disaster for entertainment (and recent novels with climate disaster themes have included London hit by a storm surge and Los Angeles by paralysing blizzards), but the subtitle of John Whittow's book hints at something more serious and scientific. Nonetheless, the preface sets a doom laden scenario – 'the disastrous year of 1976 appeared to be the final cataclysm . . . giving the impression that the earth was in turmoil and that the day of reckoning was at hand'. After this some readers may be disappointed not to find Paul Newman or Steve McQueen striding through the pages and saving the day.

What the reader does find is a text that gives detailed descriptions of various kinds of natural disasters and attempts simple explanations of why they occur and the adjustments and adaptations man makes to lessen their impact. Readers of *Weather* will probably turn first to part four of the book – 'The Restless Atmosphere', where consecutive chapters deal with snow and fog (a strange combination), high winds, floods and droughts. In each case some of the worst climatic disasters both in the British Isles and the world generally are considered. Lists of the world's historic flood disasters and the world's most severe tropical storms may help to settle an argument in the bar, but the very breadth of treatment means that in many places the text is superficial. Because it is impossible to pigeon hole disasters neatly according to cause, climate also crops up in several other sections of the book; for example in connection with sinking coastlines and avalanches. Easily the most successful part of the text is the final section, which is a case study of the range of hazards occurring at one place. Even if the sub-heading – 'Hazard city, a case study of Los Angeles', seems a bit journalistic, it is in this section that we get a detailed look at an 'environment where hazards have proliferated in response to man's interference with the natural order of things'. The in-depth study adopted here is notably more successful than the breathtaking wide-canvas approach that characterises the rest of the book.

'Disasters' is the latest in the Pelican Geography and Environmental Studies series. By paperback standards it is rather expensive but it is well illustrated, often with dramatic photographs. Whittow never seems to have quite resolved whether he is trying to write a popular book cashing in on the apprehension that results from a rapid flow of reported disasters in the mass media, or a more scholarly text that contributes to the expanding literature on environmental hazards. The result is a chameleon-like book which will probably be most enjoyed by the man on the Clapham omnibus, although the specialist will want to sneak a look at his own section even if he is irritated by what he finds. Recommended for a long tedious train journey, perhaps, instead of as a disaster novel.

ALLEN PERRY

'WEATHER'
MAY 1981
P Clostie

LETTERS TO THE EDITOR

Correspondents are requested to observe the following rules when submitting letters for publication: the material should be typed or clearly written on one side of the paper only; it should carry ample margins at top and bottom as well as at each side of the text; typed matter should be double line-spaced.

Ball lightning

During the course of one of the many severe showers and thunderstorms on 26 June 1980 a neighbour's house was struck by lightning, causing slight damage to their roof. In a subsequent conversation, my neighbour said that prior to the lightning strike, there appeared, almost overhead, a sphere of light which descended and became brighter over a period of about four seconds; it then exploded, and apparently discharged itself as a very powerful arc on the roof and the ground. I saw this latter strike to ground which was accompanied by a deafening explosion. As the house is on a bend, I did not see the sphere.

I have always been rather a sceptic regarding so-called ball lightning, but this event, including the nerve-shattering bang, louder than any thunderclap I have ever heard, has

given me food for thought. Finally, I should mention that prior to this observation, the storm had ceased for nearly half an hour but following the discharge we were bombarded with a cloudburst of large hailstones, some over half an inch, plus frequent and intense forked lightning.

Rottingdean, Sussex — C. A. CLARK

Ball lightning

The following account of ball lightning on the night of 19/20 September 1980 was recently sent to me by Mr R. A. Fisk of Trimley St Mary, Ipswich.

He writes: 'I was lying awake with the bedroom door open during the height of a thunderstorm when at 3 am there was a terrific cracking sound very close. What seemed to be a ball of very intense light about the size of a football was hovering about in the kitchen. I got up thinking that a nearby house had been struck as there seemed to be no damage visible.'

Mr Fisk continued 'In the morning we found that a colour TV, and a black and white TV had both been rendered unusable. A portable radio, the clock in our gas central heating system and our telephone were also rendered unserviceable. The televisions were not plugged in but a socket for the aerial and mains had burn marks around the edges and the wall paper had been torn away.'

Has anyone yet explained the phenomenon?

Felixstowe, Suffolk — R. G. VERYARD

Dynamical meteorology– slantwise convection

Mr Sellick's accusation of a *reductio ad absurdam* in my treatment of a slantwise convection (*Weather*, 35(12), pp. 374–375) demands a reply.

If I can summarise the argument so far: Napier Shaw showed that, in a hydrostatic pressure field, the gravitational potential energy, the internal energy and the pressure, integrated over a column of atmosphere were proportional to each other. Thus, as potential energy is released by the slantwise convection, the horizontal variation in the integrated pressure must *decrease*. One effect of the Earth's rotation is that motion on the synoptic scale must be nearly geostrophic so the pressure gradient must *increase* in order to support the increased winds. Mr Sellick argues that these two requirements are contradictory so the theory is proved false.

Now what happens in slantwise convection is that warm air moves polewards at some longitudes, cold air equatorwards at others. Thus while the extreme values of the pressure decrease as the potential energy is released, the gradients increase because of the decrease in scale. This scale is manifest as the west–east wavelength of the developing trough-ridge system, The decrease in scale is greater than the decrease in amplitude, so the pressure gradient increases to balance the increased kinetic energy.

In an interesting class of problems, the effect of the stratosphere can be idealised by replacing the tropopause by a rigid lid. This lid can then support a pressure gradient and we can indeed imagine the ultimate absurdity posed in Mr Sellick's letter, in which the isentropic surfaces finally become everywhere horizontal yet the kinetic energy is evident as geostrophically balanced motion. In more realistic models the stratosphere is represented as a layer of large static stability that behaves as a less rigid lid to the motion, and a similar but more elaborate argument can be used.

The mathematical theory of baroclinic instability, taking full account of the equations of motion and of the Earth's rotation, has been in existence since the pioneering work of Eady (*Tellus*, 1, 1949) and my comment on Sellick's mathematics was intended