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29

Military Geography

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South Korea

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This chapter supersedes the military geographic coverage in the General Survey dated February 1970.

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FIGURES

Military Geography

A. Location and description (U/OU)

South Korea is a small, hilly and mountainous country at the southern end of the peninsula that extends south from China toward the East China Sea. Seoul, the capital, is within 300 nautical miles of Dairen and Mukden and within 500 nautical miles of Peking, Shanghai, Tsingtao, Tientsin, Harbin, and Vladivostok. Most of eastern Asia is within 2,000 nautical miles. The country has an area of about 38,000 square miles, slightly smaller than that of Virginia, and a population of almost 33 million. The mainland extends north-south for about 300 miles[1] and east-west for about 185 miles.

1. Topography

Rolling to steep-sided hills and sharp-crested mountains occupy most of South Korea; flat to rolling plains occur along the coasts and are most extensive on the western side of the peninsula (see Figure 18, the Military Geographic Factors Map at the end of the chapter). The numerous offshore islands consist of hills and rolling plains. The most rugged terrain is in the mountains (Figure 1) in the northeast and the south-central part of the country. Elevations in the hills and mountains range from 2,000 to 5,000 feet; the highest peak on the mainland is 6,283 feet. Local relief (difference in elevation between tops and bottoms of adjacent topographic features) ranges from 500 to 2,000 feet in the hills (Figure 2) and is more than 2,000 feet in the mountains. Slopes in the hills range from 10% near valley bottoms to 30% near summits. In the mountains, slopes are very steep, commonly between 30% and 70%. Scrub, consisting mainly of shrubs, stunted trees, and scattered grassy areas, is the main vegetation on the hills and mountains (Figure 1); extensive moderately dense broadleaf and needleleaf evergreen forests (Figure 3) are on the highest slopes of the hills and mountains in the northeast and south. Most valley bottoms are cultivated in wetland rice (Figure 4). Streams generally are narrow, less than 3.5 feet deep, and have a moderate rate of flow; however, after heavy rains, mainly between mid-March and late September, depths and velocities increase considerably and flash floods are common. High, steep banks and rocky, gravelly, or sandy bottoms characterize most streams. Ice ranging from a thin layer in the southwest up to 17 inches thick elsewhere covers most streams from early December to mid-March. Culture features are sparse in the highlands and consist of a few small towns and numerous mines in the central and east-central highlands. The mining areas and towns are usually connected by gravel-surfaced, one-lane roads.

The most extensive lowlands are in the west and south and consist of numerous discontinuous coastal plains and river valleys. Similar but smaller lowlands are scattered along the east coast. Local relief is up to 500 feet. Slopes are commonly less than 2% near river mouths and deltas, but are up to 10% adjoining hill areas. The lowlands along the west and south coasts are intensively cultivated, primarily in wetland rice (Figure 5); there are scattered areas of dry crops, small grains, soybeans, and cotton. The principal streams are more than 3.5 feet deep and more than 500 feet wide. Some streams, for a few miles near the mouths, are more than 1,200 feet wide (Figure 6). Bottoms consist predominantly of sand and gravel and some silt; banks are generally up to 15 feet high. Streams are subject to flooding during the high-water period (mid-March to late September). Culture features of significance on the lowland plains are towns and numerous villages. The towns are compact and are characterized by narrow, congested streets lined by concrete or masonry Western-style buildings up to six stories high or rows of shophouses one or two stories high constructed of wood or masonry and having tile roofs. The villages consist mostly of one-story houses with thatch roofs and mud-plastered exterior walls and are located on ground above normal flood levels or at

[1] Distances are in statute miles unless nautical miles are specifically indicated.

FIGURE 1. Rugged, scrub-covered mountains, mainly in northeastern part of country, have sharp, jagged crests, and steep slopes (U/OU)

the bases of hills. Near the villages are cultivated fields as well as grave mounds, canals, irrigation ditches, artificial levees, and embankments. The lowland settlements are connected by a moderately dense transportation network of single- and double-track 4'8½"-gage railroads and mostly one-lane gravel-surfaced roads.

Cheju-do, about 50 miles south of the mainland, consists of a high (6,398 feet) dormant volcano, Hallasan (Figure 7), in the center surrounded by hills and dissected, gently sloping coastal plains. Local relief in the hills is between 500 and 2,000 feet and in the plains is up to 500 feet. Precipitous slopes up to 10% occur on the plains. Vegetation is chiefly scrub and some forests in the highlands and dry crops and some wetland rice on the plains. Most streams are short and intermittent. Streambanks are 10 to 50 feet high, and bottoms mostly are rocky. The population of the island is concentrated along the coast in small agricultural and fishing villages. The villages, numerous stone fences, and old masonry defense walls are distinctive features of the landscape. The main road around the periphery of the island is mostly two lanes wide and gravel surfaced.

2. Climate

South Korea lies within the Asiatic monsoon circulation, which produces a climate alternating

FIGURE 2. Rolling to steep-sided hills. Covered by shrubs, stunted trees, and scattered grasslands, these hills occupy most of South Korea. (U/OU)

FIGURE 3. Evergreen forest in highlands. These forests along the upper slopes of hills and mountains provide good concealment. (U/OU)

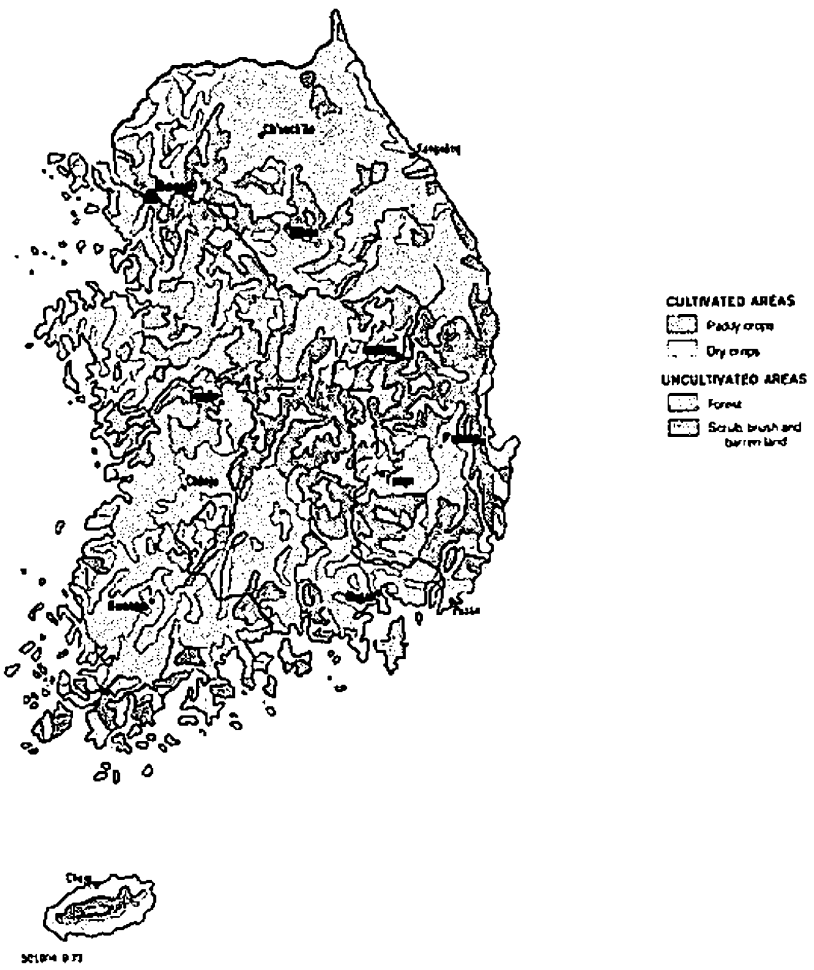


FIGURE 4. Vegetation and land utilization (U/OU)

between continental in winter and maritime in summer. During the winter monsoon, November through March, invasions of polar continental air from the Asian continent bring low temperatures and clear or partly cloudy skies (Figure 8). During the summer monsoon, June through August, the reverse is experienced: tropical maritime air from the Pacific Ocean creates warm, humid, cloudy, and rainy conditions. The remaining months are transitional periods between the monsoons. Other important climatic controls, in addition to the monsoons, are the varied terrain, the migratory pressure systems that pass over or near the country, and the adjacent seas and nearshore currents.

The cold winter monsoon air from interior Asia is rapidly warmed in the lower layers during its passage over the Yellow Sea and the Sea of Japan before arriving in South Korea. As a result, mean daily maximum temperatures are only moderately cold, in the 30°F. to 45°F. range. Mean daily minimums, on the other hand, are considerably colder, especially in December through February when early morning readings fall to the teens and 20's (°F.) at most places. Extremely cold temperatures, some approaching −20°F., have been recorded at low elevations during invasions of polar air, and both mean temperatures and extremes are appreciably colder in the mountains. There are occasional breaks in the winter monsoon

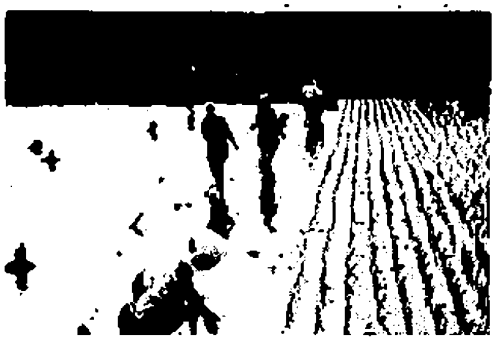


FIGURE 5. Flooded ricefields on the lowland plains. Wetland rice is intensively cultivated throughout the plains. (U/OU)

that interrupt the cold regime and bring brief spells of somewhat milder temperatures. Mean relative humidities in winter are moderately high, varying mostly between 50% and 80%; the higher values usually occur in the morning. Precipitation, usually light snow, falls on 5 to 10 days during most months of the winter monsoon. The light nature of the precipitation results in relatively small mean monthly amounts, generally less than 3 inches. Snow cover is not frequent and snow depths normally do not exceed 1 foot except on the higher mountains, where snow melt is minimal. Skies are frequently clear or partly cloudy, since the country experiences minimum cloudiness throughout this season; monthly averages range mostly from 30% to 60%. Visibility conditions are generally best at this time of year. Morning fogs and light snow are the chief restrictions, but only for brief periods. The winter monsoonal winds, blowing mainly from between west and north, are moderate in strength and occasionally become strong during the onset of polar outbreaks. However, in the rugged mountains the monsoonal flow is noticeably diverted and broken up and winds are light and extremely variable.

The summer monsoon circulation has a long trajectory over tropical oceans before arriving in South Korea. The warmth that is added to the air is reflected in the high temperatures during this season. This increase is especially evident in July and August, when mean daily maximums are in the middle or upper 80's (°F.) with mean daily minimums in the low 70's at most places. During these same months, afternoon relative humidity increases to mean values ranging from 54% to 80%. The combination of high temperature and high relative humidity creates a sultry condition that is enervating. The summer monsoon is also the wet season, which extends into September. Monthly rainfall amounts ranging from 5 to 15 inches are normal during the wet season. The greatest amounts occur over the windward sections and the smallest at sheltered locations. Precipitation falls mostly as rain showers, usually on 10 to 20 days per month. Heavy showers usually occur during thunderstorms, which average less than five per month during this season. The most intense rainfalls are generally associated with tropical cyclones. Concurrently, large increases in cloud amounts occur everywhere as the country experiences maximum

FIGURE 6. Naktong-gang northwest of Pusan. Here the river is approximately 1,500 feet wide and between 6 and 13 feet deep. (U/OU)

FIGURE 7. Halla-san on the volcanic island Cheju-do. This dormant volcano towers 6,328 feet above the surrounding hills and plains. (U/OU)

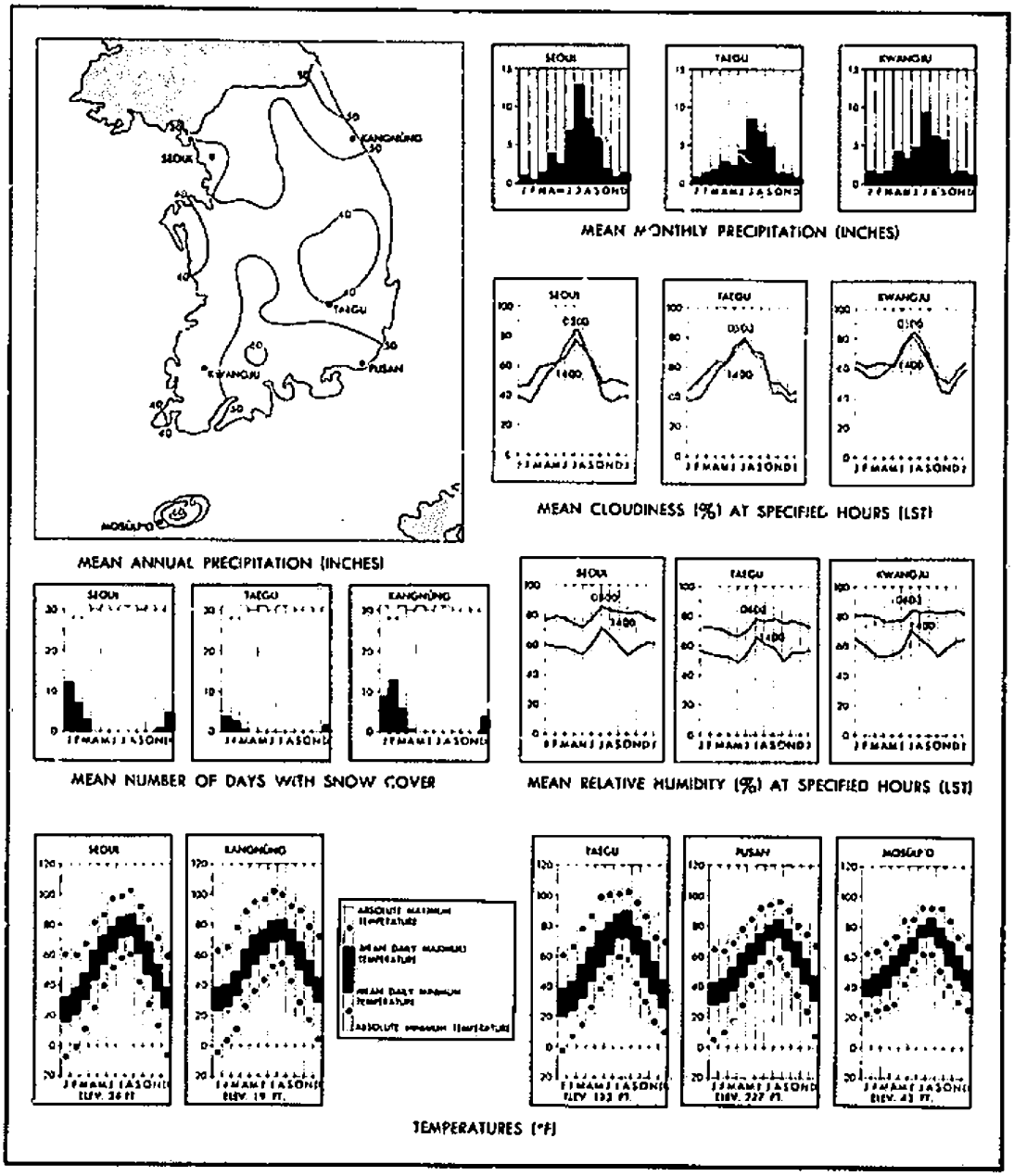


FIGURE 8. Precipitation, cloudiness, humidity, snow cover, and temperature (U/OU)

cloudiness throughout the summer monsoon. Mean monthly cloud cover primarily cumulus and cumulonimbus, varies between 60% and 85%. Restricted visibilities from low-hanging clouds occur often in the mountains and, at times, the clouds may completely obscure peaks and upper slopes. Elsewhere, restrictions to visibility are chiefly due to morning fogs and rain showers. Sea fogs are prominent along the coast and may move inland for a considerable distance, especially on the western and southern sides of the peninsula where the monsoonal flow is onshore. The summer monsoon is a relatively weak wind system and is mainly from a southerly component. Afternoon sea breezes are the most prominent winds on the coasts; some sea breezes become well developed and attain moderate speeds. Light to moderate mountain and valley breezes dominate the rugged interior highlands. Occasionally, strong winds accompany the infrequent thunderstorms but the strongest winds are associated with the several tropical cyclones that affect the country each year, mainly in June through October. The most severe are the typhoons, with winds of 65 knots or greater. The southern part of the peninsula is most exposed to the destructive winds of these storms, but the whole country may be affected by torrential rains from the thick, low-hanging clouds; severe flooding and landslides are likely.

B. Military geographic regions (C)

There are two military geographic regions (Figure 18). Peninsular South Korea and nearby islands constitute a single military geographic region, the South Korean Highlands and Lowlands. Cheju-do, south of the mainland, has physical and cultural differences from the rest of South Korea, and is the other military geographic region.

1. South Korean Highlands and Lowlands

This region is poorly suited for ground operations. Onroad movement would be restricted by sharp curves and steep grades in the highlands and by numerous fords and, at times, flooding in the lowlands and river valleys. Cross-country movement and offroad dispersal would be precluded by steep slopes, dense scrub, and forests in the hills and mountains (Figure 9) and by wet ricefields (flooded mid-June through mid-October) in the plains. Vehicular cross-country movement would be best on valley floors and plains between mid-October and mid-June when ricefields are drained, and especially from early December through March, when the ground is likely to be frozen. Road construction would be difficult because of steep slopes and narrow winding valleys and would require much cutting, filling, drilling, and blasting; extensive bridging would be needed throughout the region. Forests in the mountains and hills afford good concealment from air and ground observation (Figure 31). Additional concealment from ground observation and cover from flat-trajectory fire are provided by many surface irregularities in the highlands and to a limited extent by artificial levees and closely spaced buildings in the plains. Numerous sites favorable for tunnel-type underground installations (Figure 10) are available in the mountains and hills; sites for bunker-type installations are scarce because of unstable soils and poor drainage in the plains.

Airborne and airmobile operations would be restricted in the hills and mountains. There are 15 airfields in the region suitable for landing of assault-type aircraft. Sites suitable for parachute and helicopter operations and for the construction of airfields are limited to scattered coastal plains and a few valley bottoms in the highlands. During the Korean war, however, helicopters were used extensively, particularly in the mountains and hills.

The region is suited for large-scale amphibious operations in several areas along the east coast, but is poorly suited along the south and west coasts. Offshore approaches to the east coast are generally deep and clear, but the nearshore approaches are partly obstructed by scattered rocks, reefs, shoals, port facilities, seasonal sandbars, and, in places, drifting kelp. The coast is bordered by mostly short stretches of sandy shore alternating with cliffed, rocky shores and headlands. Most beaches are backed by narrow, cultivated lowlands, and stream valleys that are backed and flanked by wooded hills and mountains. Beach material is predominantly sand with admixtures of mud or gravel. Many beaches are immediately backed by sandy strips and partly scrub-covered low dunes. Exits are primarily by tracks and trails that lead to a surfaced road which closely parallels the coast and is within 3 miles of the sea, except for a stretch south of P'ohang.

The deeply indented south coast has few beaches and is mostly unsuitable for amphibious operations because of obstructed approaches, restricted exits, and difficult cross-country movement conditions in the rugged coastal terrain. Offshore approaches are channelized and obstructed by myriad small islands and islets. Nearshore approaches are partly obstructed by rocks, reefs, shoals, sandbars, and, in a few places, by fishtraps and drifting kelp. The coast consists of cliffed, rocky shores and promontories interspersed

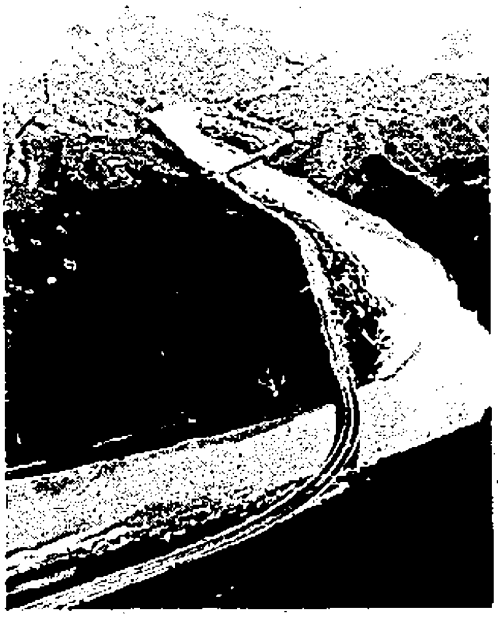


FIGURE 9. Super-highway in hills. Steep slopes preclude dispersal from this road as it winds through the hilly midsection of South Korea. (U/OU)

with mudflat-filled bays and scattered beaches. Partly cultivated lowlands, stream valleys, and terraced slopes back most beaches. Exits are cross-country or by tracks and trails to a network of surfaced and unsurfaced roads which lead to the main coastal highway farther inland. The off-lying islands are mostly fringed by rocks and cliffed shores.

Along the west coast, large-scale amphibious operations would be severely limited by encumbered approaches, flat nearshore bottom gradients, and restricted access to the main transportation network. Offshore approaches are mostly channelized and obstructed by numerous islands, islets, and shoals. Nearshore approaches are partly obstructed by scattered islets, rocks, reefs, shoals, seasonal sandbars, and, in a few places, by fishtraps and drifting kelp. Extensive tidal flats which fill many of the narrow bays and estuaries also endanger nearshore approaches. The greatly indented and embayed coast consists mostly of cultivated lowlands and valleys, separated by hills and spurs which extend seaward from the interior mountains and form bold, rocky coastal headlands and peninsulas. Exits from the widely scattered beaches are cross-country or by tracks and trails to mostly unsurfaced roads leading to a main highway along most of the coast. In spite of the difficult approaches, U. N. forces during the Korean war made a large-scale landing at Inch'on† utilizing the large spring tidal range (about 29 feet) and operating each day only during high tide.

†For diacritics on place names see the list of names on the apron of the Military Geographic Factors map and the map itself (Figure 18).

FIGURE 10. Road tunnel. Tunnel was cut through hard rock on hillside southeast of Ch'orwon. (U/OU)

Conditions for irregular force operations in most of the region range from fair to poor. Forests in the mountains and hills afford good concealment from air and ground observation. Additional concealment from ground observation and cover from flat-trajectory fire are provided by surface irregularities in the hills and mountains and by manmade features, chiefly buildings, grave mounds, irrigation ditches, artificial levees, and embankments on the plains. Movement by small units, although feasible, would be slowed by steep slopes in the hills and mountains, and, at times, by flooded ricefields on the plains. Shelter materials and fuel are scarce outside the forested area. Food is scarce particularly during the winter when cultivated areas are fallow. Water, although generally available, may be difficult to obtain in the winter when many water sources are dry or frozen; most sources are biologically contaminated. Sites for airdropping supplies are scarce in the highlands but numerous on the plains; however, the recovery of airdropped supplies on the plains would be difficult when ricefields are flooded. Irregular forces would be exposed to numerous communicable diseases (tuberculosis, leprosy, malaria, dysentery, cholera, and typhoid) and disease-carrying insects (mosquitoes, flies, and lice), and helminthic parasites. Moreover, wildlife (bears, wolves, tigers, snow leopards, wild boars, and poisonous snakes) may be encountered in remote areas.

2. Cheju-do

Cheju-do is poorly suited for ground operations. Cross-country movement and offroad dispersal would be precluded by steep slopes, dense forests, and scrub in the rugged central area and by stone walls, old cinder cones, and the steep streambanks on the plains. Movement would be easiest on the gravel-surfaced coastal road and on unsurfaced roads that cross the plains near the coast. Concealment from air and ground observation would be limited to villages and to dense forests in the hills and mountains. Additional concealment from ground observation and cover from flat-trajectory fire would be provided by stone walls on the plains and surface irregularities in the uplands. Numerous sites for tunnel-type installations are available in the hills and mountains; sites for bunker-type installations are scarce in the plains because of unstable soils and poor drainage.

Conditions are generally unfavorable for airborne and airmobile operations. There is one airfield suitable for landing of assault-type aircraft. A few sites near the coast are suitable for parachute and helicopter operations and for airfield construction.

Cheju-do is unsuitable for large-scale amphibious operations because of its rocky, cliff-lined shores. Offshore approaches are relatively deep and clear, but nearshore approaches are partly obstructed by a few islets, rocks, reefs, sandbars, isolated wrecks, and piers. Several widely scattered beaches offer potential sites for small-scale amphibious landings. Exits from the beaches are cross-country or by tracks and trails to the surfaced coastal road closely paralleling the shore. Difficult cross-country movement conditions, however, hinder access to the coastal road.

The conditions for irregular force operations are similar to those described in the South Korean Highlands and Lowlands. The numerous stone walls provide an additional source of concealment from ground observation and cover from flat-trajectory fire.

C. Strategic areas (C)

Two areas in South Korea, Seoul-Inch'on and Pusan (Figure 18), are designated as strategic areas because of controlling positions in the transportation and telecommunication systems of the country, major port facilities, and industrial concentrations.

1. Seoul

Capital and largest city (population 6 million) of South Korea, Seoul (Figures 11 and 12) is the country's principal transportation and telecommunication focal point, a rapidly expanding industrial complex, and site of important military and administrative installations. Much of the country's textiles, chemical products, electrical machinery, and machine tools are produced here. There are storage facilities for 483,000 barrels of refined petroleum products. An international airfield is located west of the city.

Inch'on (population 645,000), approximately 10 nautical miles southwest of Seoul, is the second largest port in the country and an important industrial center producing automobiles, steel, ball bearings, heavy machinery, plywood, plate glass, textiles, synthetic rubber, and explosives. There are storage facilities for 3,238,000 barrels of refined petroleum products. Near the city are important military installations, including a large supply depot.

2. Pusan

On the southeast coast, Pusan (Figure 13) is the second largest city (population 1.9 million), a provincial capital, a major military supply center, the largest port (Figures 14 and 15) with extensive shipbuilding and repair facilities, and the terminus of key roads and railroads connecting with the national networks. It is also a major industrial center producing textiles, motor vehicles, and a wide variety of

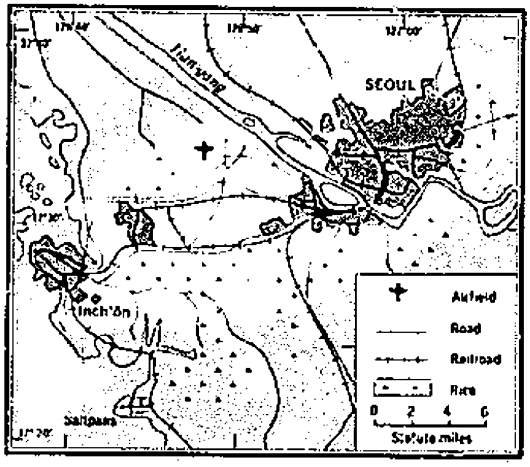


FIGURE 11. Seoul-Inch'on strategic area (C)

consumer goods. There are storage facilities for 1,225,000 barrels of refined petroleum products. Two airfields are in the environs—a civil field northeast of the city and a military field to the northwest.

3. Other important cities:

NAME	IMPORTANCE
Masan 35°11'N., 128°34'E.	Industrial center (population 190,000) producing steel, synthetic fibers, and machine tools; small ships constructed and repaired at shipyard. Road and railroad junction; secondary port.
P'ohang 36°02'N., 129°22'E.	P'ohang (population 60,000) contains large integrated iron and steel mill; annual capacity 2.4 million tons. Port can accommodate large iron ore ships. Important military installations in environs.
Taegu 35°52'N., 128°36'E.	Third largest city (population 1.1 million), provincial capital, and food-processing center; also, about half of textiles in country produced here. An important road and railroad hub. Numerous military installations in environs.

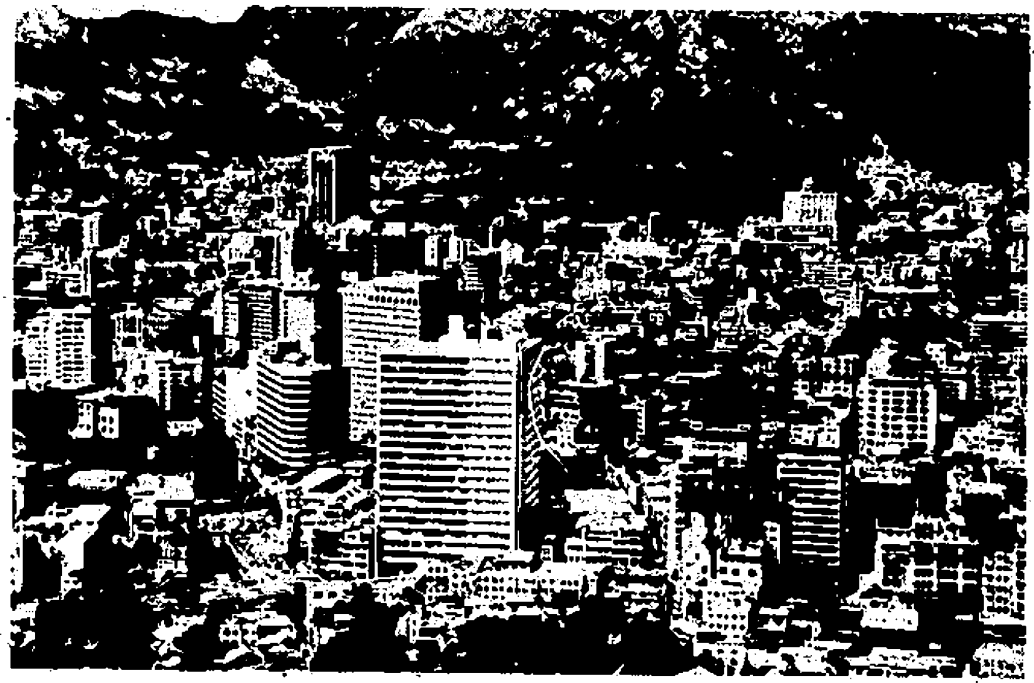


FIGURE 12. Seoul, New western-style buildings are rapidly changing skyline. (U/OU)

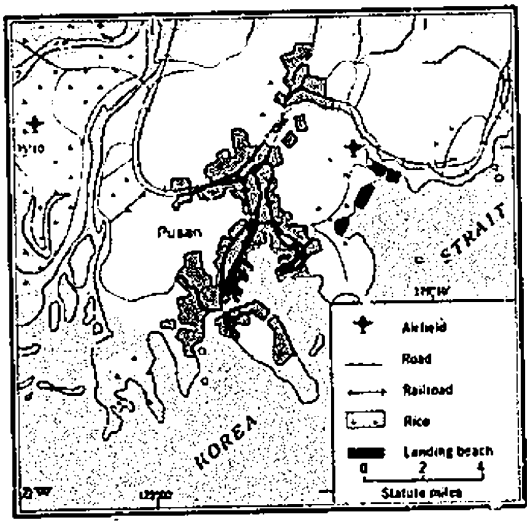


FIGURE 13. Pusan strategic area (C)

NAME	IMPORTANCE
Taejon 36°20'N., 127°20'E.	Key military and supply center, provincial capital, and cultural center (population 415,000). Site of large textile mill and shoe factory. Important road and rail junction. Military airfield northwest of city.
Ulsan 35°33'N., 129°19'E.	A rapidly growing industrial complex (population 100,000). Major industries include an oil refinery with a total storage capacity of 7,433,000 barrels (includes storage for 2,125,000 barrels of crude), two fertilizer plants, automobile assembly plant, nylon mill, and sugar refinery. A large civil airfield nearby. New superhighway links Ulsan with Seoul and Pusan.

D. Internal routes (C)

The internal routes are the easiest avenues of movement between strategic areas, from the land approaches to strategic areas, and from the amphibious landing area near Pohang to the Pusan

FIGURE 14. Port of Pusan. Pusan, South Korea's largest port, is the site of an important shipbuilding and ship-repair yard. (C)

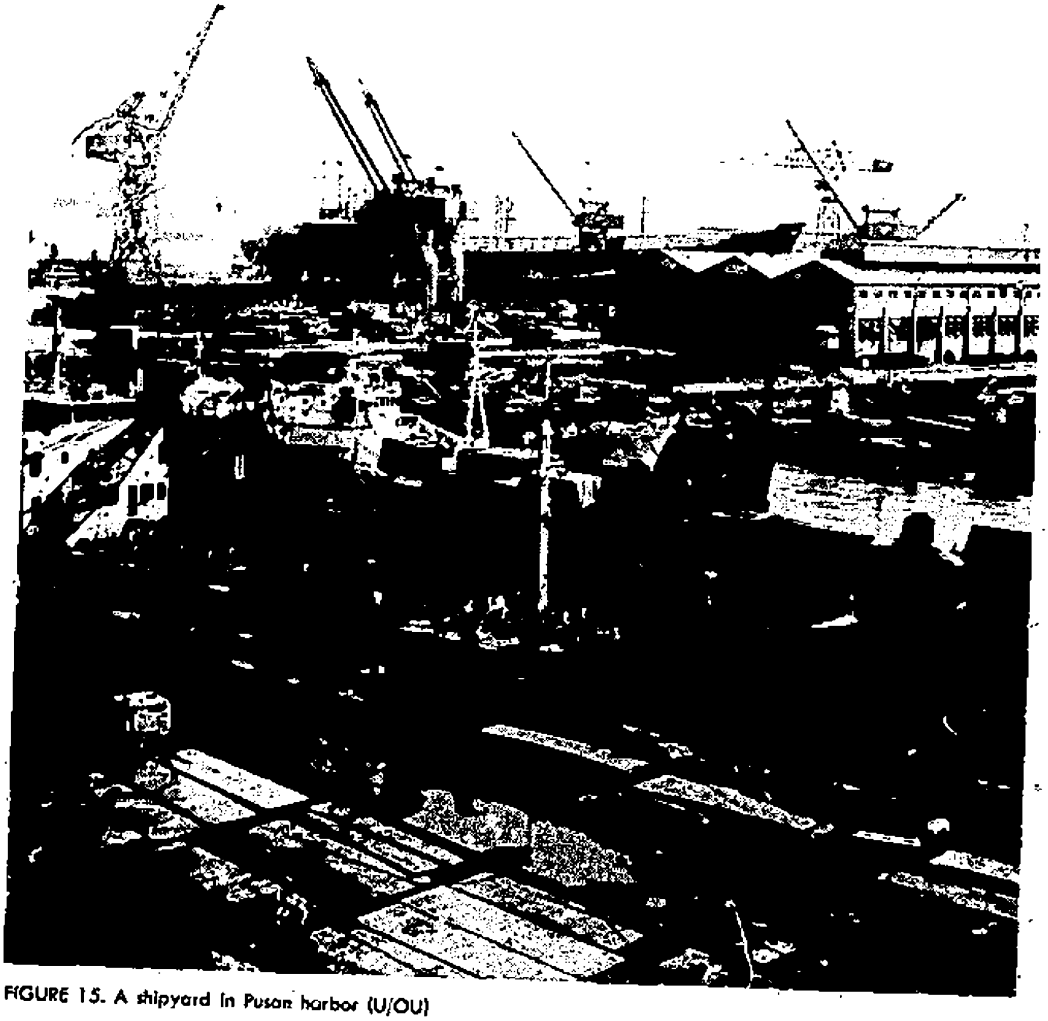


FIGURE 15. A shipyard in Pusan harbor (U/OU)

strategic area (Figure 18). The other amphibious landing area gives direct access to the Pusan strategic area. Each of the routes contains a road and a 4'8½"-gage railroad. Bottlenecks along the roads include numerous narrow bridges, tunnels, underpasses, steep grades, sharp curves, and, at times during the high-water period, washouts and floods.

The route connecting the Seoul-Inch'on strategic area with the Pusan strategic area via Taejon and Taegu is the major transpeninsular route (Figure 9). It crosses flat to rolling cultivated plains for most of the distance between Seoul and Ch'onan, in the remainder it traverses small valleys and basins of the rugged brush-covered hills and mountains. The route contains a road and a double-track railroad. The road is predominantly four lanes wide and asphalt concrete surfaced but is bituminous surfaced in places. It is generally in good condition. Conditions for offroad dispersal and cross-country movement on the plains in the north are fair from early December through March, when the ground is usually frozen and firm; during the remainder of the year, conditions are

generally poor because surrounding ricefields are wet or flooded. Elsewhere along the route, however, conditions for offroad dispersal and cross-country movement are generally poor in rugged hills or mountains; locally in river valleys, conditions are seasonally fair.

The route leading from the western approach from North Korea to the Seoul-Inch'on strategic area traverses narrow valleys flanked by low, rolling to rugged scrub-covered hills in the north and a broad cultivated river plain in the south. A single-track railroad and a road serve almost the entire route; near the demilitarized zone (DMZ), the railroad tracks have been removed and the road is blocked. The road is two lanes wide, bituminous surfaced, and generally in good condition. Conditions for offroad dispersal and cross-country movement are generally fair; however, conditions are poor in rugged hill areas and in the plains when ricefields are flooded.

The route leading from the eastern approach from North Korea to the Seoul-Inch'on strategic area is through narrow cultivated valleys flanked by rugged scrub- or forest-covered mountains and hills and contains a single-track railroad and a road. Near the DMZ the railroad tracks have been removed and the road is blocked. The road is one to two lanes wide, mostly bituminous surfaced, and generally in fair to good condition. Offroad dispersal and cross-country movement would be severely restricted or precluded by steep slopes but locally feasible in narrow valleys.

The route linking the amphibians landing area at P'ohang to the internal route between Seoul and Pusan is along narrow cultivated river valleys for much of its length. The route contains a road and a single-track railroad. The road is two lanes wide, gravel surfaced, and in fair condition. Conditions for offroad dispersal and cross-country movement are fair locally in the river valley.

E. Approaches

The perimeter of the country, including Cheju-do but excluding the small offshore islands, is about 1,510 miles, comprising about 1,500 miles of coast and about 150 miles of land boundary. South Korea claims a territorial jurisdiction varying from 20 to 200 nautical miles offshore. There are scattered fortifications along all coasts. (U/OU)

The only land boundary is with North Korea. Since the end of the Korean war in 1953, the demarcation line, which is generally north of the 38th parallel and represents the front between the opposing forces at the time of the armistice, has been the northern boundary. This boundary extends through rugged scrub- or forest-covered hills and mountains and, in places, river valleys; it is demarcated along the center of the 2½-mile-wide DMZ extending the length of the boundary. Both sides of this zone are fortified. (U/OU)

1. Land (C)

Two approaches (Figure 18), from Kaesong and P'yonggang, provide the best routes of overland movement from North Korea. Each contains a gravel-surfaced road and formerly a 4'8½"-gage single-track railroad. The roads have been completely blocked near and in the DMZ. The railroad tracks have been removed, but the roadbed has not been damaged. Numerous bottlenecks are narrow or low-capacity bridges, steep grades, sharp curves, fords, and frequent washouts and landslides. The western approach, from Kaesong, crosses flat and rolling plains that are covered by wetland rice and scrub and enters South Korea near Munsan-ni. The road in the route is two lanes wide and in good condition. The eastern approach, from P'yonggang, crosses predominately dryland cultivated rolling plains and enters South Korea near Chorwon. The road in the route is one lane wide and in fair condition. Offroad dispersal and cross-country movement would be easy in both approaches except in areas in the western approach that contain wetland ricefields (flooded mid-June through mid-October).

2. Sea (C)

Sea approaches are through the Sea of Japan, Korea Strait, the East China Sea, and the Yellow Sea. Offshore approaches to the east coast are generally deep and clear, but to the south and west coasts are relatively shallow and channelized by numerous islands, islets, and shoals. Nearshore approaches to all coasts are partly obstructed by scattered islets, rocks, and fringing reefs, and are partly encumbered by jetties, breakwaters, piers, fishtraps, and drifting kelp. Along the east coast, sandbars are the most prevalent nearshore obstruction. Shoals, tidal flats, and shifting sandbars partly obstruct nearshore approaches to the south and west coasts. Sea fog is a hindrance from late March through August and occasionally in winter when winds are from the south. Gale winds occur several times a month in winter over the waters off South Korea. Tropical cyclones or typhoons most often occur during July through September but may affect the area any time during May through November. High surf occurs throughout the year along all coasts but is most prevalent along the east coast during the

winter monsoon, which lasts from early November through March. During the summer monsoon, high surf is equally common along all exposed coasts. Surf 4 feet or higher is expected to occur as much as 22% of the time, October through March, on exposed beaches along the east coast and 9% of the time, April through September, on most west coast beaches.

Tides are mixed and diurnal along the east coast, and mixed and semidiurnal on the south and west coasts. Tropic tides on the east coast are less than 1 foot north of P'ohang, but to the south spring tides increase to 4 feet near Pusan. Spring tidal ranges on the south coast are 4 to 11 feet. On the west coast the spring ranges increase from 11 feet in the south to an average of 27 feet near Inch'on.

The east coast of South Korea is mostly regular and is bordered by numerous beaches alternating with rocky shores of cliffed headlands. Most beaches are short and front narrow coastal lowlands or stream valleys that are closely backed and flanked by wooded hills and mountains. Lagoons, marshes, or saltpans back several beaches. Nearshore gradients are sufficiently steep on most beaches to permit dry-ramp LST landings. Exits from most beaches are cross-country or by scattered tracks and trails to a surfaced road closely paralleling the coast.

The south coast is deeply indented by narrow bays and estuaries separated by irregularly shaped hilly peninsulas and is fronted by many islands and islets. The south coast consists of mostly rocky and cliffed shores interspersed with sandy stretches and mudflat-filled bays and inlets. Most beaches are composed of sand with admixtures of mud and gravel. Cultivated lowland strips and stream valleys border most beaches and are closely backed and flanked by steep, wooded hills and mountains. Exits are mainly cross-country or by tracks and trails to a network of surfaced and unsurfaced roads leading to the main coastal highway farther inland.

The deeply indented west coast has many embayments, peninsulas, and offshore islands (Figure 16) but relatively few beaches. Drying tidal flats fill numerous bays and estuaries and, in places, are between islands and islets and the mainland. Elsewhere, steep, rocky shores and headlands separate the sandy and muddy shores. Most beaches are composed predominantly of sand and are interrupted by rivers, streams, and a few piers and breakwaters. The beaches front broad, cultivated lowlands or stream valleys separated and backed by wooded hills and mountains. Numerous streams and drainage ditches cross the lowlands and valleys which are covered by wetland ricefields and dotted with isolated low hills, towns, and villages. Many adjoining slopes are terraced and cultivated. Exits from the beaches are by tracks, trails, or village streets to surfaced and unsurfaced roads leading to the main coastal highway.

The two amphibious landing areas shown in Figure 18 provide access to the strategic area of Pusan. The amphibious landing area at P'ohang consists of two beaches, separated by stream mouths, that have a total combined usable length of 3.4 miles. Beach widths range from 20 to 120 yards at low water and 15 to 110 yards at high water. Offshore approaches are clear except for an isolated wreck and probably fish traps. Nearshore approaches are partly obstructed by a few rocks, jetties, shifting sandbars, and probably shoals. Portions of the southern beach at P'ohang are suitable for dry-ramp LST landings. The tropic tidal range is less than 1 foot. Surf 4 feet or higher is estimated to occur as much as 12% of the time during the winter monsoon off the southern beach at P'ohang, and infrequently during the remainder of the year; high surf is infrequent on the northern beach. The beach material throughout is predominantly sand mixed with some gravel and has fair to good trafficability. The southern beach at P'ohang is flanked by a large stream and backed by a 200- to 1,000-yard wide strip of low dunes, dryland crops, scrub, and marsh. A rice-cultivated alluvial lowland extends as far as 4 miles inland to wooded hills. Many fenced streams and drainage canals cross the lowland. Exit is by a few roads and scattered tracks and trails to a surfaced road 300 yards to 1½ miles inland. The northern beach is backed by a village and by several rice-cultivated stream valleys separated by low hills that are fronted by low bluffs. Exit is cross-country or by village streets to a surfaced road paralleling most of the beach 50 to 100 yards inland and joining the main coastal highway and standard gage railroad at P'ohang.

The amphibious landing area centered about 4½ miles east of Pusan (Figure 13) is composed of four beaches that are separated by streams and rock-fringed headlands and have a total usable length of approximately 2 miles. Widths at low water range from 10 to 75 yards on three beaches and average about 300 yards on the remaining beach. High-water widths range from 5 to 300 yards. Offshore approaches are restricted to channels in the bay and are partly encumbered by scattered shoals as far as 2 nautical miles off the low-water line. Nearshore approaches are partly obstructed by a few rocks, reefs, shifting shoals, sandbars, and piers. In a few places off three of the beaches, nearshore bottom slopes are suitable for dry-

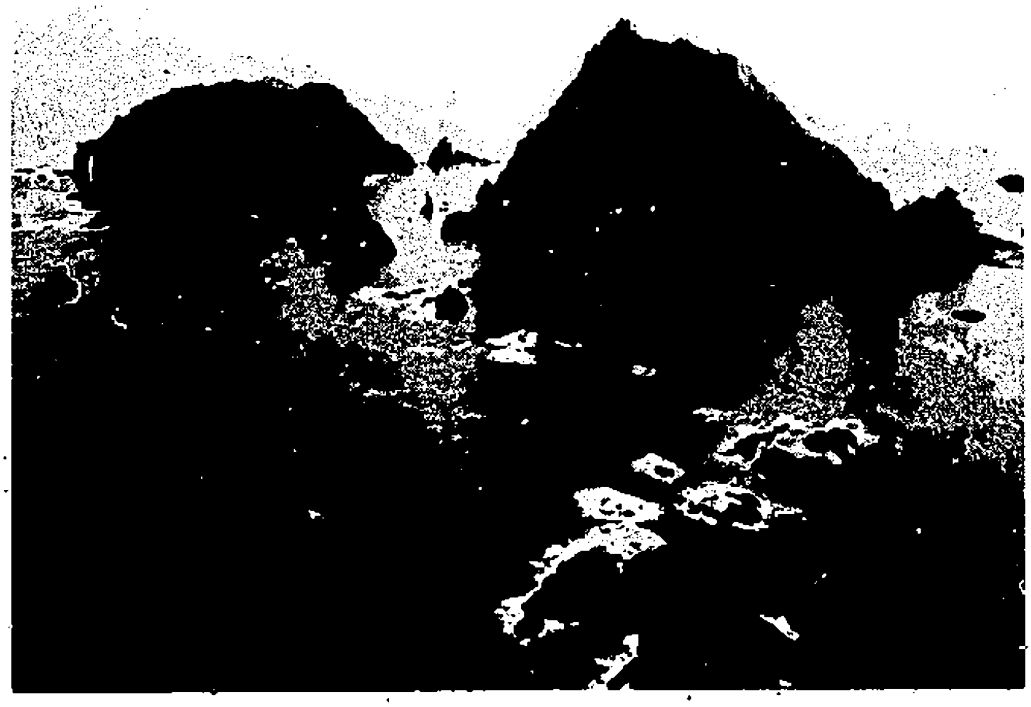


FIGURE 16. The coastline of Hong-do, the westernmost island, is dotted with rocks and islets (U/OU)

ramp LST landings. The spring tidal range is 3½ to 4 feet. Surf 4 feet or higher occurs infrequently throughout the year. Beach material is primarily sand with poor to fair trafficability. The beaches are backed mostly by cultivated valleys and lowlands hemmed in by partly wooded hills and mountains. A low seawall and earthen embankment immediately back portions of the two northern beaches. The lowlands and valleys are crossed by leveed streams and several drainage canals and are covered by wetland rice; there are scattered villages. An airfield is about 500 yards behind the beach on the north side of the bay. Exit is cross-country or by a few unsurfaced roads, tracks, and trails to the streets of Pusan. A standard-gage single track railroad on the north side of the bay parallels the coastal road.

3. Air (U/OU)

Air approaches[3] from the north are over North Korea, a small part of China, the extreme northern part of the Yellow Sea, and the extreme western part of the Sea of Japan. The mountains of North Korea are the major terrestrial obstructions. The highest peaks, from 6,270 to 8,272 feet above sea level, are all located north of the 40th parallel. From the east and south, air approaches are over the southwestern part of the Sea of Japan, the northern part of the East China Sea, and part of the Japanese islands of Honshu and Kyushu where the only terrain obstacle is a 5,866-foot peak. Approaches from the west are over the Yellow Sea.

[3]The discussion zone for air approaches extends approximately 200 nautical miles beyond the borders of South Korea.

In all approaches, winter, November through March, is the best time for flying because cloudiness and thunderstorm activity is minimal. Much of the winter cloudiness is associated with the occasional migratory lows which traverse the approach zones. The summer months, June through August, are least favorable; the most hazardous weather for flying is associated with typhoons and tropical storms that affect the approaches most often in June through October. Figure 17 summarizes weather conditions in the air approaches.

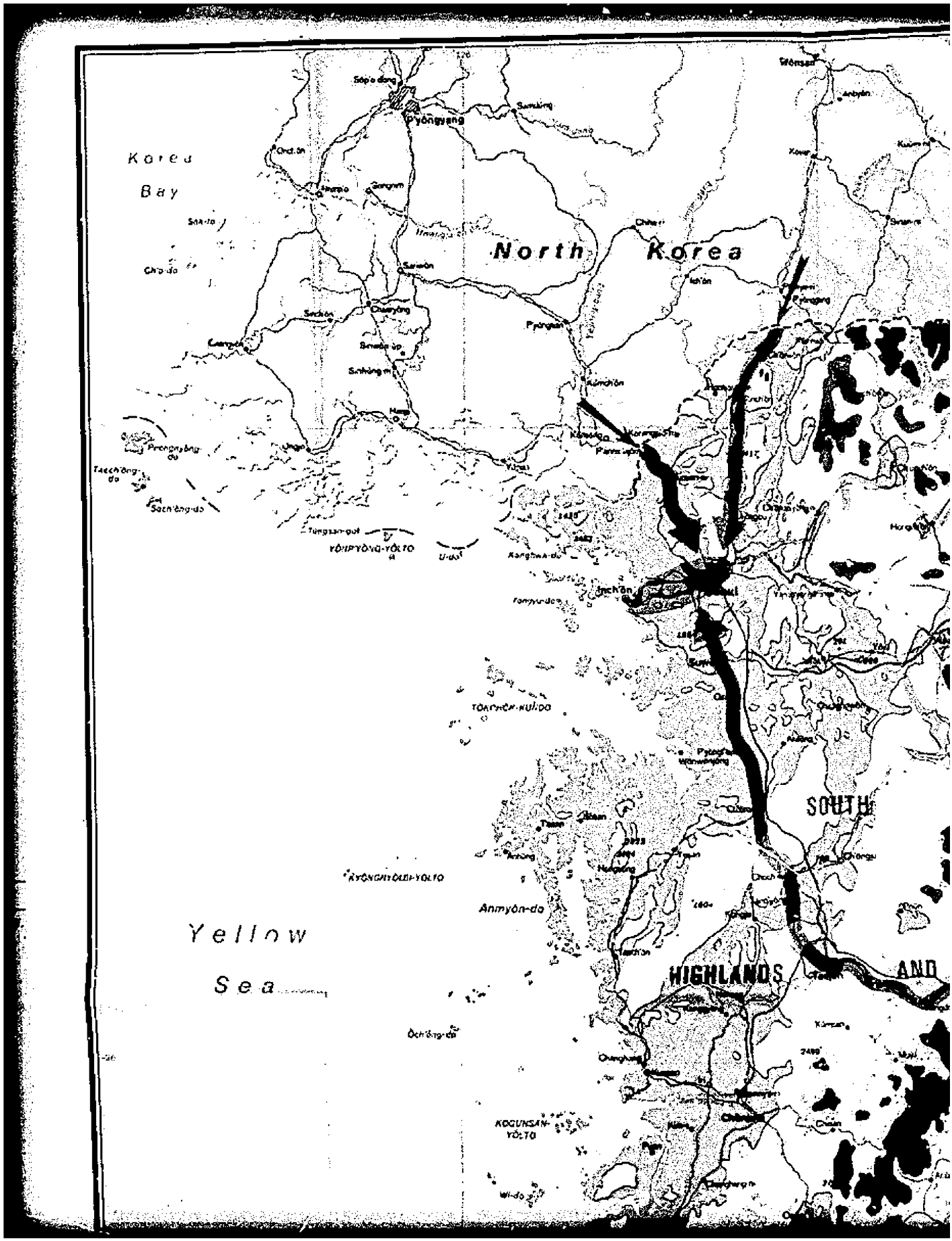
FIGURE 17. Weather conditions in the air approaches (U/OU)

ELEMENT	WINTER (NOVEMBER THROUGH MARCH)	SUMMER (JUNE THROUGH AUGUST)
Mean cloudiness (%)	35 to 70.	50 to 80.
Visibility	Occasionally restricted by snow and dust at lower levels.	Frequently restricted for short periods by heavy precipitation and haze.
Mean thunderstorm days per month	Rare	2 to 7.
Icing	Freezing level ranges from surface in north to about 8,000 ft. in south. Aircraft icing not a serious hazard except in frontal zones.	Freezing level near 13,000 ft. Icing conditions most severe in towering clouds.
Turbulence	Moderate to severe clear-air turbulence prevalent near jet streams.	Severe in thunderstorms. Light to moderate over mountains and at low levels during afternoons.
Winds aloft	Predominantly westerly at all levels. Mean speeds reach a maximum of 65 to 75 knots between 30,000 and 35,000 ft. Strongest winds are in south near jet streams, where winds may occasionally exceed 200 knots.	Predominantly westerly at all levels. Mean speeds reach a maximum of 55 knots near 40,000 ft.

Places and features referred to in this General Survey (U/OU)

	COORDINATES			
	°	'N.	°	'E.
Andong	36	34	128	44
Andŏng-ch'ŏn (*strm*)	36	54	126	54
Changhang	36	01	126	42
Changhang-ni (*lcty*)	35	39	126	53
Chang-san (*mts*)	35	12	129	09
Chech'ŏn	37	08	128	12
Cheju	33	31	126	32
Cheju-do (*isl*)	33	20	126	30
Chinhae	35	08	128	40
Ch'ŏnan	36	48	127	09
Chŏngha-ri (*lcty*)	37	26	129	11
Ch'ŏngju	36	38	127	30
Ch'ŏngnyangni-dong	37	34	127	03
Chŏnju	35	49	127	09
Ch'ŏrwŏn	38	15	127	13
Chosa	35	11	127	24
Chukpyŏn-ni (*lcty*)	37	03	129	23
Chumunjin	37	53	128	40
Ch'unch'ŏn	37	52	127	44
Chungang-myoji (*anch*)	31	50	128	12
Chungjo	36	14	126	42
Ch'ungmu	34	51	128	26
Chungnyŏng-gul (*railroad tunnel*)	36	56	128	26
East China Sea	29	00	125	00
Hadong	35	04	127	45
Haep'yŏng	35	10	127	33
Haeundae	35	09	129	10
Halla-san (*mt*)	33	22	126	32
Hamhŭng, North Korea	39	54	127	32
Hangch'on	34	32	126	44
Han-gang (*strm*)	37	45	126	11
Hoengsan-ni (*lcty*)	38	07	126	50
Hong-do (*isl*)	34	41	125	13
Hŭngnam, North Korea (*rsta*)	39	50	127	38
Hup'o-ri (*lcty*)	36	41	129	28
Hwangji-ri (*lcty*)	37	10	128	39
Hwangjŏng	37	33	127	43
Hyŏngsan-gang (*strm*)	36	01	129	23
Injin-gang (*strm*)	37	47	126	40
Inch'ŏn	37	28	126	38
Iri	35	56	126	57
Japan, Sea of	43	30	135	45
Kaesŏng, North Korea	37	58	126	33
Kamp'o	35	48	129	30
Kunggu	38	22	129	24
Kanggyŏng	36	09	127	01
Kangnŏng	37	44	128	54
Kimhae	35	14	128	53
Kimp'o	37	38	126	42
Kodubawi	37	09	128	50
Kohan-ni (*lcty*)	37	12	128	52
Korangp'o-ri (*lcty*)	37	59	126	50
Korea Strait	34	00	129	00
Kŏni-gang (*strm*)	36	00	126	40
Kŏmho-gang (*strm*)	35	50	128	29
Kunsan	35	59	126	43
Kuryongp'o-ri (*lcty*)	35	59	129	34
Kwangju	35	09	126	55
Kyŏngju	35	50	129	13
Man'gyŏng-gang (*strm*)	35	53	126	40
Masan	35	11	128	34
Mokp'o	34	47	126	23
Moraedŭng	35	32	128	32
Mosŭlp'o	33	13	126	15
Mukhojin-ni (*lcty*)	37	33	129	07
Munsan-ni (*lcty*)	37	51	126	47
Muryong-san (*mtn*)	36	35	129	24
Naju	35	02	126	43
Naktong-gang (*strm*)	35	07	128	57
Nonsan	36	12	127	03
Ŏnyang	35	34	129	07

	COORDINATES			
	°	'N.	°	'E.
Osan	37	09	127	04
Paengnyŏng-do (*isl*)	37	57	124	40
Pangŏjin-hang (*harbor*)	35	20	129	26
P'anmunjŏm, North Korea	37	59	126	40
P'aro-ho (*reservoir*)	36	07	127	32
P'ohang	36	02	129	22
Pukp'yŏng-ni	37	29	129	08
P'unggi	36	52	128	32
Pusan	35	06	129	03
P'yŏnggang, North Korea	38	25	127	17
P'yŏngt'aek	36	59	127	05
P'yŏngyang, North Korea	39	01	125	45
Sach'ŏn	35	05	128	06
Samch'ŏk	37	27	129	10
Samch'ŏnp'o	34	55	128	04
Samnangjin	35	23	128	50
Seoul	37	34	127	00
Sŏgwi-ri	33	14	126	34
Sokch'o	38	1	128	36
Sŏkp'o-dong	36	28	126	37
Sŏnjin-gang (*strm*)	34	58	127	48
Songhyŏn-ni (*lcty*)	37	28	127	38
Songjung-ni	37	30	129	08
Songni'ŏ (*lcty*)	34	55	128	32
Sŏngsan-ni	33	27	126	46
Soyang-gang (*strm*)	37	52	127	40
Suwŏn	37	16	127	01
Suyŏng	35	10	129	07
Taebyŏn	35	13	129	14
Taegu	35	52	128	36
Taehŭng-ni	35	53	127	02
Taejon	36	20	127	26
Taep'yŏng-ni (*lcty*)	36	28	127	16
Ŭlchin	36	59	129	24
Ulsan	35	33	129	19
Ulsan-man (*bay*)	35	30	129	24
Waegwan-ni	35	59	128	23
Wŏlgon-ni (*lcty*)	37	46	126	30
Wŏnju	37	21	127	58
Wŏnsan, North Korea	39	10	127	26
Wŏnwŏnjŏng	36	59	126	56
Y[illegible]gp'yŏngdŭnae	37	29	127	30
Yellow Sea	36	00	124	00
Yŏju	37	18	127	38
Yŏm-ha (*strm*)	37	35	126	34
Yŏngch'ŏn	35	58	128	56
Yŏngdong	36	10	127	47
Yŏngdŭngp'o-dong	37	31	126	54
Yŏngju	36	49	128	37
Yongsan (*rsta*)	37	32	126	58
Yŏngsan-gang (*strm*)	34	54	128	32
Yŏngwŏl	37	11	128	28
Yŏsu	34	44	127	44
Selected airfields				
A-511	36	58	127	02
Cheju International	33	30	126	30
Kangnung	37	45	128	57
Kimhae	35	11	128	56
Kimpo International	37	33	126	48
Kunsan AB	35	54	126	37
Kwangju	35	07	126	49
Osan AB	37	05	127	02
Pohang	35	59	129	25
Pusan International	35	10	129	08
R-813	35	08	128	42
Sachon	35	05	128	55
Samchok	37	30	129	09
Seoul AB	37	31	126	58
Suwon	37	14	127	01
Taegu International	35	53	128	40



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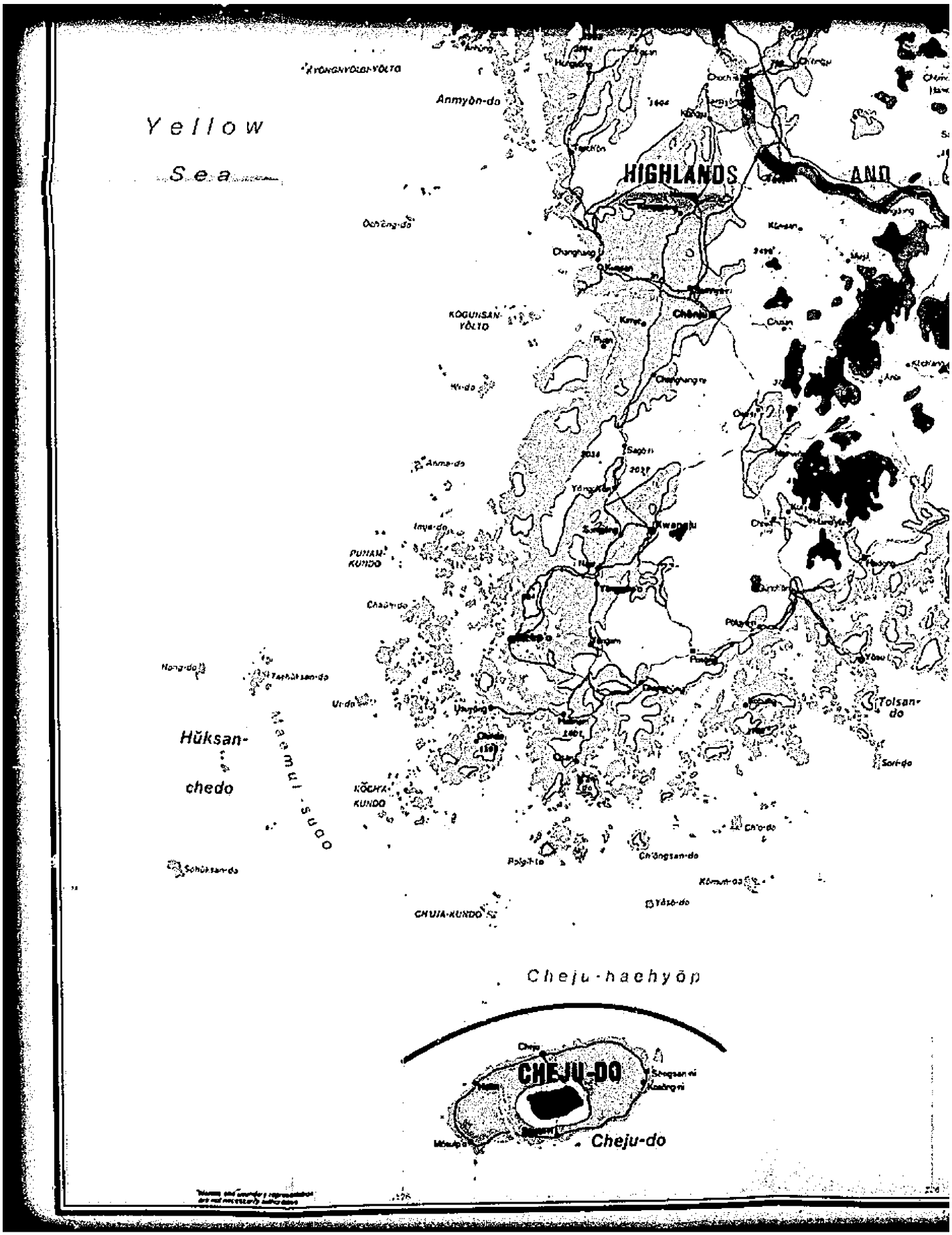

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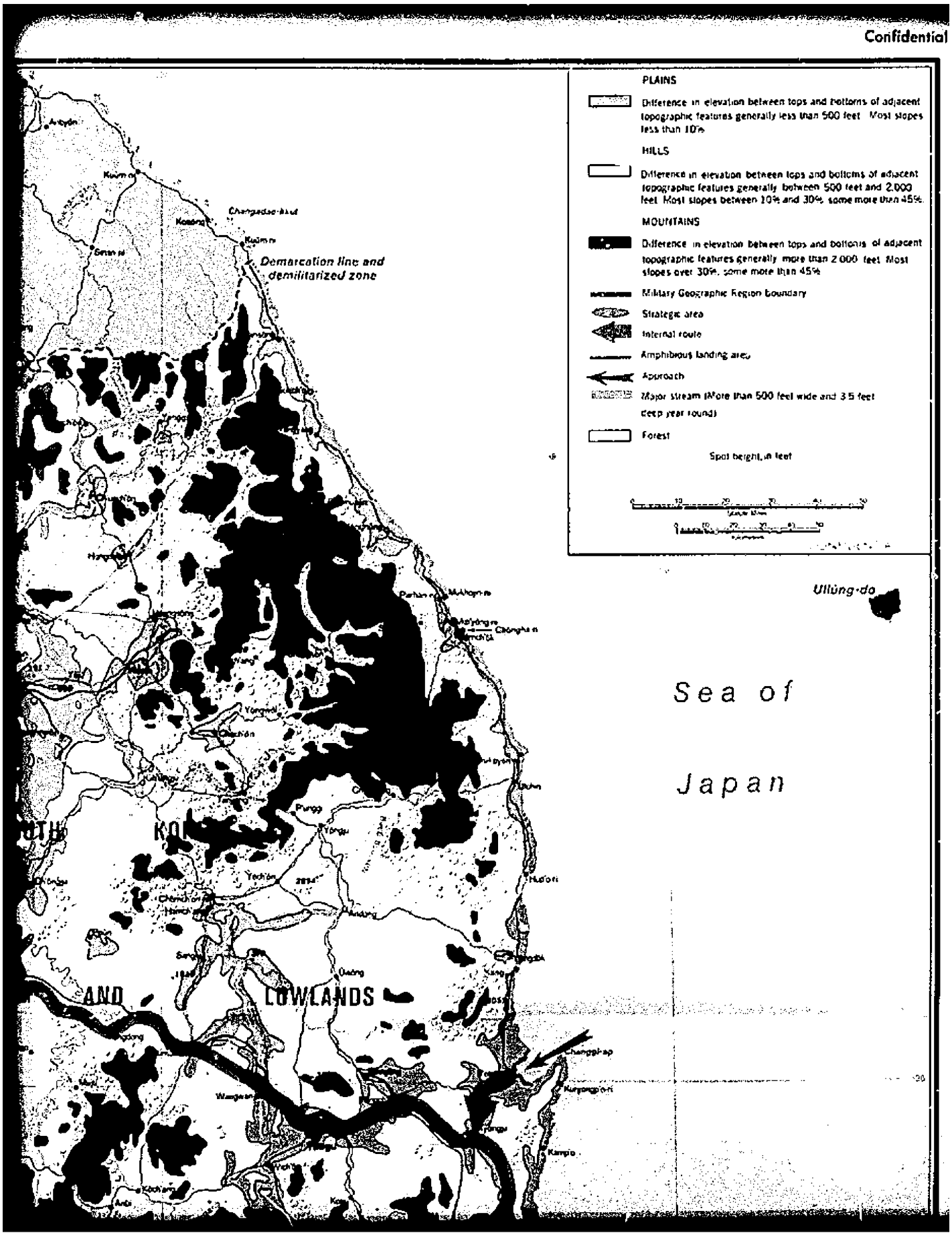

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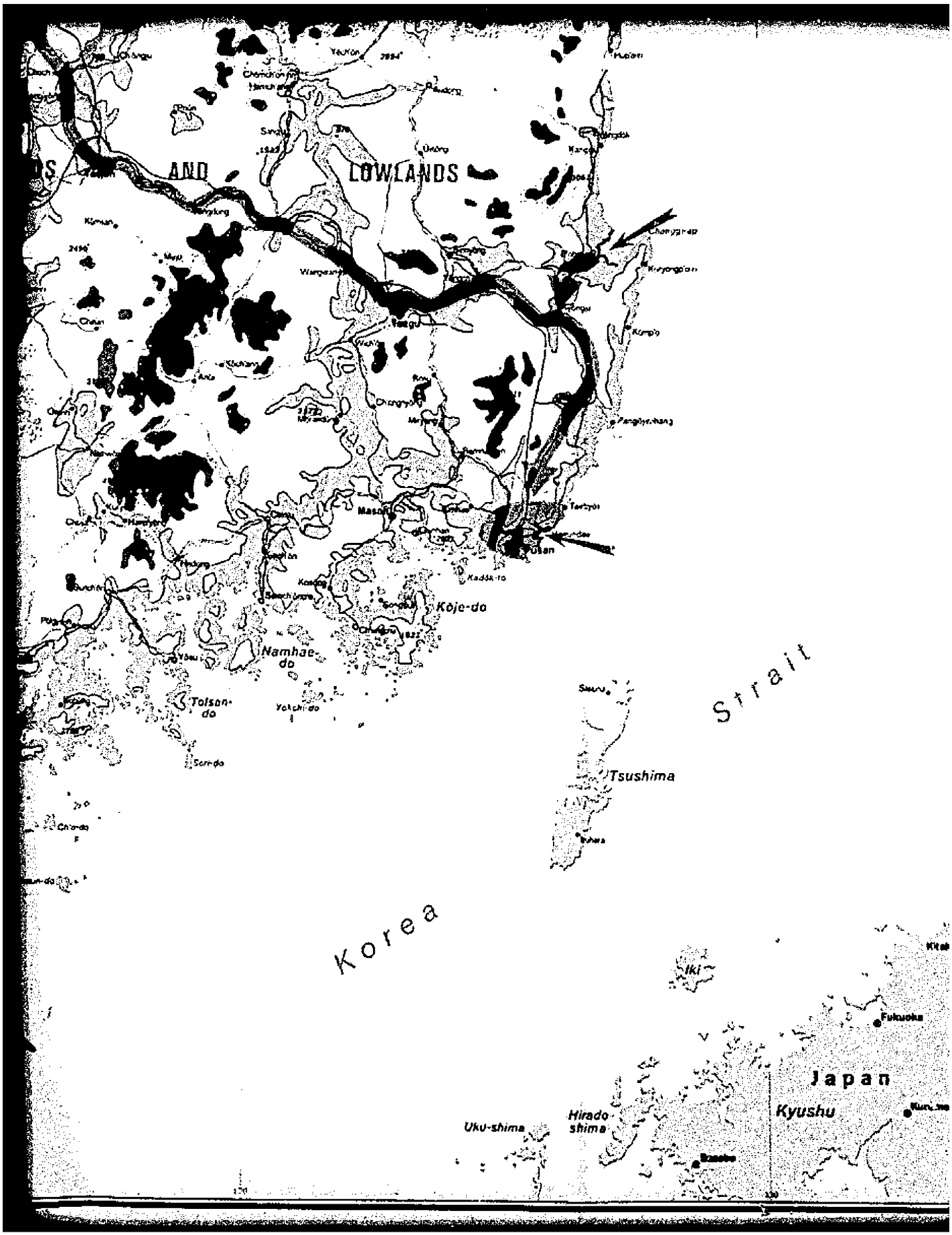

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