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Shinfield Park, Reading RG2 9AX
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Geneva, 12 February 2018

Reference: ExtremeEarth Flagship proposal / Coordination and support actions / 1st stage of a two-stage submission procedure for FETFLAG-01-2018

Subject: Endorsement Letter

Dear Dr. Bauer,

On behalf of the CLOUD experiment at CERN, I am very happy to endorse the ExtremeEarth Flagship proposal.

As you know, the Intergovernmental Panel on Climate Change (IPCC, 2013) considers that our ability to make accurate projections of long-term climate change is limited by the uncertainty in how aerosols and clouds have changed since pre-industrial times due to increases of sulphur dioxide and other pollutants in the atmosphere, and how they may continue to change in the future. The resultant uncertainty in Earth's climate sensitivity (between 1.5 and 4.5°C for a doubling of CO_2) has persisted through all IPCC assessments since 1996 and, indeed, since the seminal 1979 Charney report of the US National Academy of Sciences.

The CLOUD experiment is helping to reduce the uncertainties of atmospheric aerosols and clouds by performing laboratory measurements at CERN under precisely-controlled atmospheric conditions. In a series of experiments, CLOUD has identified the main vapours responsible for atmospheric aerosol particle formation and is measuring the particle nucleation and growth rates. CLOUD has become established as the world's leading facility for atmospheric aerosol nucleation research through a series of ground-breaking results in high-impact journals over the last six years. Following CLOUD's success, the Chinese Academy of Sciences is currently considering a similar but much larger project near Beijing with several CLOUD-like chambers and a construction budget of more than 100M Euro.

CLOUD is operated by a consortium of 21 mainly-European institutes that includes both experimental physicists and chemists and also global aerosol modelers. The integration within a single consortium and project of laboratory measurements at CERN, field and aircraft observations, and global modelling has proved highly successful. While the global models are solely capable of simulating and eventually predicting global climate, their reliability depends on a sound foundation of the fundamental physico-chemical processes and on verification against field and aircraft observations.

In summary, on behalf of the CLOUD experiment at CERN, I am very happy to endorse the ExtremeEarth Flagship proposal, and CLOUD looks forward to contributing towards a robust, experimentally-based foundation for its Earth-system models.

Sincerely,

Jasper Kirkby

Prof. Jasper Kirkby
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