



On the importance of debate in (geo-)scientific research (Arthur Holmes Medal Lecture)

V. Courtillot

Laboratoire de Paléomagnétisme, Institut de Physique du Globe de Paris, UMR CNRS 7154, 1 rue Jussieu, 75005 Paris 05, France. Also at Université Paris Diderot, both members of Sorbonne Paris Cité

It is of course a great honor to receive the Holmes medal from EGU. As past (founding) treasurer and later president of EGU, the medal carries special significance for me. It may be a good time to look back on the scientific path I have followed, pursuing research in the geosciences, with outstanding support from a number of family members (foremost my wife Michèle), mentors, colleagues and students. Chance, not planning, led me to attend a French school that trained mining engineers, then a US University that made me fall in love with geophysics and plate tectonics at a time when this scientific revolution was still going on, and finally the marvelous Institut de Physique du Globe de Paris (IPGP), where I have spent the rest of my career to this day. To pursue on this path, I selected the rather separate fields of paleomagnetism (then linked to geology) and geomagnetism (then linked to physics). I have devoted much of my time to make sure that the two specialties would closely interact, including in the structure of our groups at IPGP. Geo- and paleo-magnetism have turned out (in a way reminiscent of geochemistry) to be powerful tools to explore a broad range of exciting scientific questions. Equipped with them, I have had the pleasure and good fortune to navigate from the discovery of geomagnetic secular variation impulses (with Jean-Louis Le Mouél), now inelegantly called "geomagnetic jerks", to that of propagating rifting of continents in the Afar depression, to fascinating work on the India-Asia collision in the Tibetan plateau and the Cenozoic paleogeography of the Indian ocean bordering continents, to the reconstruction of synthetic apparent polar wander paths for major continental masses (with Jean Besse) that have been widely used, to the understanding of the significance of the volume, age and short duration of massive flood basalt volcanism in the Deccan traps of India and their potential link to the biological mass extinction at the Cretaceous-Tertiary boundary (again with Jean Besse), to a generalization of the flood basalt/extinction link throughout most of the Phanerozoic and some ideas on the climatic (and climactic) scenario of CO₂ and SO₂ degassing that made massive volcanism so lethal (with Frederic Fluteau). Joining forces with volcanologists and paleontologists, we have recently been able to show that some Deccan flows that exceeded 10.000 km³ in volume erupted in less than a few decades: during that short period of time, a single hotspot produced more than ten times more basaltic lava than the total production of basaltic crust by the full mid-ocean ridge system! Many of these diverse findings have been at first viewed with skepticism and have generated debates, some lasting to this day. I consider this to be the salt of research. Research where there is no debate is "settled science" and therefore not fundamental research anymore. This is why, in our most recent field of investigation, that of the relationships between solar and magnetic variations and their possible connection to climate change (with Jean-Louis Le Mouél and Russian colleagues from Moscow's Institute for Earthquake Prediction Research and Mathematical Geophysics), the criticism we have suffered should actually be welcome, insofar as it means "debate", though it could sometimes be done in a more tolerant and open-minded way. Debates on our previous research findings and their generally positive outcomes make me hope we might not be wrong (in thinking that the role of the Sun's variations in forcing part of the observed climate variations in the past decades to centuries has generally been under-estimated). But research without acceptance of possibly being wrong is of little value. The Holmes medal gives me, and my numerous colleagues who actually share it, the kind of support that helps us to continue.