1. Current, Sea Temperature and Salinity (Winter)
2. Current, Sea Temperature and Salinity (Summer)

The currents in the seas adjacent to Japan include the warm current which flows mainly in the northeast direction—Kurosio (Japan Current) and Tusima Current—and the cold current which flows mainly in the southwest direction —Oyasio (Kuril Current). They produce great influences on the climate of Japan.

Kurosio, one of the world's greatest sea currents, originates east of Taiwan, moves into the Eastern China Sea between Taiwan and Iriomote Zima (Island) and separates the Tusima Current as it comes north to Okinawa Zima (Island). Once again entering the Pacific Ocean near Tokara Rettō (Archipelago), Kurosio flows relatively close to the land in the seas south of Sikoku and Honsyū. But as a cold water mass often makes its appearance in the seas off the coast extending from Sizuoka Prefecture to Wakayama Prefecture, Kurosio takes a long way around the outside of this mass at times. Kurosio, producing branches or meandering off the coast of the Kantō Region, flows away to the east.

The Tusima Current, which branches out of Kurosio, moves into the Japan Sea through Tusima Kaikyō (Strait) and flows along the coast of Honsyū. Most of the Tusima Current flows off into the Pacific Ocean through Tugaru Kaikyō (Strait) or into the Sea of Okhotsk through Sōya Kaikyō (Strait), but some goes as far as the gulf off the west coast of Sakhalin. In the Japan Sea, the cold Liman Current flows along the coast of the Soviet Maritime Territory to reach the waters off the Korean Peninsula.

Oyasio, flowing in the waters east of Tisima Rettō (Archipelago), goes down to the waters southeast of Hokkaidō and then moves further south to meet Kurosio off the Sanriku coast. Oyasio is far smaller in force than Kurosio.

The temperature of Kurosio and the Tusima Current is high. They are also high in salinity and transparency. Kurosio's water is dark indigo in color. On the other hand, the temperature, salinity and transparency of Oyasio is low. The color of the water is blue-green, being rich in nourishment, Oyasio contains much plankton.

The water temperature of the Sea of Okhotsk goes below 0℃ in the wintertime, and the northeast coast of Hokkaidō is assaulted by drift ice.

Salient Points of the Legend and Map Compilation

Current : The mean speed on the surface and the mean direction both in winter (January through March) and summer (July through September) for the sections surrounded by longitude and latitude lines at intervals of 30′ were indicated in the maps with arrow symbols. The data cover the period from 1953 through 1970. No data were available for the sections not indicated with arrow symbols.

Sea temperature and salinity : The mean values of winter (February) and summer (August) in the sections surrounded by longitude and latitude lines drawn at intervals of 1° were used in drawing isolines. The data cover the period from 1925 through 1972.

Sources

1. Data from Japan Oceanographic Data Center, Hydrographic Department, Maritime Safety Agency.
2. Japan Oceanographic Data Center, Hydrographic Department, Maritime Safety Agency, Marine Environmental Atlas, Northwestern Pacific Ocean, 1975.

3. Tides

The tide represents the dilatory cyclic rising and falling of the sea level. In normal circumstances, the rising and falling of the sea level take place about two times a day. Depending on the place, they take place only once a day. The tide is generated by the gravitational force of the moon and the sun. As the moon gives force two times as big as the sun, the tide is controlled practically in every case by the revolution of the moon with the exception of some special places.

It is assumed that the earth is covered with seas the depth of which is uniform, the seawater has neither viscosity nor inertia, and there is no friction between the seabed and the seawater, it would follow that the greatest quantity of seawater concentrates directly under the celestial body and also on the opposite side, and the smallest quantity concentrates at the points perpendicular to these places. When only points along one and the same latitude are taken into consideration, it would follow that the sea depth is great and a state of high water is presented at the point where the celestial body is visible on the meridian line and also at the point with a difference of 180° in longitude and that the sea depth is small and a state of low water is presented at the points with a difference of 90°. In actuality, however, the earth is not placed in so ideal a situation, and the relative positions of the celestial bodies responsible for tides, that is, the moon and the sun change every moment, with the consequence that the tide also undergoes a complicated change.

A check of the spring rises along the coasts of Japan reveals that the rises are great in the Eastern China Sea and Seto Naikai reaching about 5 m in Ariake Kai (Bay). The rises are small in the Japan Sea and Sea of Okhotsk.

Salient Points of the Legend and Map Compilation

Spring rise : Represents the mean height of high water above the datum level at a spring tide.

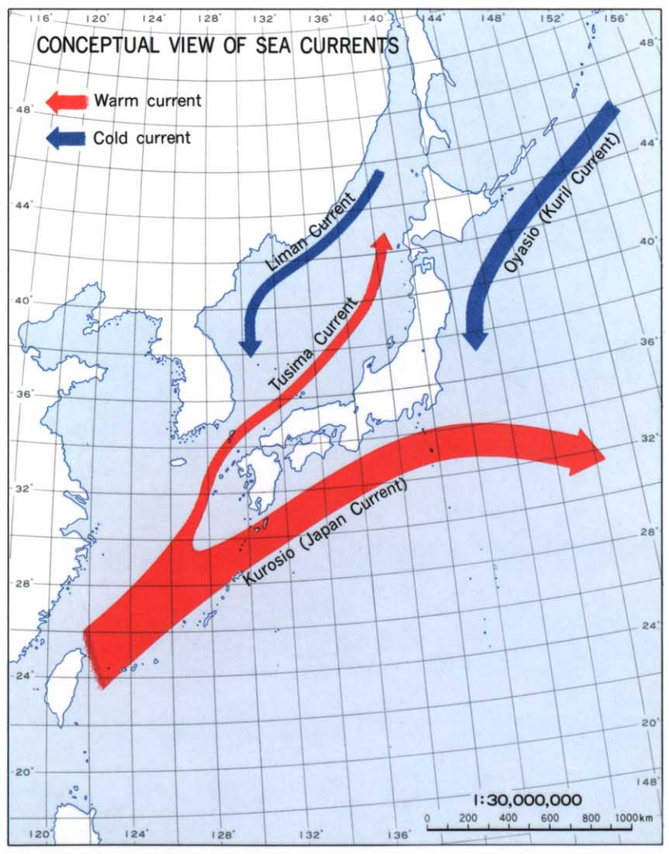
The difference in the height of sea level between successive high water and low water is known as the tidal range. The tidal range almost cyclically changes in conjunction with the age of the moon. In other words, the tidal range reaches the maximum in one or two days after the new or full moon, whereas it reaches the minimum in one or two days after the first or last quarter. The spring tide represents the situation where the tide range reaches the maximum. In Japan, the nearly lowest low water is used for the datum level for sounding.

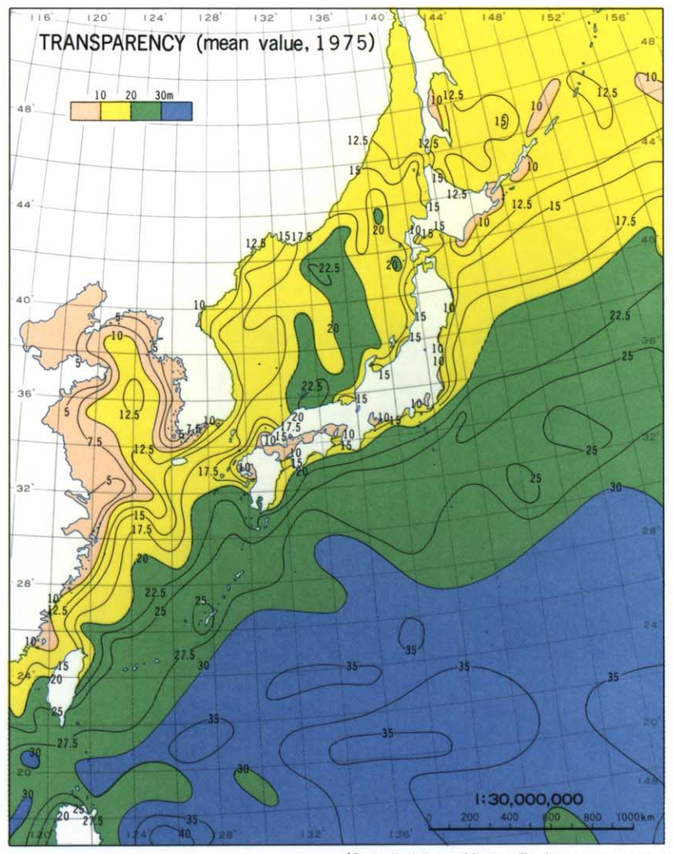
Co-tidal line : Represents the line which passes through all points where high water occurs at the same lunar time after the moon's transit at 135°E meridian. The hours are expressed in terms of lunar time. One hour in the lunar time corresponds to 1 hour 2 minutes 5 seconds in the solar time.

The tide is a wave movement. When this movement progresses and the tops of the waves reach a certain point, high water occurs, whereas low water takes place when the wave tops reach a trough. The waves of the tide are called tidal waves. The way the tidal waves progress is complex, as they are influenced by the distribution of seas and lands, depth and breadth of bays, etc. The co-tidal line represents the progress of the tidal waves.

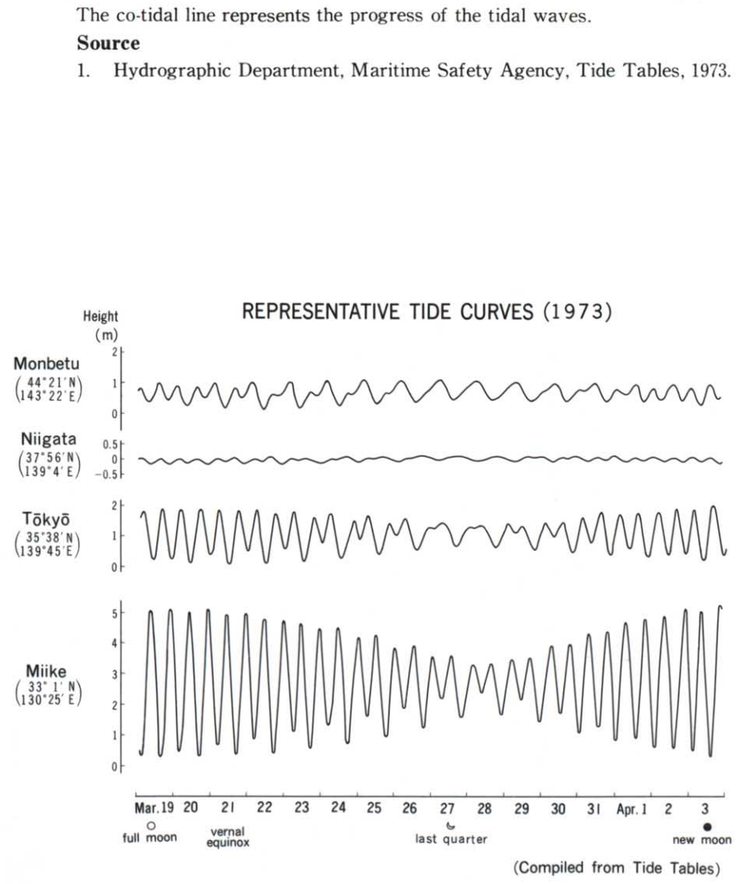
Source

1. Hydrographic Department, Maritime Safety Agency, Tide Tables, 1973.





(Compiled from Marine Environmental Atlas)



(Compiled from Tide Tables)

CURRENT, SEA TEMPERATURE AND SALINITY

(WINTER)

CURRENT (at the surface)

0 ~ 0.1 | 0.2 ~ 0.4 | 0.5 ~ 0.9 | 1.0 ~ 1.4 | 1.5 ~ 1.9 | 2.0 ~ 2.4 | 2.5kn and over

TEMPERATURE (at the surface)

0° 5° 10° 15° 20° 25°C

SALINITY (at the surface)
(In parts per thousand by weight)

33.0 33.5 33.75 34.0

Average of January, February and March from 1953 to 1970 was used for the current
Average of February from 1925 to 1972 was used for the temperature and salinity

1:8,000,000

100 0 100 200 300km

KAMCHATKA PENINSULA
SEA OF OKHOTSK
GULF OF TARTARY
SAKHALIN
SOYA KAIKYŌ
ETOROFU KAIKYŌ
Etorofu Tō
Kunasiri Tō
HABOMAI SYOTŌ
HOKKAIDŌ
TSUGARU KAIKYŌ
JAPAN SEA
SADO
Take Sima
OKI
HONSYU
TUSIMA KAIKYŌ
TUSIMA
IZU SYOTŌ
Hatizyō Zima
SIKOKU
KYUSYU
GOTŌ RETTŌ
DANZYŌ GUNTŌ
KOSIKIZIMA RETTŌ
ŌSUMI SYOTŌ
TOKARA RETTŌ
YELLOW SEA
EASTERN CHINA SEA
TAIWAN STRAIT
TAIWAN
NANSEI SYOTŌ
AMAMI SYOTŌ
SATUNAN SYOTŌ
Ō Sima
Nisino Sima
OGASAWARA GUNTŌ
OGASAWARA SYOTŌ
KAZAN RETTŌ
Okinawa Zima
SENKAKU SYOTŌ
OKINAWA SYOTŌ
Minami-Daitō Zima
DAITŌ SYOTŌ
RYUKYU SYOTŌ
SAKISIMA SYOTŌ
Oki-Daitō Zima
NORTH PACIFIC OCEAN
BASHI CHANNEL
BATAN ISLANDS
Batan Island
BALINTANG CHANNEL
BABUYAN ISLANDS
LUZON
Okino-Tori Sima
Urracas Island
Maug Island
MARIANA ISLANDS
Agrihan Island
Pagan Island
Asanatahan Island
Saipan Island
Tenian Island

CURRENT, SEA TEMPERATURE AND SALINITY

(SUMMER)

CURRENT (at the surface)

0～0.1　0.2～0.4　0.5～0.9　1.0～1.4　1.5～1.9　2.0～2.4　2.5Kn and over

TEMPERATURE (at the surface)

0°　5°　10°　15°　20°　25°C

SALINITY (at the surface)
(In parts per thousand by weight)

33.0　33.5　33.75　34.0

Average of July, August and September from 1953 to 1970 was used for the current
Average of August from 1925 to 1972 was used for the temperature and salinity

1:8,000,000

100　0　100　200　300km

9.3

TIDES

SPRING RISE

(Mean height of high water above datum level at spring tide)

- lower than 0.5 meters
- 0.5 meters and above but lower than 1.0 meters
- 1.0 meters and above but lower than 1.5 meters
- 1.5 meters and above but lower than 2.0 meters
- 2.0 meters and above but lower than 3.0 meters
- 3.0 meters and above but lower than 4.0 meters
- 4.0 meters and above but lower than 6.0 meters
- 6.0 meters and above but lower than 8.0 meters
- 8.0 meters and above

CO-TIDAL LINE

III II I

The line passing through all points where high water occurs at the same lunar time after the moon's transit at 135°E meridian

1:8,000,000

100 0 100 200 300 400km

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SEA OF OKHOTSK
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