Position of southern Africa in global climate change

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The Greenhouse Effect

Some solar radiation is reflected by the Earth and the atmosphere.

Some of the infrared radiation passes through the atmosphere, and some is absorbed and re-emitted in all directions by greenhouse gas molecules. The effect of this is to warm the Earth's surface and the lower atmosphere.

Solar radiation passes through the clear atmosphere

Most radiation is absorbed by the Earth's surface and warms it.

Infrared radiation is emitted from the Earth's surface.
Our planet did not come with a book of instructions!
Global emissions (all sources) 2012

World Total: 35418 MtCO₂
Global emissions (all sources) 1960
Global emissions (land use) 2012

World Total: 0.0 MtCO₂
In addition to the well known social issues of illiteracy and innumeracy, there also should be such a concept as "innumeracy", meaning insufficient geographical knowledge.

A survey with random American schoolkids let them guess the population and land area of their country. Not entirely unexpected, but still rather unsettling, the majority chose "1-2 billion" and "largest in the world", respectively.

Even with Asian and European college students, geographical estimates were often off by factors of 2-3. This is partly due to the highly distorted nature of the predominantly used mapping projections (such as Mercator).

A particularly extreme example is the worldwide misjudgement of the true size of Africa. This single image tries to embody the massive scale, which is larger than the USA, China, India, Japan and all of Europe,...... combined.
Emissions Annex 1 and non-Annex 1 Kyoto Protocol
Climate change and the wicked challenge of sustainable development

Mitigation responses

Climate change impacts

Uncertainty

Development pathways

Adaptation responses

Societal needs and policy

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Drought severity increased globally over the last century

The most important spatial pattern (top) of the monthly Palmer Drought Severity Index (PDSI) for 1900 to 2002.

The time series (below) accounts for most of the trend in PDSI.
Strong warming has occurred over the central parts of southern Africa.

Warming more moderate along the coastal areas, except south-western SA and southern Mozambique.
Temp anomaly 2088
What does this all mean for southern Africa?
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• Biggest direct economic effects – roads!
• Livelihoods effects – local food security (dryland agriculture); human settlements
• Weather disasters – floods, drought, heat
• Water security, except in South Africa
• International land grabs for food security
• Health, pests and diseases?
• Ecosystems? Wildfire, bush encroachment, rivers and wetlands, human demands
• Coastal impacts – sea level, marine fisheries
What does this all mean for southern Africa?

• Southern Africa needs development
• Southern African emissions tiny (excl. SA)
• High global emissions have adverse impacts
• SA – peak, plateau, decline, give us time
• Adaptation and development opportunities
• Mitigation and development opportunities
• Does climate change finally move us onto a sustainable development path?