BRITISH ASSOCIATION SCIENCE FESTIVAL
GLASGOW, SEPTEMBER 2001

Geology Section President's Address: Roger Crofts, Scottish Natural Heritage

Geology is for everyone not just Geologists

Introduction

Slide 1: Rock close up, Dunbar

- Welcome to everyone attending and especially to the wider non-earth science community as this is for you.

Slide 2: rock, Dunbar

- Not an occasion just for earth scientists but for science to be made interesting and informative to wider public. Hands up how many of you in the audience are not geologists, geomorphologists or earth scientists.
- Thanks to collaborators, the Geological Society of London working with the Geology Section of the British Association and Scottish Natural Heritage.

Slide 3: Samon's ribs

- WILL use the President's address to focus on the themes of our two-day meeting: telling the earth's story, and managing in a changing world.

Slide 4: lava flows on Heimay

Telling the Earth's Story

(1) Translating the technical

- Legitimate to have scientific language but must remember importance of working with owners of key sites and with public.

Slide 5: Lendelfoot Geology "from the citation for the Girvan to Ballantrae Coast section SSSI

- "The Ballantrae Complex, of Ordovician age, consists of three belts of pillow lavas and associated sediments, separated from each other by ultramafic intrusive rocks. The Complex shows many of the features of an obducted ophiolite although geochemical studies indicate that the various igneous rocks were generated in a variety of tectonic settings and have since been tectonically juxtaposed."
- "The coastal section between Balcreuchan Port and Port Vad exposes a thick but repeated and structurally imbricated succession of lavas belonging to the Balcreuchan Group of the centra lava belt. At Balcreuchan Port aphyric pillow-lavas and breccias are excellently exposed in faulted contact with serpentinites."
- "The foreshore and cliff exposures at Games Loup demonstrate the contact between the northern serpentinite belt and the basic lavas of the central lava

belt. The harzburgites to the north have been serpentinised and contain pyroxenite segregations. South of the contact the basic lavas of the Balcreuchan Group are sheared and brecciated but there is no evidence of dynamothermal aureole of the type developed under the serpentinite unit at Knocklaugh."

- Well done to colleagues in the former NCC Earth Science section for the description. This is fine for geologists. But not really intelligible to bosses of the statutory Conservation Agency and certainly to the owners and occupiers who are our partners in looking after the site
- So it needs translation, perhaps something along the following lines is sufficient.

Slide 6: Lendelfoot Geology "from the citation for the Girvan to Ballantrae Coast section SSSI

"Soft Rocks from the ocean bed which used to separate England and Wales from Scotland and rocks from volcanoes became very mixed up along this stretch of coast some 420 million years ago. Lavas from volcanic vents had marked differences in their chemical composition, did not flow evenly over the landscape and were not formed into neat layers. They were mixed up with pebble beds and and silts and sands from the former ocean floor. The heat from the lavas affected the old ocean floor rocks. As the owner of part of the site we ask you not to dump rubbish over the sections because they are of great interest to geologists."

(2) Telling Scotland's story

Slide 7: geological map of Scotland

- How do we tell Scotland's story? we can pick out the main events and put it over in simple language

Slide 8: Lewision gniess

- we are very old

Slide 9: map

- we started life in the southern hemisphere

Slide 10: 4-pieces

- Scotland formed from four separate pieces

Slide 11: Iapetus closure

- We joined with England and Wales 450 years ago

Slide 12: Atlantic opening

- We parted from North America 60m years ago

Slide 13: map

- We have been covered by ice at least five times in

the last 2.5m years

(3) Novel ways of telling the story

Slide 14: Egg timer

- Basic choice between scientific exactitude, careful language and reference to the classic sites **or** more novel forms of communication to inform and excite. Both have some risk of criticism from the other side. Essential issues what is the target audience and how are we aiming to increase their interest in our earth history?

Slide 15: Knockan map

Slide 16: Skaftfjell diagram

Slide 17: Skafafjell diagram

Slide 18: Glen Roy Board

- On site we can do many things.

  The map and section specialists will understand, the diagram which seeks to simplify and explain the relationships, the section which gives an impression of geological time, and the longer trials by foot or by vehicle place different bits of rocks in there wider context.

Slide 19: landscape fashion books

Slide 20: diagram from landscape books

Slide 21: wall posters

Slide 22: Alan and Aubrey

- Offsite:

  Series of books for the interested laymans such as SNH's Landscape fashioned by geology, major TV programmes such as Aubrey Manning's Earth Story, and informative wall posters and accompanying teachers packs.

- So what is the argument: are we dumbing down or levelling up? I can only answer this in terms of the audience and how we want to interest and excite them.

Slide 23: Tiede interpretation

Slide 24: Tiede interpretation centre

- Pico de Tiede, Tenerife: high quality, high cost and high expense interpretation but generally too complex. Missing out the major land side which probably created a Tsunami like that being predicted neighbouring island of La Palma and how this volcano relates to the opening of the Atlantic.

Slide 25: Section

- Knockan Crag, Ayssnt: new approach using models, computer simulations, cartoons and adverts. Clearly not everyones cup of tea eg

Slide 26: Scotland migrating

Slide 27: cartoons

- "as a lifelong and presently practising geologist many geological students still come to the area because in 1907 the Government geological survey published an explanation of the rocks in the area by Benjamin Peach, John Horne and others. Their work is still read today and is held in reverence as perhaps the classic of geological field work ... as a

contrast to this work ... the new visitor centre at Knockan is dumb and ridiculous. It has the intellectual level of a packet of cornflakes with comic strips and mechanical gimmicks... this is the dumbing down of all down-dumbs. Knockan is not a childrens' visit; the concepts and ideas is entirely adult and especially geological ... I find it insulting, not just to geologists but to every thinking person that so much money could be spent to produce the equivalent of at the back of the cornflake package."

- Contrast, this view of two local residents "what an exceedingly pompous letter ... about the fascinating Knockan Crag visitors centre. ... The new information centre ... captures the imagination of the children and succeeds in bringing geology and the structure earth within the realms of understanding by mere mortals – those not fortunate enough to be eminent university professors! ... what could be more inspiring than this setting and hearing two six-year olds discuss whether they had found a piece of torridonian sandstone or a piece of pipe rock?"

Slide 28: hands over years

- "A father of two young children" there are lots of little interactive items to attract their attention. Will and Emma were taken by some of the sculptures but also at the way you can use your hands visually to span 500 million years which naturally gave them quite a bit of excitement. ... I think some things might have been done better the overall impression you get is that feeling of excitement of what geology has to offer".

- You can form your own opinion. Suffice to say that may be it took a population biologist to inform and enthuse TV audiences and cornflakes packets are on the breakfast tables of many households.

MANAGING IN A CHANGING WORLD

Slide 29: St Cyrus erosion

- Our understanding of the earth and what causes it to change is an increasing important part of scientific study: volcanoes, coasts, rivers, water and soils – these are all part of today's agenda.

Slide 30: Aberdeen waves

- Ways of dealing with the ever changing environment whether we should play Canute or let nature take its

course. Subjects for public debate informed by science.

- I not wish to steal the thunder of my colleagues but identify five principles for managing change and give examples of each.

(1) Natural Change is inevitable

Slide 31: Kafta

Slide 32: climate change

- Volcanoes will erupt and spread debris very widely. Climate will change often in irregular manner, sea level will rise, rivers will change courses, and slopes will move.
- Importance for science to provide information in intelligible fashion to the wider public and decision-makers on past change, current change and predicted future change.

(2) Work with nature

Slide 33: Danube

- We must not stop natural system undermining slopes, stopping rivers from flooding, stopping land from being lost by the sea.

Slides 34 & 35: Tay to Perth and upstream

- To reduce the cost to society and come up with more durable solutions we should allow flood plains to flood and coasts to disappear

Slides 36,37 and 38: Coastal protection Aberdeen area

(3) Manage Natural Systems within their Capacity

Slides 39,40 & 41: soil loss, Kinross, Montrose, Chateauneuf

- We over exploit soils so that the loss is greater than the speed of formation and the capacity to produce food directly and indirectly is diminished without more and more additives.
- Careful scientific analysis of natural limits giving this information to farmers, water authorities and others is important.

(4) Work within whole natural system

Slide 42: river basin Olympics

- We cannot look at rivers in isolation from what is happening in the mountains and surrounding slopes of the river basin or the way the land is managed. Looking at the whole river basin is now critical.

Slide 43: Aberdeen bay

- Along the coast we must recognise that tides and currents take sands and gravels along the coast in particular directions. And we must remember that an activity at one point can have an affect further along the coast. Therefore looking at the natural units called

coastal cells is important.

- Developing manuals which explain these new approaches and having teach-ins for practitioners is important.

(5) Balance use of renewable and non-renewable resources

Slide 44: Rance

- Non-renewable resources are precious given the time taken for them to form and given the present rates of use.

Slide 45: Hydro station, Rhone

- Therefore renewables, re-use of materials and technological innovation to create alternatives are important.

Slide 46: Wind, Madeira

- For instance for energy a balance swinging away from non-renewable resources like coal and natural gas to wind, wave and water power.

CONCLUSIONS

Slide 47: Ardnamurchan ring

- The history of the earth, its present state and its possible future state should be of interest to everyone: everyone has a right to know and understand these issues.

Slide 48: Hutton quote

- Scientists have a responsibility to explain there work and its implications in an informative and interesting way.
- I hope that the general public and the scientists attending will have an enjoyable and inspiring day and feel even more enthused about the earth and its story.