

The wide range of temperature fluctuations (between summer highs and winter lows) and concentrated summer rains induce intense weathering and erosion of surface material. Gentle slopes at the foot of mountains/hills, and near basins, are covered with thick deposits of weathered materials formed from the erosion of upland material. Alluvial fans are rarely developed.

The largest lowlands are river deltas found along the coast of the Yellow Sea. The lowlands of the eastern and southern coastline are usually river deltas and as a rule are small, due to the mountains in the east abruptly dropping into the sea. Large tidal ranges (west coast) and funnel shaped river mouths prevent the formation of large active (growing) deltas, although rivers transport large amounts of deposited material during the wet season (summer). The wide coastal plains near the river mouths change abruptly into narrow flood plains a short distance upriver. Most river delta lowlands, especially those on the Yellow Sea, are subject to inundations by seasonal river flooding (summer) and high tides. During the flood season (summer), small dikes (2-3 m /6.5-9.8 ft) are built to protect the fields/homes. While mountains are the dominant

geological feature, lowlands have played a key role in Korea's culture/history.

Major Rivers

Name	Length km (mi)	Navigable Length km (mi)
Ch'ongch'on	198 (123)	152 (94)
Han	514 (319)	330 (205)
Imjin	254 (158)	124 (77)
Kum	401 (249)	130 (81)
Naktong	525 (326)	334 (208)
Somjin	212 (132)	39 (24)
Taebong	438 (272)	260 (161)
Tumen	520 (323)	85 (53)
Yalu (Amnok)	790 (491)	698 (434)
Yesongl	74 (108)	65 (40)

The Yalu (Amnok) and Tumen Rivers form the border between the DPRK and the PRC; the Tumen River forms the border between the DPRK and Russia. All river flows fluctuate widely, with the river discharges swelling during the summer wet season, often flooding valley floors. In the other seasons, which are relatively dry, water levels become very low, often exposing the river beds. River gradients are mostly very flat in their lower reaches, permitting navigation for long stretches above the river mouths.

All of Korea's principal rivers (with the exception of the Tumen) empty into the Yellow Sea or the Korean Strait (Straights of Tsushima). The Tumen is the only river of consequence that flows into the Sea of Japan (East Sea). With the introduction of motor transportation, primarily impacting South Korea, rivers have become secondary means of transportation. However, farmers depend on the rivers for over 70% of the water required to irrigate their crops, and they are a major source of power (hydroelectric), surpassing coal. Many of the rivers/streams are dammed for either hydroelectric or irrigation use. The majority of the rivers in Korea are less than 100 km (62 mi) long and generally 20 to 30 m (66-98 ft) wide. During the dry season (winter), rivers are fordable (via

foot) for nearly their entire course, especially rivers in the eastern portion of the peninsula where the watershed divide is closest to the shoreline. During the rainy season (summer), rivers, streamlets, and intermittent streams, quickly fill. Mountain streams are steep-sloping, strewn with boulders, have numerous rapids, and may contain many waterfalls (especially during the rainy season).

Yellow Sea

The Yellow Sea forms the western coastline. With an average depth of only 45 m (150 ft), and with the large quantity of water the Pacific Ocean pumps into the shallow basin, the tides along the coastline of the Yellow Sea are tremendous. At Inchon, the tides may reach 9.7 m (32 ft), and average 5.8 m (19 ft).

Mean Neap Tide Range	3.47 m (11.4 ft)
Mean Tidal Range	5.72 m (18.8 ft)
Mean Spring Tidal Range	7.98 m (26.2 ft)
Maximum Tidal Range	9.84 m (32.3 ft)

The rapid ebb and flow of the tides create strong currents, exceeding 7 knots, in the channels between islands. At low tide approximately 1,000 sq mi of mudflats are exposed and may extend for miles away from the coastline. When the tides flow back, the speed of their advance may outpace that of a running man.

EFFECTS OF RELIEF ON MILITARY OPERATIONS

The Korean Peninsula is extremely mountainous, offering excellent observation along avenues of approach and lines of communications (LOCs) in the northern and central mountain areas. Observation in the eastern coastal lowland area is limited, but improves the further west one travels. Observation in the northwest, southwest, and southern plains areas is fair to limited. Fields of fire are poorest in extremely rugged regions of the northern and central mountain areas, due to numerous spurs and areas offering cover from direct fire weapons. The regions offering the best fields of fire would be the northwest, southwest, and southern plains, where the terrain is relatively flat and open, except in built-up areas.

The Korean Peninsula comprises numerous ridge lines and hills. Only 20% of the total land area consists of plains and lowlands. The folds in these ridgelines and hills afford excellent cover and some degree of concealment from direct fire and ground observation.

The majority of ridge lines run in a north-south direction, severely restricting east-west movement. This restriction of lateral movement becomes more prevalent the further north operations move. The major water obstacles on the peninsula are its rivers. During most of the year, the rivers are shallow, exposing very wide, gravel river beds; however, these rivers can become formidable obstacles as a result of the increased precipitation during the rainy season.

CLIMATE

Korea's climate is defined by its latitude, its peninsular shape, terrain, currents, and close proximity to the Asian continent. It is characterized by continental winters and monsoonal summers. Though Korea juts far out into the sea, the west coast climate is less maritime due to the shallowness of the Yellow Sea; its shallow (depths average 45 m/150 ft)

water basin heats and cools rapidly, contributing little to moderating the climate, whereas the Sea of Japan moderates the east coast's climate due to its deeper waters (1,500 m/ 5,000 ft).

The southern climate is less continental and more subtropical with a significant warm period lasting approximately 6 to 7 months. In the north, winter conditions may last for 6 months, while in the south it may only last for 3 months. However, 3 successive cold days are invariably followed by 4 successive days of warm weather. The peninsula's west coast is generally open to the influence of the cool air masses that soar out of the Asian mainland, while the east coast is protected by the chain of mountains that parallel the coast (Chungnyong Mountains) and is warmed by the Sea of Japan.

In the northernmost regions, the winter lasts a full 6 months and in January the average temperatures may fall below -18°C (0°F). The hottest time of the year is the summer, with average temperature ranges between 25° - 27°C (77° - 80°F) in most of the southern regions and milder temperatures of 22°C (72°F) along the northeast coast. The range of temperatures is much greater in the north and in the interior than along the coasts.

The annual average difference in temperature between the coldest and hottest months for Seoul is approximately 28.3°C (83°F).

Korea is located in the East Asian Monsoon belt. Seasonal monsoon winds affect Korea's weather throughout the year. The Southwest Monsoon blows in from the south and southeast during the summer, bringing hot, humid weather. The cold, dry, Northwest Monsoon blows in from the north and northwest during the winter, bringing cold weather. Korea's massive mountains protect the peninsula's east coast from the winter monsoon, though occasional heavy snows can fall along the eastern mountain ranges. As a result, the east coast generally has warmer winters than the rest of Korea.

Heavy rainfall from June through September accounts for about 70% of Korea's yearly precipitation, with annual precipitation averages between less than 500 mm (20 in) in the northeastern inland areas and 1,500 mm (59 in) along the southern coast. Mean precipitation decreases from south to north. Some regions will have particularly heavy rains due to orographic effects (air uplifted by mountains), and the

convergence of moist air masses. In most years, one or two typhoons hit the peninsula during July and August.

Spring Pattern (April-May)

April marks the start of the transition from the cold, dry winter to the summer rainy season. This transition lasts nearly 2 months. Low pressure systems start forming near the Gulf of Bo Hai and the Shantung Peninsula. These lows significantly erode the dominance of the Siberian High ("Asiatic High") pressure system. As a result, cloudiness and precipitation increase during the spring months. Korea is occasionally influenced by the "Yellow Wind" during the spring months. The Yellow Wind occurs when storm winds behind a trough cause dust from the Gobi desert to become suspended in the air. The dust-laden air is subsequently transported over Korea. During a strong Yellow Wind, visibility can be reduced to less than 1 mile. Spring is also the time for heavy sea fog to form over the coastal areas. The fog forms as the warmer air passes over the cooler Yellow Sea and the Sea of Japan. Wind gusts of up to 59 knots have been recorded as well as tornados. The average April temperature

in the north is approximately 10°C (50°F) and in the south 12°C (54°F); spring is generally cooler than fall.

Summer Pattern (June-September)

Summer is the rainy season in Korea. During the summer, southern monsoon winds engulf the country, the winds shift to the southwest, and the warm, moisture-laden air moving off the oceans clashes with the drier air to the north. These fronts oscillate back and forth across Korea during the summer months. The interior highlands disturb the winds, forcing them into a westerly/southwesterly direction. The majority of the annual precipitation falls between late June and the middle of September, with rains fully developing along the entire peninsula by mid-June. Seoul receives approximately 126 mm (5 in) of precipitation during the winter (December-March), but in July alone receives approximately 383 mm (14.3 in).

Thunderstorms usually occur about 2 to 5 days per month during this period. Summer precipitation in Korea is as likely to occur at 0200 as at 1400. Humidity is very high and fog will develop whenever a cold air mass confronts this moisture-laden air, often forming on cloudless days. The typhoon

season occurs from July through September. About once each year, a typhoon will pass very close to or move over Korea, causing heavy showers. Strong winds are usually confined to islands and exposed coastal areas. Although winds might not pose a problem, the associated rainfall can cause significant flash flooding, a very real threat during the rainy season, especially in rough terrain. The mean temperature for Seoul in August is 25.3°C (78°C).

Fall Pattern (October-November)

October is the transition month between the summer rainy season and the cold, dry winter. The predominantly tropical cloudy weather of the summer is replaced by cooler, drier, and less cloudy conditions. The primary weather producers during October are cold frontal systems from the Asian mainland. On the average, one frontal passage per week can be expected during the month. A typical frontal passage is preceded by increasing middle and high cloudiness with light rain. Following the frontal passage, mostly clear skies can be expected for 3 or 4 days. During this clear period, it is very likely for fog to form. Fog is especially prevalent in river valleys and in low-lying areas.

Winter Pattern (December-March)

The winter in Korea is controlled by the large Siberian High (Asiatic High) pressure system that results in predominantly cold, dry northwesterly winds. About every 4 to 5 days a low-pressure trough will move through Korea, bringing with it cloudiness and light precipitation. The amount of precipitation locally depends mostly on the elevation of the station and the length of time that the air has been over the Yellow Sea. Maximum snowfall occurs over the northwest coast, which is the most exposed to the northwesterly flow, and in the mountain areas. Normally less than 10% of the annual precipitation falls during the winter. Frequently, the weather is cloudless, clear, and dry, except for the southwestern region of the peninsula. The mean January temperature in Seoul is -4.4°C (24°F).