Ainaro
Timor,
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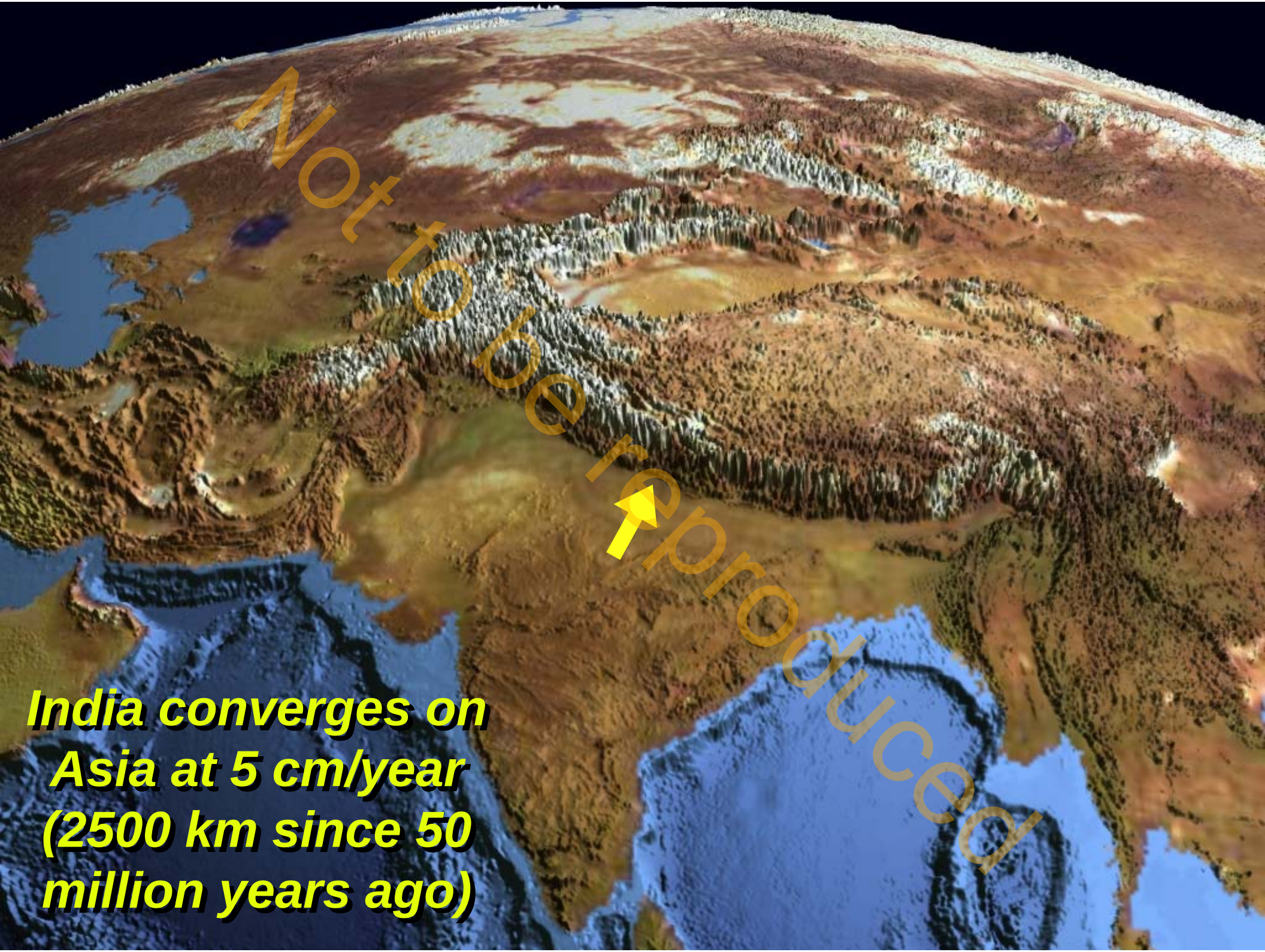
Garhwal, India
2011

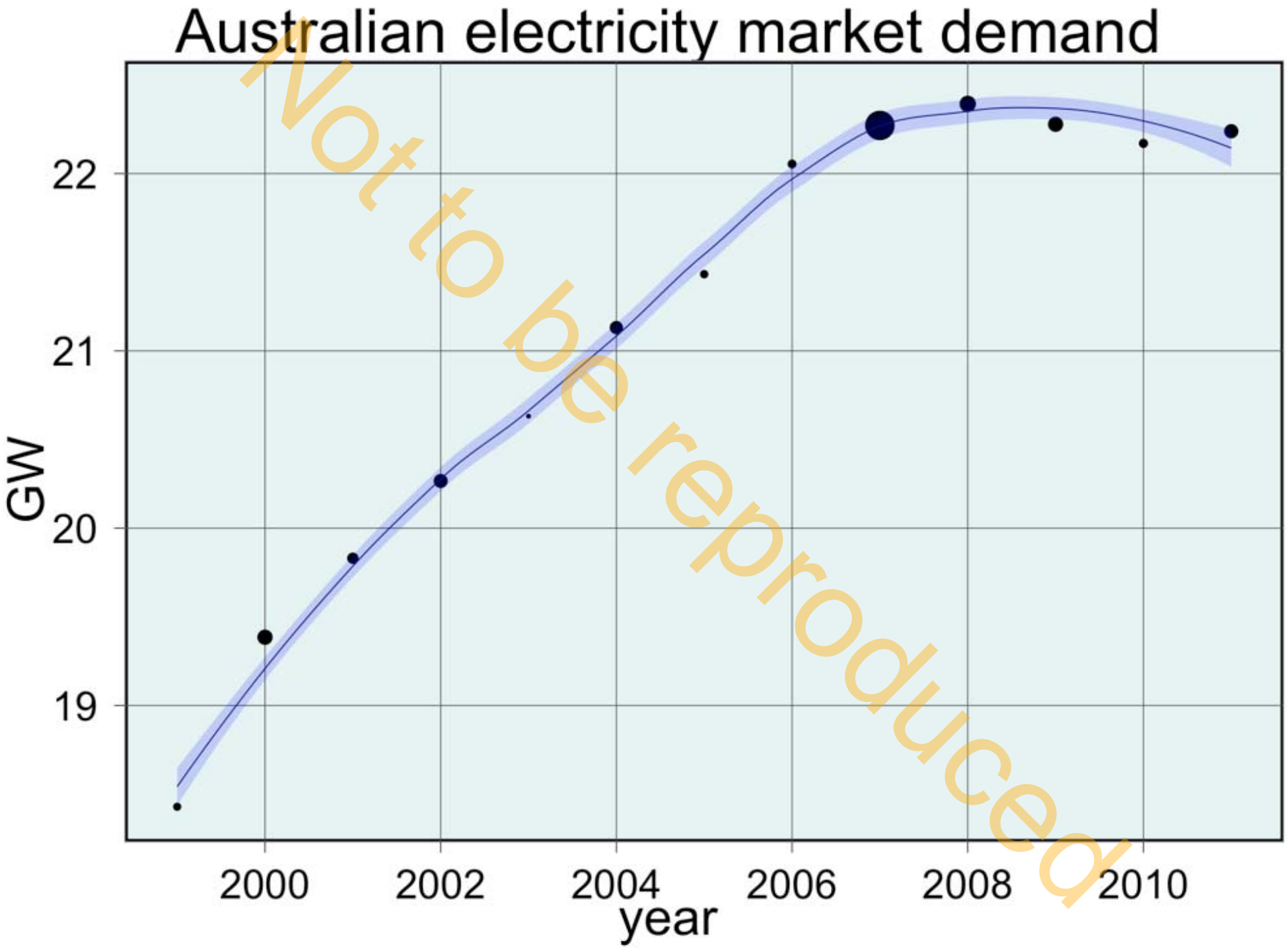
geoscience and society

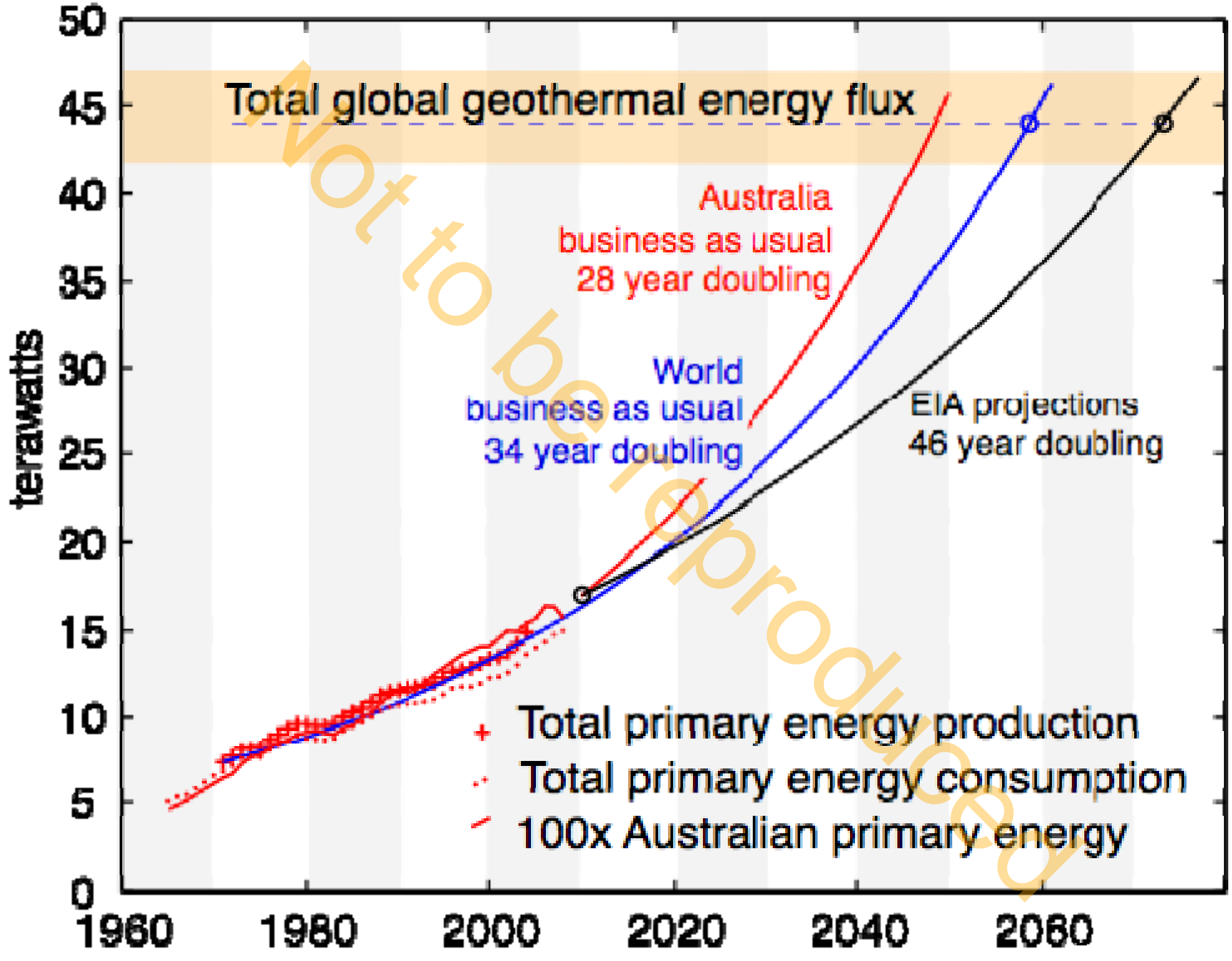
1. humans as geophysical agents
2. the idea of crustal services
3. the stories of our planet as foundation myth

mike sandiford

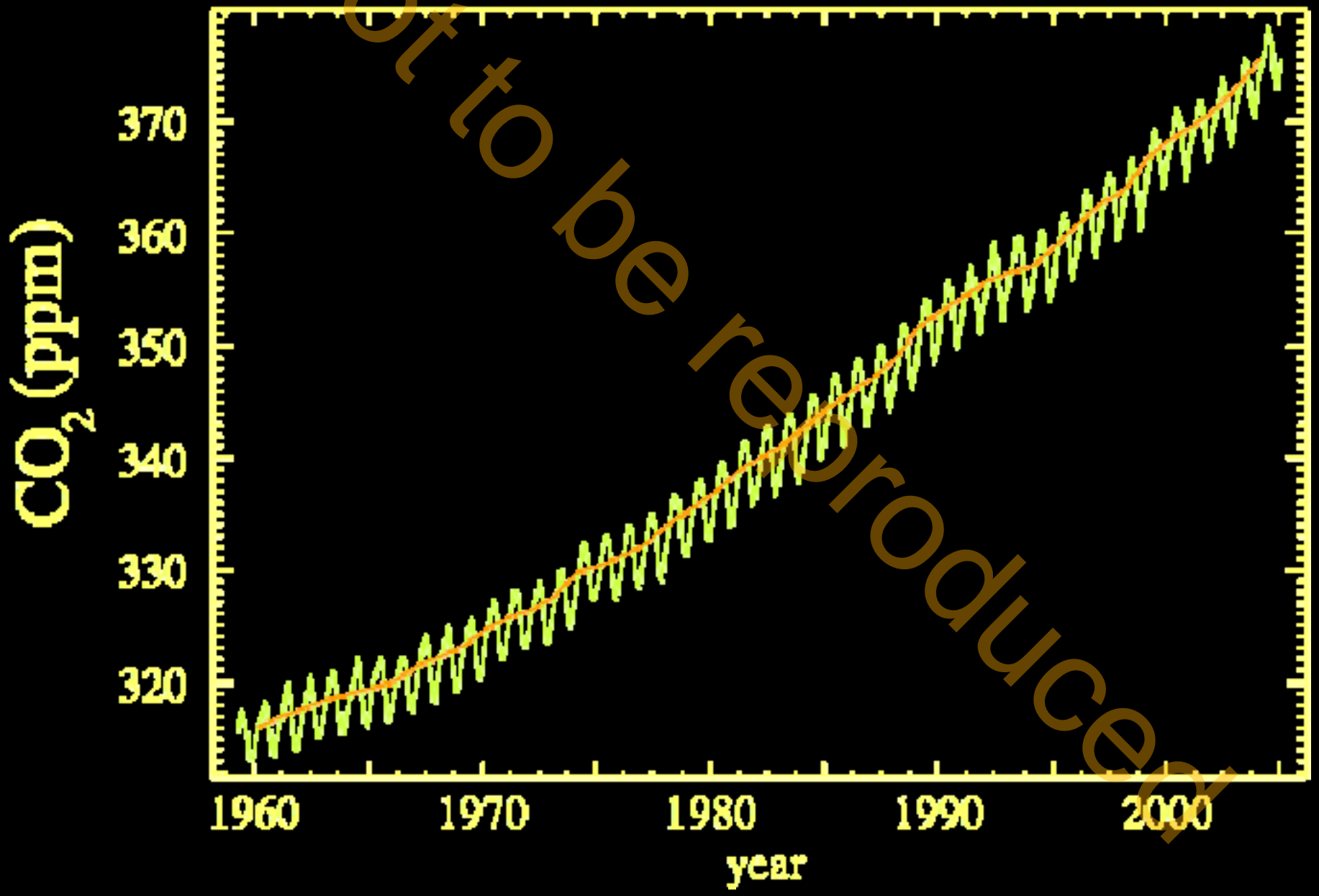



6000 m, Tibetan Plateau
Not to be reproduced
15 yotta joules
(over) 50 million years
energy stored at a rate of
10^{25} joules
10^{15} seconds
10^{10} watts
(10 gigawatts)

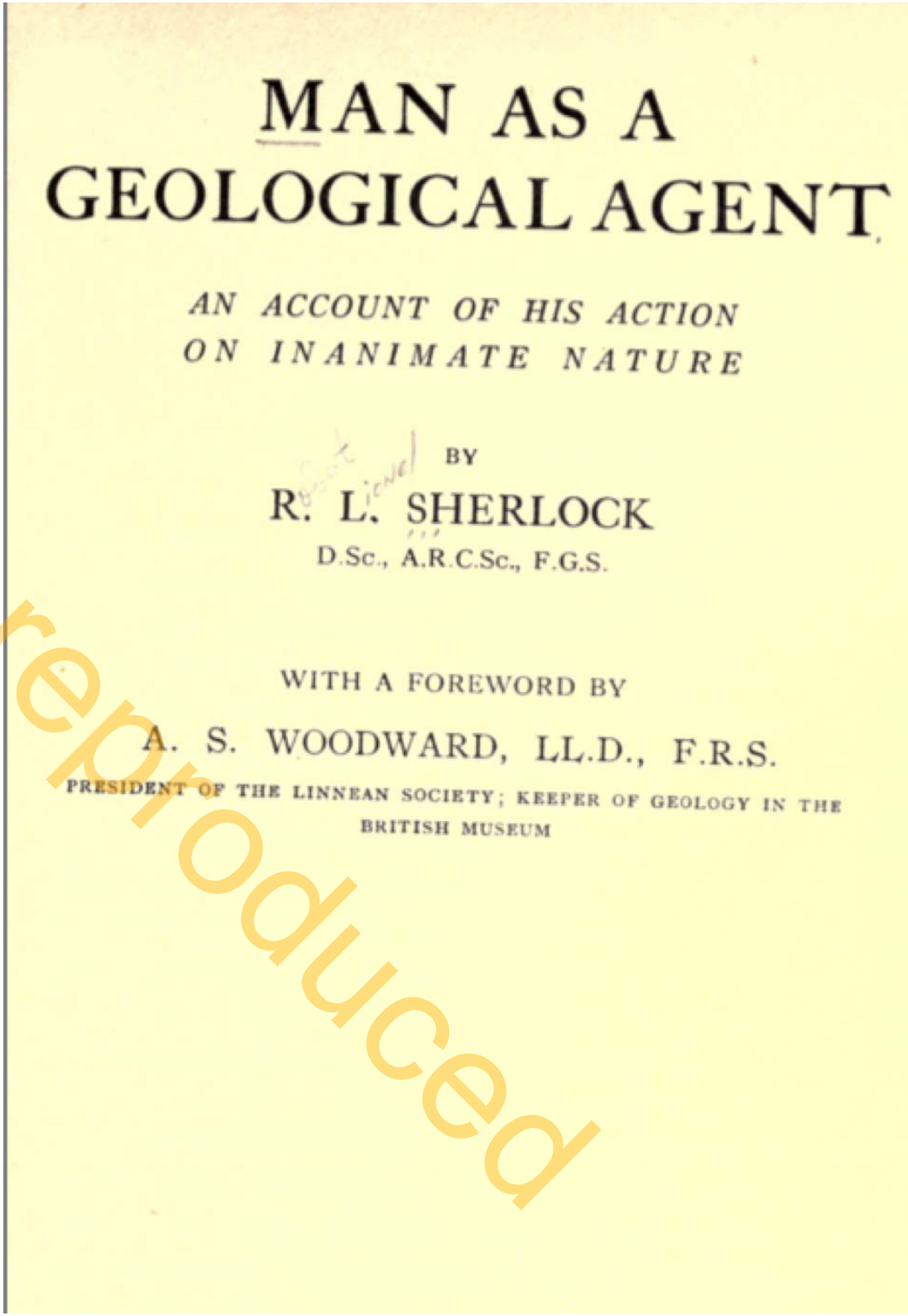




Humans as geophysical agents



“Most interesting of all, perhaps, is the question whether man, by his prodigious combustion of coal …, is producing more carbonic acid [CO2] than can be eliminated by ordinary natural processes. If this production is excessive, the result eventually may be an unwelcome change in his atmospheric surroundings.“ Foreword to “Man as a geological agent”, 1922.



MAN AS A GEOLOGICAL AGENT

AN ACCOUNT OF HIS ACTION ON INANIMATE NATURE

BY

R. L. SHERLOCK

D.Sc., A.R.C.Sc., F.G.S.

WITH A FOREWORD BY

A. S. WOODWARD, LL.D., F.R.S.

PRESIDENT OF THE LINNEAN SOCIETY; KEEPER OF GEOLOGY IN THE BRITISH MUSEUM

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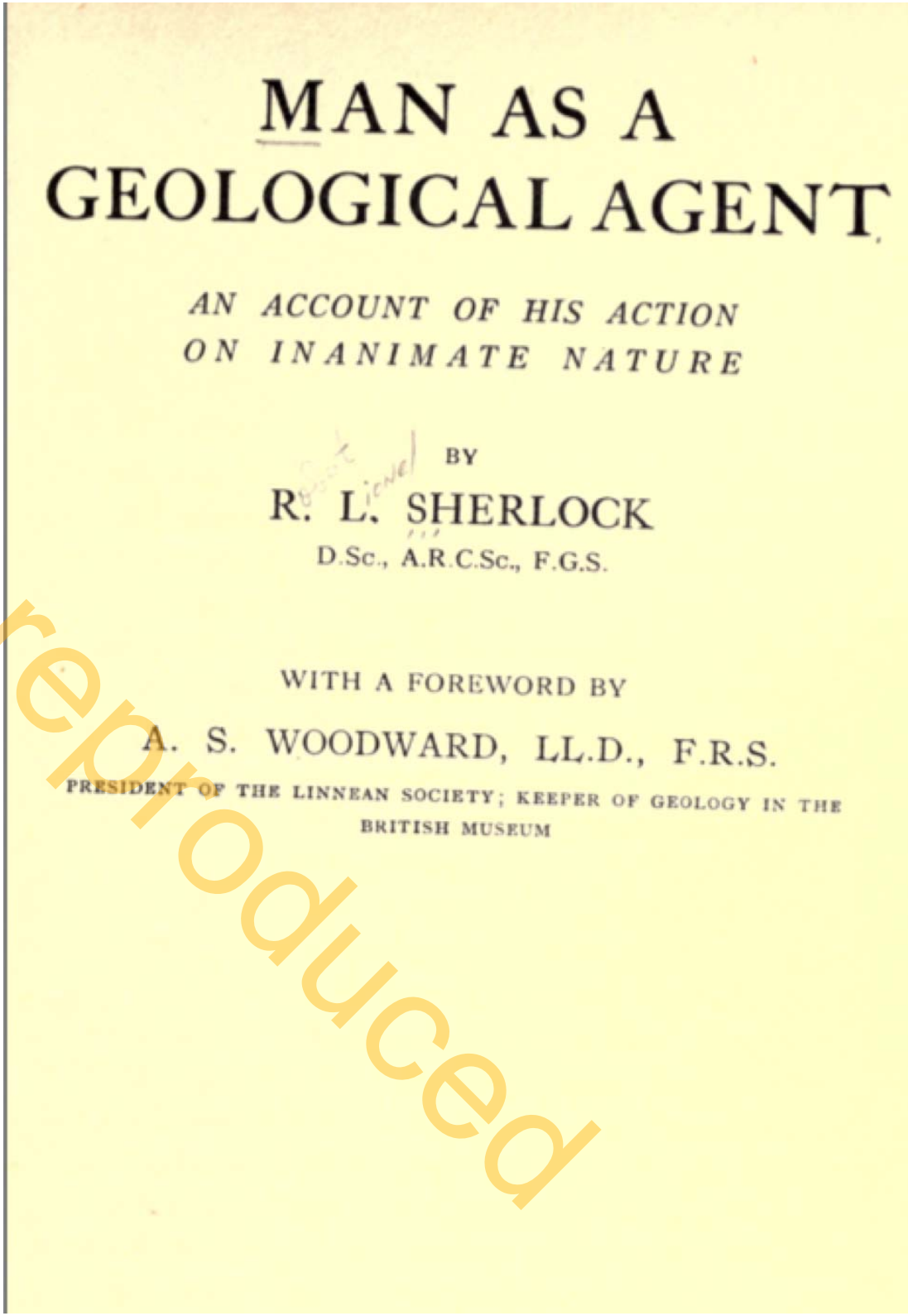
“Man … may be approaching a stage when he should pause to consider whether his use and alteration of the crust of the earth itself are for future as well as for present advantage.“
Foreword to “Man as a geological agent”, 1922.



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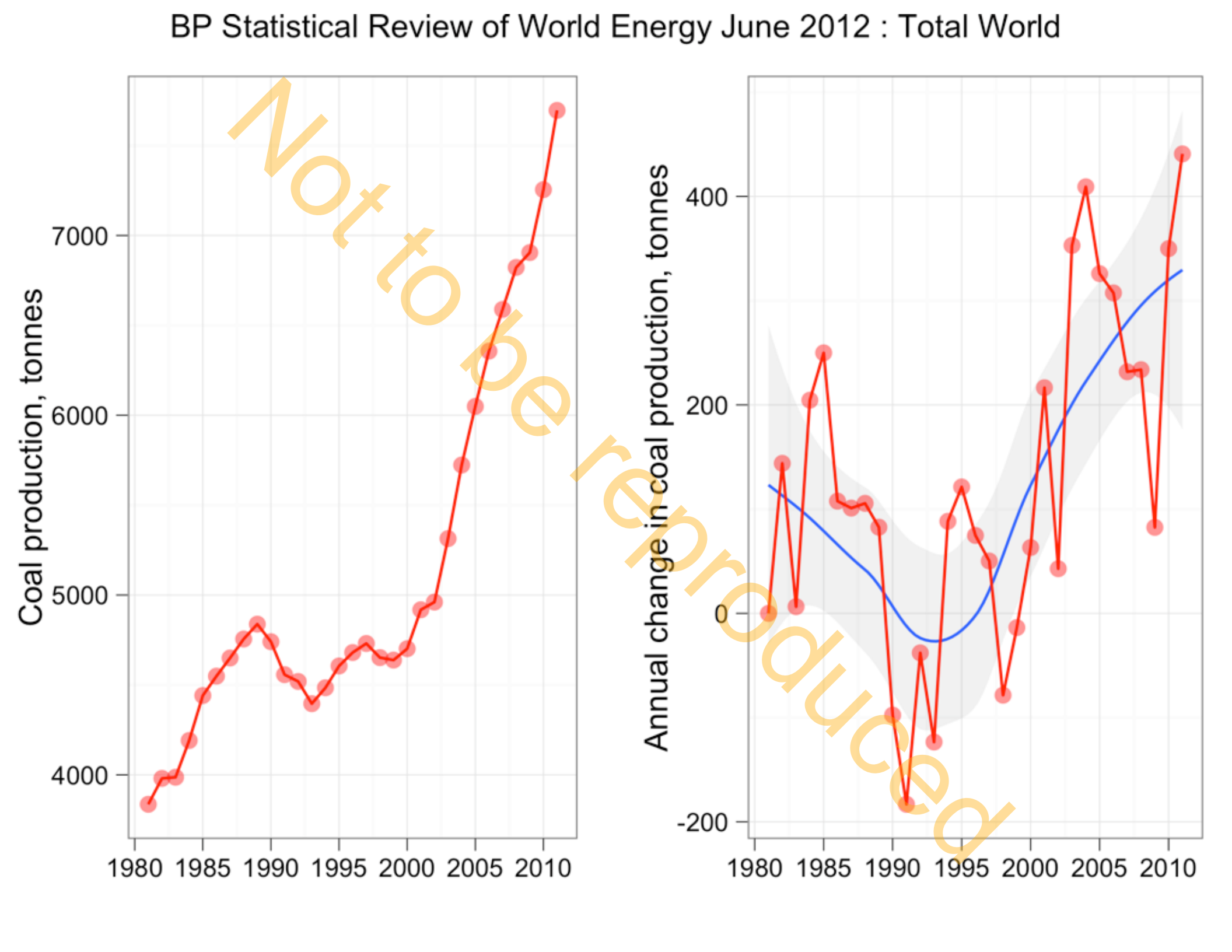
BP Statistical Review of World Energy June 2012 : Total World
Coal production, tonnes
7000
6000
5000
4000
1980
1985
1990
1995
2000
2005
2010
Annual change in coal production, tonnes
400
200
0
-200
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the mythic stories of Oz

the stories of Oz

Jack Hills
North Pole
Kalgoorlie
Snowball
Ediacara
Naracoorte
Mungo

mike sandiford's earth science pages

Jack Hills and the birth of the continents

The oldest known fragments of our planet are the ~4.4 billion year old zircons from the Jack Hills some 900 km's northeast Perth. These extraordinary time capsules - crystal remnants of the very first continents - formed within a few hundred million years of the birth of the Earth and tell of an already evolved crust on the hot young Earth.

The "*faint young sun paradox*" relates to the fact that suns luminosity has steadily increased over the history of the Earth, from about 70% of its present value at the beginning of Earthly time 4.5 billion years ago. For our present atmosphere, temperatures would plummet to an average of -35°C if the suns radiant energy was dropped to 70% and lead to a Snowball Earth!

The Jack Hill zircons provide tantalizing evidence for the existence of water on the Earth from almost the beginning of time, and almost everywhere we look in the geological record, no matter how far back, we find evidence for a watery carapace. The early atmosphere must have been far more efficient at holding in the heat it received from the Sun, with a much greater abundance of the "*greenhouse*" gases (H_2O, CO_2 etc).

The notion that a set of feedbacks links the composition of the atmosphere to the existence of a hydrosphere provides the gist of a kind of planetary metabolism at the heart of the Gaia hypothesis. It points to a profound long-term robustness in the global system.

Jack Hills, WA
Jack Hills zircons
the faint young sun

timelines

Geological time in millions of years (myrs)