Jersey: description of 1:25 000 Channel Islands Sheet 2

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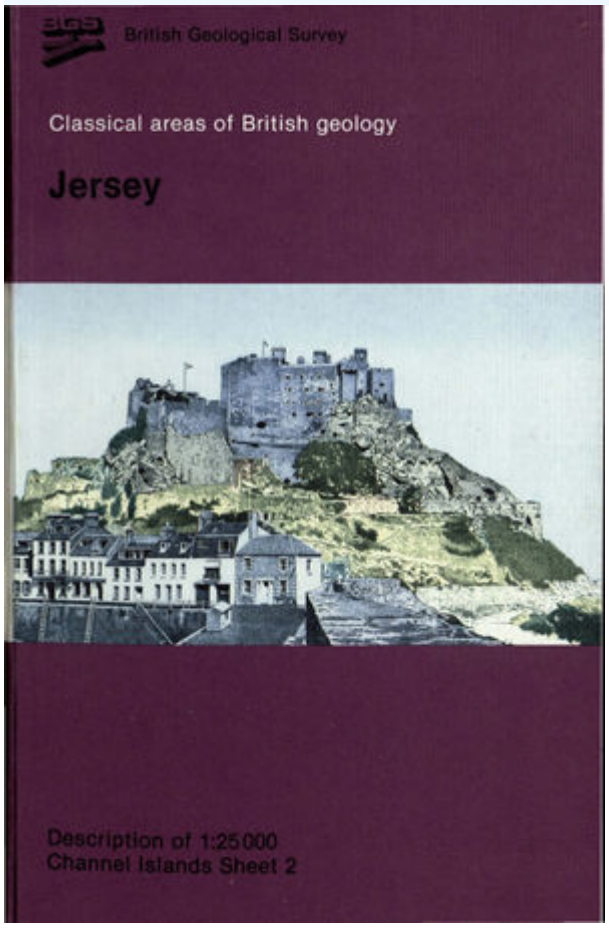
Jersey (Channel Islands Sheet 2). 1:25 000 series - Classical areas of British geology



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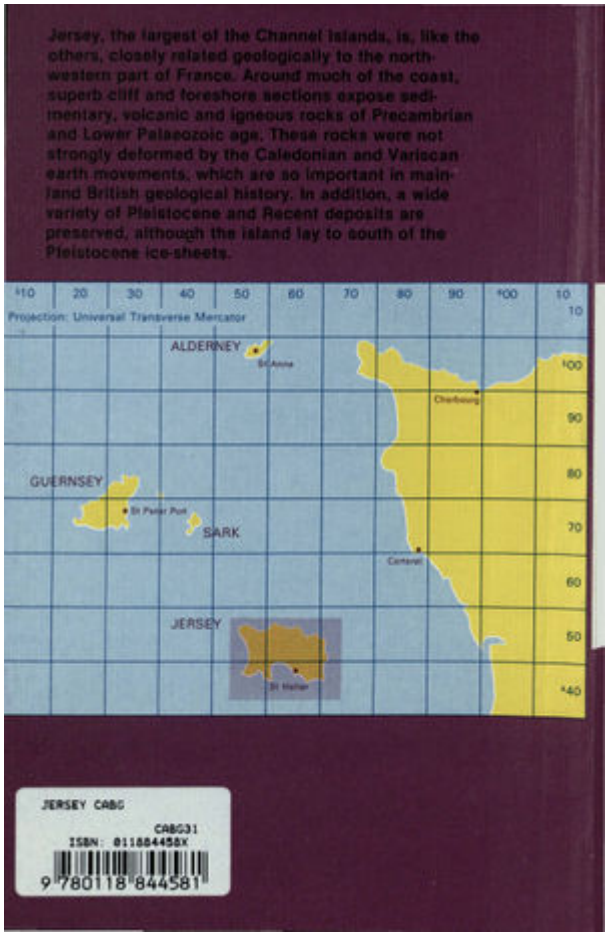

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Preface

This handbook describes the geology of Jersey, as depicted on the 1:25 000 map published in 1982, and is intended to be read in conjunction with the map.

A geological survey of Jersey was carried out between 1972 and 1977, under a Natural Environment Research Council research contract, by staff of Queen Mary College, University of London, on behalf of the Institute of Geological Sciences (now the British Geological Survey) and the States of Jersey (Island Development Committee). The field work was directed for Queen Mary College by Professor J. F. Kirkaldy until his retirement in 1974, and then by the late Professor W. W. Bishop, supervision being the responsibility of Dr A. C. Bishop and Dr W. J. French. Mr G. Bisson was the District Geologist in charge for the Institute of Geological Sciences, and throughout the work the survey team benefited from the advice and assistance of Dr A. E. Mourant, FRS.

In the handbook, Dr Bishop has written the Introduction (Chapter 1), and the chapters on plutonic igneous rocks, minor igneous intrusions (incorportating information from Mr G. J. Lees of the University of Keele), and economic geology. The chapter dealing with the Rozel Conglomerate has been written by Dr J. T. Renouf, that on the Jersey Shale Formation is by Dr D. G. Helm, and that on the Quaternary deposits is by Dr D. H. Keen. The chapter on geophysical field surveys has been provided by Professor J. C. Briden, and Dr R. A. Clark of Leeds University, and contributions on palaeomagnetism by Dr B. A. Duff, also of Leeds University, have been included at appropriate places in the text. Mr Bisson has compiled the chapter on volcanic rocks from the unpublished PhD thesis by Dr G. M. Thomas, and the chapter on geological structure mainly from the doctoral thesis by Dr A. D. Squire and the works of Dr Helm and Dr Thomas. Dr N. J. Snelling has advised concerning the geochronology. Contributions from numerous sources, but particularly from Dr Mourant, have been incorporated. It has been necessary to assume that the reader has a basic knowledge of geology, but a glossary of terms that may be unfamiliar has been appended. The handbook has been edited by Mr Bisson.

It gives me great pleasure to thank all the people concerned for their efforts in bringing this work to completion, and Mr R. B. Skinner, Chief Executive Officer of the Island Development Committee, for his sustained interest and support.

F G Larminie, OBE Director, British Geological Survey, Keyworth, Nottinghamshire. NG12 5GG 5 November 1988

Notes

Grid references are given in the form [5750 5638] throughout this handbook; they are related to the UTM co-ordinates printed on the 1:25 000 geological map.

Numbers preceded by the letter A refer to photographs in the Geological Survey collections.

Numbers preceded by 'Birm' and 'SRR' relate to samples that have been subjected to radiocarbon dating at Birmingham University Geology Department and at the Scottish Universities Research and Reactor Centre respectively.

The isotopic ages given in this work have been recalculated according to the decay constants recommended by the Subcommission of Geochronology at the International Geological Congress in Sydney, Australia, in 1976. As shown in the table below, these constants differ slightly from those of the original cited works, as do the calculated ages.

Decay scheme	Former decay constant	Adopted decay constant
$^{238}U \rightarrow ^{206}Pb$	1.537×10^{-10}/a	1.55125×10^{-10}/a
$^{235}U \rightarrow ^{207}Pb$	9.722×10^{-10}/a	9.8485×10^{-10}/a
$^{232}Th \rightarrow ^{208}Pb$	4.990×10^{-10}/a	4.9475×10^{-10}/a
$^{87}Rb \rightarrow ^{87}Sr$	1.47×10^{-11}/a	1.42×10^{-11}/a
	1.39×10^{-11}/a	1.42×10^{-11}/a
$^{40}K \rightarrow ^{40}Ar$	$\lambda_e+\lambda_e' \ 0.585 \times 10^{-10}$/a	0.581×10^{-10}/a
	$\lambda_\beta 4.72 \times 10^{-10}$/a	4.962×10^{-10}/a
	$^{40}K/K = 0.0119$ atomic%	0.01167 atomic%

$\lambda\beta$ = decay by beta emission

λe = decay by electron capture

λ_e' = decay by electron capture and decay to ground state

In Chapter 3, Jersey Volcanic Group, the petrographical nomenclature used is based on the work of Ross and Smith, 1961 (see References, p. 112).

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Glossary

Acicular	Needle-shaped.
Adamellite	Granite in which alkali feldspar and plagioclase occur in about equal amounts.
Agglomerate	A volcanic rock formed of pyroclastic blocks or fragments generally more than 64 mm in diameter.
Air-fall tuff	A tuff formed by consolidation of fine-grained pyroclastic debris (ash) which was laid down on land from the air.
Amphibolite	A metamorphic rock consisting mainly of amphibole and plagioclase.
Amygdale	A gas bubble or cavity in an igneous rock which has been filled with secondary minerals.
Andesite	A lava of intermediate composition consisting of plagioclase feldspar (usually andesine) and one or more ferromagnesian minerals.
Andinotype	An orogeny characterised by sedimentation in fault-margined furrows, andesites, I-type tonalites, burial metamorphism, cauldron batholiths that feed volcanoes, and vertical movement with minimal shortening.
Anticline	A fold, generally convex upward (an arch), the core of which contains the older rocks.
Aphyric	Adjective applied usually to a fine-grained igneous rock which lacks phenocrysts.
Aplite	A light-coloured, fine- to medium-grained acid igneous rock with an equigranular texture and consisting mainly of quartz and feldspar.
Aplogranite	A light-coloured, even-grained plutonic acid igneous rock consisting mainly of quartz and alkali feldspar.
Apophysis	An offshoot from an igneous intrusion.
Appinite	A dark-coloured plutonic igneous rock rich in hornblende which commonly occurs as elongate prismatic crystals.
Ash	Unconsolidated fine-grained pyroclastic debris.
Assimilation	Incorporation of foreign material into a magma.
Aureole	The rocks adjoining an igneous intrusion that have suffered contact metamorphism.
Authigenesis	The process whereby minerals are formed in place within a sedimentary rock during or after deposition.
Autobreccia	A rock composed of angular fragments, formed by a process that is penecontemporaneous with the deposition or consolidation of the rock.
Axial plane	The surface that passes through successive hinge lines within a fold.
Axial trace	The line of intersection of the axial plane or axial surface of a fold with the Earth's surface.
Axiolite	A spherulitic aggregate elongated along a central axis.
Basalt	A fine-grained lava or minor intrusion composed mainly of calcic plagioclase and pyroxene with or without olivine.
Base-surge	A cloud of gas and solid debris that moves rapidly outward from the base of a volcanic explosion column.
Bouguer anomaly	A gravity anomaly left after corrections have been made for the attraction effect of topography.

Braid	To branch and rejoin repeatedly, forming a network.
Breccio-conglomerate	A sedimentary rock consisting of angular and rounded sedimentary clasts.
Camptonite	A lamprophyre consisting mainly of plagioclase (usually labradorite) and brown hornblende, the hornblende forming elongated prismatic crystals.
Cataclasite	A rock formed by shattering less severe than would produce a mylonite.
China-stone	Any form of granitic rock used in the manufacture of china and usually, but not necessarily, kaolinised.
Clast	A grain or fragment in a sedimentary rock.
Cleavage	Aligned and closely spaced tectonic surfaces along which a rock tends to split.
Columnar jointing	Prismatic fractures in lavas, sills or dykes that have resulted from cooling.
= Concretion =	= A nodular or irregular mass formed by the secondary precipitation of minerals about a nucleus or centre in a sedimentary rock. =
Conglomerate	A sedimentary rock consisting of cemented rounded pebbles or clasts.
Contact metamorphism	Metamorphism resulting from the emplacement of a body of magma.
Cross-cut	A mine tunnel driven through barren rock, commonly to intersect a mineral deposit.
Crystal fractionation	The separation of a cooling magma into parts of differing composition by the successive crystallisation and settling of different minerals at progressively lower temperatures.
Devitrification	The replacement of glassy texture by crystalline texture in a volcanic rock during or after cooling.
Dextral fault	A fault in which the rock on the far side appears to have been moved horizontally to the right.
Diagenesis	The sum of the processes involved in changing a sediment into a sedimentary rock.
Diorite	A plutonic igneous rock of intermediate composition consisting essentially of plagioclase and hornblende, with or without biotite and pyroxene.
Disconformity	A break in the stratigraphic sequence without major structural discordance.
Dolerite	A medium-grained igneous rock consisting mainly of calcic plagioclase and pyroxene, commonly with an ophitic texture, with or without olivine.
Dolmen	A prehistoric burial chamber.
Drag fold	A fold produced by differential movement between beds on the limb of a large fold or by shearing in a fault zone.
Dune	A ripple-like bedform greater than 10cm in height and 1 m in wavelength.
Enclave	An inclusion or fragment enclosed in an igneous rock.
Epiclastic	An adjective applied to sedimentary rock formed of fragments derived by weathering and erosion of older rocks.
Epidiorite	A metamorphosed basic igneous rock, consisting principally of amphibole and plagioclase.

Eugeosynclinal	A major elongate structural and sedimentological unit of the Earth's crust, with a thick sequence of deep-water sediments and characteristic igneous rocks.
Euhedral	An adjective applied to mineral grains in igneous rocks that are bounded by their natural crystal faces.
Eutaxitic texture	The texture in tuffs where shards and pumice are flattened to give a banded or streaky appearance.
Facies	The lithology, structure, fauna, etc., of a rock unit.
Felsite	A fine-grained igneous rock composed mainly of quartz and feldspar. Fiamme Collapsed pumice fragments in ignimbrite, commonly with ragged terminations.
Flow banding	A structure characterised by alternating layers of slightly .different composition and texture owing to the movement of magma, most common in silicic lava flows.
Fluxion banding	Flow banding.
Flysch	A marine sedimentary facies comprising a thick sequence of sandstones, shales and mudstones, typically found on the borders of the Alps.
Fold axis or hinge-line	The line at which the two sides or limbs of a fold meet.
Gabbro	A coarse-grained intrusive igneous rock composed essentially of basic plagioclase and pyroxene with or without olivine.
Gneiss	A foliated metamorphic rock in which layers of coarsely granular minerals alternate with layers or lenticles of platy minerals.
Graded bed	A sedimentary unit in which the grains normally show a progression from coarse below to fine above. Some beds display inverse grading.
Granite	In common usage, a coarse-grained acid igneous rock consisting essentially of quartz, feldspar and mica. More precisely, the feldspar is predominantly (greater than 2/3) alkali feldspar.
Granoblastic	A textural term used of regionally metamorphosed rocks having mineral grains of the same general size.
Granophyre	A granitic rock in which the bulk consists of micrographic intergrowths of quartz and potassic feldspar, giving a texture called granophyric.
Gravity gradient	A measure of the change in the value of gravity relative to horizontal distance.
Greenschist facies	Regionally metamorphosed rocks produced under conditions of low temperature and low to medium pressure.
Greywacke	A poorly sorted sandstone with more than 15 per cent interstitial matrix and angular to subangular grains of quartz, feldspar and lithic fragments.
Heavy mineral	A mineral with specific gravity greater than 2.9; a mineral that will sink in bromoform.
Hornfels	A rock consisting of fine equidimensional grains without preferred orientation, produced by contact metamorphism.
Humic	Derived from plants.
Hydrothermal	Relating to hot solutions emanating from a magma.
Idiomorphic	*See* euhedral.
Ignimbrite	A subaerial pyroclastic rock formed by the deposition and consolidation of ash flows and glowing avalanches (nuees ardentes).
Imbrication	A sloping and overlapping arrangement.

Intraclast	A sedimentary rock fragment derived penecontemporaneously from within the sedimentary basin, e.g. pebbles in an intraformational conglomerate.
Isochron	A straight line constructed most commonly by plotting the ratio $^{87}Rb/^{86}Sr$ against the ratio $^{87}Sr/^{86}Sr$, or $^{207}Pb/^{204}Pb$ or $^{208}Pb/^{204}Pb$ against $^{206}Pb/^{204}Pb$, for different rocks or minerals from the same geological body. The slope of the isochron is a function of the age of the body.
Isocline	A fold with parallel limbs. Isotopic dating The determination of the age of a rock by methods based on the nuclear decay of certain natural chemical elements contained within it.
Kaersutite	A titanium-bearing amphibole.
Keratophyre	A soda-rich acid to intermediate lava or minor intrusion.
Kersantite	A lamprophyre consisting mainly of biotite and plagioclase, usually accompanied by augite and/or hornblende.
Lacustrine	Relating to a lake.
Lahar	A mudflow composed of volcaniclastic material.
Lamprophyre	A general term for dark, porphyritic intrusive igneous rocks composed of phenocrysts of one or more of dark mica, pyroxene, amphibole or olivine in a groundmass of alkali feldspar or plagioclase. Some lamprophyres are feldspar-free.
Lapilli	Fragments in the range of 5 to 50 mm ejected by volcanic eruption.
Liquefaction	Quicksand effect in soft sediments owing to sudden increase in pore fluid pressure and loss of cohesion.
Lithic	Made of rock.
Machair	Low-lying sandy environment.
Mafic.	Rich in ferromagnesian minerals
Magnetic anomaly	A departure from the normal magnetic field of the Earth.
Megacryst	A crystal significantly larger than the grains in the surrounding groundmass of an igneous rock. Metasediment Metamorphosed sedimentary rock.
Metasomatism	Metamorphism involving a change in the bulk composition of the affected rock.
Microlites, microliths	Microscopic needle-like crystals generally found in volcanic rocks and having some determinable optical properties.
Minette	A lamprophyre in which biotite forms phenocrysts and orthoclase is the main feldspar.
Molasse	A sequence of sedimentary rocks laid down in intermontane basins.
Monchiquite	A lamprophyre composed essentially of phenocrysts of pyroxene, olivine and titanium-bearing amphibole in an isotropic groundmass consisting largely of analcime, commonly highly altered.
Monzonite	A coarse-grained igneous rock intermediate in composition between syenite and diorite, containing approximately equal amounts of potassic feldspar and plagioclase.
Mortar structure	A structure produced by the mechanical fracture of rocks, especially granites and gneisses, such that the comminuted grains of quartz and feldspar surround larger grains of the same minerals.
Mylonite	A compact fine-grained streaked and flinty rock formed by severe granulation and shearing of rocks during dynamic metamorphism.

Neomagmatic	An adjective referring to magma formed by partial or complete refusion of pre-existing rocks.
Orthogneiss	A coarse-grained rock produced by the regional metamorphism of igneous rocks.
Palaeocurrent	A current that flowed in the geological past.
Palaeomagnetism	The study of natural remanent magnetisation in order to determine the intensity and direction of the Earth's magnetic field in the geological past.
Palaeoslope	A slope that existed in the geological past.
Parasitic fold	A relatively small fold on the limb or in the hinge of a larger congruous fold of the same generation.
Parataxitic texture	An extreme variation of eutaxitic texture in tuffs, in which the shards and pumice lumps are flattened and appear to have been drawn out.
Pegmatite	An exceptionally coarse-grained igneous rock. Most pegmatites are granitic and form irregular dykes, lenses or veins, especially near margins of intrusions.
Pelitic	Argillaceous
Pericline (doubly plunging fold)	A fold in which the beds dip outwards from the centre (dome) or towards the centre (basin).
Perlitic texture	Small-scale arcuate cracks caused by cooling in volcanic glass.
Petrographical	Pertaining to the descriptive aspects of the study of rocks (petrology).
Phenocryst	A crystal in an igneous rock that *is* conspicuously larger than those of the matrix in which it is set.
Plunge	The inclination of a fold axis. Plutonic Relating to igneous rocks formed at great depth in the Earth. P
neumatolysis	Alteration of a rock, or crystallisation of minerals, by gases emanating from a magma.
Poikilitic	A texture in which smaller crystals of one mineral are enclosed within a larger crystal of another.
Poikiloblastic	A texture in a metamorphic rock formed where a recrystallised mineral surrounds relicts of earlier minerals.
Polygenetic	Originating in more than one way.
Porphyritic	A texture in which larger crystals in an igneous rock are set in a finer-grained groundmass, as in a porphyry.
Porphyroblast	A large, usually well shaped crystal, that has grown in a finer-grained matrix during metamorphism.
Pressure solution	The mass transfer of material by fluid diffusion from one part of a rock to another as a result of grainto-grain contact during tectonic deformation.
Propylite	A hydrothermally altered andesite or related rock containing secondary minerals such as chlorite, zoisite and calcite.
Provenance	Source areas from which fragments in sedimentary rocks have been derived.
Proximal	Close to the source of supply of sedimentary material.
Pseudomorph	A mineral whose outward crystal form is that of another, which it has replaced.
Pumice	A highly vesiculated glassy lava, usually of rhyolite and light enough to float in water.

Pyroclastic	Adjective describing a elastic rock formed by explosion or eruption from a volcanic vent.
Quartz-wacke	A sedimentary rock with 15 per cent or more matrix in which framework grains are mainly quartz.
Radiocarbon date	The age of a deposit determined by measuring the content *of* carbon-14 ("C) in organic material.
Raised beach	A beach deposit left at a level above that of the modern beach, following a lowering of sea level.
Rhyolite	A fine-grained acid extrusive igneous rock, commonly porphyritic and flow-banded.
Ripple mark	A small sand ridge formed by the movement of water or sediment over unconsolidated sediment. Ripples usually have a cross-laminated internal structure useful in determining the palaeocurrent direction.
Schist	A strongly foliated metamorphic rock in which the lamellar or elongate minerals show parallel orientation.
Scree	An accumulation of angular rock fragments, usually at the foot of and derived from a cliff or hill.
Shard	A glass fragment typically found in pyroclastic rocks, having distinctive cuspate margins.
Shear	A fracture caused by shearing due to compressive stress.
Sinistral fault	A fault in which the rock on the far side appears to have been moved horizontally to the left.
Sole mark	A sedimentary structure at the base of a bed produced by currents and used to determine the direction of palaeocurrent flow.
Spessartite	A lamprophyre consisting mainly of phenocrysts of hornblende set in a groundmass of sodic plagioclase.
Spherulite	A mass of radiating crystals, usually spherical in shape.
Stalagmite	A column of calcareous material deposited on the floor of a cave by water dripping from the roof.
Strike slip	The component of the movement on a fault that is parallel to the strike of the fault.
Subhedral crystal	A mineral within an igneous rock only partly bounded by its natural crystal faces.
Sub-volcanic	Relating to the region below the Earth's surface where dykes and sills are intruded.
Supracrustal	Descriptive of rock that overlies the basement.
Syenite	A plutonic rock consisting essentially of alkali-feldspars and amphibole or dark mica.
Syncline	A fold, generally convex downward, the core of which contains the younger rocks.
Synclinorium	A composite regional syncline composed of lesser folds.
Synplutonic	A term used to describe a dyke intruded into a granite rock before the granite had solidified.
Tear fault	A fault in which the movement has been substantially in a horizontal sense.
Tectonic	Relating to the forces involved in the large-scale structural evolution of the upper part of the Earth's crust.
Tectonic pitting	The indentation of one sedimentary grain by another.

Trace fossil	A sedimentary structure, such as a track or boring, left by an animal in the geological past.
Tuff	A lithified deposit of volcanic ash.
Tuffite	An admixture of pyroclastic (>25 per cent) and epiclastic (>25 per cent) material.
Turbidity current	A turbulent current laden with suspended sediment at the base of a column of water that flowed down a slope under the influence of gravity.
Unconformity	A break in the stratigraphical sequence marked by a structural discordance.
Vergence	The direction in which a fold is inclined or overturned.
Volcaniclastic	Composed mainly of volcanic rock fragments.
Wrench fault	A tear fault.
Xenocryst	A crystal in an igneous rock to which it is not genetically related.
Xenolith	An inclusion in an igneous rock to which it is not genetically related.

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