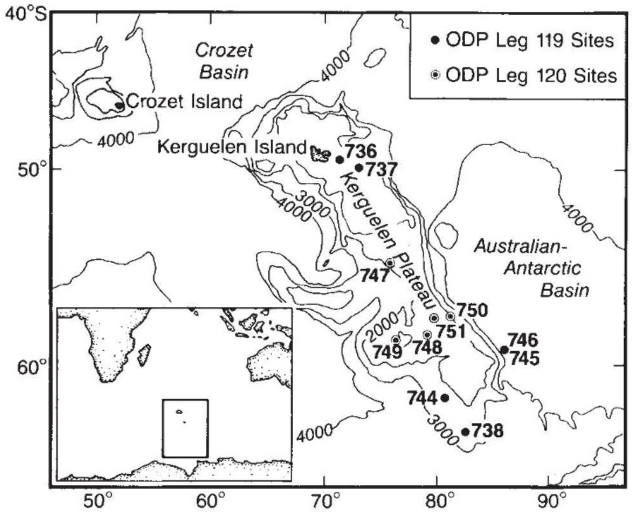

Bathymetric chart of the Kerguelen Plateau showing Leg 119 and Leg 120 drilling locations.

low-temperature (sites 747 and 750) to the high-temperature (749) zones of the zeolite facies.

The evolution of the Southern Kerguelen Plateau can be summarized as follows. First, basalts were erupted before the Cenomanian (98 Myr) above or just below the sea surface and were emplaced on a near-horizontal surface. The basalt flows are relatively thick and massive in the eastern part of the Ragatt Basin (site 750), fresh to highly altered on the Banzare Bank (site 749) and strongly weathered and interlayered with siltstones and claystones produced by weathering in the western part of the Raggatt Basin (site 748). The early sedimentation denotes fluvial conditions and consists at site 750 of a broad range of water-laid terrigenous claystones and siltstones, with some sandy or conglomeratic intervals. Similar sediments were found at site 748. Wood fragments denote the development of soils and vegetation on some of these flows.

During the Cenomanian, Turonian and, probably, Santonian (between 98 and 83 Myr), sedimentation evolved in the eastern part of the Raggatt Basin (site 750) to open marine deposits of chalk with dark clay interlayers. The eastern margin of the plateau slowly subsided to about 50 m below sea level (m.b.s.l.). To the west (site 748) the plateau remained at about sea level, with sedimentation of glauconitic sand-, silt- and claystones, no or rare silicified bioclastic debris and some pyritized wood fragments.

During the Campanian and late Maastrichtian (83–65 Myr), the eastern margin of the Southern Kerguelen Plateau subsided rapidly to about 2,000 m.b.s.l. and open marine sedimentation continued at a rate of 10–20 m Myr^{-1} with nannofossil chalk, chert and intermittently silicified limestone. To the west the plateau subsided only slowly and remained shallow (50–200 m.b.s.l.). The sediments (deposition rate ~ 46 m Myr^{-1}) consist of glauconitic sand-, silt- and claystones, having evolved progressively to intermittently silicified rudstones, grainstones and wackestones.

At about 75 Myr a major tectonic episode affected the eastern margin of the Southern Kerguelen Plateau (site 750). To the west this tectonic event was recorded at about 68 Myr (site 748). Normal listric faults developed to the east (site 750) and are possibly related to the break between the Southern Kerguelen Plateau and Broken Ridge–Diamantina fracture zone. To the west (site 748) this event corresponds to the emplacement of the 77° E Graben and to a large north-west–south-east uplift that abuts the southern end of the 77° E Graben. At this time the western margin of the Raggatt Basin (site 748) subsided rapidly to 1,000 m.b.s.l., at a rate of about 150 m Myr^{-1}.

From the late Maastrichtian to the middle Eocene (about 45 Myr), sedimentation (mainly nannofossil chalk and ooze with some chert) was continuous all over the plateau at a rate of about 18 m Myr^{-1} to the west (site 748) and of 5–30 m Myr^{-1} to the east. The plateau subsided only slowly.

A hiatus of at least 2 Myr occurred during the middle Eocene (sites 748 and 750). At site 747, in the transition zone between the Northern and Southern Kerguelen Plateau, this hiatus extends over 15 Myr and is accompanied by a subsidence of about 500 m. This event can be related to the separation by seafloor spreading[3] of the Northern Kerguelen Plateau and Broken Ridge dated at 43–42 Myr. From the middle Eocene to the Pliocene (5 Myr), sedimentation continued at up to 15–20 m Myr^{-1} all over the plateau and resulted mainly in nannofossil ooze. During the Pliocene and the Pleistocene (until 100,000 years ago) a low sedimentation rate of 3 m Myr^{-1} is recorded in the central part of the Raggatt Basin (site 751) and is related to erosion that affected the whole Southern Kerguelen Plateau. □

1. Schlich, R. *Soc. geol. France, Mem. Hors-Serie*, **6**, 1–103 (1975).
2. Houtz, R.E. *et al. Mar. Geol.* **25**, 95–130 (1977).
3. Munschy, M. & Schlich, R. *Mar. Geol.* **76**, 131–152 (1987).

Erratum

The onset of glaciation in Antarctica occurred during the Eocene–Oligocene, not the Miocene as stated at the end of the first paragraph of the Leg 119 report (*Nature* **333**, 303–304: 1988).

Daedalus

Beaming from on high

The geostationary orbit is inconveniently high for relay satellites. A TV signal of a mere few watts, beamed from 36,000 km up, can be picked up only by an expensive dish aerial. The obvious solution, that of spinning the Earth up to an 86-minute day, thus bringing the geostationary orbit down to a convenient 70 km altitude is a bit extreme, even for Daedalus. He has a simpler way of suspending a communications relay at that height.

He has been inspired by the Crookes' radiometer, that little windmill in a glass flask which spins in sunlight. The radiation warms the blackened side of each vane, which pushes the adjacent gas away from that side by thermal transpiration effects. The resulting reaction propels the vane away from the radiation. The effect is greatest at a pressure of around 5 pascals or so, just about the pressure at 70 km altitude. A big, light, convex reflector might easily be levitated at that height by the heating effect of microwaves beamed up to it from a powerful transmitter on the ground. The energy not absorbed in thermal levitation would be reflected back to Earth in a widely diverging beam. Careful shaping of the reflector could define the desired 'reception footprint' exactly. It could extend to an ultimate horizon nearly 1,000 km away.

One complication is that the levitated mirror would not be stable. If it drifted sideways from the beam centre, the thermal-transpiration forces would push it further sideways still. The lifting beam would have to juggle with it constantly, holding it in the sky like a plate balanced on an invisible stick.

The electronics required for this trick would be trivial. All the functions of a relay satellite would still be achieved at a fraction of the cost. Strong TV signals, data and telephone traffic could all be uplinked by the main levitating transmitter and relayed by reflection over most of a continent. Other transmitters within the footprint could also bounce their signals off the big sky mirror, provided they were not powerful enough to push it seriously off station. But how to get it up there in the first place?

Cunningly, Daedalus will fashion his reflector as a light, aluminized, plastic-film balloon, able to rise the first 40 km under its own helium. The levitating microwave beam will then be aimed at it, lifting it as a 'hot-helium' balloon until it is high enough for thermal transpiration forces to take over. It will soon rise to its stabilized position, reflecting the wonderful nonsense of modern TV entertainment, bureaucratic data traffic and compulsive telephone chatter strongly and bountifully over its whole vast reflection area. David Jones