Letters

Cost of Geological Congress

The Organizing Committee for the 28th International Geological Congress (IGC) has been deeply concerned from the beginning about participation in IGC activities by geoscientists from developing countries because of the usually high costs of international congresses. Therefore we are pleased to respond to the letter by Carlos Schubert (18 Sept., p. 1399) and to describe some of the steps being taken by the organizing committee to keep costs to a minimum. This is the first U.S.-hosted IGC since 1933, and we feel that it is especially important to have a strong representation by foreign scientists.

Our efforts to contain the costs of attendance fall into two categories. In the first category—benefits for all attendees—we have done the following.

- Set the registration fee at $200, about the same as for the congresses of 1980 (France) and 1984 (U.S.S.R.), inflation notwithstanding.
- Negotiated reduced air travel fares with two U.S. international carriers for travel by 28th IGC attendees.
- Bargained for discounted housing costs at major hotels in Washington, D.C.; large blocks of rooms are priced between $68 and $90 for either single or double occupancy. In addition, more than 1500 beds in dormitories at local universities will have rates starting at $20 per day.

In the second category are more specialized programs intended specifically to help attendees from developing countries.

- The Geohost Grant program will subsidize part of the cost of attending the congress for 50 competitively selected awardees chosen by a committee composed of representatives of IGC and the Association of Geoscientists for International Development in consultation with International Union of Geological Sciences (IUGS) representatives. For each successful applicant, the IGC will (i) waive the registration fee, (ii) provide dormitory lodging, and (iii) waive the first $600 of the fee for one field trip, one short course, or one workshop.
- The Organizing Committee, in cooperation with IUGS, has established a competitive travel grant program that will help subsidize travel costs for a limited number of recipients.
- Last, the Organizing Committee is exploring the possibility of offering a bed-and-breakfast program that would enable attendees to stay with individual hosts during the Congress. Though intended primarily to facilitate "people-to-people" contacts, the program would also cut lodging costs for its participants.

From all of this, we hope it is obvious that, we, too, are concerned about the cost of attending the 28th IGC and that we are doing everything possible to contain costs and to help scientists from developing countries attend. To receive further information regarding the 28th IGC write to Bruce B. Hanshaw, Secretary General, 28th IGC, Post Office Box 1001, Herndon, VA 22070-1001.

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What Drives the Aurora?

An article by Richard Kerr (Research News, 28 Aug., p. 974) discusses "A new source of power to drive the aurora." The article describes results of Tsurutani and Gonzalez (*1*), who argue that most auroral activity may be caused by interplanetary Alfvén waves. Some statements in Kerr's article might be misleading, since magnetic and auroral activity are actually caused by a southward component of an interplanetary magnetic field, whatever its origin. For example, solar flares, coronal mass ejections, corotating interaction regions, and seasonal changes in the orientation of the earth's rotation axis all produce aurora and magnetic disturbances, as do Alfvén waves. In every case it is arrival of solar magnetic field at the earth with an orientation antiparallel to the earth's dayside magnetic field that causes activity.

The reason a southward solar wind magnetic field drives magnetic activity is well known. Reconnection between the magnetic fields of the solar wind and the earth allows the solar wind to drag the earth's field into a comet-like tail. These reconnected field lines eventually disconnect from the solar wind and snap back to the nightside of the earth. This process accelerates particles that are either injected into the Van Allen belts or are precipitated into the atmosphere. The drifting particles create a ring of current around the earth that has a magnetic effect on the earth called a magnetic storm. The precipitated particles collide with atmospheric particles causing light (the aurora) to be emitted.

It thus comes as no surprise that interplanetary Alfvén waves "cause" magnetic activity. Every time the waves turn the solar wind magnetic field southward, reconnection begins, driving activity. Furthermore, the observation of Tsurutani and Gonzalez that rapid fluctuations are less effective in driving magnetic activity is also understood. The stretching of the earth's field requires changes in electrical currents that, in part, close through the earth's ionosphere. The self-inductance of these currents combined with the resistance of the ionosphere constitutes a low pass filter that removes all high-frequency components of the interaction.

Important unanswered questions remain about the causes of geomagnetic activity and aurora, in particular. What causes the solar wind magnetic field to change its orientation relative to the earth's magnetic axis? It is hoped that a major NASA project, the International Solar Terrestrial Physics Program, will provide simultaneous detailed measurements in the solar wind, the magnetosphere, and on the ground that will allow quantification of the interaction processes. Then, at least, measurements immediately upstream of the earth could be used to predict ensuing activity.

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REFERENCES

1. B. T. Tsurutani and W. D. Gonzalez, *Planet. Space. Sci.* **35**, 405 (1987).

Response: McPherron does not seem to dispute the point of my article, that Tsurutani and Gonzalez "demonstrated for the first time that Alfvén waves . . . drive the aurora much of the time, even when there has been no recent magnetic storm." Their documentation of the connection between certain prolonged episodes of auroral activity and observed Alfvén waves would seem to have had no precedent in the literature.

Admittedly, some researchers had implicitly assumed that Alfvén waves could drive the aurora when properly oriented, as can all disturbances in the interplanetary magnetic field. In this sense, Alfvén waves are not a new source of power for the aurora, as the article's headline might imply.

Tsurutani and Gonzalez believe their contribution was the first identification of this specific phenomenon supplying energy to the magnetosphere at specific times, perhaps through reconnection. The mechanism of reconnection has long been recognized as a pivotal link between aurora and interplanetary energy sources, as is made clear in the article.—RICHARD A. KERR