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GCSE and A level 2016 Geography Qualifications

Session 4:

- Practical guidance on how to deliver:
- Topic 1: Hazardous Earth
- Topic 2: Development Dynamics
- 11:45 to 12:30pm

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Focus for this session

- Covering the content in the time available (referring to the 2-yr course planner)
- A brief overview of Component 1: Topics 1 and 2
- New and/or challenging concepts, processes, theories
- Common misconceptions among students
- Depth required for GCSE level; i.e. drawing the line between GCSE and A level
- Selecting case studies & located examples
- Integrating geographical skills.

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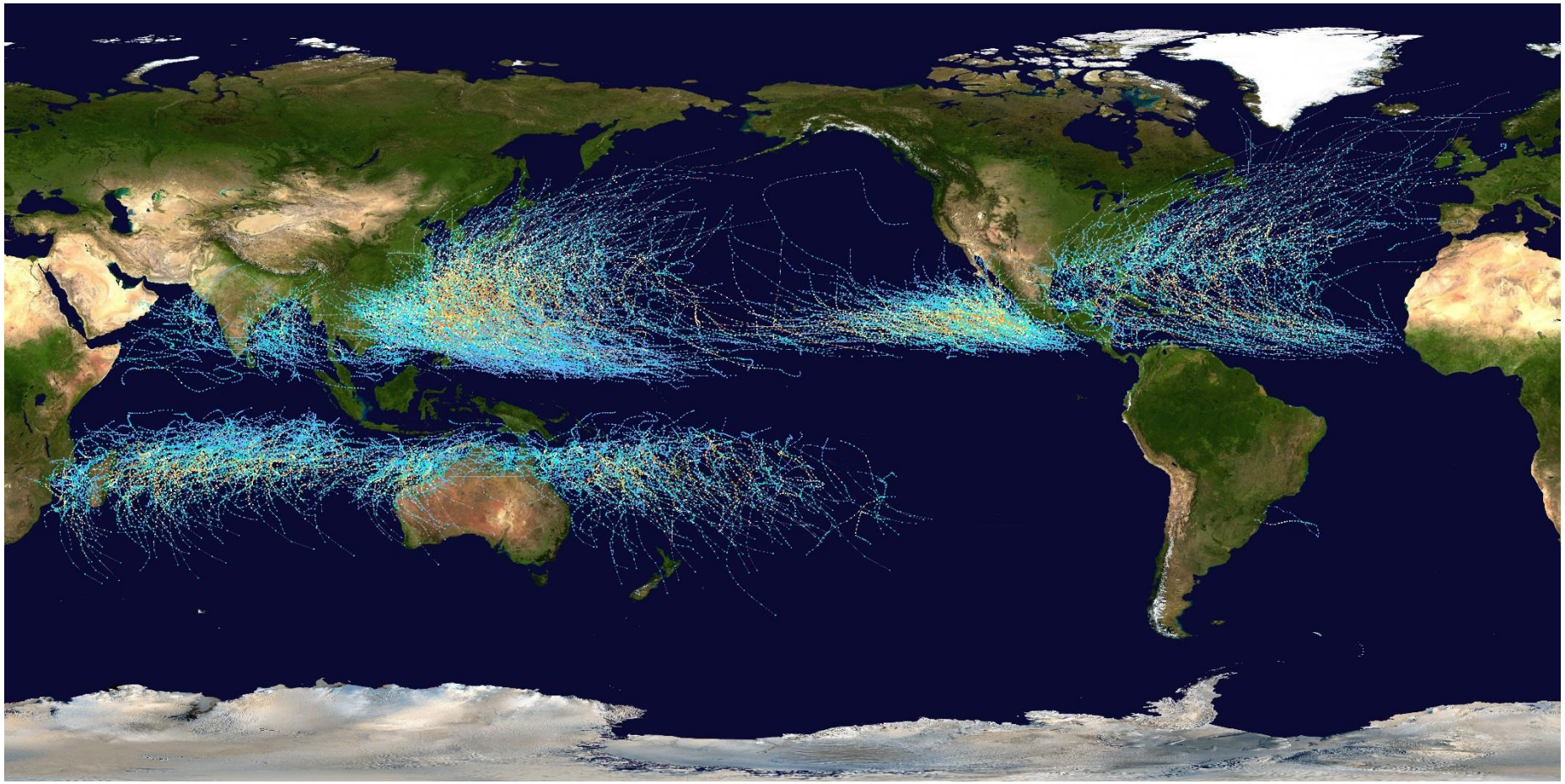
Component 1: Global Geographical Issues

- This component develops and deepens understanding of some key challenges faced by the world today including:
  - global warming
  - protecting people and places from extreme weather event
  - tectonic hazards
  - tackling global inequalities in development
  - sustainable management of megacities.

- Topic 1: Hazardous earth
- Topic 2: Development dynamics
- Topic 3: Challenges of an urbanising world

Topic 1: Hazardous Earth



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Topic 1: Hazardous earth

Of particular note to those teaching the legacy specification:

- **Understanding the global circulation of the atmosphere** and changing climate

This content is equivalent to the content in Edexcel GCSE Geography B (2012)

Plus two located examples of:

- **an extreme weather hazard (tropical cyclones)**
- tectonic hazards in contrasting locations.

The topic is studied through 3 enquiry questions:

Q How does the world's climate system function, why does it change and how can this be hazardous for people?

Q How are extreme weather events increasingly hazardous for people?

Q Why do the causes and impacts of tectonic activity and management of tectonic hazards vary with location?

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Delegate ACTIVITY 6:
new and/or challenging theories, concepts or processes (5mins)

Discussion

- What might your students find difficult when studying:
  - Weather?
  - Climate?
  - Climate change?

Met Office

The Met Office website has a 'learning' section providing clear information about all of the main processes that students may find challenging.

http://www.metoffice.gov.uk/learning

Supported by accessible diagrams with sufficient depth for GCSE but not the level of detail required for A-level.

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Handling difficult concepts

- ✓ Language to describe weather and climate
- ✓ Explaining processes – some students do this well but many student responses are poor (e.g. In 2015, Unit 1: Q2b)
- ✓ Sun's energy – it is light, not heat
- ✓ The causes of wind and air movement
- ✓ Air pressure – particularly high pressure air (cold descending dry air) associated with warm weather
- ✓ The circulatory cells, e.g. Hadley Cell, and impacts on global weather
- ✓ Understanding natural causes of climate change (though volcanic dust is usually well described in exams)
- ✓ Remembering terminology – e.g. Milankovitch cycles
- ✓ Confusing some of the causes of climate change attributable to greenhouse gases with the impacts of ozone

Handling difficult concepts

- Some parts are easier – e.g. conditions under which tropical cyclones originate, their different names, their impacts, prediction, and preparation

- But meteorological processes are complex! Remember this is GCSE so don't go into too much depth.

  e.g. The key processes – origin, development, low air pressure, spin, intensification and decay – are one bullet point of detailed content (1.4a) and can be taught in a single lesson if you focus on the top-level details.

- Coriolis Effect – not too difficult to grasp but try putting it into words! Students might just have to accept that it exists…

- Coriolis video by NOVA PBS: https://www.youtube.com/watch?v=i2mec3vgeaI

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Handling difficult concepts

- Wind speeds – a function of pressure difference between higher and lower pressure air
- The relatively narrow range of air pressures that produce big impacts - 40mb either side of 1000mb really makes a difference!

  920mb… even more so!

  880mb… take cover under something very solid!

  e.g. One of the lowest air pressures ever recorded was 877mb in Typhoon Ida in the Philippines in 1958, where winds reached 300 km/hr!
- Vulnerability – students seem to grasp this relatively well
- Prediction – not a hard concept; just need to understand that it's intelligent guesswork based on previous storm tracks

Common misconceptions

www.meridian.aag.org/climate/

This website is an excellent online resource for the overview parts of this topic and specifically addresses common misconceptions held by students.

There is also a useful 'teacher forum' facility.

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Tropical Cyclones:
The appropriate depth for GCSE?

Keep a sense of proportion – remember these are all to be taught in approximately two hours to GCSE students!

- What are they? Characteristics (v. low pressure, rotation, structure) & Features (e.g. wall, clear/still eye, rotating winds, and in which direction winds move)
- Where do they form? Formation and development; ocean heat and moisture as energy sources for the engine and intensification
- When do they strike? Seasonal distribution of tropical cyclones including source areas, tracks, and how these change over time
- Why do their tracks change? Latitude, over sea or land?

Integrated Skills: Using GIS to track tropical cyclones.

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Where is this?

Averages in Ja
- 0 days of s
- Night-time
- Daytime av

Tresco, Isles of Scilly, 49.5°N

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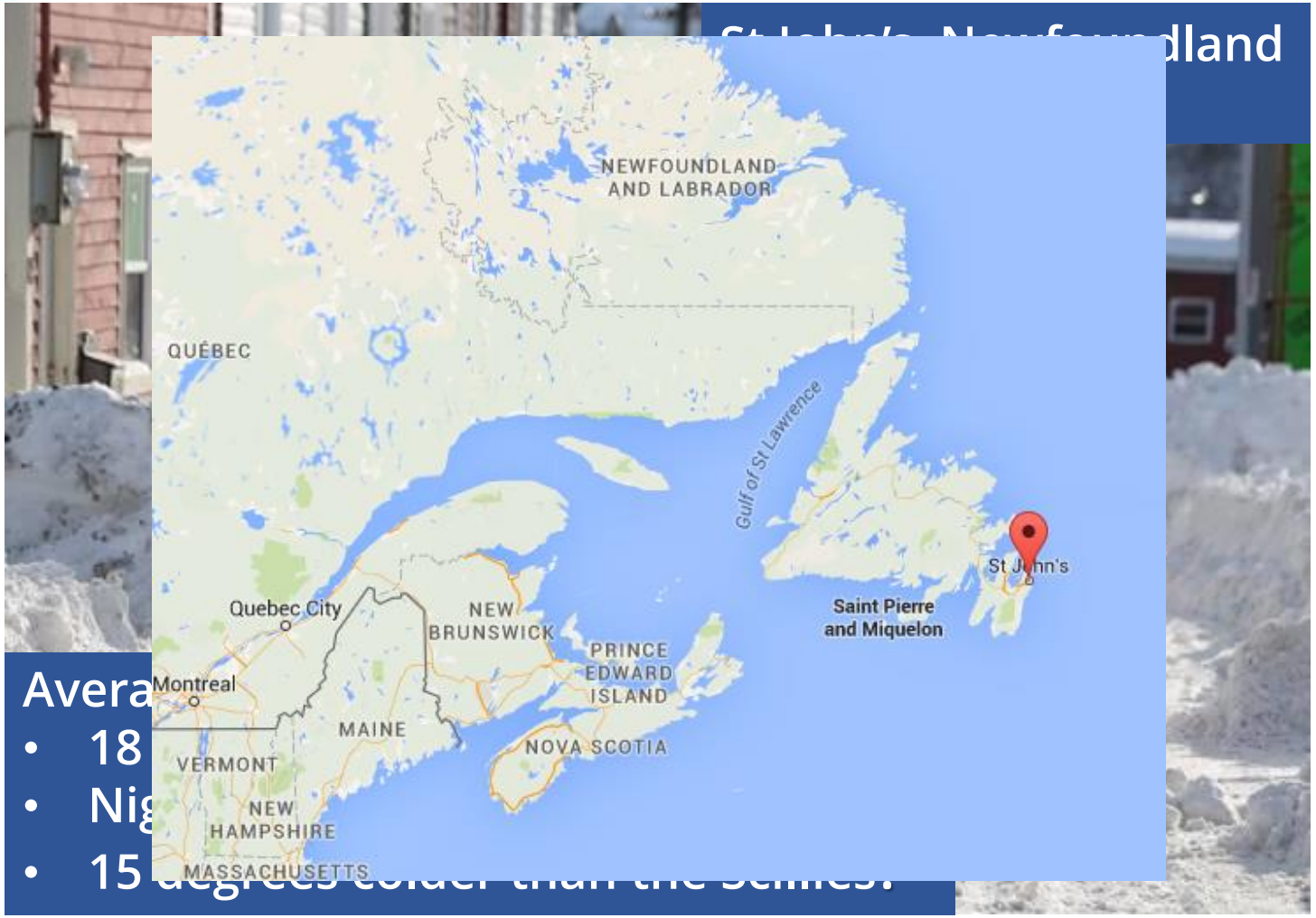
St John's, Newfoundland



Avera

- 18
- Nig
- 15 degrees colder than the Scilles!

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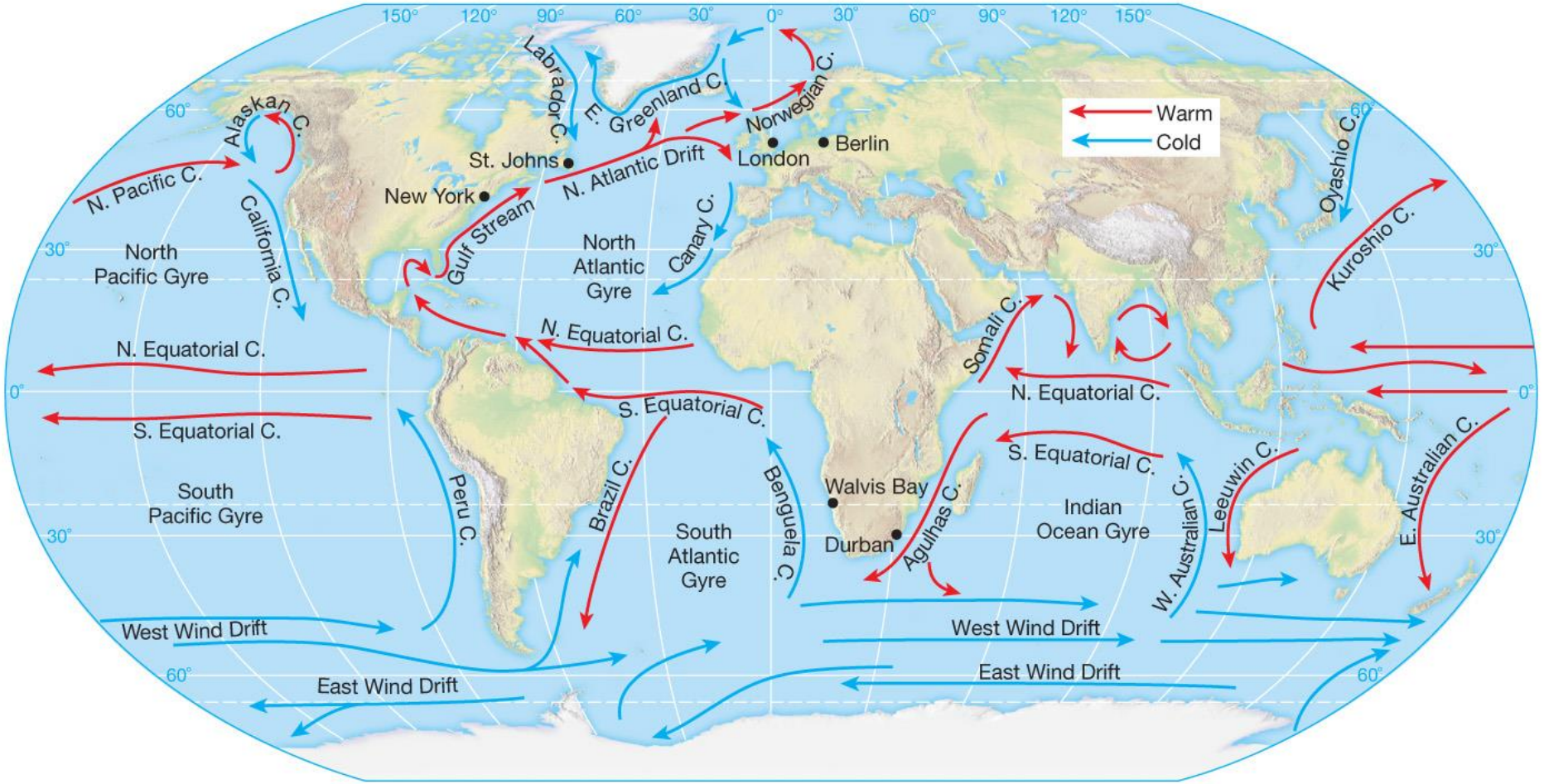
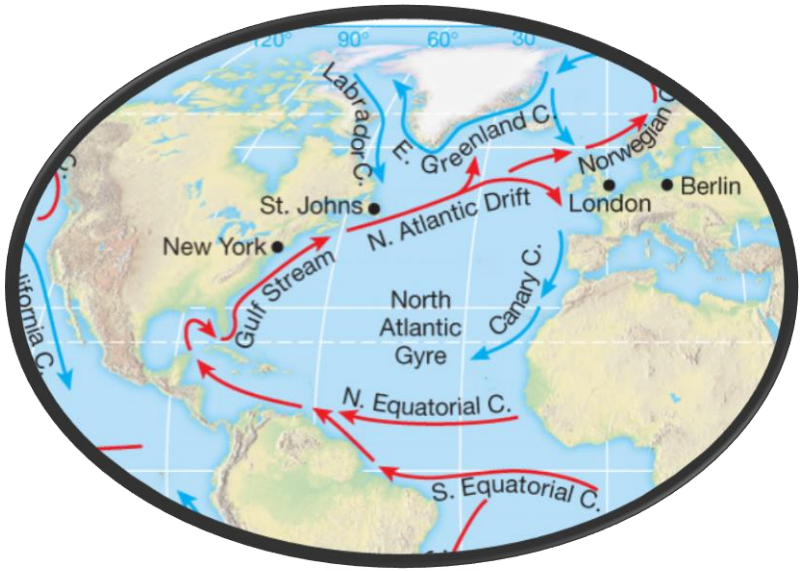
The product of ocean currents



Tresco vs. Newfoundland

- Differences are caused by the Gulf Stream, a warm ocean current
- It begins in the Gulf of Mexico as part of the N. Equatorial Current
- It is driven by westerly winds across the Atlantic
- It turns towards north-western Europe as the North Atlantic Drift, and then joins the Norwegian current where it is chilled by the icy Arctic



- Around N. Canada and S. Greenland, the current cools, turns south around Greenland, joining the cold Labrador Current, chilling Newfoundland.

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Global atmospheric circulation

- It is worth watching the high-definition global air circulation animation by CSDMS:

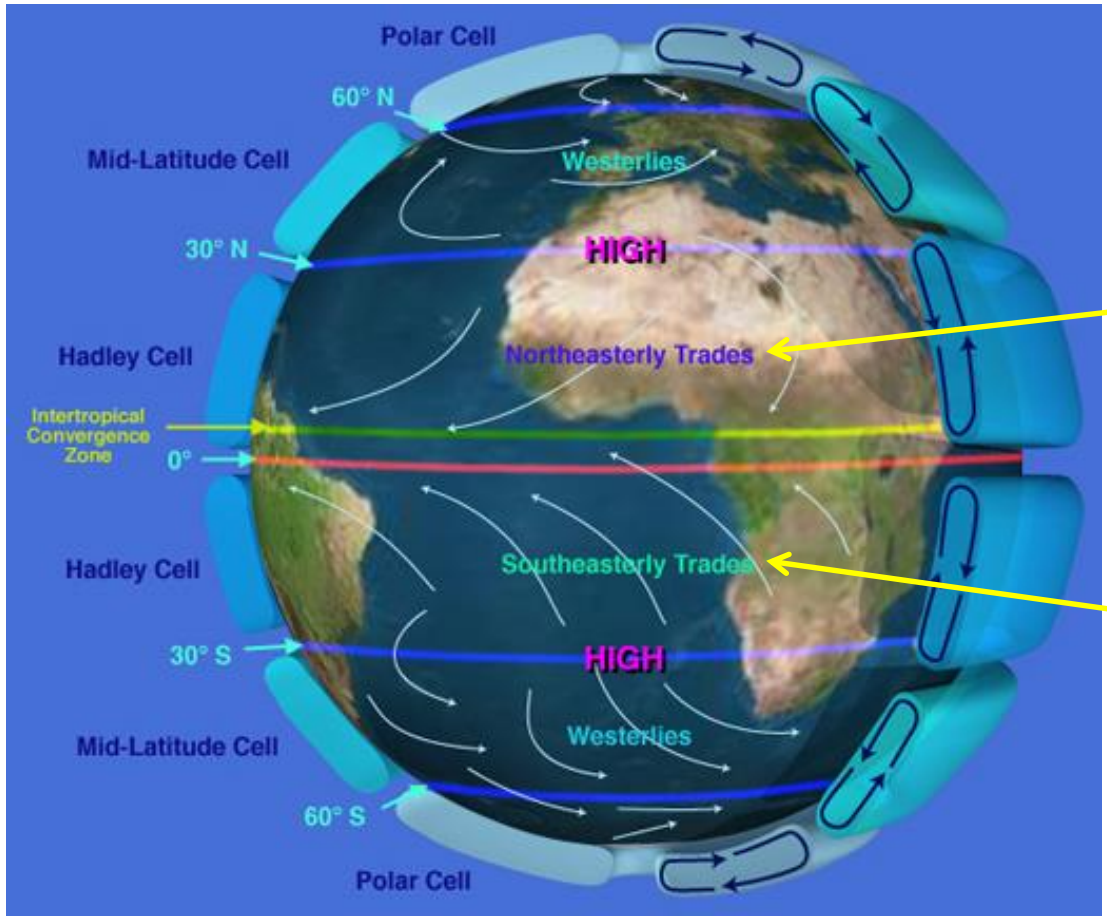
  https://www.youtube.com/watch?v=qh011eAYjAA

- The global circulation redistributes heat from the Equator (which would otherwise become unbearably hot) and the Poles (otherwise intensely cold).

Heat is redistributed globally in two ways:

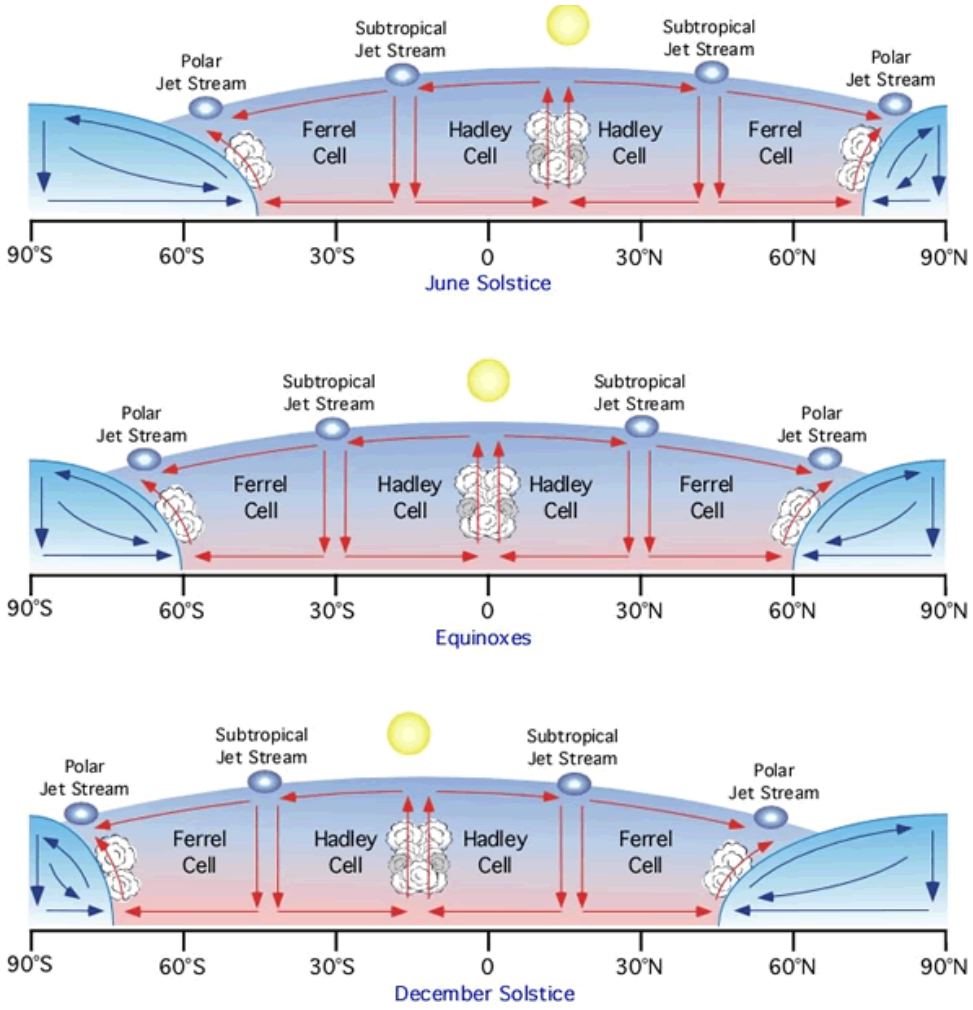
1. air movements caused by pressure differences
2. ocean currents.

Atmospheric circulation model



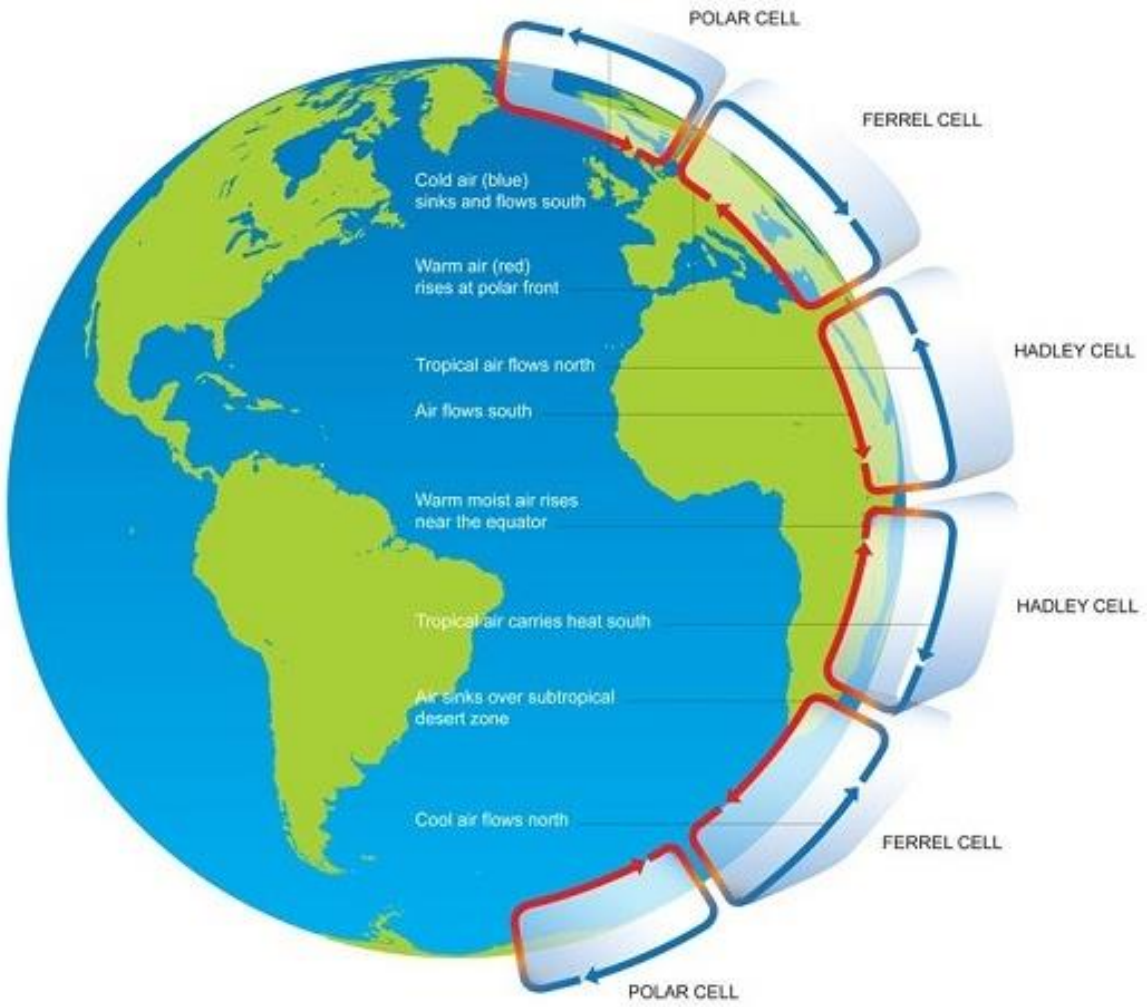
- The sun's energy is highest at the equator so air at the surface warms and rises
- Therefore a low pressure zone is created at the equator, drawing Trade Winds south to West Africa
- These Trade Winds converge with those from the Gulf of Guinea at the 'Inter-Tropical Convergence Zone' (ITCZ)
- Forced to rise as the winds meet, the air cools, water vapour condenses and this creates heavy rainfall.

Annual movement of the ITCZ



- Rainfall seasonality in the tropics (e.g. the monsoon) is almost always caused by movement of the ITCZ.
- By January, the pattern shifts south, bringing a dry season to West Africa and a rainy season to southern Africa

Atmospheric cells



- Like the Hadley Cell, the Ferrel Cell (30º-60º N and S) and Polar Cell (60º-90º N and S) are found in both hemispheres.
- Ferrel Cell: caused by air cooling and falling over North Africa. As well as blowing south as part of the Hadley Cell, some air also blows towards the poles.
- These winds drive the Gulf Stream and collect moisture over the oceans.
- They meet cold, dense air from the Polar Cell at 50º-60ºN and S, which creates a front (this causes high rainfall, such as in the UK!).

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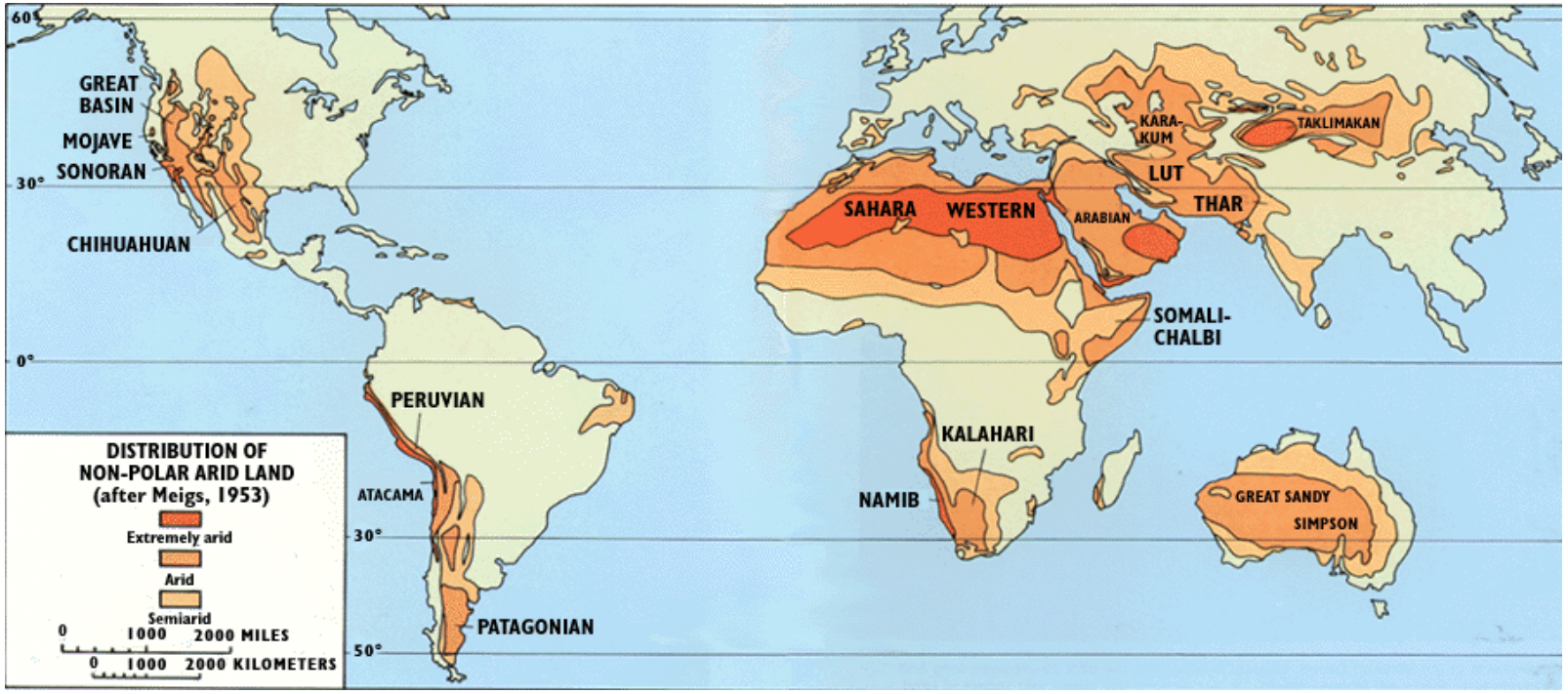
Key teaching points

- The ITCZ drives almost all seasonal rain in the Tropics
- It forms within the Tropics when two air masses converge
- It's part of a movement of the atmosphere called the global circulation model (GCM), created by heating and atmospheric cooling
- The GCM consists of three 'cells' of air, the largest of which is the Hadley Cell
- Between them, these create the world's high and low pressure systems

Explaining arid areas

- January: Cooling air (at altitude) falls to create high pressure on the surface. This leads to dry air & no clouds.
- June: Despite movement of the ITCZ, rains never reach the Sahara or other deserts in the tropics (e.g. Atacama or Great Sandy)



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Integrating geographical skills

Global climate and climate change (p.9 of the spec)

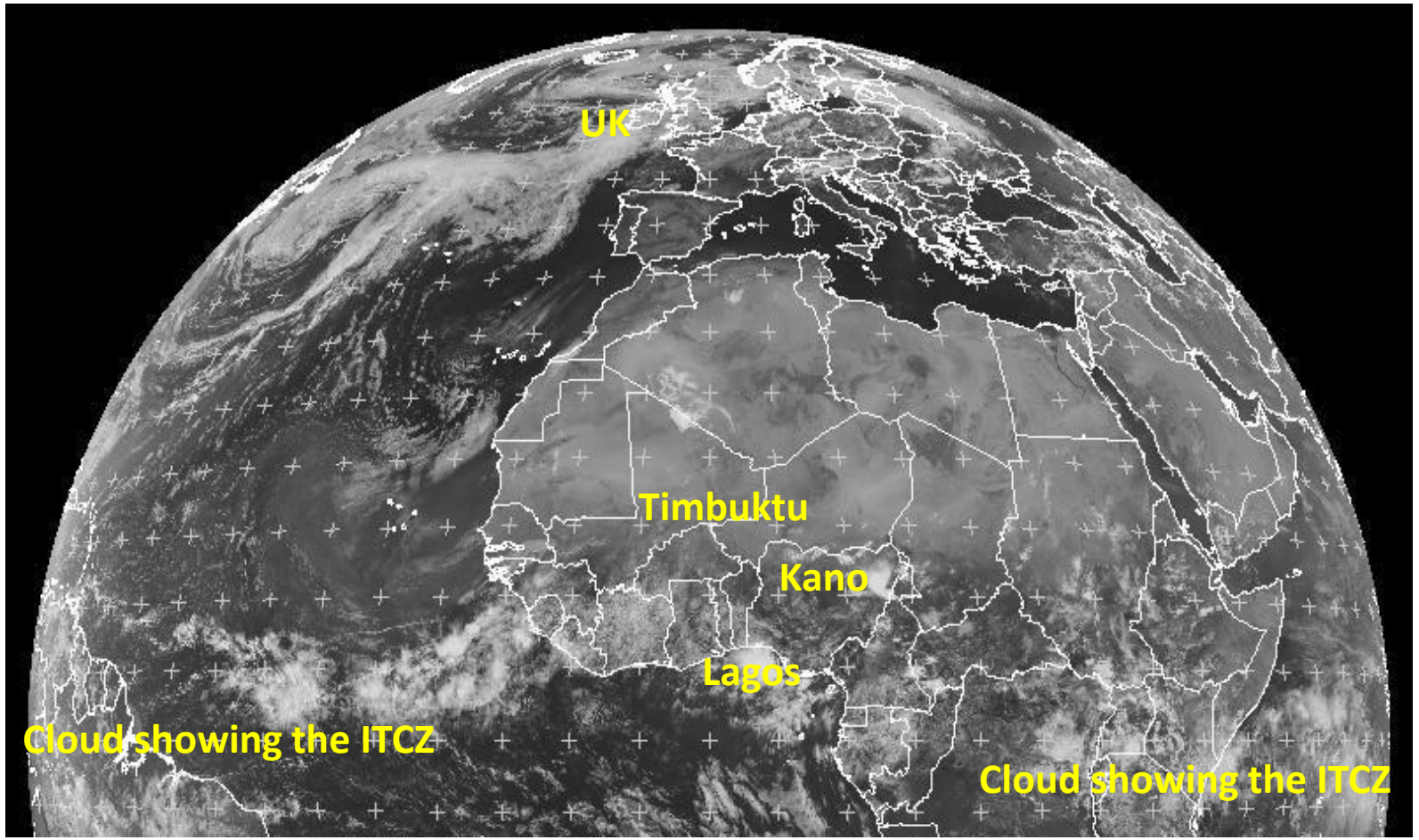
(1) Use and interpretation of climate graphs.

(2) Use and interpretation of line graphs/bar charts showing climate change.

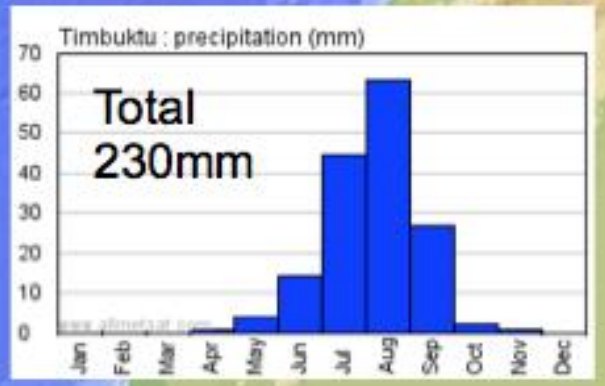
(3) Use and interpretation of temperature and sea-level projection graphs to 2100.

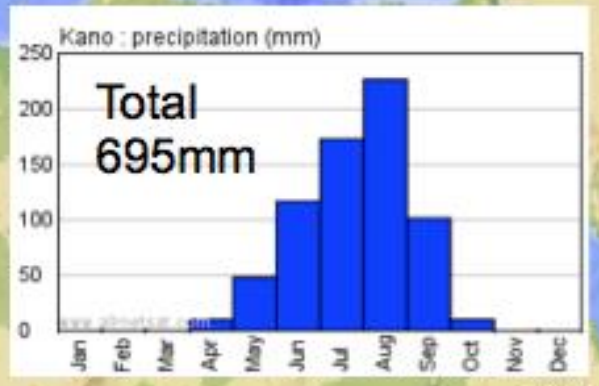
Using satellite images – specified later in EQ2, but useful here

West Africa - June 2012

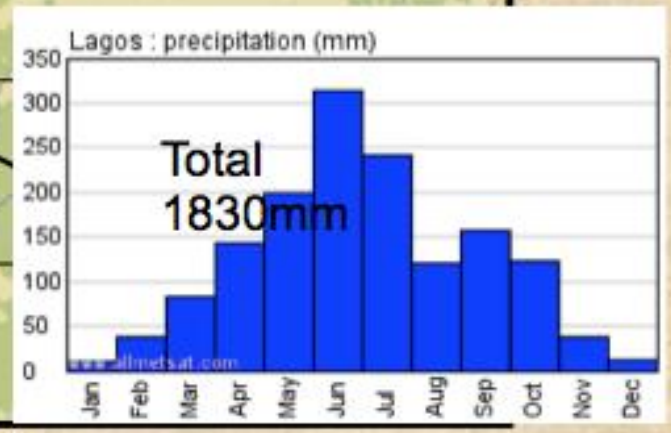


The ITCZ in West Africa





20°N
15°N
10°N
3
15
25
36
60
75
111
123
110
250
500
1000
2000
3000
Timbouctou
Late May
Late April
Kano
Early March
1000 Lagos
Arrival of rains



May
Text in blue shows start of rainy season
250 Isohyets showing rainfall in mm
75 Average number of rainy days per year
Towns / cities

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Integrating geographical skills

(4) Use of GIS to track tropical cyclones (p.10 of the spec)

- The National Hurricane Center (http://www.nhc.noaa.gov/) is the answer to your prayers!
- So is Weather.com! http://www.weather.com/storms/hurricane
- In the southern hemisphere, the Australian Bureau of Meteorology is excellent - http://www.bom.gov.au/cyclone/
- Remember it's the images you want to use, not those of forecasting or understanding 'how and why'.
- Once you know the rough track, you have a good basis from which to identify places at risk
- *Can be tied in to prediction and warning systems later…*

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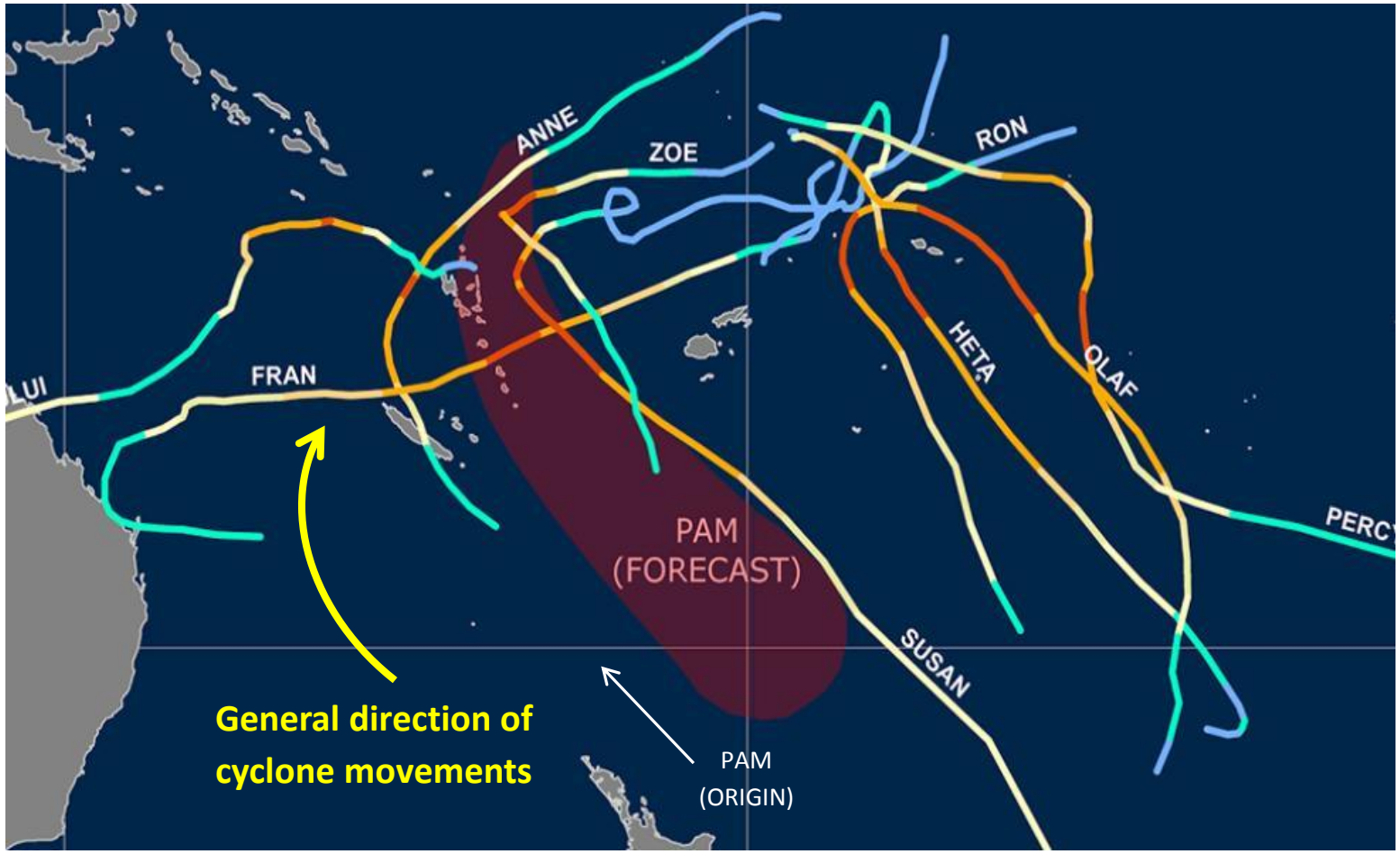
Pacific tropical cyclones 2015

What is the shape of the track that most of these cyclones are taking?

Most tend to behave in similar ways, with similar tracks



Integrating geographical skills

(5) Use of weather and storm-surge data to calculate Saffir-Simpson magnitude

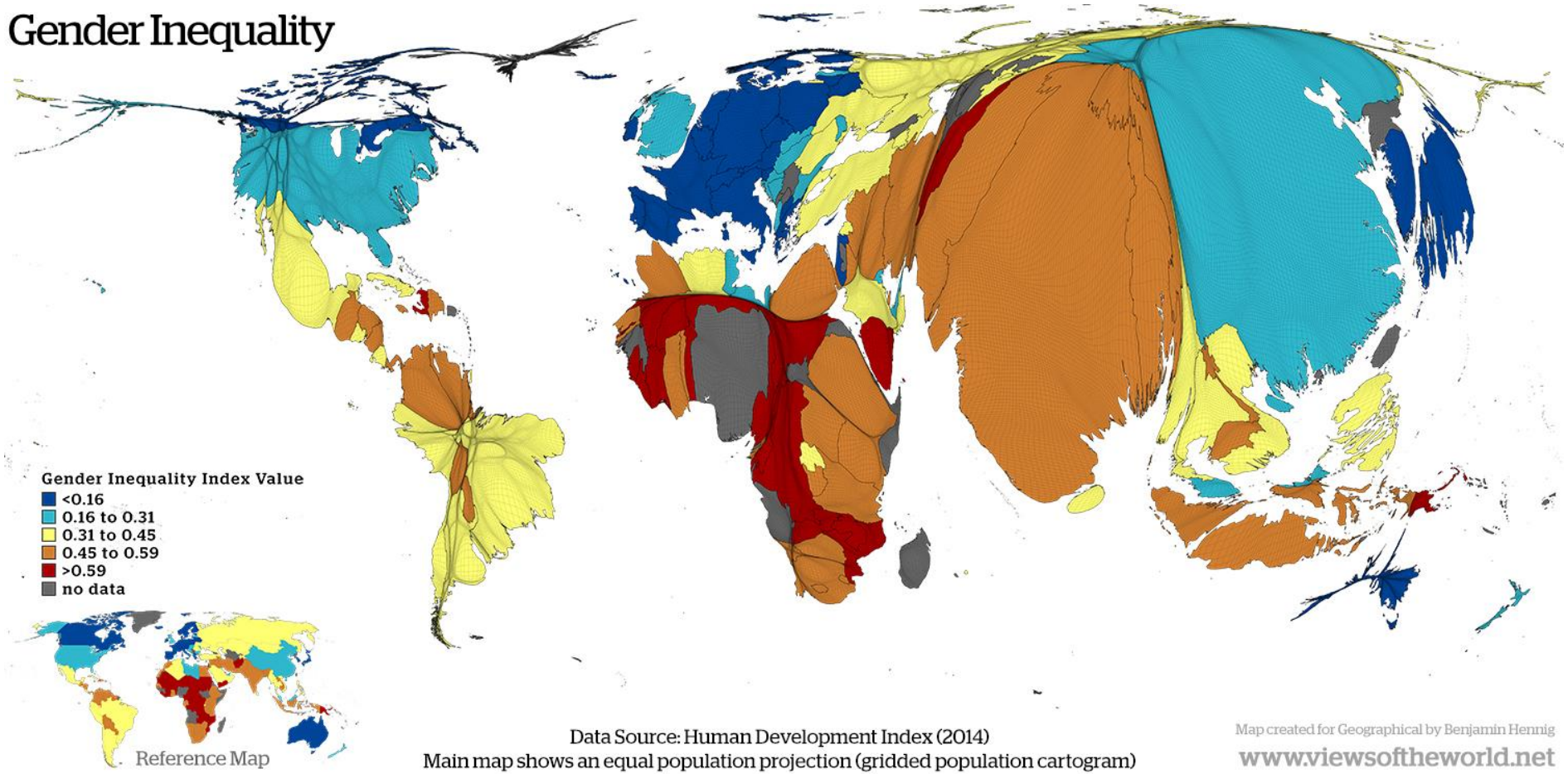
- *Again, this is simply knowing how different tropical cyclones compare in magnitude*

(6) Use of social media sources, satellite images and socio-economic data to assess impact

- *Use searches on Twitter and Facebook as part of student homework to identify reactions, problems, impacts*

(p.10 of the spec)

Topic 2: Development Dynamics



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Topic 2 Development dynamics

This topic requires an understanding of the scale of global inequality, plus one in-depth case study of how an emerging country is developing and the consequences for people, environment and the country's relationship with the wider world.

Same as the 2012 qualification	New in the 2016 qualification
Different ways of defining and measuring development	More in-depth focus on the study of one emerging country (*high or medium on HDI)*
Global inequality, development and theories on how inequalities can be reduced	Focus on the emerging country's site, situation and connectivity; its geopolitical location
Approaches to development vary in type and success	Globalisation integrated in development topic, thus changing international relations and FDI

This topic is studied through 2 enquiry questions:

Q What is the scale of global inequality and how can it be reduced?

Q How is ONE of the world's emerging countries managing to develop?

Delegate ACTIVITY 7:
new and/or challenging theories, concepts or processes (5mins)

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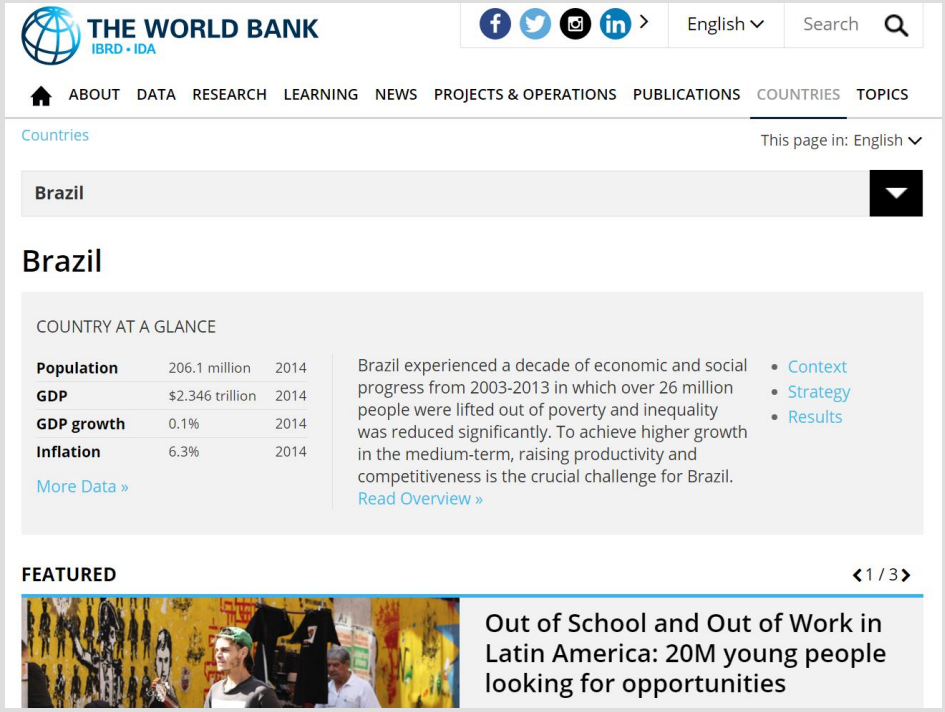
Discussion

- What might your students find difficult when studying:
  - Development?
  - Globalisation?

The World Bank website:
http://www.worldbank.org/en/country
provides a very useful starting point...



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Handling difficult concepts

- ✓Some of it is quite esoteric. e.g. Who's more developed?
- ✓Mass of data and terminology – GDP, PPP, GDP per capita, GNI
- ✓Different units – percentages (e.g. literacy), average units (e.g. life expectancy), per 1000, per 100 000, etc.
- ✓Interpreting the data – what do they actually mean?
- ✓Developing a real sense of what it means to live in these countries…

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Teaching the content

- Remember, the detailed content bullet points are written as one lesson each…
- Simple comparisons are fine – between developed, emerging countries and developing

- Use the same data for the case studies you're studying elsewhere in the course

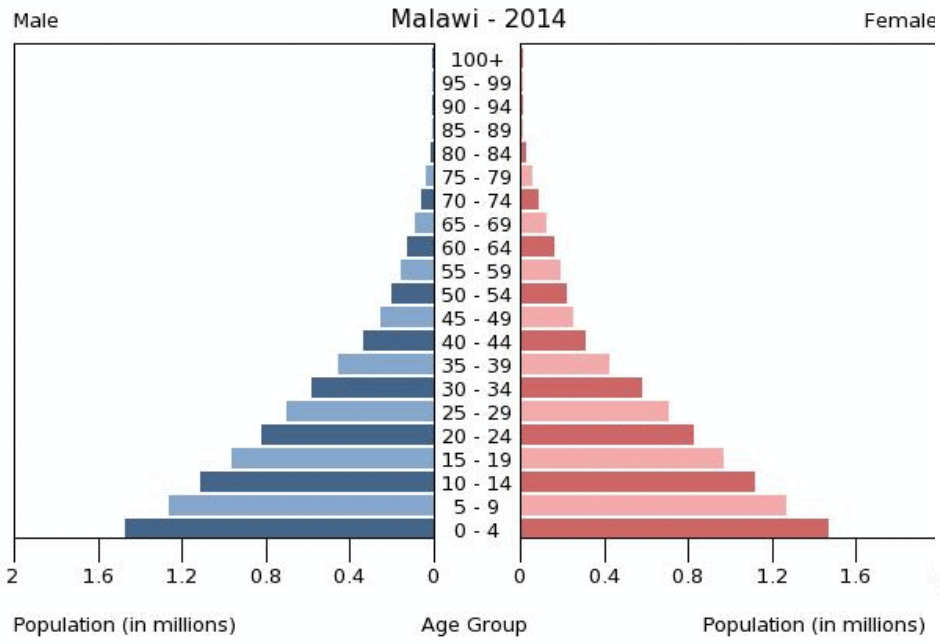
  e.g. your chosen megacity for topic 3 could be in the emerging country you have chosen for topic 2

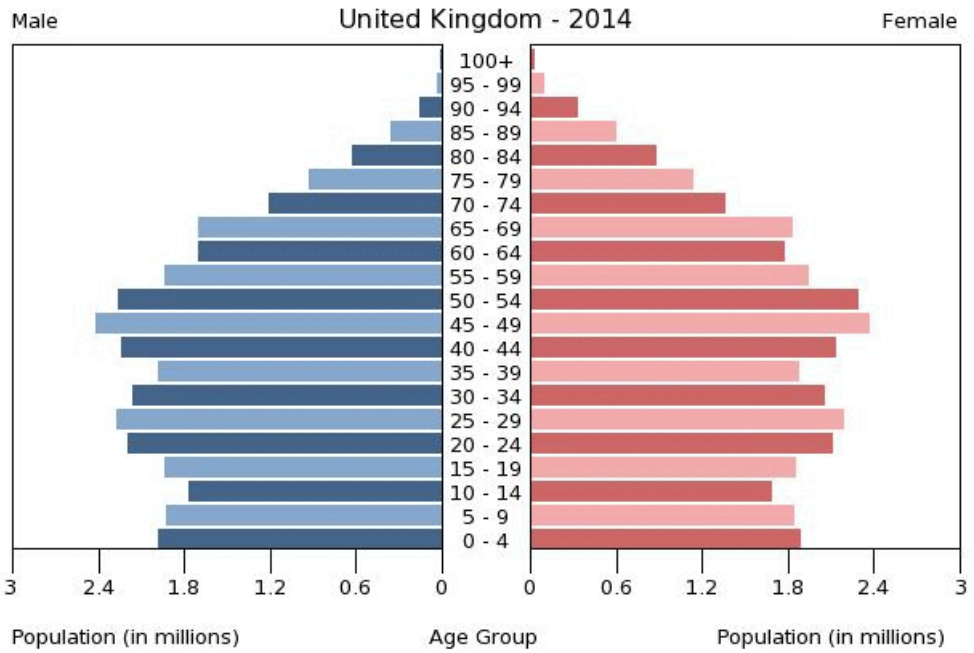
- You could apply some of the detailed content to the study of your chosen emerging country (e.g. top-down, bottom-up)

Integrating geographical skills

Handling demographic data

(2) Interpreting population pyramid graphs for countries at different levels of development





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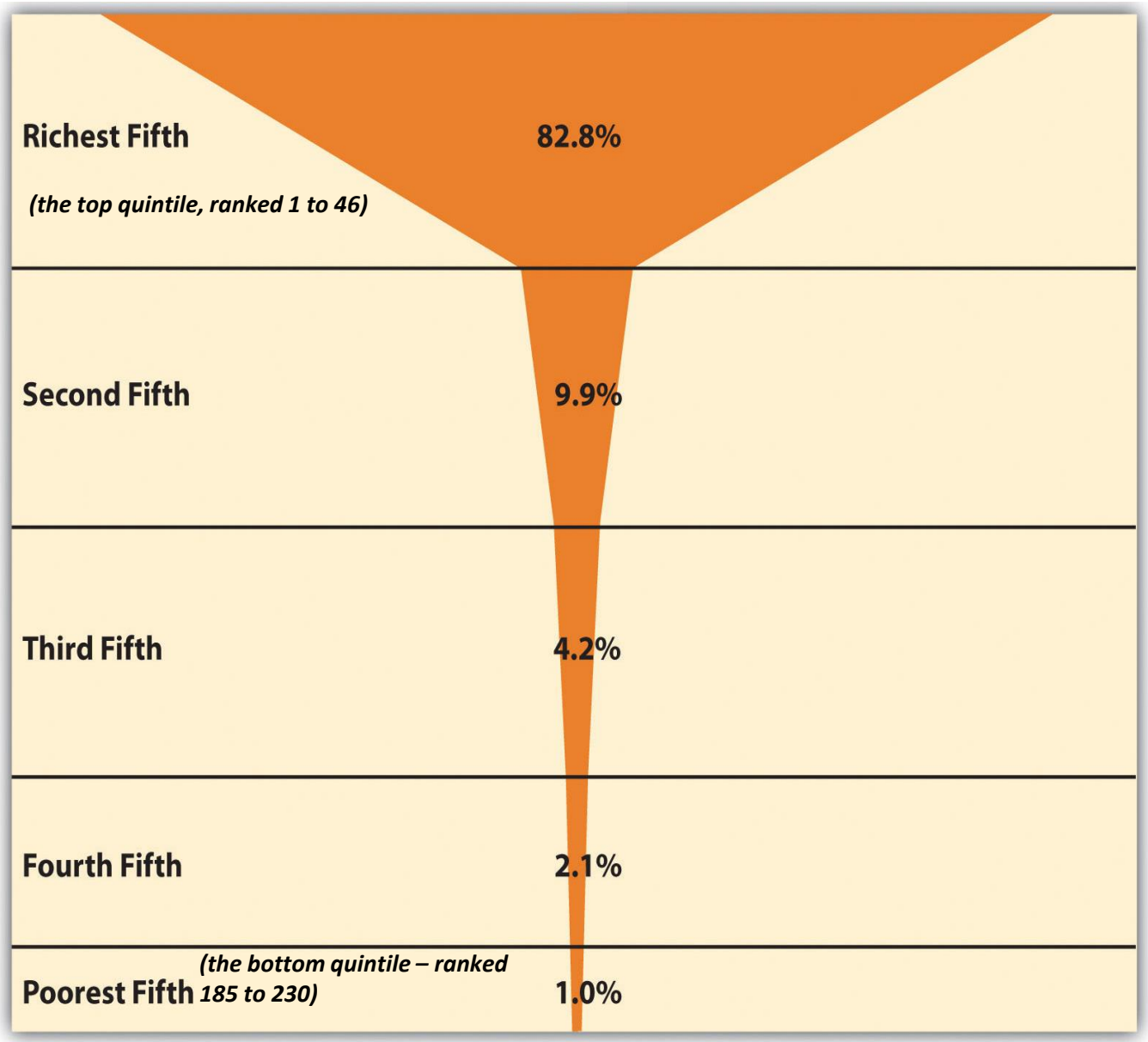
Use the data to guess the country

HDI	0.69	0.94	0.55	0.63	0.73
GDP per capita US$ PPP	9,200	49,900	3,900	4,900	11,900
Internet users (% pop)	40	78	11	22	46
GDP from agriculture (%)	10	1	17	38	6
Population growth rate (%)	0.5	0.9	1.3	1.0	0.8
(2012 data)					

(1) Comparing the relative ranking of countries using single versus composite development measures.

(3) Using income quintiles to analyse global inequality.

It doesn't need to be complicated!



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Choosing your emerging country case study

It's a fast-changing world!

Rank in global economies in 2015	Likely position by 2050
2	1 China
10	2 India
1	3 USA
20	4 Indonesia
21	5 Nigeria
7	6 Brazil
9	7 Russia
3	8 Japan
39	9 Philippines
6	10 UK

Developing a sense of place: where is this?

India's position in the world

- Geographically
- Economically
- Culturally
- Politically
- Environmentally (positives)
- Environmentally (negatives)

India's growing TNCs & overseas investment (FDI)

TATA STEEL

Tata bought Corus Steel in 2006 – an Anglo-Dutch company which owned most of the steel production in the UK. Its purchase made Tata the world's 5th biggest steel producer

JAGUAR | LAND ROVER

Tata bought brands with a global reputation from Ford

Tata owns top hotel 51 Buckingham Gate in London

TATA

Tetley

Tata owns Tetley – the world's second biggest tea producer

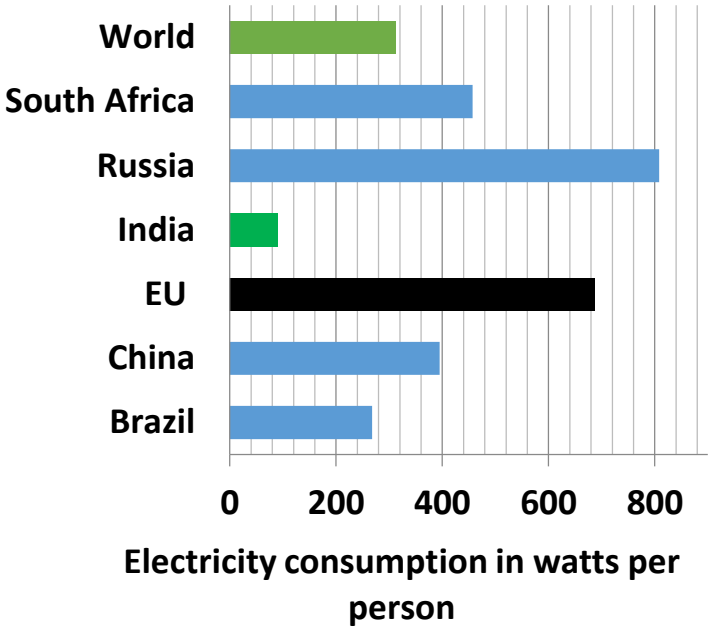
BRITISH SALT

UK's leading manufacturer of pure dried vacuum salt products.

British Salt at Nantwich, Cheshire – part of Tata Chemicals

- 25% of people have no electricity even when everything works.
- India has a low per capita electricity consumption compared with other BRICS, or the world

Blackout gridlock in 2012



July 2012 India blackout – the world's largest power outage in history:

- Affected over 620 million people
- Half of India's population across 22 states, or 9% of world population
- Hot weather increased demand for power for irrigation and cooling

Geopolitics

- Relations with some neighbours are tense; three wars with Pakistan since 1947. Kashmir, lying between them, remains disputed.
- Both countries have nuclear weapons, raising fears of future conflict.
- Water scarcity is a source of conflict; the main rivers of both countries rise in the mountains of Kashmir.
- HEP projects on India's side could take irrigation from farming areas of Pakistan that most need it.

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Evaluating India

Strengths	Weaknesses	The lowest *per capita* GDP of the emerging economies with huge rural poverty, but huge potential
• Education • English language • Youthful population • IT and Software	• Infrastructure • Energy and water supply • Poverty • Weak inward investment	
Opportunities	**Threats**	
• Huge domestic market • Vast growth potential • Urbanisation	• Regional tensions e.g. Pakistan • Resource / food crises • Red tape/ bureaucracy	