

Chapter 1 : Jedburgh - Melrose - Kelso - an excursion - Earthwise

The geology of Scotland is unusually varied for a country of its size, with a large number of differing geological features. There are three main geographical sub-divisions: the Highlands and Islands is a diverse area which lies to the north and west of the Highland Boundary Fault; the Central Lowlands is a rift valley mainly comprising Paleozoic formations; and the Southern Uplands, which lie.

Overview[edit] The main geographical divisions of Scotland From a geological and geomorphological perspective the country has three main sub-divisions all of which were affected by Pleistocene glaciations. This part of Scotland largely comprises ancient rocks, from Cambrian and Precambrian times, that were uplifted to form a mountain chain during the later Caledonian orogeny. These foundations are interspersed with many igneous intrusions of more recent age, the remnants of which have formed mountain massifs such as the Cairngorms and Skye Cuillins. A significant exception to the above are the fossil-bearing beds of the Old Red Sandstone found principally along the Moray Firth coast and in the Orkney islands. These rocks are around million years old, and were laid down in the Devonian period. Scotland has over islands, divided into four main groups: Stac an Armin , St Kilda The Hebridean archipelago outlier of St Kilda is composed of Paleogene igneous formations of granites and gabbro , heavily weathered by the elements. Similarly, there are also Old Red Sandstone deposits and granite intrusions. The most distinctive feature is the ultrabasic ophiolite peridotite and gabbro on Unst and Fetlar , which are remnants of the Iapetus Ocean floor. Although relatively low-lying, hills such as the Pentland Hills , Ochils and Campsie Fells are rarely far from view. They lie south of a second fault line running from Ballantrae towards Dunbar. The Great Glen is the most seismically active area of Britain, but the last event of any size was in They are among the oldest rocks in both Europe and the World. They form the basement to the west of the Moine Thrust on the mainland, in the Outer Hebrides and on the islands of Coll and Tiree. The granite here is anorthosite , and is similar in composition to rocks found in the mountains of the Moon. Torridonian sandstones were also laid down in this period over the gneisses, and these contain the oldest signs of life in Scotland. In later Precambrian times, thick sediments of sandstones, limestones muds and lavas were deposited in what is now the Highlands of Scotland. This is composed of a wide variety of materials, including mica schist, biotite gneiss schist, schistose grit, greywacke and quartzite. Fossils from the north-west Highlands indicate the presence of trilobites and other primitive forms of life. This occurred in shallow tropical seas at the margins of the Iapetus Ocean. The Ballantrae Complex near Girvan was formed from this ocean floor and is similar in composition to rocks found at The Lizard in Cornwall. Nonetheless, northern and southern Britain were far apart at the beginning of this period, although the gap began to close as the continent of Avalonia broke away from Gondwana , collided with Baltica and drifted towards Laurentia. The Caledonian orogeny began forming a mountain chain from Norway to the Appalachians. There was an ice age in the southern hemisphere, and the first mass extinction of life on Earth took place at the end of this period. During the Silurian period Ma the continent of Laurentia gradually collided with Baltica, joining Scotland to the area that would become England and Europe. Sea levels rose as the Ordovician ice sheets melted, and tectonic movements created major faults which assembled the outline of Scotland from previously scattered fragments. The majority of the rocks are weakly metamorphosed coarse greywacke. Volcanic activity occurred across Scotland as a result of the collision of the tectonic plates , with volcanoes in southern Scotland, and magma chambers in the north, which today form the granite mountains such as the Cairngorms. The accumulations of Old Red Sandstone laid down from to million years ago were created as earlier Silurian rocks, uplifted by the formation of Pangaea , eroded and were deposited into a body of fresh water probably a series of large river deltas. A huge freshwater lake - Lake Orcadie - existed on the edges of the eroding mountains stretching from Shetland to the southern Moray Firth. The formations are extremely thick, up to 11, metres in places, and can be subdivided into three categories "Lower", "Middle", and "Upper" from oldest to youngest. As a result, the Old Red Sandstone is an important source of fish fossils and it was the object of intense geological studies in the 19th century. In Scotland these rocks are found predominantly in the Moray Firth basin and Orkney Archipelago, and along the southern

margins of the Highland Boundary Fault. Several changes in sea level occurred and the coal deposits of Lanarkshire and West Lothian and limestones of Fife and Dunbar date from this time. There are oil shales near Bathgate around which the 19th-century oil-processing industry developed, and elsewhere in the Midland Valley there are ironstones and fire clay deposits that had significance in the early Industrial Revolution. However, Permian sandstones are found in only a few places - principally in the south west, on the island of Arran, and on the Moray coast. Triassic period[edit] During the Triassic \approx Ma , much of Scotland remained in desert conditions, with higher ground in the Highlands and Southern Uplands providing sediment to the surrounding basins via flash floods. This is the origin of sandstone outcrops near Dumfries , Elgin and the Isle of Arran. Towards the close of this period sea levels began to rise and climatic conditions became less arid. Most of northern and eastern Scotland including Orkney, Shetland and the Outer Hebrides remained above the advancing seas, but the south and south-west were inundated. There are only isolated sedimentary rocks remaining on land from this period, on the Sutherland coast near Golspie and, forming the Great Estuarine Group , on Skye, Mull, Raasay and Eigg. This period does however have considerable significance. The burial of algae and bacteria below the mud of the sea floor during this time resulted in the formation of North Sea oil and natural gas , much of it trapped in overlying sandstone by deposits formed as the seas fell to form the swamps and salty lakes and lagoons that were home to dinosaurs. Sea levels rose globally during this period and much of low-lying Scotland was covered in a layer of chalk. Although large deposits of Cretaceous rocks were laid down over Scotland, these have not survived erosion except in a few places on the west coast such as Loch Aline in Morvern [38] [39] where they form a part of the Inner Hebrides Group. At the end of this period the Cretaceous-Paleogene extinction event brought the age of dinosaurs to a close. Paleogene period[edit] In the early Paleogene period between 63 and 52 Ma, the last volcanic rocks in the British Isles were formed. This led to a chain of volcanic sites west of mainland Scotland including on Skye , the Small Isles and St. The rich flora here included temperate-climate tree species such as plane , hazel , oak , Cercidiphyllum , Metasequoia and ginkgo. Plant and animal types developed into their modern forms. Scotland lay in its present position on the globe.

Chapter 2 : Geology of the Scottish Southern Uplands: Introduction

The book is composed of 20 individually authored chapters. The introductory chapter gives an overview of the geological evolution of the area. The following chapters go on to describe short.

Geotourism Eildon Hills, Melrose: Indeed, Michael is attributed with splitting the Eildon Hills into three peaks with the help of an idle devilish spirit. But perhaps the geological explanation is a little more plausible – one of weathering and erosion by water and ice leaving the harder igneous rocks standing proud of the surrounding land. Overlooking the beautiful valley of the River Tweed, with Melrose lying immediately below, the three conical peaks of the Eildon Hills North Hill, m above sea-level, Mid Hill, m and Wester Hill, m evoke an exciting geological and historical past. The Eildons, known by the Romans as Trimontium the name also applied to the major fort east of the present village of Newstead have distinctive volcanic shapes. In fact, the underlying rocks are not the original surface of a volcano but instead are the eroded remnants of a suite of igneous trachytic and rhyolitic sills – places where magma has squeezed in between the layers of sedimentary rocks and solidified, creating a layer of igneous rock. The sills in the Eildons are around million years old Early Carboniferous , and intruded into the uppermost Devonian sedimentary rock. Compositionally, the silica content of trachytes and rhyolites is much greater than that of basalts. A small prominence, called Little Hill, lying between Wester Hill and Mid Hill is the remnant of a volcanic plug now filled with agglomerate and basalt – this was probably a conduit to a small volcano. On lower ground, to the northwest of the Eildons closer to Melrose and near the Borders General Hospital, another small hill is underlain by a large vent called the Chiefswood Vent. This is filled with rock formed from fragments of sedimentary rock including Devonian sandstones and Silurian greywacke sandstones, together with fragments of trachyte and rhyolite. At the time the vent was created, the area might have been low-lying swamp, with volcanoes erupting and creating new land. The rock in the vent originated from the explosive interaction of silica-rich magmas with surface waters. The resulting brown to greenish-grey vent rock was quarried extensively in the 12th century for use in the earliest parts of Melrose Abbey. Examples can also be seen in the walls of some of the older buildings in Melrose. Local warm-coloured Devonian sandstones were also used as building stone extensively for the Abbey and in this part of the Tweed valley. One of the easiest approaches to the hills is from the west. Limited road-side car parking is available next to Bowdenmoor Reservoir off the B From here a traverse of the hills is possible, firstly observing en route reddened greywacke sandstones in a small quarry to the east of Bowdenmoor Reservoir, and then taking in the Little Hill vent where both intrusive basalt and vent rocks can be seen. Wester Hill and the steep slopes of Mid Hill are made up of pinkish felsite a very fine-grained rhyolite composed of quartz and feldspar. The summit of Mid Hill and the whole of North Hill are made from sheets of trachyte an igneous volcanic rock rich in silica and potassium feldspar. Clarkson, E, and Upton, B. Volcanoes and the Making of Scotland Edinburgh: Dunedin Academic Press , Melrose Abbey:

Chapter 3 : Geodiversity Charter | scottishgeodiversityforum

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Less well known is the fact that it is also a mineral locality, as the rocks are cut by thin veins of barite, providing a convenient justification for including this famous site on mindat. Collectors should note, however, that owing to its great historical importance it is a Site of Special Scientific Interest SSSI , and hammering is unlikely to be appreciated! The barite is of poor quality anyway, although it does exhibit cockscomb habit when crystallised in small cavities. It is the role the locality played in the early development of the earth sciences that makes it so special. He had already found other examples of unconformities in Scotland, and had read descriptions of continental examples. His friends, however, were impressed. Playfair was later to write: The mind seemed to grow giddy by looking so far into the abyss of time. Ever since the locality has been cited as proof of the great age of the earth, and is a Mecca for geology students. For a detailed account of the history the reader is referred to Montgomery The accompanying photos show what they found. Hutton knew these must have been deposited originally as horizontal layers. Overlying them at almost a right angle are gently dipping red Devonian sandstones. The bottom layer of these is a breccia full of broken fragments of the underlying Silurian rocks in a red sandy matrix. This, Hutton realised, was an ancient land surface where once the upright Silurian strata had been exposed and eroded, and onto which the red sandstones were deposited. These rocks indicated a sequence of events far longer than the Biblical years. Firstly, rocks had to be eroded to generate the sediments deposited on an ancient sea floor. These were then hardened into rock, folded until the beds were upright, elevated and eroded to create a land surface. Onto this eroded surface was deposited another generation of sediments, creating the beds of red sandstone. These too hardened into rock, were tilted slightly and eroded to expose them, and the underlying rocks, once more. Links to the references are provided below.

Scottish Borders geology: an excursion guide (Out of print) MacAdam, A.D., Clarkson, E.N.K., and Stone, P. Editors. Scottish Borders geology: an excursion guide.

Lower Old Red Sandstone Conglomerate. Introduction This part of the Borders Region sits astride the Devonian conglomerates and red sandstones which lie between the folded Lower Palaeozoic greywacke uplands to the west and the Lower Carboniferous sedimentary basin of the Merse to the east. Volcanic activity has left its legacy in the Lower Devonian lavas of the Cheviots and the Lower Carboniferous lavas of the Kelso Traps. The same age as the latter are the dolerite and agglomerate plugs which form many of the sharp hills rising out of the general glaciated landscape. The softer Devonian sediments, best seen in incised valleys, have a glacial cover with a SW-NE drumlinoid grain produced by ice-flow from the south-west. The excursion has a selection of localities at which the many rock types can be studied and where the varied landforms produced by different geological formations can be seen. The whole excursion could be completed in a day, or selected localities could be combined with other excursions in the area. Private transport is essential. Jedburgh - Melrose - Kelso - excursion map. The monument was erected by William Kerr in , full details being given on two stone tablets on the monument. The Wellington Monument sits on a crag-and-tail feature, the crags of dolerite lying to the south-west, the tail running north-east. The intrusion, a dolerite of Jedburgh type, is a black fine-grained non-porphyrific rock, seen on glaciated surfaces around the monument, and in a quarry m to the south-west. This quarry probably provided the black stone for the bulk of the monument, but the red dressed sandstone used in details has come from further afield. The three peaks of the Eildon Hills show red screes of the Carboniferous igneous rocks Eildon Hills excursion. Black Hill, looking reddish, and Redpath Hill, looking blackish and topped by a working quarry, are both Carboniferous intrusions. Smailholm Tower sits on a ridge of intrusive Carboniferous dolerite locality 7 below the distant skyline of the gently rounded Lammermuir Hills, carved out of Ordovician and Silurian greywackes. Darrington Laws, two rounded hills in the far distance are Lower Carboniferous granites intruding the Lower Palaeozoic greywackes. Kelso, a cluster of buildings round a prominent church spire, nestling at the confluence of Tweed and Teviot, is surrounded by the drumlin landscape of the Merse. The Cheviot Hills form a lumpy skyline of Devonian volcanics along the Scottish-English border, the most prominent being Auchhope Cairn. Across the Tweed valley Morebattle is visible in the middle distance at the far end of the open valley of the Kale Water. The fells around Carter Bar have a smoother skyline reflecting Carboniferous sediments and lavas, whereas isolated lumpier hills of Devonian volcanics can be seen below the horizon. Jedburgh itself is hidden in the incised valley of the Jed Water cut in Old Red Sandstone sediments localities 2 and 3. Dunion Hill has the rugged shape of a quarried Carboniferous dolerite plug locality 4. Rubers Law with its conical shape is a similar dolerite plug. The Minto Hills, across the Tweed are two bare rounded Carboniferous agglomerate-filled vents locality 5 , whereas the wooded Fatlips Castle crags to their left is a dolerite-filled vent. The Lammermuir Hills, forming soft rounded hills on the skyline beyond the TV masts behind Galashiels, consist of Ordovician and Silurian greywackes. The drumlins strike of SW-NE follows the local ice flow direction. Upper Old Red Sandstone Sediments In cutting into the sides of its incised valley, the Jed Water has created several prominent cliffs of Old Red Sandstone sediments, both to the north and to the south of Jedburgh. One of the more accessible of these, provided the river is not in spate and it is not a winter Saturday afternoon, is beside the Jed-forest Rugby Club ground at Riverside Park, where there is off-road parking NT A path along the north side of the ground leads to the 20 m high cliff. The beds of red to purple sandstones and silty sandstones are evenly bedded to massive, with green staining at some horizons. The beds dip gently southwards 3. Leaving Jedburgh to the south by the A68 look out for the red sandstone structure marking the entrance to Allerley Well Park. Take the road to the right 30 m beyond down to park beside the former mill NT Meanwhile it is within the mill land and permission for parking should be obtained. In the river bed and the lower part of the bank vertical Silurian greywackes and shales can be seen striking east-west. The upper part of the bank is formed of horizontal Old Red Sandstone sandstones. The unconformity between these two lithologies marking the long time gap during

which the Silurian beds were folded, uplifted, and eroded prior to the deposition of the sandstone in Upper Old Red Sandstone times, is normally obscured by scree and vegetation. The now abandoned quarry has worked out the upper part of the plug but has left good exposures even though part of the area is used as a tip. The quarry is oval with 25 m high faces of well-jointed black dolerite, the joints reflecting the original intrusive shape. Fine examples of horizontal hexagonal jointing at the west corner, for example, lie at right angles to the vent margin. The black fine-grained dolerite has scattered macro- and micro-phenocrysts, mm diameter, mainly feldspar with some olivine. Black Law, a dolerite and agglomerate-filled plug, lies a kilometre to the south-west. The reddish, grass-covered Minto Hills are the sites of agglomerate filled vents locality 5, whereas the rocky bluff on which stands Fatlips Castle is a dolerite plug, these features standing out of the glaciated drumlin terrain. Vent Agglomerate The twin hills are volcanic vents of vent agglomerate rising prominently above the drift-covered Upper Old Red Sandstone sediments. Erosion of the softer country rocks has exhumed their original oval shape. Park in the small lay-by at the north end of Minto golf course NT Take the path obliquely up to the col between the two hills, and then on to the larger, southern hill. Crags, partly quarried, show the vent agglomerate to consist of angular to rounded fragments mainly of sandstone, greywacke, felsite and vein quartz, generally 1 to 2 cm diameter, a few as much as 5 to 10 cm, set in a matrix of brownish unbedded tuff. Ascend to the trig point, set in agglomerate. Pause to reflect that the geological surveyor, despite the paucity of exposure confidently mapped the vent as totally filled with agglomerate. Were there any dolerite intrusions they would surely have stood out more prominently as outcrops. To the south on either side of the Tweed lie the villages of Minto and Denholm, the latter dominated by the dolerite plugs of Rubers Law. Return carefully obliquely down towards the starting point, cutting back to visit the small quarry in agglomerate above the two tall conifers. Scott stopped here so regularly to admire the view that it is said that on his final journey his horses automatically stopped the funeral cortege. The geologist too should spare the time to admire the view: The glaciated low ground is underlain by Lower Palaeozoic greywackes while far below the River Tweed sweeps across its alluvial plain. Basalt intrusion of Lower Carboniferous age. These are basalt lavas of Carboniferous age thought to be contemporary with the Birrenswark Lavas further to the south-west. This part of the eastern Borders has many igneous intrusions which are generally harder and more resistant to erosion than the surrounding country rocks. Rocky eminences such as these could be more easily defended in time of conflict and were commonly used as the site of fortified tower houses such as this 15th century example at Smailholm. P The Tower, a 15th century fortified farmhouse erected by the Pringle family, is under the care of the Historical Buildings and Monuments. The location NT is well signposted from the village of Smailholm on the B to the north-east. It is an impressive approach to the tower-house, sitting on the rugged glaciated and quarried rocks of Sandyknowe Craigs, another Carboniferous intrusive plug. The black, fine-grained, non-porphyrific dolerite looks remarkably fresh. Rough angular blocks of this stone were used to build most of the tower. A soft red sandstone from Melrose was dressed for use on the corners and round doors and windows, but incongruously a cream sandstone has been used for a later restoration of the crow-step gables on the roof. The small entry charge is worth paying, both for the fascinating historical exhibits on four levels and for the spectacular views from the north and south balconies. From the former the Eildon Hills to the west again catch the eye, as do Borthwick Hill, Hume Castle and the glaciated lowland of the Merse to the east. From the latter can be seen the distant Cheviots to the south-east, Penielheugh Monument locality 1 and Rubers Law to the south-west. Glaciation has impressed a SW-NE grain on the dolerite of Lady Hill below the Tower and in the drumlin topography on either side of the River Tweed in the middle distance. Exposures near Roxburgh can be reached from roadside parking on the A at the entrance to Roxburgh Barns farm NT Scramble down through the wood to the riverside where good sections are normally accessible. Grey, green and red interbedded siltstones mudstones, ripple-bedded sandstones and cementstones dip gently NW. A hard nodular white limestone, 80 cm thick, resting on a green-purple nodular mudstone, forms a natural weir across the river. A large deposit of conglomerate fills an ancient valley in the Lower Palaeozoic greywackes, now partly exhumed along the valley of the Leader Water. Roadside cuttings have been excavated along the A68 between Earlston and Lauder. The best of these NT can be reached from a large lay-by off the southbound lane, just to the north of the cutting. The rounded boulders and cobbles of the conglomerate consist

predominantly of the Lower Palaeozoic greywackes, with some of vein-quartz, quartzite and igneous rocks derived from dykes. These are set in a coarse red sandstone matrix.

Chapter 5 : Download Death Of An Ocean A Geological Borders Ballad PDF – PDF Search Engine

Scotland's Geology: Getting started, geological time scale, simplified geological map of Scotland, regional geology and famous Scottish geologists. 51 Best Places to see Scotland's geology and Where to go: museums, walks and information centres.

Bedrock in the Southern Uplands Map based on the much more detailed online British Geological Survey Map Key The oldest rocks in the Southern Uplands are those of the Crawford group that were scraped off the bed of the diminishing Iapetus Ocean and laid down here on the Laurentian plate in the Lower Ordovician period about million years ago. Currently, there are two recognised formations: The first is a succession of basaltic pillow lavas chemically proven to have erupted at different times from both mid-ocean ridge and island-arc zones , blue-grey cherts and brown mudstone. The second is a sequence of red and grey cherts that contain broken pieces of pillow lava, and red and green mudstones with chert nodules. The two formations outcrop in the Abington area. Next in line came the Moffat shale group deposited here in the mid-Ordovician to mid-Silurian periods to million years ago. These shales had been originally laid down as sediment over the great expanse of the Iapetus Ocean. In the s, Charles Lapworth studied the fossilised remains of graptolites, long-extinct marine fauna of the Ordovician and Silurian times, in these shales in Moffatdale and in the Girvan district. His observation of their systematic development over time not only enabled him to establish a zonal scheme for the deposition of the shales throughout the region, but also a system of biostratigraphy that continues to have international application today. Iapetus Ocean closure and Southern Upland geology By far the most common rock types in the region are the greywacke, siltstone and shale sequences that were also beginning to be laid down in the mid-Ordovician during the continued subduction of the oceanic plate under Laurentia. The resulting mass of sediments, known as the Southern Uplands Accretionary Complex, is regarded by many to be the best-preserved ancient accretionary complex in the world. It occupies some 10, km² of Southern Scotland as well as about 6, km² Ireland. The striking bands seen on geological maps of the region graphically display the division of the terrain into discrete units, each bounded by north-east to south-west running, parallel-strike faults. Emplacement in the accretionary prism, faulting, and rotation have resulted in units overall younging from northwest to southeast. However, within each unit, the younging of deposits is reversed – the earlier beds to be deposited being to the north and the later to the southeast. The subjecting oceanic plate acts like a conveyor belt that transports sediments to the toe of the prism. Sediments are forced wedge -like under the system pushing older units up and rotating them towards the vertical. Most, if not all of the complex would have been underwater until the later stages of its formation and material would have been stripped from its steep surfaces and transported and deposited at its base by turbidity currents, and from there, recycled back into the prism. Following further rotation and uplift by compressive forces, a swarm of calc-alkaline felsic and lamprophyre dykes then cut the accretionary complex in advance of the emplacement, early in the Devonian period c Ma , of large granitic plutons at Criffel, Cairnsmoor of Fleet and Loch Doon. These plutons are related to the granitic plutons of North-Western England and also to the slightly later Cheviot pluton to the east – but with interesting and not fully explainable, differences. The section on Igneous rocks in the Southern Uplands and Ballantrae Area begins to explore this more fully. By the end of the Devonian and into the Carboniferous period – Ma , tectonic movements had placed what was to become the British Isles within a supercontinent and lying between 30o and 20o south in the mid-latitude low rainfall belt. The Scottish Uplands was, therefore, wholly terrestrial and situated in arid conditions that led to the erosion of higher ground and the deposition of red sand and other sediments into transtentionally created basins. These deposits were transported by wind and huge river systems to form the Old Red Sandstone deposits which currently overlie the greywackes in some localities of the eastern Scottish Uplands. In the south east, adjacent to the northern limit of the Cheviot andesite lava flows, a cluster of volcanoes erupted alkali lavas over the sandstones, and associated sills and dykes were intruded into the sandstones and the greywackes. In the same period, further west, the Birrenswark Formations olivine-rich basalts were erupted. The Pangaeian supercontinent continued to move northwards carrying the region into and beyond equatorial

latitudes where wet tropical conditions supported tropical rainforest. Land subsidence produced shallow lagoons. The tropical conditions supported lush Carboniferous plant growth that led to the deposition of coal deposits and warm shallow waters gave rise to marine life and so to limestones along with siltstones and mudstones. Immense compressive forces were building mountains in South-western England and Wales building and permitting plutonic emplacement. Here in the Southern Uplands, Variscan compression had less effect but nevertheless was responsible for some faulting, folding and uplift in the Carboniferous sedimentary strata. The material that was eroded in this process became the fluvial and aeolian Permian sandstones and conglomerates we can see today in the Thornhill area. Early in the Jurassic period Ma, much of the Southern Uplands was submerged and marine sediments must have been widespread. However, uplift in the mid-Jurassic and early Cretaceous period 66 Ma promoted erosion that created a widespread unconformity across the region before rising sea levels led to renewed submersion and the deposition of sediments in the late Cretaceous. At the outset of the Palaeogene period 66 Ma to 23 Ma, the great continent of Pangaea started to rift apart to form the Atlantic Ocean. It is now believed that this may have been triggered by a strong mantle plume or hot spot. From 60 Ma to 55 Ma, what is now the Western seaboard of Scotland from Arran to Skye, and the North of Ireland became a centre of intense volcanic activity erupting vast amounts of basaltic magma and intruding plutons, sills and dykes far and wide into surrounding rocks. The Mull volcano in particular drove a number of these tholeiite basalt dykes across the region from north-west to south-east into Northern England – the Cleveland and Acklington dykes being the most prominent. Palaeogene dyke exposed with elements of the obducted Ordovician Ballantrae Complex. The major elements of the complex are serpentinitised ultramafic oceanic mantle and the remains of island arc with ocean crust. Continued uplift into the Neogene period 23 Ma to 2. Most of the Jurassic and Cretaceous sequences disappeared as did some of the Carboniferous and Devonian rocks revealing the Palaeozoic basement rocks. The cyclic deposition and melting of ice in the Quaternary, from 2. At one stage ice covered the whole of Scotland with the main accumulations in the Southern Uplands being north of Glentworth and in the Tweedsmuir Hills and Moffat Hills. Later, as the climate warmed, glacial meltwaters deposited expansive sand and gravel sheets in the valleys that were reworked by modern rivers into alluvial flood plains. Edinburgh, Scottish Academic Press. Geology in south-west Scotland: Stone, P, McMillan, A. P, and Phillips, E. British Geological Survey, Stone, P. Scottish Journal of Geology, [http:](http://www.bgs.ac.uk)

Chapter 6 : Dive St Abbs - Diving Scotland - Boat Charters - Scottish Borders

The Edinburgh Geological Society is one of the UK's foremost geological societies, whose aim is to promote public interest in geology and the advancement of geological knowledge. We are a friendly and informal organisation with a wide range of members of varied backgrounds and interests.

The abbey was founded in 1136, but border wars with England in the 16th century left it a ruin. It was an occasional royal residence for the Scots. It was demolished in 1286 when Alexander III was married to Yolande in the abbey in 1286. At various times and at various locations the town supported a horse market, a cattle market, a corn market and a butcher market. Farm workers and servants also attended hiring fairs seeking employment. It is a subsidiary title of the present Earl of Angus, the Duke of Hamilton. The Duke of Douglas was raised to the position of Viscount Jedburgh Forest, but he died without an heir in 1542. In 1746, the Jacobite army led by Prince Charles Edward Stuart passed through the town on its way to England, and the Prince also stayed there. The Castle Prison opened in 1793. James Thomson "who wrote "Rule Britannia", was born in Ednam, a village only twelve miles away, but he was educated in Jedburgh. David Brewster, physicist, mathematician, scientist, writer and inventor of the kaleidoscope, was born in Jedburgh in 1800. The popular preacher Rev. Robert Aitken - was born in Crailing near Jedburgh. General Sir Bindon Blood was born nearby in 1793. He died in Jedburgh in 1857. The author and broadcaster Lavinia Derwent was born in a farmhouse a few miles outside Jedburgh in 1880. Former Scotland rugby team captain Greig Laidlaw also hails from Jedburgh. Douglas Young, fought at Heavyweight at the Summer Olympics. The town today [edit] The Canongate in Jedburgh. The abbey is maintained by Historic Scotland and open to the public there is an entry fee. Many of the more important finds from excavations are displayed on site in the modern visitor centre attached to the Abbey ruins. The Abbey, though much damaged over the years, especially by invasions from England, is still one of the finest late Norman buildings remaining in Scotland. Now roofless, part of the church was used as the parish church into the 19th century. Jedburgh Castle Jail, built in the early 19th century on the site of the medieval castle, is also open to the public. Although most of the pear orchards have now gone, some of the famous Jedburgh pear trees do still remain. The Canongate Brig dates from the 16th century, and there are some fine riverside walks. Central to the festival and customs associated with the town of Jedburgh are the Jedforest Instrumental Band who support many civic, religious and social events throughout the year, a service provided consistently since 1950. Free Wi-Fi has been provided around the town since the summer of 2011. Jedburgh is known to motorists from the Edinburgh and Newcastle-upon-Tyne areas as Jedburgh is a control town to direct road traffic on the A1. Bus services to Jedburgh are provided by Borders Buses. A Bowling Club is located at Allars Mill. Cricket was once also played at Woodend but the club disbanded in the late 80s. Many sports activities are offered in Jedburgh to children including rugby, football, swimming and badminton amongst others. Jedburgh has a golf club dating from 1850, the course was extended to 18 holes in recent years.

Chapter 7 : Siccar Point - Wikipedia

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Chapter 8 : Death of an Ocean: A Geological Borders Ballad | Books from Scotland

The Scottish Borders with the Cheviot Hills in the distance The view from Peniel Heugh, one of the mafic intrusions of the Lower Carboniferous period. The Pangaeian supercontinent continued to move northwards carrying the region into and beyond equatorial latitudes where wet tropical conditions supported tropical rainforest.

Chapter 9 : Scottish Borders geology: an excursion guide - Earthwise

The Scottish Borders region is famed for its frontier history and attendant myths and ballads. This book concerns the much more ancient geological history revealed by its rocks.