April 7, 2025

News and notes

Before going on to discuss the geology and geopolitics of Israel and Palestine, here are some news items I thought were interesting, there are a lot this week.

Geologist Day

A Breath of Spring, 1959
Credit: Ivan Naumovich Nesterov, ©sovartists

The first Sunday in April, is Geologist Day, a holiday first established by the old Soviet Union in 1966. The painting above, by the Russian artist Ivan Naumovich Nesterov depicts three geologists, two of whom are closely examining core samples and a third appears to be lost in thought. In the background is someone preparing drill core. It's early springtime, and the furry catkins of Pussy Willows are out.

Geopolitics

- Minerals deal disrupted by those with 'their hand in the till,' US official claims.
- China Just Turned Off U.S. Supplies Of Minerals Critical For Defense & Cleantech.
- Germany plans to bring back 1,200 tons of gold from US vaults: Why now?

- Tectonics in Turbulence: Defending Science in Unstable Times.
- Iraq Seeks to Resume Talks on Restoring Kurdistan's Oil Exports.
- So, how's that multiculturalism working out? Britain is lurching towards civil war, and nobody knows how to stop it.
- War with Iran 'almost inevitable' – France, if nuclear deal fails.
- Infographic: Who pays for whom in the European Union.
- Russia, US in talks over joint rare earths projects.
- *Si vis pacem, para bellum*: Germany decides to leave history in the past and prepare for war; related: Germany Ready to Bring Back Conscription as Russian Belligerence Grows.
- Guyana: The U.S. Sets Sights on 11 Billion-Barrel Oil Find Beneath Tiny Rainforest Nation.
- Victor Davis Hanson: How Donald Trump Is Reshaping America In Just 7 Weeks.

Research and News

- Melting rocks for fun and science: Valence/Spin States of Iron in Peridotite Glass to Megabar Pressure Implications for Dense Iron-Rich Silicate Melt at the Bottom of the Mantle.
- Spatiotemporal Patterns of Subsidence and Sea Level Rise in the Samoan Islands 15 Years After the 2009 Samoa-Tonga Earthquake.
- Petrogenesis and Tectonic Setting of Late Permian Granitoids in the East Kunlun Orogenic Belt, NW China: Constraints from Petrology, Geochemistry and Zircon U-Pb-Lu-Hf Isotopes.
- Characterizing ancient seep environments by in-situ sulfur isotope composition of authigenic pyrite.
- The Great Oxygenation Event: Widespread chemically oscillating reactions during oxidative organic diagenesis recorded during the Ediacaran.
- Geologic history: Is drainage reorganization a plausible explanation for late Cenozoic incision of Yosemite Valley and within the Kings and Kaweah watersheds (Sierra Nevada, California)?
- Zircon trace element geochemistry of the Neoarchaean late-granite suites along the southern margin of the Zimbabwe craton, Zimbabwe.
- Acceptance of the Dana Medal of the Mineralogical Society of America for 2024.
- Acceptance of the 2024 Roebling Medal of the Mineralogical Society of America.
- Ooh, shiny: Rare yellow diamond found at Rio Tinto's Diavik mine.
- Evidence for a Proterozoic carbonatite system in the Mount Isa Province, Australia.

- Geophysics: Seismic Stratigraphy of Valdivia Bank, South Atlantic and Implications for Oceanic Plateau Evolution, Sedimentation, and Thermal Rejuvenation.

- Mars: Shocking Spherules! Science Alert summary here.

Sedimentology

- Climate Control on Erosion: Evolution of Sediment Flux From Mountainous Catchments During a Global Warming Event, PETM, Southern Pyrenees, Spain.

- Provenance Variations of Cretaceous Sandstones from Arkansas and Drainage Reorganization in Southern USA: Evidence from Detrital Zircon Ages.

- Strontium-isotope stratigraphy: methodology, standard values (SRM987, EN-1, E&A), a new Neogene curve of 87Sr/86Sr against time, its implications for astrochronology ([I]ODP Sites 1146, 1264, U1337, and U1338), and its application to ODP Site 758 (Indian

- Plow versus Ice Age: Erosion rate variability from glacial−interglacial climate change is an order of magnitude lower than agricultural erosion in the Upper Mississippi River Valley, USA.

- Making turbidites: Processes and Products of Turbidity Currents and Submarine Landslides in a Glacierized Fjord (Southwind Fjord, Baffin Island).

- The April 2025 Sedimentology, Volume 72, Issue 3, Pages: 709-1020 is online now

- Dolomite luminescence thermochronometry reconstructs the low-temperature exhumation history of carbonate rocks in the central Apennines, Italy.

- Lithostratigraphic analysis of the La Loma Formation and depositional model of the intermontane Cesar Sub-Basin (Colombia) during the Eocene: Exploring potential for CO2 storage.

Plate Tectonics

- Why Are Plume Excess Temperatures Much Less Than the Temperature Drop Across the Lowermost-Mantle Thermal Boundary Layer?

- Australia: Intense rift magmatism caused rapid thickening of Yilgarn Craton crust at 2.7 Ga.

- Which Of Earth's Continents Is Moving The Fastest? And Where Is It Going? Spoiler, it's Australia.

- Investigating the Lid Effect on the Generation of Ocean Island Basalts: 2. Geodynamical Simulations.

- Development of Intra-Rift Basins During Stress Field Change in the Central Upper Rhine Graben (SW Germany).

- Dislocation creep of glaucophane in mafic blueschists during subduction: Weighted Burgers vector analysis from the Catalina Schist (California, USA).

- Multi-decadal fault creep preceding co-located coseismic slip at the Nankai subduction zone, offshore Japan.
- Distribution and timing of lithospheric breakup across the Gulf of Mexico: The role of seaward-dipping reflectors, spreading propagators, and crustal shear zones.

Paleontology

- The atlas-axis complex in the titanosaur *Neuquensaurus australis* (Dinosauria: Sauropoda).
- Let that sink in: track depth as a driving factor in the formation of dinosaur tail traces.
- From the Burgess Shale: *Helmetia expansa* Walcott, 1918 revisited – new insights into the internal anatomy, moulting and phylogeny of Conciliterga.
- Fortunian archaeocyath sponges acquired biomineralization in the beginning of the Cambrian explosion.
- An Upper Cretaceous mesophotic coral reef (Gosau Group, Eastern Alps, Austria): Significance for the palaeoreef record.
- A description of new sauropodomorph cranial material from the Lower Jurassic Lufeng Formation of Yunnan Province, P. R. China.
- A new metriacanthosaurid theropod dinosaur from the Middle Jurassic of Yunnan Province, China.
- Morphological stasis in the mite family Caeculidae: *Caeculus aeternus* sp. nov., a remarkable fossil species of rake-legged mite from Baltic amber.
- Oligo-Miocene marine bivalves from the Kutch Basin (western India) and their biogeographic implications in the context of Tethyan closure.
- A new avian footprint taxon (*Gragliavipes gavenskii*, Ignotornidae) from the Cenozoic of South America and a reappraisal of avian ichnofamilies from the Cretaceous and Cenozoic.
- Middle Jurassic *Ginkgoites* fossils from the Weijiadi Coal Mine of Baiyin City, Gansu Province, and indications of the paleo-CO2 concentration.
- Permian fossil whispers of ancient climates and forests: a megafloral-palynofacies odyssey in a part of eastern India.
- Down to earth: therian mammals became more terrestrial towards the end of the Cretaceous.
- New digital anatomical data of *Keichousaurus hui* (Reptilia: Sauropterygia) and its phylogenetic implication.
- A new specimen of *Plesiopterys wildi* reveals the diversification of cryptoclidian precursors and possible endemism within European Early Jurassic plesiosaur assemblages.

- Phosphatic stromatoporoid sponges formed reefs ~480 Mya.
- The Canadian fossil record supports anagenesis in *Triceratops* (Ornithischia, Ceratopsia).
- Physiology and climate change explain unusually high similarity across marine communities after end-Permian mass extinction; Phys.org summary here.

Ore and Petroleum Deposit Geology

- Carbonaceous Shale Deposits as Potential Unconventional Sources for Rare Earth Elements at the Witbank Coalfield, Permian Vryheid Formation, South Africa.
- Constraining role of organic matter in P-U mineralization: A case study of the Bahuang uranium-rich phosphorus deposit in eastern Guizhou, China.
- Geology of the Bisie wood tin (cassiterite) deposit and its host rocks, North Kivu Province, DR Congo.
- Petroleum geology: A synergistic approach to enhanced oil recovery by combining in-situ surfactant production and wettability alteration in carbonate reservoirs.
- Zircon U-Pb Geochronology and Hf Isotopes of the Granitoids from Cahanwusu Cu Deposit in Awulale Mountain, Western Tianshan: Implication for Regional Mineralization.
- Decoding imprints of hydrothermal alteration around Imalia polymetallic sulphide deposit, Central Indian Tectonic Zone, and its implications on ore genesis.

Mining and Energy

- Nuclear safety commission OKs construction of Ontario small modular reactor.
- CHART: Mining stocks massacre as copper price craters by 9%.
- It’s not just copper: Australian Energy Stocks Plunge as Panic Selloff Expands.
- Greed and fear: Panic selling hits oil markets as crude prices fall more than $10/bbl in 2 days; related: Today’s Oil Prices Aren’t Survivable For US Producers.
- 'Largest' Rare Earth Metals Deposit Discovered in Kazakhstan.
- Mining research and operations in the Wagner and Vivaldi mines (León Province).
- DoE Hands the Keys to Strategic Crude Oil Stockpile to New Firm.
- U.S. uranium production in 2024 was highest in six years.
- Aging refineries: One in Five Refineries Faces Shutdown Despite Rising Fuel Demand.
- China Uncovers 110 Million Tons of Oil in Major South China Sea Find – and It Changes the Game.
- An American mine still has millions of tons of copper, if companies can get to it.

- Why Canadian oil is sold to the U.S. at a 'discount' and have tariffs made things worse?
- Saudi Arabia Faces Oil Price Dilemma.
- Coin-sized nuclear 3V battery with 50-year lifespan enters mass production.

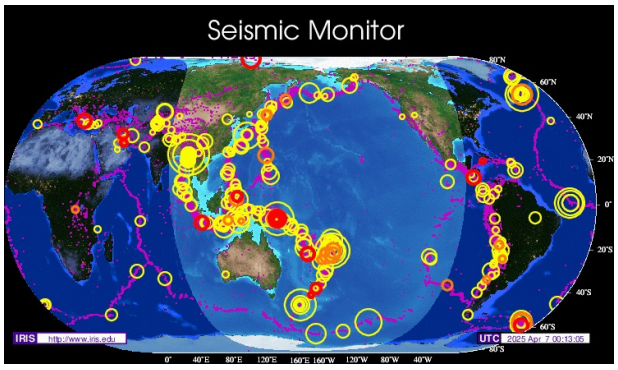
Environmental Geology and Hydrogeology

- Correlating Groundwater Level Fluctuations of a Fractured Confined Aquifer With Relative Variations in Seismic Velocity: A Way to Estimate the Groundwater Storage.
- Decrease in the Permeability of Microcracked and Macrocracked Granite at Elevated Pressure and Temperature.
- Assessing Shallow Groundwater Depth and Electrical Conductivity in the Brazilian Semiarid: A Geostatistical Analysis.
- Latitudinal gradients of snow contamination in the Rocky Mountains associated with anthropogenic sources; Gizmodo summary here.

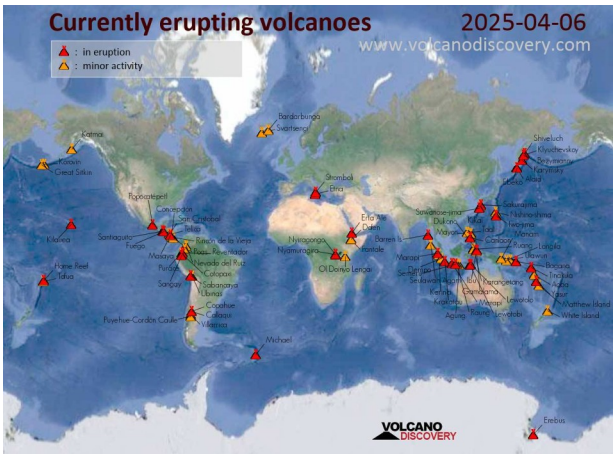
Glaciers and Climate Change

- Stratospheric residence time and the lifetime of volcanic stratospheric aerosols.
- Giant iceberg meltwater increases upper-ocean stratification and vertical mixing; Phys.org summary here.
- Holocene climate change: Monsoonal imprint on late Quaternary landscapes of the Rub' al Khali Desert; Phys.org summary here.
- Periglacial environment: Lengthening of biogeochemical processes during winter in degraded permafrost soils.

Volcanoes, Earthquakes and Geohazards



Seismic Monitor



Active Volcano Map

Volcanoes

- Smithsonian / USGS Weekly Volcanic Activity Report.
- United States Geological Survey (USGS) Volcano Observatories:
  - Cascades Volcano Observatory Weekly Update.
  - Volcano Watch – Kīlauea's continuing summit eruption.
  - Spectacular waterfalls are an often-hidden gem of Yellowstone National Park.
- Unusual activity observed as the eruption progresses
- Iceland evacuates Blue Lagoon amid volcano eruption.
- Alaska: Background and science behind Mount Spurr and what you should know.

Earthquakes

- Euro-Mediterranean Seismological Centre (EMSC).
- Earthquakes Monitoring Live Worldwide.
- Earthquake research: Precise aftershock activity in the marine source region of the 2024 Noto-Hanto earthquake by rapid response observation using ocean bottom seismometers.
- Fault Geometries of the 2024 Mw 7.5 Noto Peninsula Earthquake From Hypocenter-Based Hierarchical Clustering of Point-Cloud Normal Vectors
- Kyle Bradley and Judith A Hubbard: Further thoughts about the very long fault rupture in Myanmar.
- More from Kyle and Judith: Surface ruptures of the Myanmar M7.7 earthquake mapped from space.
- Earthquake research: Examining the Effects of Basin Interfaces on Ground Motions with Lab-Based Seismic Data Obtained Using a 3D-Printed Basin Model.
- Earthquake research: Tracking Tsunamigenic Slip Across the Japan Trench (JTRACK); SciTechDaily summary here.

Comments

If anyone has comments on any of my postings, please leave a comment on the Linkedin page for the posting or email me at raymondreichelt@gmail.com.

Free Geology Books and Other Stuff

Free geology books can be downloaded from these sites:

- OreZone Readers and Experts Telegram Channel; the Ore Zone channel also shows employment opportunities for geologists.

- The Groundwater Project has many groundwater geology books for free download.
- Free Groundwater Modeling Course – HydroGeoCenter.
- From Western Australia: Carbonatite, lamprophyre and host rocks in the northern Aileron Province.
- Two volumes of Geology of Indonesia now can be accessed for FREE/GRATIS. The books can be accessed from: vol 1 https://lnkd.in/eH6Gcka4; vol 2 https://lnkd.in/egTYmpjk.

Upcoming Events

- 4th Annual MPDA Reconciliation Forum & Gala, April 10, 2025, Winnipeg.
- Williston Basin Petroleum Conference, April 28-30, Regina Saskatchewan
- European Geosciences Union: EGU General Assembly 2025, Vienna, Austria & Online 27 April–2 May 2025.
- ISMAR 2025 – International Symposium on Controlled Aquifer Recharge April 28 – May 2, 2025 – Stellenbosch, South Africa
- The USGS David A. Johnston Cascades Volcano Observatory will be hosting an Open House for the public on May 10, 2025!
- Geoscience Beyond Borders, GAC-MAC-IAH-CNC 2025 Ottawa, Ontario, May 11-14, 2025.
- Sedimentary Geology and the Energy Transition Conference, June 2-5, 2025 – Salt Lake City, UT USA.
- Society for Sedimentary Geology conference, Mountjoy IV – August 10-13, 2025, in Montreal, Canada.
- Copper to the World Conference, Tuesday 26 – Wednesday 27 August 2025, in Adelaide, Australia; report on 2024 conference here.
- GeoManitoba 2025 78th Annual Canadian Geotechnical Society Conference & 9th Canadian Permafrost Conference, RBC Convention Centre, Winnipeg, Manitoba, September 21 – 24, 2025.
- 29 September -1 October 2025, Stuttgart, Germany, Nature Conference on Advancing Perovskite-Based Photovoltaics.
- 5th International Professional Geology Conference (IPGC), November 5 to 7, 2025, Zaragoza, Spain.
- 2025 Society of Petroleum Engineers Distinguished Lecturer Schedule.
- List of geoscience events in 2025 from the International Union of Geological Sciences.
- American Geophysical Union List of Upcoming Meetings.
- The Geological Society: Events & Courses.

April 7, 2025

Geology and the Fate of Societies – Israel and Palestine

Figure 1a – Israel & Palestine
Credit: CIA World Factbook, public domain

Figure 1b – Location of Israel & Palestine
Credit: CIA World Factbook, public domain

The State of Israel and the State of Palestine are found at the eastern end of the Mediterranean Sea in the region often called the Levant. The two states are intertwined in a tragedy of mutual animosity and armed conflict. Besides historic grievances and resentments, one of the causes of the conflict it is that many

citizens in both states claim that all the territory of the other properly belongs to their country. With this in mind, I will deal with the two nations together. It is not my intent to take sides in this conflict, but rather to understand the situation as dispassionately as possible.

Basic Facts – Israel

The CIA World Factbook indicates that Israel has a total area of 21,937 square kilometres (km^2) of which 21,497 km^2 is land and 440 km^2. To the west is the Mediterranean Sea. Israel land borders are with Palestine, (Gaza Strip and the West Bank), with Egypt, Syria, Lebanon, and Jordan. Also according to the World Factbook, Israel has 9,402,617 people, 92.9% of whom live in urban areas. Of the approximately 9.4 million people in Israel, 73.5% are Jews; 21.1% are Arab; and 5.4% are something other. The Jewish population is further divided into a variety of ethnic groups, reflecting the different countries in the Jewish Diaspora who later returned to modern Israel. The major divisions among Israeli Jews are among the Ashkenazi Jews, the Sephardic Jews, and the Mizrahi Jews. Hebrew is the official language of Israel, Arabic has a special status and English is commonly used. In terms of religion, 73.5% are Jewish; 18.1% are Muslim; 1.9% are Christian; 1.6% are Druze; and 4.9% are something other including Baha'i. In terms of education, 97.8% of the total population aged 15 and over can read and write; and people can expect to spend 16 years in school.

Economically, the per capita GDP (PPP) is $55,847, the Gini coefficient is 37.9, indicating medium inequality; and the Human Development Index is very high at 0.915. The top exports of Israel are integrated circuits ($9.99b), diamonds ($9.13b), broadcasting equipment ($3.34b), medical instruments ($2.56b), and refined petroleum ($2.47b), exporting mostly to United States ($20.3B), China ($7.09B), Ireland ($4.22B), Germany ($2.75B), and Hong Kong ($2.46B). The top imports of Israel are cars ($6.19b), diamonds ($3.67b), crude petroleum ($3.23b), broadcasting equipment ($2.49b), and packaged medications ($1.93b), importing mostly from China ($13.5B), United States ($9.21B), Germany ($5.27B), Turkey ($5.02B), and Italy ($3.3B). Israel is a unitary parliamentary republic; the President is Isaac Herzog; the Prime Minister is Benjamin Netanyahu; the legislature is called the Knesset, whose speaker is Amir Ohana.

Basic Facts – Palestine

Wikipedia indicates that Palestine has a total area of 6,020 km^2 divided between the West Bank, 5,655 km^2 and the Gaza Strip, 365 km^2. Its land boundaries are with Israel, Egypt and Jordan; the Gaza Strip also borders on the Mediterranean Sea. 5,483,450 people live in Palestine, 2,949,246 in the West Bank and the rest in the Gaza Strip. About half of all ethnic Palestinians no longer live in Palestine. The Palestinian Authority considers all Palestinians to be Arabs, and Arabic is the official language. In terms of religion, 80.73 of the people in Palestine are Moslem; 13.07% are Jewish; 0.88% are Christian; 0.05% are Baha'i; and 5.27 are something other or have no religion. In terms of education 96.3% of the population over 15 years of age can read and write. Economically, the per capita GDP (PPP) is $6,642; the Gini coefficient is 33.7, indicating medium inequality; and the Human Development Index is high at 0.716. The top exports of Palestine are scrap iron ($68.6m), tropical fruits ($53.8m), pure olive oil ($10.9m), building stone ($7.56m), and other prepared meat ($5.66m), exporting mostly to Jordan ($96.6M), Turkey ($22.1M), United Arab Emirates ($14.3M), Saudi Arabia ($8.53M), and United Kingdom ($7.04M). The top imports of Palestine are cement ($136m), raw sugar ($135m), cars ($128m), baked goods ($69.8m), and perfumes ($66.2M), importing mostly from Egypt ($496M), Jordan ($338M), China ($165M), Germany ($143M), and United Arab Emirates ($137M). Palestine is a

unitary provisional semi-presidential republic; the President is Mahmoud Abbas, and the Prime Minister is Mohammad Mustafa. The legislature is the National Council whose Speaker is Aziz Dweik. The writ of the Palestinian Authority is essentially limited to the West Bank; the Gaza Strip is (or was prior to the current war) under the effective control of Hamas whose Chief in Gaza is currently Mohammed Sinwar (he may be dead by the time you read this post like this senior Hamas commander).

Both Israel and Palestine claim Jerusalem (pop. 1,253,900 in the metropolitan area) as their Capital city, which is also the largest city in both Israel and the West Bank. The Capital of the Gaza Strip is Gaza City (pop. 590,481 in 2017, unknown now).

Demographics

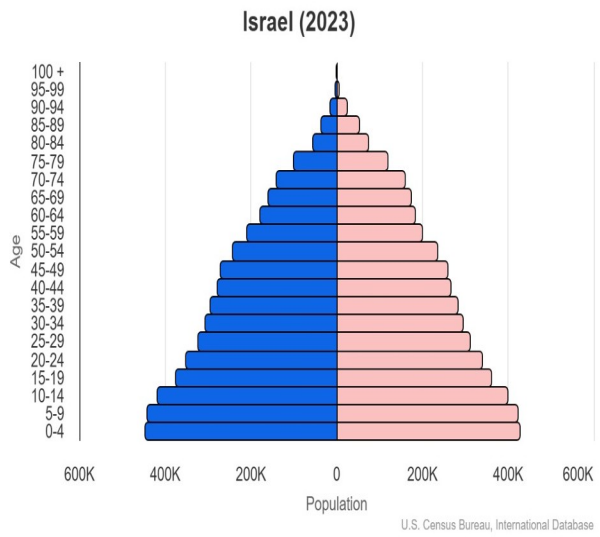


Figure 2a – Demographics of Israel
Credit: U.S. Census Bureau, International Database, public domain

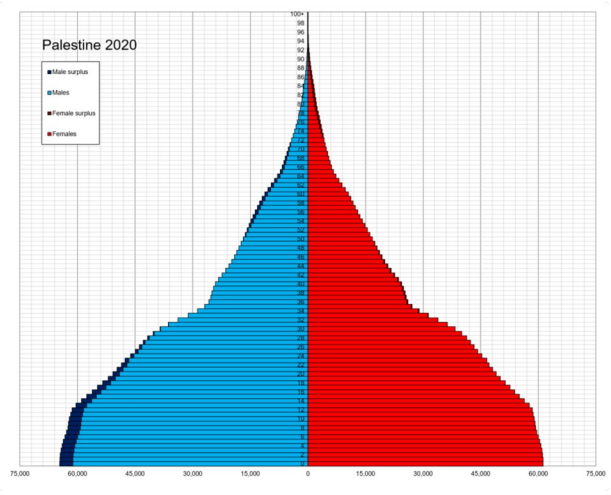


Figure 2b – Demographics of Palestine
Credit: Sdgedfegw, Creative Commons Attribution-Share Alike 4.0 International license

In terms of demographics, both Israel and Palestine are young societies. In Israel, 27.5% of the population are under 15 years; in Gaza, 38.8% are less than 15 years; and in the West Bank, 36.7% are under 15.

In Israel, the median age is 30.1; the total fertility rate is 2.94 births per woman and the annual growth rate is 1.56%. The life expectancy for Israelis of both sexes is 82.2. Israel is also growing through immigration, 1.9 migrant(s)/1,000 population in 2024.

In Palestine, the median age in Gaza is 19.5, and in the West Bank it is 21.9. The total fertility rate for the West Bank is 3.49 births per woman and 3.26 births per woman for Gaza. The annual growth rate is 2.02% for Gaza and 1.69% for the West Bank. The life expectancy for the people of Gaza, for both sexes, is 75.5 years and 76.5 years for both sexes in the West Bank. The current net migration rate for the West Bank is -3.8 migrant(s)/1,000 population and for -3.7 migrant(s)/1,000 population for Gaza (before the current war).

Geology

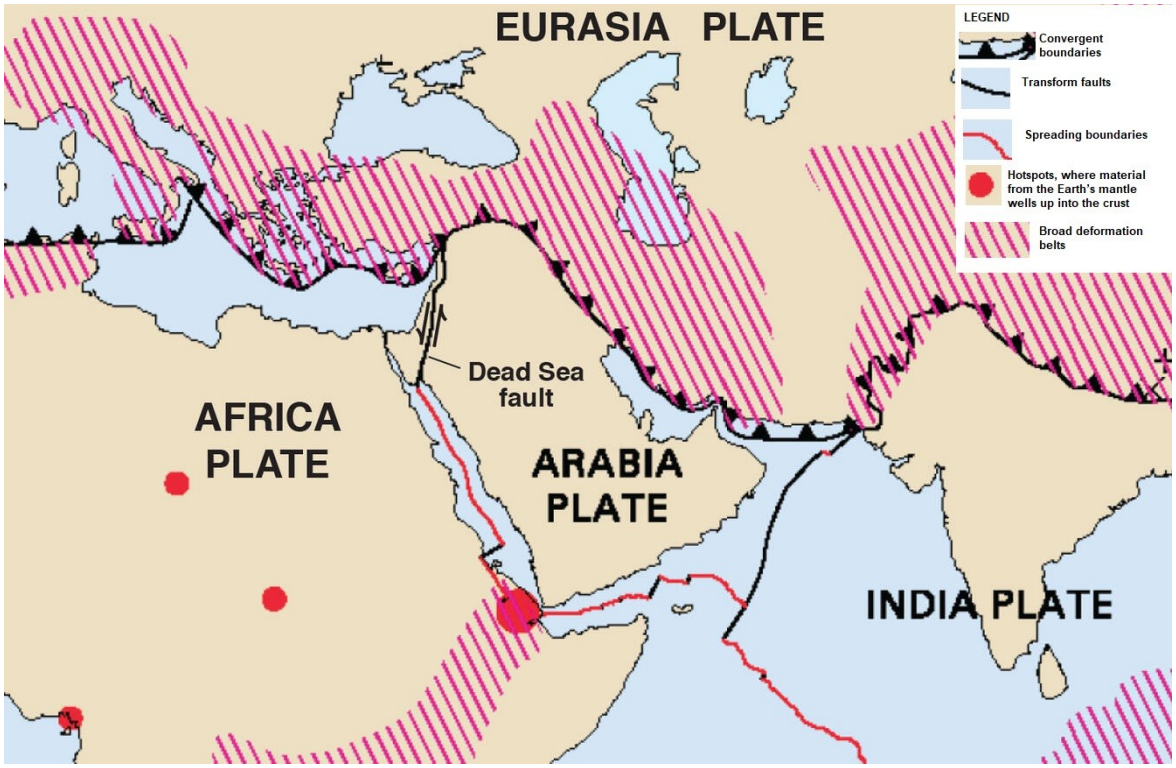


Figure 3 – Plate Boundaries of the Middle East
Credit: Woods Hole Coastal and Marine Science Center, public domain

Tectonically, Israel & Palestine sits at the convergence of the African Plate and the Arabian Plate that are separated by the Dead Sea Fault. To the south, under the Gulf of Aqaba and the Red Sea, the Dead Sea Fault connects to the East African Rift Zone. To the north, both the African and Arabian Plates are converging with the Eurasian Plate in the current Alpine Orogeny.

The youngest deposits in Israel & Palestine are Quaternary aged sedimentary deposits; these include sandstone, mudstone, oolitic limestone, conglomerate, gypsum, and aragonite varves together with travertine, calcareous sandstone, red sandy loam, and alluvium.

Going older into the Neogene Period, rocks from the Pliocene Epoch in Israel &Palestine include the marl of the Yafo Formation; and the marl, conglomerate and sandstone 20 meters thick in the Bira, Gesher and Pleshet formations. Older still, in the Miocene Epoch are: the limestone of the Lakhish Formation; the sandstone, mudstone, siltstone, and conglomerate of the Hordos and Umm Sabun formations; and the limestone of the Ziqlaq Formation.

Older still, beginning in the Oligocene Epoch of the Paleogene Period and continuing into the Miocene, the Tethys Ocean closed in the vicinity of the Eastern Mediterranean. Eocene aged formations include: the chert and chalk of the Adulam Formation; the limestone of the Timrat, Meroz, and Yizre'el formations; the chalk of the Maresha Formation, the Avedat Group and the Bet Guvrin Formation. Paleocene aged formations include the chalk, marl and clay of the Mount Scopus Group.

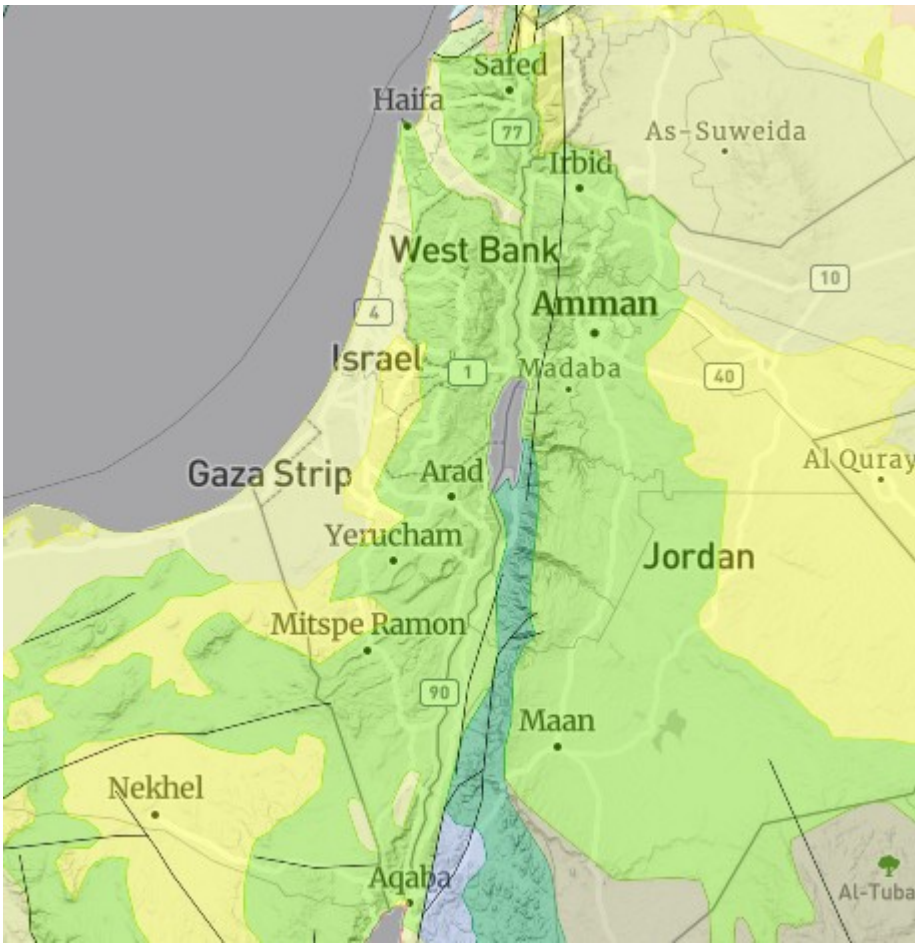


Figure 4 – Interactive Geology Map of Israel & Palestine (click on the map to go to interactive function)
Credit: Macrostrat, Creative Commons Attribution-Share Alike 4.0 International license

Going deeper into the Mesozoic Era, microgabbro and diabase intrusions were common. The upper part of the Cretaceous Period rocks includes the "Mottled Zone of Hatrurim Formation made up of pyrometamorphosed rocks ranging in age from Eocene to Maastrichtian; the Hatrurim Formation also includes limestone along with coal-bearing chalk and marl. Other Cretaceous aged rocks in Israel & Palestine includes: the limestone, dolomite, chalk, marl and phosphorite) of the Mishash Formation; the sandstone, limestone and clay of the Kurnub Group; the marl, chalk, sandstone and limestone of the Nabi Sa'id, Ein el Esad, Hidra, Rama and Kefira formations; together with the Lower Cretaceous aged Tayasir volcanic deposits. Jurassic Period rocks in Israel and Palestine include the limestone and marl of the Matmor Formation.

Few rocks older than the Jurassic Period outcrop in Israel & Palestine. Sandstone, limestone, clay, and gypsum deposits in Central Israel & Palestine date from the Permian Period of the Paleozoic Era and extend into the Triassic Period of the Mesozoic. Among the other rocks of Paleozoic age are: the Ordovician aged Disi Sandstone Formation in the southern Negev region; the sandstone, conglomerate, mudstone, dolomite and limestone of the Cambrian aged Yam Suf Group and the Cambrian Shehoret and Netafim formations, also in the south. There are other Cambrian aged rocks in central Israel & Palestine, these include: the Burj Dolomite Shale formation (which includes sandstone, dolomite, and mudstone) and the Umm Ishrin Sandstone Formation.

Among Precambrian aged rocks in Israel & Palestine are the igneous and metamorphic crystalline basement rocks of the Arabian Plate. These include a wide variety of crystalline rocks.

The outline above is very basic. For further information, check out the following papers and maps for a start:

- 2004, The geological map of Israel in scale 1:50,000, very detailed.
- Derin, B. I., 2020, *The Structure And Evolution Of The Subsurface Geology Of Israel Upper Paleozoic To Neogene*.
- Gardosh, M., Druckman, Y., Buchbinder, B., Rybakov, 2008, *The Levant Basin Offshore Israel, Stratigraphy, Structure, Tectonic Evolution and Implications for Hydrocarbon Exploration*, Geological Survey of Israel.

Resources

The important resources of Israel & Palestine are food production (agriculture and fishing), water resources, and mineral resources. While there are some forest lands in the country, indeed the Israelis have planted new ones, they are not critical in assessing their geopolitical situation. (Forest makes up 6.5% of the land area of Israel and 1.7% of the land in Palestine).

Food Production

Figure 5 – Taking in the Harvest at Kibbutz Dan ca. 1939
Credit: unknown author, public domain

People have been growing crops in the Levant since the Neolithic and agriculture remains important to both Israel and Palestine, despite its apparently small contribution to their GDP, i.e. people got to eat. According to the CIA World Factbook, agriculture uses 29.5% (17.2% arable land, 4.7% permanent crops, 7.6% permanent pasture) in Israel; and 64.9% (7% arable land, 11.8% permanent crops, 46.1% permanent pasture) in Palestine. Israel has 1,927 km^2 of irrigated land and Palestine has 151 km^2. Large

areas of both Israel (64%) and Palestine (33.4%) have other or no use, i.e. urban areas and desert. Agriculture makes up 1.2% of Israeli GDP and 5.7% of Palestinian GDP.

The top ten agricultural products based on tonnage in Israel were: dairy products, chicken, potatoes, tomatoes, tangerines/mandarins, bananas, eggs, avocados, beef, carrots/turnips in 2023. In Palestine, the top agricultural products in2023 were tomatoes, cucumbers, olives, poultry, milk, potatoes, sheep milk, eggplants, gourds in the West Bank; and in the Gaza Strip they were tomatoes, milk, cucumbers/gherkins, olives, potatoes, sheep milk, eggplants, pumpkins/squash, grapes, goat milk. Production statistics from the United Nations Food and Agriculture Organization (FAO) can be found here. Also, according to the FAO, 12.2 % of the Israeli population and 27.4 of the Palestinian population suffered from moderate to severe food insecurity in 2021-23.

Fishing in the Sea of Galilee, ca. 1945
Credit: roni manor (מלבסקי), public domain

Israelis do most of the fishing in Israel & Palestine. Although the residents of Gaza have a small fishing industry, despite of restrictions imposed by war and their Israeli neighbours. The current war in Gaza will probably extinguish the fishing industry there.

Israelis harvest wild fish in the Mediterranean sea, the Gulf of Aqaba, and Sea of Galilee, as well as raising fish via aquaculture. Species harvested from the Mediterranean include mullet (Red And Striped), grouper, Sea bream (Striped And Black), pink dentex, Shi drum, Hake, Sea eagle, sardines, mackerel, Blue runner, Amberjack, Dolphin-fish, and Albacore tuna. Species harvested from the Sea of Galilee include: Galilee St. Peter's Fish, Blue tilapia, Barbel (Longhead, Large scale, Damascus), Kinneret bleak, Tiberias sardine, Silver carp, Grey mullet, and Catfish. Species harvested from the Gulf of Aqaba, out of the port city of Eilat include mackerel and mullet. Aquaculture in Israel mostly raise carp, rainbow trout, and gilt-head sea bream. Statistics on fishery production in Israel from the FAO can be found here. Also, if you are interested in sports fishing in Israel, check out this site.

Water Resources

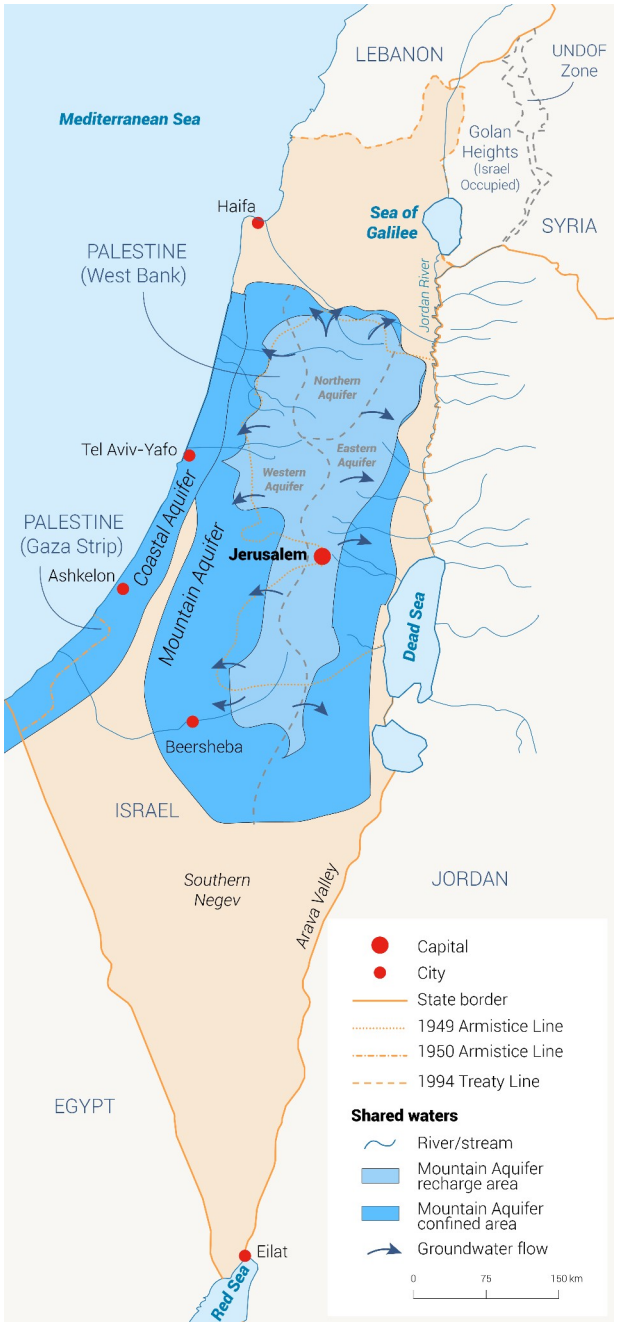


Figure 7a – Generalized map of the shared waters of Israel, Palestine and Jordan, Credit: ©Fanack Water

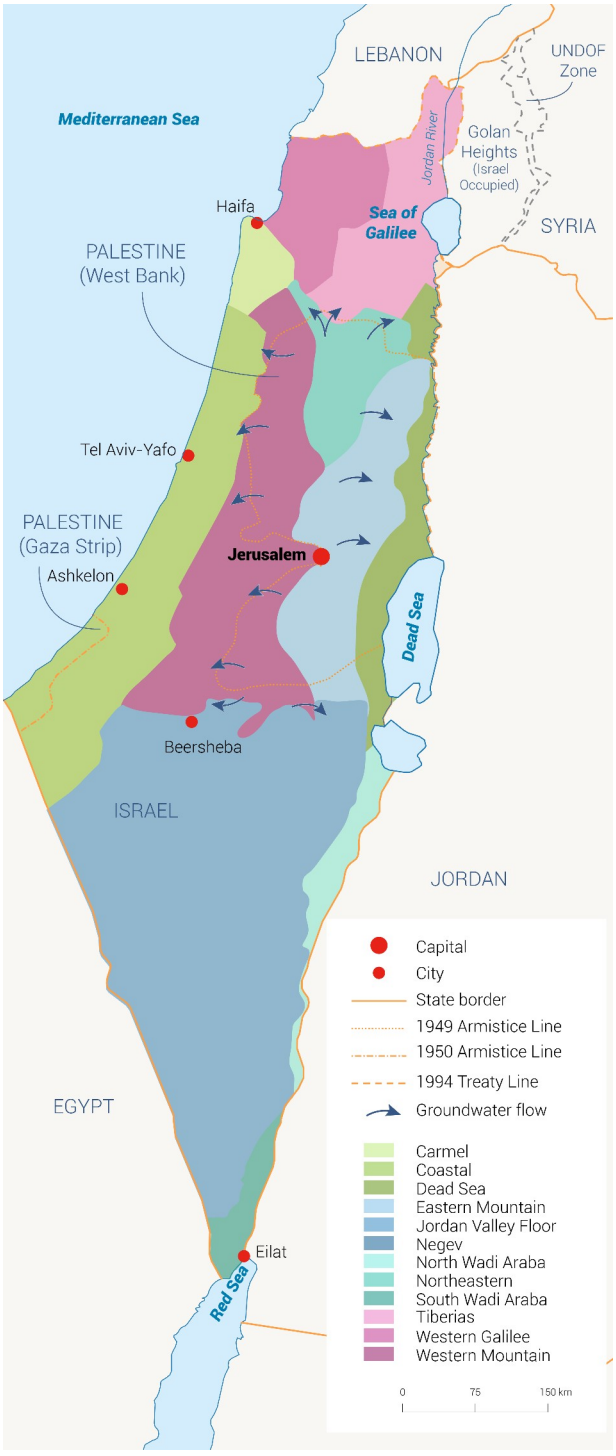


Figure 7b – The Coastal Aquifer and Mountain Aquifer, Credit: ©Fanack Water

When considering the water resources of Israel & Palestine, keep in mind the saying from the Western United States that "Whiskey Is for Drinking; Water Is for Fighting". Water is necessary for human health

and sanitation; it is also the key resource for irrigation agriculture. Conflict between Israelis and Palestinians over water use is an ongoing part of the regional situation as is Israeli conflicts with Syria and Jordan over the same issue. Most recently, Israeli forces seized a dam on the Yarmouk River in southern Syria.

The main water sources in Israel & Palestine are surface water and groundwater. Also, the Israelis are producing 55% of their domestic water supply by desalination of seawater. The main surface water sources are the Jordan River, the Sea of Galilee, and the Yarmouk River. Several small streams such as the Kishon River and Yarkon River are also used. All the surface water sources in Israel & Palestine are heavily used. The Jordan River, historically a muddy stream, is now severely polluted in its lower reaches.

Groundwater sources are also critical to life in Israel & Palestine. Groundwater has been used since ancient times, most notably at Jacob's Well, believed to have been dug by the Biblical Patriarch Jacob, (believed to be the progenitor of Israel). The major aquifers in Israel & Palestine are the Mountain Aquifer and the Coastal Aquifer. The Mountain Aquifer is further subdivided into the Yarqon-Taninim basin, the Western Galilee basin, the Mount Carmel basin, the Kinneret basin, the Eastern Mountain basin, the Negev basin, and the Arava basin. Both the Coastal and Mountain aquifers are heavily subscribed; the Mountain Aquifer alone supplies 1/3 of Israel's water needs. Heavy use of the aquifers means that their overuse will remain a chronic problem. Groundwater quality has suffered in the Coastal Aquifer as high groundwater abstraction has led to salt water seepage into the aquifer. The flooding of the tunnels in Gaza with seawater will probably render that aquifer unusable. Water quality problems are likely to remain another source of conflict in the region.

Mineral Resources

Figure 8 – Salt Crystals from the Dead Sea
Credit: Uzi Paz Pikiwiki Israel, Creative Commons Attribution 2.5 Generic license

The USGS report on the Mineral Industry of Israel indicate that they mostly produce industrial minerals and natural gas; production statistics here. While there is no USGS report on the mineral industry of Palestine, a quick search indicates that dimension stone is the main mineral extraction activity in the Palestinian controlled territories.

The production facilities for industrial minerals in Israel include:

- The production of potash, bromine, sodium chloride (salt), magnesia, magnesium chloride and metal magnesium at the Dead Sea Works, Sodom (yes, that Sodom);
- Phosphate rock at the Oron, Rotem, and Zin Mines in the Negev Desert;
- Salt from Israel Salt Industries Ltd. facilities in Eilat and Haifa;
- Lime, limestone, silica sand and clay from Negev Industrial Minerals Ltd.; and
- Cement from numerous production facilities.

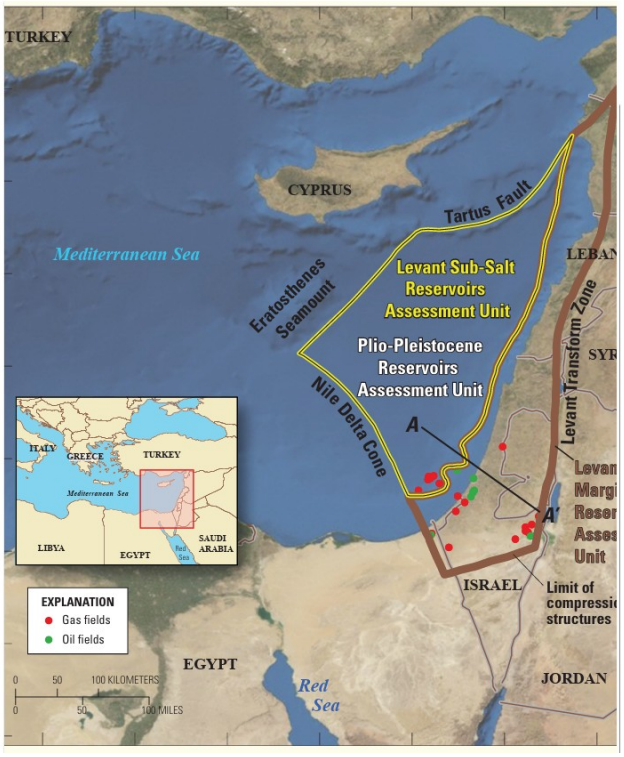


Figure 9 – Assessment of Undiscovered Oil and Gas Resources of the Levant Basin Province, Eastern Mediterranean, Credit: USGS, public domain

Mineral fuel production in Israel comes from:

- Petroleum from the onshore Heletz oilfield, 70 km south of Tel Aviv;
- Natural gas from the offshore Leviathan gas field; and
- Natural gas and condensate from the offshore Tamar gas field.

For further information on the potential for further oil and gas production in the Eastern Mediterranean off shore of Israel & Palestine, check out:

- USGS Fact Sheet 2010–3014 (Figure 9 extracted from that report); and
- Xiaobing et al, 2017.

Although no longer in operation, historical mining operations for copper in the Negev Desert, the so-called King Solomon's Mines, operated in the Timna Valley from the eleventh to ninth centuries BC.

Figure 10a and 10b, below, link to interactive mineral occurrence maps of Israel and Palestine.

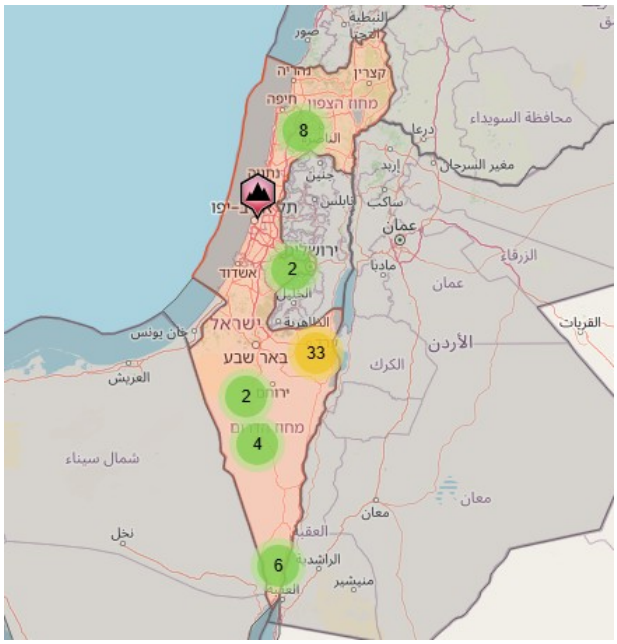


Figure 10a – Interactive Mineral Occurrence Map of Israel, Credit: ©Mindat.org

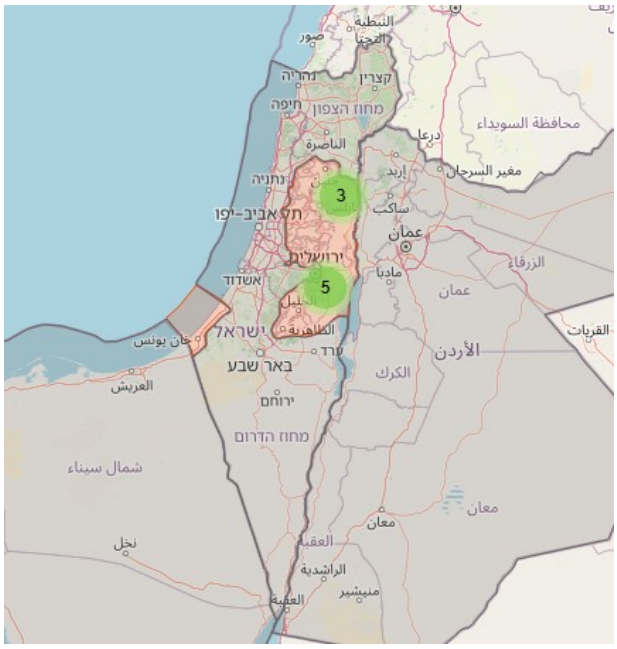


Figure 10b – Interactive Mineral Occurrence Map of Palestine, Credit: ©Mindat.org

Climate

Israel & Palestine have temperate climate that grades to hotter and dryer in southern and eastern desert areas. The climate zones include:

- Cold desert climate, BWk;
- Hot desert climate, BWh;
- Hot semi-arid climate, BSh;
- Hot-summer Mediterranean climate, Csa; and
- Cooler climates around Mount Hermon, Csb, Dsb, Dsc.

Although Israel and Palestine are frequent sites of armed conflict, as in the current war, they also remain frequent destinations for tourism including religious pilgrimage Before you go, check out the tourism advisories (here and here). Also, check out Lonely Planet and Climates to Travel. In a few years, if Donald Trump has his way, Gaza could become the "Riviera of the Middle East".

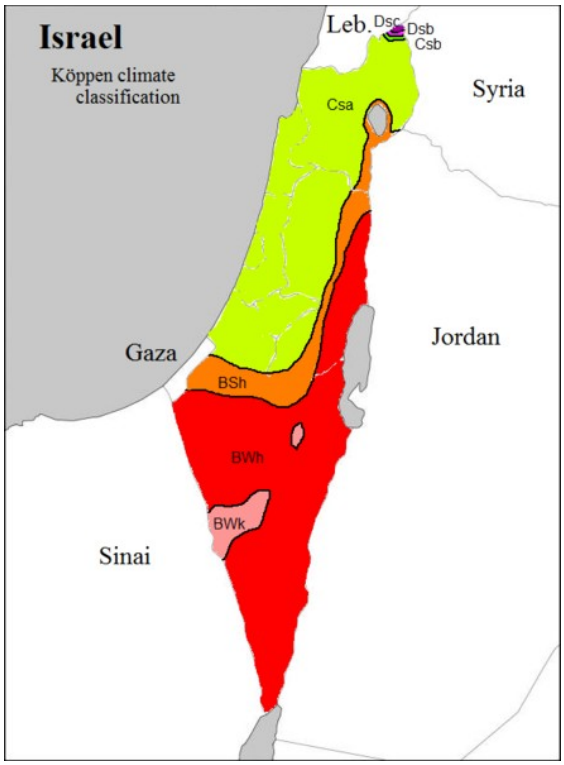


Figure 11- Köppen Classification Map, Israel Credit: Herr J. Fleischer, Creative Commons CC0 1.0 Universal Public Domain Dedication

History and Geopolitics

History – War and Conquest

Figure 12 – Kingdoms of Israel and Judah, ca. 9th Century BC
Credit: FinnWikiNo, Creative Commons Attribution-Share Alike 3.0 Unported license

The histories of Israel and Palestine goes back to the Paleolithic and involves a long history of conflict and conquest. If you like details, check out these sites here and here. Here is a summary:

The beginnings of both the Israeli and Palestinian peoples go back to the Late Bronze Age Collapse, when the Egyptian rule over the various small polities of Canaan ended and a period of anarchy ensued. Semitic tribes who escaped Egyptian slavery, possibly in Egypt proper but also in the mines of the Sinai,

formed up into a loose confederation that became the Israelites mentioned in the Bible. Also, following the Late Bronze Age Collapse, a group of the Sea Peoples that the Egyptians called the Peleset settled along the Canaanite coastline. The Israelites called them Philistines, and the coastline eventually came to be called Palestine.

The conquest of Canaan by the Israelites is recorded in the Book of Joshua in the Bible. It is pretty grim reading with the Israelites regularly conducting genocidal campaigns against the Canaanites and anyone else that got in their way. It was the beginning of a long history of bloodshed. Eventually the Israelites formed a Kingdom under Kings Saul, David, and Solomon. After Solomon, the Israelite kingdom split unto two. The Books of Judges, Samuel (1&2), Kings (1&2), and Chronicles (1&2) in the Bible record many, almost continuous, armed conflicts among the polities of Canaan during the Early Iron Age.

The independence of the two Israelite Kingdoms, and the other polities in the region, did not last for long. First, the Assyrians conquered the northern kingdom and took away most of the inhabitants of – the so called Ten Lost Tribes. The Babylonians then conquered the whole of the Levant, carrying off much of the population of Judah to Babylon. After the Babylonians were in turn conquered by the Persians, some of the Jews, as they were now called, were allowed to return to Judea and rebuild Solomon's Temple. The Greeks under Alexander of Macedon later conquered the Persians. Alexander's successors ruled until the Romans under Pompey conquered them. King Herod, Rome's client king, built the Second Temple. Later, during Roman rule, Jesus of Nazareth preached and his followers established Christianity. The Jews in Roman Palestine revolted repeatedly against their rulers. Eventually, the Romans destroyed Jerusalem and expelled many of the Jews from Palestine. Those people who stayed behind, including Christian Arabs and others, were among the ancestors of the Palestinians.

The Romans ruled in Palestine until Arab followers of Mohammad conquered the land. The Arabs were eventually replaced by the Muslim Turks, first Seljuks and then the Ottomans. Also, Western European Crusaders, established the Crusader States until the Muslims drove them out. Moslem rule of the Levant under the Turkish Caliph continued until modern times.

The modern history of Israel & Palestine begins with rule of the Ottoman Empire in the Levant. During the late 19th Century and early 20th Century European Zionists began to settle in the Ottoman Syria, adding to the Jewish population already living there from ancient times. Following World War 1, the British took control of Palestine. Throughout the British rule in Palestine, there was conflict between the Arab and Jewish population. The British tried to put restrictions on Jewish migration to Palestine despite their promises to the Jews of Europe in the Balfour Declaration. Jews continued to come and resistance by the Arabs brought on a revolt in 1936-39.

During World War II, the British raised a brigade of Jewish soldiers from Palestine. This became the core of the Israeli Army after the Declaration of the State of Israel when the United Nations partitioned Palestine in 1948 between a Jewish state and a Palestinian one. The Israelis were going to need an army because the first thing that the neighbouring Arab states, Egypt, Syria, and Jordan, did after the establishment of the State of Israel was to go to war to eliminate Israel. Having many people who had survived the Holocaust in WW2, the new State of Israel was not going just roll over and die. In fact, the 1948 Arab Israeli War went very badly for the Arab states. It also went badly for the Palestinians who left or were expelled from their lands in the new State of Israel, losing much of what had been set aside for them in the United Nations' partition plan.

Things continued to go badly for the Arab states in subsequent wars with Israel in 1956, 1967, 1973, and 1982. After these failures by neighbouring Arab states to get rid of the Israelis, the Palestinians began a guerrilla war against Israelis called the Intifada. The Intifada falls into what William Lind calls is a Fourth Generation War and is marked by regular attacks on civilian population, such as that of Israel. This war continues to this day with the October 7th, 2023 attack by Hamas being the most recent operation in the campaign. The Israeli response to the October 7 operation by Hamas led to the current Gaza War.

While there have been many attempts to broker a peace deal between the Israelis and Palestinians, none have succeeded and there is little hope that the two sides will actually come to a lasting agreement.

Geopolitics – No Place to Retreat

Figure 13 – Dome of the Rock on the Temple Mount Jerusalem
Credit: Ralf Roletschek, GNU Free Documentation License, Version 1.2

The tragic conflict between Israel & Palestine has deep roots and is ultimately, a consequence of mutually exclusive goals. The sad truth is that, for both sides, there is no place to retreat.

The Israelis have a great deal going for them, despite their internal divisions. They have a powerful military backed up with a modern industrial state. They also have nuclear weapons. They have a strong friend in the United States. They will continue to aggressively defend their interests, even it means committing horrible atrocities against the Palestinians. It is fight to the finish, and they have no intention of losing.

Things are not so favourable for the Palestinians. They have few friends and are mostly dependent on international charity. The Palestinians cannot expect too much overt help from the neighbouring Arab states, since an effective invasion of Israel by Egypt, Syria and/or Jordan would most likely trigger nuclear retaliation. The help for the Palestinians from the Arab states, such as that given to the Palestinian Authority in the West Bank and Hamas in Gaza, is generally intended as humanitarian aid, even if that aid that gets diverted to other purposes.

Also in the game is Iran. Iran supports Hamas and has even attacked Israel directly with missiles. They, too, are playing with nuclear fire if they are too successful against the Little Satan, as the Iranian leadership calls Israel.

Another regional player in the background is the modern successor stat to the Ottomans, The Republic of Turkey. The Turks are none too happy with Israel's treatment of the Palestinians. Also, the Turks are currently involved in the troubles in neighbouring Syria, and may have ambitions to re-establishing their hegemony of the Levant, if only to put an end to the murderous squabbles. However, if the Turks mess with Israel too much, they too could be playing with nuclear fire. On the other hand, both the Turks and Israel have a common interest in developing the natural gas/petroleum resources of the Levantine Basin so they are likely to have a complicated relationship.

That wraps up this short look at Israel and Palestine. It is hard to be optimistic about Israel and Palestine. Contrary to the statements of those who hate either (or both) Jews and Arabs say, neither are fundamentally worse than any other human beings. Rather, theirs is a tragedy of history and politics that guarantees conflict. The harsh reality is that neither side can afford to compromise, since any such compromise will be seen as an existential threat by some, or most, of their people – people with guns who have demonstrated a willingness to use them. It should be noted that the political organizations that run Gaza, Hamas, and the West Bank, Fatah, have it as a requirement of their contitutions that they work to destroy Israel; so they won't or can't give up their war against Israel. While the Israelis have no such law, the behavior of Israelis in their war with the Palestinians suggest a deep antipathy toward Arabs that is unlikely to go away any time soon. That innocent people on both sides suffer is also guaranteed in this situation.

I can't foresee a happy ending to this story. There are reasons why Christians and Moslems hope for the Last Judgment.

Standard Caveat

J. Robert Oppenheimer on freedom and scientific inquiry

The purpose of my weblog postings is to spark people's curiosity in geology. Don't entirely believe me until you've done your own research and checked the evidence. If I have sparked your curiosity in the subject of this posting, follow up with some of the links provided here. If you want to, go out into the field and examine some rocks on your own with the help of a good field guide. Follow the evidence and make up your own mind.

In science, the only authority is the evidence.