - T \cdot \Delta h$$

B、若所求日期在月赤纬最大与最小之间

$$\text{高(低)高潮潮高} = \text{月赤纬最大时的平均高(低)高潮潮高} + T \cdot \Delta h$$

$$\text{高(低)低潮潮高} = \text{月赤纬最大时的平均高(低)低潮潮高} + T \cdot \Delta h$$

其中: T 为月赤纬最小(或最大)至所求日期的时间间隔天数;

Δh = 潮位日差 = (月赤纬 0°的平均潮高 - 月赤纬最大时的平均潮高) / D , D 为月赤纬最小(最大)与最大(最小)的时间间隔天数。

例:求宁波港 2009 年 5 月 10 日的大概潮时和潮高。

解:根据海图查得宁波港潮信表为

地 点	位 置	潮面	月赤纬 0°时		潮面	月赤纬最大时(月上中天)			平均海面
			平均 潮汐间隙	平均 潮高		平均潮汐间隙		平均 潮高	
						北赤纬	南赤纬		
宁波港	29°53′ N 121°34′ E	高潮	00h29min	2.74m	高高潮	13h13min	00h48min	3.01m	2.00m
		低潮	06h52min	1.27m	低高潮	00h03min	12h29min	2.24m	
					低低潮	06h17min	18h42min	1.14m	
					高低潮	19h59min	07h34min	1.56m	

从潮汐表中查知 2009 年 5 月 10 日在月球赤纬最南时的前 2 天,月上中天时刻为 00 时 15 分。则:

(1)求潮时

$$\text{高高潮潮时} = 00 \text{ 时 } 15 \text{ 分} + 00 \text{ 时 } 48 \text{ 分} = 01 \text{ 时 } 03 \text{ 分}$$

低高潮潮时 = 00 时 15 分 + 12 时 29 分 = 12 时 44 分

低低潮潮时 = 00 时 15 分 + 18 时 42 分 = 18 时 57 分

高低潮潮时 = 00 时 15 分 + 07 时 34 分 = 07 时 49 分

(2) 求潮高

从潮汐表中查知, 5 月 10 日在月赤纬最小和最大之间, $T=6$; $D=8$, 按 A 式计算潮高。则:

高高潮潮高 = $274 - T \cdot \Delta h_1 = 274 - 6 \times [(274 - 301)/8] = 294$ 厘米

低高潮潮高 = $274 - T \cdot \Delta h_2 = 274 - 6 \times [(274 - 224)/8] = 237$ 厘米

低低潮潮高 = $127 - T \cdot \Delta h_3 = 127 - 6 \times [(127 - 114)/8] = 117$ 厘米

高低潮潮高 = $127 - T \cdot \Delta h_4 = 127 - 6 \times [(127 - 156)/8] = 149$ 厘米

Operation Manual

The Chinese Tide Tables are compiled by the Navigation Guarantee Department of the Chinese Navy Headquarters in four volumes including:

Bohai Sea and Yellow Sea: (Pub No. H101)

East China Sea: (Pub No. H102)

South China Sea: (Pub No. H103)

Northwest Pacific Ocean: (Pub No. H104)

Summarization

Ports published the time and the height of daily tide in Tide Tables are called Standard Ports, which usually to be important ports or represent some kinds of tidal characters. If the tidal characters between the two ports is similar or there exists almost the same ratio of tidal ranges and time difference of tide, moreover, according to daily high low water predictions of one of the standard ports and difference relation between the two ports, the tide of the other port can be calculated, so those ports are called Secondary Ports, tide of which can be calculated through the above connections.

The tidal height extrema and times of daily high low water of standard ports are listed in this table and the daily height of tide at the expected time is shown more particularly at some standard ports. The symbols ● ☾ ○ ☾ S N E below the dates in these tables indicate respectively New Moon, First Quarter, Full Moon, Last Quarter, Declination Maximum South, Declination Maximum North and Declination Minimum.

All predicted heights are given above Tide Height Datum and chart depths are given above Chart Depth Datum. Tide Height Datum is the same as Chart Depth Datum between Tide Tables published by our department and charts, so the actual depth is the sum of depth on large - scale chart and tidal height.

When Tidal Datum is not the same as Chart Depth Datum, the actual depth should be calculated as follows: the actual depth = depth on large - scale chart + predicted height + (Chart Depth Datum - Tidal Datum).

MSL (mean sea level) is the average level of the sea surface in a certain period of time. MSL is to be shown by the height from Tide Height Datum to MSL and generally calculated from tidal observations over a long period.

All times of predictions are given in the official standard time kept at the place. Those times of predictions of height of tide at ports and places of China coast, moon declination extremum, lunar phases and moon culmination are given in Beijing Standard Time, i. e. time zone: -0800.

Normally in Tide Tables, errors in predicted tidal times is within 20 ~ 30 minutes and errors in predicted heights is within 20 ~ 30 cm. The effects of meteorological conditions and other random factors on tidal heights are not included in all predicted heights. Errors might be large in special circumstances such as at predicted station of estuary or under the effects of typhoon, cold wave and floodwater and so on factors. Caution should be taken in use.

Tidal Factors

Tide is the regular and continuous fluctuating change in the level of the sea affected by gravitation of moon and sun. In the tidal cycle, the maximum height reached in a rising tide is to be called High Tide and the minimum height reached in a falling tide is to be called Low Tide. In the course of low tide to high tide, when the sea level is rising to a higher level, it is called Flood Tide. In the course of high tide to low tide, when the sea level is falling to a lower level, it is called Ebb Tide.

Tidal Range is the difference in height between a high tide and the succeeding or preceding low tide. The Duration of Flood is the length of time from low tide to high tide; the Duration of Ebb is the length of time from high tide to low tide.

Spring Tides: semi – diurnal tides of the largest range occurring 2 – 3 days after the moon is new or full; Neap Tides: tides of the smallest range occurring 2 – 3 days after the moon is at its first or last quarter.

Tidal Pattern

There are four tidal patterns as follows:

1. Semi – diurnal Tide: there are two high tides and two low tides in a lunar day (about 24hrs and 50mins). The height of tide between a high tide (low tide) and the succeeding or preceding high tide (low tide) is approximately the same; the duration of flood and ebb is also approximate.

2. Diurnal Tide: In half a month, the number of days is more than 7 days in which there appears one high tide and one low tide, other days are compound tide.

3. Irregular Semi – diurnal Compound Tide: Basically its characters is as much as semi – diurnal tide. There are two high tides and two low tides in a lunar day. The height of tide between a high tide (low tide) and the succeeding or preceding high tide (low tide) is different; the duration of flood and ebb is not equal, too.

4. Irregular Diurnal Tide: In half a month, the number of days is less than 7 days in which there appears one high tide and one low tide, other majority of days are irregular semi – diurnal tide in which there appear two high tides and two low tides.

Table of Tidal Signal on Chart

Table of tidal signal on chart provides many data for navigators: tide situations of parts of standard ports and secondary ports, mean – tidal intervals and mean tidal rise, etc for semi – diurnal tide ports, mean – tidal intervals and heights during tropical tide and equinoctial tide respectively for compound tide ports and diurnal tide ports, etc.

High Tide Interval is the time interval from lunar upper (lower) culmination to high tide; Low Tide Interval is the time interval from lunar upper (lower) culmination to low tide; Mean Spring Rise is the height between depth datum and mean high water springs level and the mean height of high tide during spring tide; Mean Neap Rise is the height between depth datum and mean high water neaps level and the mean height of high tide during neap tide.

Diurnal Inequality of Tide is the phenomenon that the height of tide between a high tide (low tide) and the succeeding or preceding high tide (low tide) is constant inequality. Tropical Tide is the tide when diurnal inequality of tide is maximal caused while the maximal moon declination coming. Equinoctial Tide is the tide when the moon declination is minimal, diurnal inequality of tide is much little, the height of tide between a high tide (low tide) and the succeeding or preceding high tide (low tide) is approximately the same.

Tide Tables

According to the data shown in tide tables, time of tide and height of tide for certain sea area can be approximately calculated, however there exists some errors and sometimes differs greatly from the actual surveyed water levels. Care should be taken when using it. Calculating methods are listed as follows:

1. Tabular statement of semidiurnal tide

(1) to find the time of tide

time of high water = upper (lower) culmination time + mean high water lunitidal interval

time of low water = upper (lower) culmination time + mean low water lunitidal interval

(2) to find the height of tide

height of high water = spring rise - (spring rise - neap rise)/7 × days (days refer to the interval days with the time of spring tide)

height of low water = 2 × MSL - height of high water

For example: to calculate the approximate time and height of tide of Xiamen Gang on August 8, 2009.

Analysis: The tide table of Xiamen Gang consulted from chart is listed as follows:

place	position	MHW lunitidal interval	MLW lunitidal interval	spring rise	neap rise	MSL
Xiamen Gang	24°27'N 118°04'E	00h00min	06h12min	5.69m	4.66m	3.28m

As shown in tide table, upper culmination time on August 8, 2009 is 01h13min, lower culmination time is 13h34min, thus:

(1) to find the time of tide

the first time of low water = 01h13min + 00h00min = 01h13min

the first time of high water = 01h13min + 06h12min = 07h25min

the second time of low water = 13h34min + 00h00min = 13h34min

the second time of high water = 13h34min + 06h12min = 19h46min

(2) to find the height of tide

As shown in tide table, approximate days after spring tide on August 8 is 1 day, thus:

height of high water = 569 - (569 - 466)/7 × 1 = 554cm

height of low water = 2 × 328 - 554 = 102cm

2. Tabular statement of mixed tide and diurnal tide

(1) to find the time of tide

① to find the date at 0° or approaching to 0° of the moon declination

time of high water = upper (lower) culmination time + MHW lunitidal interval

time of low water = upper (lower) culmination time + MLW lunitidal interval

② to find the date at the maximum or approaching to maximum of the moon declination

time of HHW (LHW) = upper (lower) culmination time + MHHW (MLHW) lunitidal interval

time of HLW (LLW) = upper (lower) culmination time + MHLW (MLLW) lunitidal interval

(2) to find the height of tide

① to find the date at the maximum or minimum of the moon declination, the calculating height of tide is listed in this table;

② to find the date between the minimum (maximum) and maximum (minimum) of the moon declination, the calculating methods are listed follows:

A. to find the date between the minimum and maximum of the moon declination

height of HHW (LHW) = mean height of high tide at 0° of moon declination - T · Δh

height of HLW (LLW) = mean height of low tide at 0° of moon declination - T · Δh

B. to find the date between the maximum and minimum of the moon declination

height of HHW (LHW) = mean height of HHW (LHW) of moon declination at maximum + T · Δh

height of HLW (LLW) = mean height of HLW (LLW) of moon declination at maximum + T · Δh

Thereinto: T represents the interval days from moon declination at minimum (or maximum) to the time as requested;

Δh = tidal level range per day = (mean height of the tide at 0° - mean height of the tide at

maximum of moon declination)/D, D represents the interval days from minimum (maximum) to maximum of moon declination.

For example: to calculate the approximate time and height of tide of Ningbo Gang on May 10, 2009.

Analysis: the tide table of Ningbo Gang consulted from charts is listed as follows:

place	position	tide level	moon declination at 0°		tide level	moon declination at maximum (upper culmination)			MSL
			mean tide interval	mean height tide		mean tide interval		mean height tide	
						N declination	S declination		
Ningbo Gang	29°53′ N 121°34′ E	HW LW	00h29min 06h52min	2.74m 1.27m	HHW	13h13min	00h48min	3.01m	2.00m
					LHW	00h03min	12h29min	2.24m	
					LLW	06h17min	18h42min	1.14m	
					HLW	19h59min	07h34min	1.56m	

As shown in tide table, May 10, 2009 is 2 days previous to the Moon Declination Maximum South, upper culmination time is 00h15min, thus:

(1) to find the time of tide

time of HHW = 00h15min + 00h48min = 01h03min

time of LHW = 00h15min + 12h29min = 12h44min

time of LLW = 00h15min + 18h42min = 18h57min

time of HLW = 00h15min + 07h34min = 07h49min

(2) to find the height of tide

As shown in tide table, May 10 is between the minimum and maximum of moon declination,

T = 6, D = 8, calculating the height of tide should follow the calculating way of A, thus:

height of HHW = $274 - T \cdot \Delta h_1 = 274 - 6 \times [(274 - 301)/8] = 294\text{cm}$

height of LHW = $274 - T \cdot \Delta h_2 = 274 - 6 \times [(274 - 224)/8] = 237\text{cm}$

height of LLW = $127 - T \cdot \Delta h_3 = 127 - 6 \times [(127 - 114)/8] = 117\text{cm}$

height of HLW = $127 - T \cdot \Delta h_4 = 127 - 6 \times [(127 - 156)/8] = 149\text{cm}$

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余 山 岛

SHESHAN DAO

2009 年

纬度:31°25'N

经度:122°14'E

潮汐表

1 月 Jan.				2 月 Feb.				3 月 Mar.				4 月 Apr.			
潮时 潮高		潮时 潮高		潮时 潮高		潮时 潮高		潮时 潮高		潮时 潮高		潮时 潮高		潮时 潮高	
Time	cm	Time	cm	Time	cm	Time	cm	Time	cm	Time	cm	Time	cm	Time	cm
1	01 10 311 07 31 93 13 27 357 20 12 84	17	02 38 323 08 58 106 14 43 320 21 20 91	1	01 58 349 08 20 76 14 08 339 20 45 60	17	03 10 312 09 52 171 15 09 254 21 39 163	1	01 04 383 07 28 49 13 15 361 19 45 36	17	01 52 354 08 26 130 13 57 294 20 24 134	1	02 00 380 08 39 99 14 15 286 20 44 113	17	02 37 306 10 15 163 15 13 224 20 00 182
2	01 45 305 08 02 104 13 59 339 20 44 92	18	03 17 307 09 37 140 15 16 285 21 47 122	2	02 38 337 09 01 101 14 45 305 21 26 82	18	04 01 288 11 41 200 16 09 222 22 55 193	2	01 38 379 08 01 74 13 45 336 20 19 60	18	02 20 327 09 06 165 14 27 262 20 47 168	2	02 48 349 09 52 132 15 19 248 21 41 151	18	03 32 278 12 01 165 17 55 213 23 00 195
3	02 24 300 08 40 122 14 35 321 21 23 105	19	04 03 294 10 30 173 16 02 255 22 30 153	3	03 28 321 09 59 130 15 34 266 22 17 109	19	06 51 275 14 41 181 20 53 226	3	02 15 362 08 43 104 14 20 299 21 00 91	19	02 56 297 10 34 194 15 18 228 21 04 197	3	04 00 318 11 44 148 17 19 228 23 16 176	19	06 00 266 13 33 149 19 45 238
4	03 10 299 09 32 148 15 19 303 22 15 124	20	05 10 284 12 30 192 17 20 231 23 59 175	4	04 36 304 11 41 150 16 57 230 23 36 132	20	01 39 196 08 36 296 15 30 148 21 19 246	4	03 00 333 09 42 136 15 06 255 21 51 126	20	04 12 268 13 44 187 20 46 221	4	05 54 306 13 45 130 19 31 250	20	01 11 189 07 30 283 14 22 129 20 18 272
5	04 08 303 10 49 174 16 18 287 23 19 142	21	07 24 287 14 45 174 20 03 232	5	06 14 298 13 41 141 19 21 223	21	02 56 169 09 15 317 16 00 115 21 42 265	5	04 06 301 11 35 159 16 38 216 23 18 156	21	00 04 210 07 55 274 14 52 154 20 56 244	5	01 30 167 07 37 328 14 45 101 20 24 287	21	02 30 162 08 15 309 14 58 109 20 46 311
6	05 30 314 12 26 185 17 55 276	22	01 55 171 08 33 306 15 39 142 21 03 246	6	01 20 135 08 04 318 15 19 105 20 49 249	22	03 40 134 09 45 336 16 30 83 22 06 285	6	06 04 287 14 07 146 19 51 228	22	02 33 186 08 39 299 15 25 123 21 12 270	6	02 46 133 08 33 357 15 28 74 21 06 325	22	03 12 131 08 54 334 15 30 88 21 17 349
7	00 32 153 07 01 337 14 00 173 19 31 282	23	03 02 147 09 17 322 16 15 107 21 43 258	7	02 59 112 09 09 352 16 13 66 21 43 284	23	04 17 98 10 16 352 16 57 54 22 33 307	7	01 30 159 08 07 317 15 15 112 20 50 271	23	03 18 150 09 10 324 15 54 92 21 34 298	7	03 34 99 09 19 381 16 06 54 21 45 361	23	03 50 99 09 31 354 16 05 66 21 53 382
8	01 52 149 08 15 366 15 17 143 20 40 297	24	03 49 116 09 54 337 16 46 76 22 15 272	8	04 04 76 10 00 386 16 57 31 22 27 319	24	04 52 63 10 48 365 17 25 30 23 02 328	8	03 06 129 09 03 359 15 59 81 21 31 316	24	03 54 112 09 42 348 16 23 64 22 00 328	8	04 16 72 10 00 397 16 41 41 22 21 391	24	04 28 70 10 09 365 16 41 45 22 30 406
9	03 06 129 09 12 393 16 16 105 21 37 314	25	04 30 86 10 30 352 17 17 52 22 47 289	9	04 55 41 10 45 414 17 37 6 23 08 349	25	05 26 36 11 20 374 17 54 14 23 32 348	9	03 59 94 09 47 396 16 38 52 22 09 356	25	04 28 76 10 15 368 16 53 40 22 30 356	9	04 55 55 10 39 401 17 14 37 22 59 411	25	05 06 48 10 47 366 17 16 31 23 08 421
10	04 08 99 10 03 414 17 06 70 22 29 331	26	05 05 62 11 03 368 17 47 38 23 19 310	10	05 38 16 11 28 430 18 14 -9 23 48 370	26	05 59 21 11 52 379 18 22 8	10	04 42 61 10 28 419 17 14 27 22 46 384	26	05 00 47 10 48 382 17 23 22 23 03 380	10	05 30 49 11 15 394 17 44 42 23 32 421	26	05 44 36 11 26 360 17 53 27 23 46 429
11	05 02 69 10 52 430 17 51 44 23 16 346	27	05 41 48 11 38 382 18 17 33 23 50 330	11	06 17 4 12 07 430 18 48 -12	27	00 02 364 06 29 20 12 21 380 18 48 10	11	05 21 35 11 05 425 17 46 10 23 23 399	27	05 34 29 11 22 388 17 53 14 23 36 398	11	06 03 54 11 48 379 18 12 54	27	06 22 36 12 04 350 18 30 38
12	05 50 46 11 38 439 18 32 29	28	06 15 42 12 10 391 18 46 34	12	00 25 380 06 54 8 12 43 414 19 20 -4	28	00 33 377 06 59 31 12 48 375 19 15 20	12	05 56 20 11 41 416 18 17 4 23 58 403	28	06 06 23 11 55 386 18 22 15	12	00 03 419 06 33 66 12 18 358 18 39 71	28	00 26 430 07 04 50 12 45 336 19 11 62
13	00 01 357 06 33 36 12 22 438 19 13 24	29	00 21 346 06 45 43 12 40 391 19 14 38	13	01 00 378 07 28 25 13 15 386 19 49 16			13	06 29 21 12 14 397 18 45 12	29	00 09 409 06 38 29 12 26 375 18 53 26	13	00 31 408 07 03 82 12 45 334 19 05 90	29	01 06 422 07 53 74 13 29 318 19 55 95
14	00 44 360 07 15 39 13 01 423 19 50 29	30	00 51 354 07 15 49 13 08 382 19 40 41	14	01 32 368 08 00 53 13 43 352 20 15 47			14	00 29 400 06 59 36 12 43 372 19 12 33	30	00 44 411 07 12 44 12 58 355 19 26 46	14	01 00 389 07 36 101 13 12 309 19 30 110	30	01 51 403 08 51 102 14 21 295 20 46 131
15	01 23 354 07 52 53 13 38 394 20 24 42	31	01 23 355 07 45 60 13 36 365 20 10 47	15	02 03 353 08 30 90 14 09 318 20 38 84			15	00 58 390 07 27 62 13 08 347 19 36 63	31	01 19 402 07 50 68 13 33 324 20 02 76	15	01 29 364 08 13 123 13 42 280 19 57 133		
16	02 00 340 08 26 76 14 12 358 20 54 63			16	02 34 334 09 02 131 14 36 286 21 03 124			16	01 25 375 07 55 95 13 31 322 20 00 98			16	02 00 336 09 01 145 14 19 251 20 22 157		

时 区:东 8 时区
Time Zone: -0800

潮高基准面:在平均海面下 229 厘米。
Tidal datum:229cm below mean sea level.

SHESHAN DAO

潮汐表

潮高基准面:在平均海面下 229 厘米。
Tidal datum: 229cm below mean sea level.

佘 山 岛
SHESHAN DAO

2009 年

纬度:31°25'N

经度:122°14'E

潮汐表

9 月		Sept.		10 月		Oct.		11 月		Nov.		12 月		Dec.	
潮时	潮高	潮时	潮高	潮时	潮高	潮时	潮高	潮时	潮高	潮时	潮高	潮时	潮高	潮时	潮高
Time	cm	Time	cm	Time	cm	Time	cm	Time	cm	Time	cm	Time	cm	Time	cm
1	03 42 154 09 27 322 15 19 202 21 16 400	17	04 07 81 09 41 384 16 07 108 21 54 462	1	03 36 122 09 19 335 15 36 151 21 20 376	17	04 11 71 09 53 424 16 31 80 22 08 416	1	03 49 96 09 32 396 16 14 98 21 48 373	17	04 57 67 10 47 410 17 31 62 23 06 330	1	03 50 74 09 46 397 16 31 72 22 03 324	17	05 17 98 11 15 399 18 02 89 23 34 321
2	04 11 136 09 46 353 15 56 179 21 46 428	18 _E	04 44 64 10 17 422 16 49 84 22 32 477	2	04 03 100 09 42 361 16 09 117 21 50 388	18 _•	04 48 59 10 30 439 17 11 65 22 46 406	2	04 22 86 10 08 426 16 48 83 22 26 380	18 _○	05 30 67 11 22 405 18 05 63 23 39 317	2	04 34 59 10 30 417 17 15 54 22 48 328	18	05 52 101 11 47 400 18 36 92
3	04 38 123 10 10 383 16 30 154 22 16 448	19 _•	05 20 51 10 55 446 17 30 68 23 10 471	3	04 32 79 10 09 383 16 42 86 22 23 394	19 _○	05 23 57 11 05 444 17 47 63 23 22 390	3 _○	04 58 79 10 45 446 17 26 75 23 03 378	19 _S	06 03 73 11 55 394 18 39 70	3 _N	05 18 49 11 13 427 18 00 45 23 35 329	19	00 07 324 06 25 107 12 18 397 19 10 98
4	05 06 108 10 35 407 17 03 127 22 48 455	20 _○	05 54 46 11 30 453 18 06 62 23 45 449	4	05 00 61 10 38 402 17 15 66 22 56 394	20	05 57 68 11 39 441 18 23 76 23 54 372	4	05 33 77 11 23 454 18 03 75 23 42 367	20	00 11 305 06 34 85 12 26 381 19 14 82	4	06 02 48 11 57 430 18 45 45	20	00 39 324 06 59 116 12 49 389 19 45 104
5 _{OE}	05 33 91 11 04 421 17 35 102 23 21 449	21	06 27 51 12 03 448 18 41 71	5	05 30 52 11 12 418 17 46 61 23 29 392	21	06 30 91 12 10 432 18 57 99	5 _N	06 10 81 12 02 451 18 44 82	21	00 43 294 07 04 103 12 58 369 19 51 100	5	00 21 328 06 48 58 12 41 426 19 35 55	21	01 10 318 07 30 127 13 20 373 20 20 111
6	06 01 78 11 35 426 18 06 86 23 53 435	22	00 17 416 06 58 70 12 35 434 19 15 92	6	06 00 56 11 45 431 18 18 72 23 59 386	22 _S	00 24 354 06 59 121 12 39 418 19 30 126	6	00 20 350 06 48 94 12 43 437 19 30 95	22	01 17 284 07 35 126 13 31 355 20 33 120	6	01 08 324 07 36 78 13 25 415 20 27 72	22	01 43 305 08 03 137 13 51 350 20 55 117
7	06 28 73 12 05 426 18 35 85	23	00 46 382 07 25 101 13 04 415 19 46 124	7	06 30 73 12 17 438 18 52 93	23	00 52 334 07 28 151 13 08 396 20 08 150	7	01 02 327 07 31 113 13 25 413 20 24 112	23	01 00 263 08 09 152 14 07 338 21 23 140	7	01 58 318 08 27 106 14 12 395 21 20 91	23 _E	02 18 289 08 36 147 14 23 320 21 30 122
8	00 20 418 06 53 80 12 36 427 19 04 99	24	01 14 348 07 51 137 13 33 391 20 22 158	8	00 28 376 07 03 96 12 51 435 19 30 117	24	01 25 310 07 58 176 13 41 367 20 56 169	8	01 52 300 08 21 137 14 15 381 21 30 128	24	02 50 264 08 50 176 14 51 316 22 27 152	8	02 51 308 09 21 135 15 02 367 22 19 109	24	03 00 273 09 19 157 15 02 290 22 15 127
9	00 46 401 07 19 98 13 07 426 19 35 123	25 _S	01 41 315 08 18 172 14 05 362 21 08 190	9 _N	01 00 356 07 41 123 13 29 418 20 16 142	25	02 05 279 08 30 196 14 17 332 22 02 180	9 _C	03 00 275 09 21 161 15 18 348 22 49 137	25 _☾	04 02 256 09 00 198 15 55 293 23 36 153	9 _{CE}	03 54 299 10 23 160 16 00 335 23 25 119	25 _☾	03 54 263 10 27 168 15 54 264 23 09 133
10	01 14 381 07 51 124 13 42 418 20 15 152	26 _☾	02 15 280 08 51 204 14 46 329 22 40 213	10	01 37 324 08 25 152 14 13 386 21 19 164	26 _☾	03 13 247 09 30 211 15 19 296 23 55 173	10	04 28 264 10 42 178 16 40 324	26 _E	05 30 258 11 34 197 17 30 277	10	05 04 294 11 44 171 17 07 304	26	05 15 267 11 50 174 17 30 250
11	01 45 350 08 28 153 14 23 395 21 09 181	27	03 30 246 06 18 236 09 52 230 16 36 301	11 _C	02 31 285 09 20 179 15 19 349 22 57 174	27	06 30 239 11 04 216 17 35 278	11	00 18 131 06 04 274 12 22 176 18 12 317	27	00 42 144 06 59 276 13 11 180 18 55 277	11	00 31 122 06 24 300 13 14 164 18 30 283	27	00 13 137 06 47 292 13 30 169 19 04 259
12 _{CE}	02 26 306 09 17 182 15 23 360 22 45 199	28	01 30 198 08 30 260 12 30 237 19 42 310	12	04 39 259 10 45 198 17 04 329	28	01 20 153 07 44 258 13 30 199 19 10 288	12 _E	01 27 116 07 15 300 13 47 154 19 24 324	28	01 36 128 07 49 304 14 19 152 19 50 288	12	01 34 118 07 35 317 14 25 144 19 45 279	28	01 24 138 07 52 330 14 45 152 20 06 279
13	03 55 258 10 30 203 17 11 334	29	02 31 168 08 47 284 14 15 213 20 23 335	13	00 51 158 06 57 276 12 46 193 18 56 342	29	02 10 133 08 10 286 14 27 170 20 00 310	13	02 18 101 08 06 333 14 46 126 20 17 334	29	02 24 110 08 27 337 15 08 122 20 36 302	13	02 28 112 08 31 340 15 19 122 20 45 286	29	02 30 132 08 43 368 15 38 131 21 00 302
14	01 21 179 07 30 255 12 40 201 19 19 347	30	03 07 143 09 00 309 15 01 183 20 52 358	14	02 00 132 07 56 316 14 08 165 20 01 372	30 _E	02 45 119 08 34 321 15 04 143 20 37 334	14	03 02 87 08 50 364 15 33 101 21 03 341	30	03 07 92 09 06 370 15 49 95 21 19 315	14	03 14 106 09 18 363 16 07 105 21 38 297	30 _N	03 30 119 09 31 401 16 27 107 21 51 322
15	02 40 138 08 27 292 14 24 171 20 27 386			15	02 49 109 08 37 359 15 03 134 20 47 399	31	03 17 108 09 01 360 15 39 119 21 13 356	15	03 42 77 09 31 390 16 15 82 21 47 344			15	03 58 101 10 01 382 16 51 95 22 21 308	31	04 22 100 10 18 424 17 14 84 22 41 338
16	03 27 105 09 04 337 15 21 137 21 13 428			16 _E	03 32 88 09 15 396 15 48 105 21 29 415			16	04 19 70 10 11 406 16 56 69 22 28 340			16 _{•s}	04 39 98 10 40 393 17 29 90 23 00 316		

时 区:东 8 时区
Time Zone: -0800

潮高基准面:在平均海面下 229 厘米。
Tidal datum:229cm below mean sea level.

佘 山 岛
SHESHAN DAO

2009 年

纬度:31°25'N

经度:122°14'E

潮汐表

一 月 Jan.

时间	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31					
	E				☾				N				O				E				☾				S				●				E			
0	285	253	217	182	156	147	156	178	207	241	286	333	357	345	307	260	214	181	166	167	175	186	196	208	229	263	301	330	343	336	311					
1	310	294	267	235	200	171	155	156	172	198	233	281	331	358	350	317	277	239	209	190	180	175	174	176	187	214	256	302	336	353	351					
2	298	303	297	277	247	210	174	149	143	155	181	218	266	315	344	340	315	283	251	220	193	171	156	147	148	164	196	241	288	324	346					
3	254	277	294	298	285	254	210	163	129	119	133	162	200	245	290	318	321	306	281	250	216	179	147	124	114	119	141	176	218	261	298					
4	201	229	260	289	302	292	256	200	140	99	90	109	145	182	222	261	289	299	294	273	240	200	156	116	90	82	94	119	153	191	231					
5	157	183	217	257	295	312	298	253	183	113	69	62	88	129	167	202	238	268	284	283	263	227	181	133	90	62	57	72	98	131	168					
6	121	147	181	223	271	312	327	305	247	166	90	47	44	72	115	155	192	228	260	279	280	259	221	172	121	78	50	43	56	80	113					
7	97	116	149	194	245	297	337	346	314	246	159	82	41	40	68	110	152	194	234	268	287	285	264	228	181	129	85	55	44	51	71					
8	96	104	127	167	219	275	329	365	366	327	255	167	92	53	53	80	119	163	209	252	285	303	300	281	249	207	157	112	78	61	61					
9	127	115	123	151	195	249	305	358	392	387	344	272	190	120	83	82	106	143	187	232	273	304	321	323	309	282	246	200	153	114	90					
10	187	155	141	150	179	222	274	328	381	414	409	365	297	222	158	124	122	142	175	214	254	288	316	337	347	342	321	289	247	199	155					
11	261	217	183	168	174	200	239	287	341	394	430	427	383	320	253	196	165	161	175	201	231	262	290	319	347	368	372	357	328	288	239					
12	320	280	239	205	185	187	207	242	288	344	399	436	434	392	333	274	225	196	187	193	209	229	252	279	313	350	379	390	379	353	312					
13	353	323	287	248	213	188	183	198	231	279	336	392	426	423	384	330	279	237	208	193	189	194	207	228	258	299	342	375	388	381	356					
14	351	339	316	283	244	204	173	162	175	211	262	318	368	396	391	357	312	269	231	199	177	163	161	172	196	233	277	320	351	365	361					
15	313	321	319	302	270	227	181	144	129	145	187	239	289	329	350	344	319	284	247	210	175	145	125	120	134	163	204	246	283	310	325					
16	257	276	292	298	286	253	203	148	107	93	113	160	212	253	280	295	294	279	255	222	183	143	108	85	81	98	131	172	209	239	262					
17	203	225	249	272	282	271	235	177	114	71	60	84	132	180	213	233	246	252	248	231	200	158	114	77	54	51	69	100	136	170	197					
18	151	179	206	236	264	276	262	221	157	89	44	37	61	104	146	176	196	215	228	230	216	187	145	101	62	39	35	48	71	101	135					
19	104	132	167	202	237	268	279	262	215	148	79	34	26	47	83	120	152	179	205	223	227	215	188	150	108	71	45	36	39	51	77					
20	85	99	128	168	208	247	280	291	270	222	154	87	42	30	46	78	113	148	183	213	232	236	226	205	174	137	100	70	51	43	48					
21	94	93	107	139	181	221	261	295	307	287	239	173	109	65	51	64	92	128	164	199	227	246	252	249	237	213	181	144	108	79	61					
22	133	113	109	124	157	197	235	275	311	326	308	263	202	141	100	86	97	123	155	187	215	238	257	271	279	277	260	230	192	150	112					
23	193	158	135	130	143	172	207	242	284	325	344	330	288	233	179	141	128	136	155	179	200	219	238	263	289	308	315	304	277	237	189					

二 月 Feb.

时间	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28				
	☾				N				○				E				☾				S				●				E			
0	270	219	172	141	133	148	176	215	268	328	369	373	347	308	270	237	214	202	199	203	210	220	237	268	308	343	364	368				
1	328	286	235	185	149	136	145	171	211	265	325	368	378	359	327	293	261	232	211	198	191	190	196	216	251	298	341	371				
2	349	329	287	233	179	139	121	129	155	196	249	306	347	362	353	328	295	261	226	197	175	162	157	165	188	226	275	322				
3	325	335	317	275	217	157	112	93	103	134	176	225	276	314	332	331	311	280	244	205	169	140	121	118	130	159	199	246				
4	270	303	316	299	255	191	125	76	58	73	110	155	201	245	281	301	303	288	258	220	178	135	99	78	77	97	131	174				
5	208	250	287	302	283	234	164	92	41	26	45	87	136	182	223	256	277	282	268	239	200	154	105	64	41	44	69	108				
6	154	199	244	283	297	277	222	146	69	19	7	28	72	123	172	214	246	268	273	260	233	193	141	87	43	21	26	52				
7	107	155	206	255	294	307	283	226	145	67	18	8	30	73	124	176	220	253	275	281	270	243	202	147	89	46	27	31				
8	78	117	170	225	278	318	330	304	244	164	88	40	32	53	94	144	195	239	272	294	301	292	267	226	173	117	75	55				
9	84	101	140	194	252	309	352	363	333	273	197	127	84	75	94	131	177	225	265	295	316	327	322	299	261	214	164	122				
10	124	114	130	168	221	280	340	386	397	365	305	236	175	137	128	142	171	211	251	285	312	335	351	351	332	300	261	217				
11	189	153	140	153	189	241	302	365	413	423	389	331	271	220	186	175	182	201	231	261	289	316	343	364	371	360	336	303				
12	261	209	168	151	163	197	248	312	376	421	429	397	345	293	249	218	202	200	210	229	251	274	303	336	364	379	376	359				
13	315	262	207	164	144	155	191	243	305	365	405	411	384	340	296	257	225	204	193	194	206	222	245	276	313	347	369	374				
14	338	296	241	186	141	121	133	172	225	281	331	363	369	350	318	281	244	210	183	166	160	167	182	207	241	278	314	339				
15	325	304	263	207	150	106	88	102	144	197	245	282	307	314	305	284	253	217	181	150	127	116	120	136	166	202	237	269				
16	279	282	264	224	169	110	66	50	66	108	160	201	231	251	262	261	248	222	188	150	115	87	71	72	91	124	163	197				
17	219	238	245	230	193	138	77	32	16	32	71	120	160	188	209	223	228	220	197	165	127	87	54	34	33	52	86	127				
18	164	189	212	223	212	177	121	58	10	-7	6	42	87	129	162	187	206	213	207	188	158	119	76	37	14	11	26	58				
19	113	148	179	206	222	215	182	125	60	9	-11	0	32	76	120	158	187	208	217	214	199	172	132	86	44	18	11	21				
20	71	111	150	187	221	242	238	205	148	82	31	9	17	48	90	134	173	203	224	235	237	227	203	165	119	75	45	33				
21	61	85	126	167	208	249	275	274	241	185	122	74	53	59	86	124	165	200	226	246	260	268	266	246	212	169	126	90				
22	89	87	110	149	190	235	283	314	314	282	230	174	131	112	115	134	164	196	223	243	264	285	301	306	293	265	228	184				
23	146	118	115	135	168	208	257	312	349	350	319	273	227	190	170	167	176	193	213	230	248	273	303	328	340	336	315	281				