Professor Dr. Sierd Cloetingh

AFFILIATION:
Utrecht University, Department of Earth Sciences

LINK TO WEBPAGE: http://www.ae-info.org/ae/Member/Cloetingh_Sierd
https://www.uu.nl/staff/SAPLCloetingh

TITLE OF PRESENTATION: ***Bottom-up probing System Earth: a journey in deep time and space***

Abstract of presentation

Integrated studies of the full Earth system across space and timescales are rapidly advancing, such as exemplified by the recent conception of the International Union of Geosciences' (IUGS) first big science program on Deep-time Digital Earth (Oberhaensli, 2020, J.Geol.Soc.India). Probably one of the important developments in Solid-Earth science over the past decade has been the recognition of the importance of linking deep Earth dynamic processes with surface and near-surface geologic processes (e.g., Cloetingh et al. 2007, GPC; Cloetingh et al., 2013, Gondwana Res.; Cloetingh et al., 2020, Encycl Solid Earth Geoph.). Deep Earth research, encompassing fields such as seismology and mantle geodynamics, has traditionally operated distinctly from fields focusing on dynamics near the Earth's surface, such as sedimentary geology, geomorphology, and climate/paleoclimate. However, as realized by the International Lithosphere Program (ILP), these endeavours have in common the study of Earth's topography and the prediction of its origin and rates of change. Observations from surface studies, such as basin stratigraphy, geomorphology of landscapes, changes in surface elevation, and changes in sea level (Cloetingh and Haq, 2015, Science), provide some of the principal constraints on geodynamic and tectonic models. Conversely, deep geodynamic processes give rise to topography, thereby modifying regional climate, erosion, and sediment generation that are the basis of surface geology. The lithosphere, due to its stratified rheological structure, acts as a non-linear "filter" for deeper sources, attenuating long deformation wavelength and creating new, shorter wavelength deformation; giving a surface response more complex than that of the mantle source (Cloetingh et al., 2021, GCubed; Koptev et al., 2021, GJI).

It is the surface manifestations of these deep geodynamic processes modified by mantle-lithosphere interactions that have significant societal impact by (1) creating natural hazards, such as earthquakes and mass movements, and (2) controlling the distribution of natural resources including fossil fuels and geothermal energy (Cloetingh et al., 2010, ESR; Limberger et al., 2018, Renew & Sust Energy Rev). The relevance of research conducted in both the deep Earth and surface regimes is thus strongly enhanced through a focus on their interaction. Research on enhanced geothermal systems has developed as a vigorous focus for networking European Earth science research institutions and provides a fine example of connecting basic research in coupled deep Earth and surface processes with societal relevance in the present era of energy transition to a more sustainable world.

TOPO-EUROPE integrates European research facilities (e.g. the European Plate Observing System EPOS) and know-how essential to advance the understanding of the role of topography in Earth System Dynamics. The principal objective of the network, initiated within the Earth and Cosmic Science section of Academia Europaea, is twofold. Namely, to integrate national research programs into a common European network and, furthermore, to integrate activities among TOPO-EUROPE institutes and participants. Key objectives are to provide an interdisciplinary forum to share knowledge and information in the field of the neo-tectonic and topographic evolution of Europe, to promote and encourage multidisciplinary research on a truly European scale, to increase mobility of scientists and to train young scientists.
The overview presented here demonstrates the opportunities for a further understanding of the full Earth system across space and timescales.

Biographical note

Sierd Cloetingh is Utrecht University Distinguished Professor. His research field is Earth Sciences. He published 383 papers in international peer-reviewed journals (Scopus: 17,945 citations, h-index 74) and has been promotor of close to 80 PhD students of 18 different nationalities.
Currently he serves as Chair Regional Coordinating Committee Europe of the International Lithosphere Program. Past functions include President of the Academia Europaea, Member and Chair of the Board of SAPEA (Scientific Advice for Policy by European Academies), President of the Association for European Cooperation in Science & Technology (COST), Membership of the Scientific Council (2009-2015) and Vice-President of the European Research Council (ERC), President of the European Geophysical Society (1998-2000), President of the International Lithosphere Program (ILP, 2004-2017), Distinguished Professor of the Royal Netherlands Academy for Arts and Sciences (KNAW, 2006-2015), Editor-in-Chief of the international journal “Global and Planetary Change” and Chairman of the TOPO-EUROPE collaborative research program.
Sierd Cloetingh received honorary doctorates from five European universities and numerous medals and awards. He is member of the Royal Netherlands Academy of Sciences, the Royal Norwegian Academy, the Royal Danish Academy, the German National Academy for Technical Sciences (acatech), the Heidelberg Academy, the Bavarian Academy of Sciences and honorary member of the Hungarian Academy of Sciences. He was distinguished in 2005 as Chevalier de Legion d’Honneur and in 2014 as Knight of the Royal Order of the Netherlands Lion for his contributions to science and European scientific cooperation in research and education.