

**Kucharski Fred,
kucharsk@ictp.it**

Male,

21/01/1965

Comments and Ratings

Comment

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ng**

Your Personal Details

First (given) name: Fred
Middle name(s):
Surname (family) name: Kucharski
Gender: Male

University Education

From	To	Institute Name	City	Country	Degree	Specialization
06/1991	06/1997	University of Frankfurt	Frankfurt	GER	Phd	
05/1984	05/1991	University of Kiel	Kiel	GER	Diplom	

English Proficiency

Mother Tongue: German
Reading: Good
Writing: Good
Speaking: Good

Permanent Institute

Full name of institute: ICTP
City: Trieste
Country: ITA
Level: Professor/Faculty member
Responsibilities: Research Scientist in the Earth System Physics Section and Head of OEA

Nationality

Country of birth: Germany
City of birth: Heiligenrode
Date of birth: 21/01/1965
Present nationality: Germany

Previous Employment

Institute	From	To	Position
Rerading University	01/1999	06/2001	Postdoctoral Research Fellow

Present Institute

Same as permanent institute

Mailing Address

Street: ICTP
City: Trieste
Postal code: 34151
Country: ITA
Telephone: 39 040 2240 345
Mobile:
Skype:

Area of Research

Area of Research: Climate Variability and Predictability
Specific Topic of Interest: Climate Simulations with Intermediate Complexity Climate Model 'Speedy'

Distinctions

Publications

Kucharski, "On the concept of Exergy and Available potential Energy", *QJRMS*, **(1997)**

Kucharski F, Bracco A , Yoo JH, Molteni F, "Low-frequency variability of the Indian Monsoon-ENSO relation and the Tropical Atlantic: The 'weakening' of the '80s and 90s", *Journal of Climate*, **20 (2007) 4255-4266**

Kucharski, F., Bracco, A. , Yoo, J. H., Molteni, F, "Atlantic forced component of the Indian monsoon interannual variability", *Geophysical Research Letters*, **35 (2008) L04706**

Kucharski, F. Bracco, A., Yoo, J. H., Tompkins, A., Feudale, L., Ruti, P., Dell'Aquila, A., "A Gill-Matsun-type mechanism explains the Tropical Atlantic influence on African and Indian Monsoon Rainfall", *Quart. J. R. Met. Soc.*, **135 (2009) 569-579**

Kucharski, F.; Bracco, A.; Barimalala, R.; Yoo, J. H, "Contribution of the east-west thermal heating contrast to the South Asian Monsoon and consequences for its variability", *Climate Dynamics*, **37 (2010) 721-735**

Kucharski, F.; Kang, I.-S.; Farneti, R.; Feudale, L., "Tropical Pacific response to 20th century Atlantic warming", *Geophysical Research Letters*, **38 (2011) L03702**

Kucharski, F.; Zeng, N.; Kalnay E, "A further assessment of vegetation feedback on decadal Sahel rainfall variability", *Climate Dynamics*, **40 (2013) 1453-1466**

Kucharski, F.; Molteni, F.; King, M.P., Farneti, R.; Kang, I.S.; Feudale, L., "On the need of intermediate complexity general circulation models: a 'SPEEDY' example.", *BAMS*, **94 (2013) 25-30**

Kucharski, F.; Syed, F. S.; Burhan, A.; et al., "Tropical Atlantic influence on Pacific variability and mean state in the twentieth century in observations and CMIP5", *Climate Dynamics*, **44 (2015) 881-896**

Kucharski F, Ikram F, Molteni F, Farneti R, Kang I-S, No HH, King MP, Giuliani G, Mogensen K, "Atlantic forcing of Pacific decadal variability", *Climate Dynamics*, **46 (2016) 3259-3277**

Kucharski F, Joshi MK, "Influence of tropical South Atlantic sea-surface temperatures on the Indian summer monsoon in CMIP5 models", *Quart. J. R. Met. Soc.*, **143 (2017) 1351-1363**

Li, Y et al., "Climate model shows large-scale wind and solar farms in the Sahara increase rain and vegetation", *Science*, **351 (2018) 1019-1022**

Hamouda EM and Kucharski F, "Ekman pumping mechanism driving precipitation anomalies in response to equatorial heating", *Climate Dynamics*, **52 (2019) 697-711**

Sun C, Kucharski F, Li JP, Jin FF, Kang IS, Ding RQ, "Western tropical Pacific multidecadal variability forced by the Atlantic multidecadal oscillation", *Nature Communications*, **8 (2017) 15998**

Ehsan MA, Nicoli D, Kucharski F, et al, "Atlantic Ocean influence on Middle East summer surface air temperature", *NPJ Climate and Atmospheric Science*, **3 (2020)**

Project Title

Title: Master and Phd programme in Climate Change Modelling

Summary of Project

Description: The aim of this project is to establish an 18 month Master level course on climate change modelling, thus training about 10 students every year in this subject. Such a programme is currently completely missing in our country and region. Given that Climate Change and sustainable development is one of the main challenges of our times, and that the south is under-represented in developing science in this direction (<https://www.bbc.com/news/science-environment-58808509>) there is the urgent need for such a programme in our region. The course will consist of lectures (12 months), plus a 6-month Master thesis. During the first 12 months, students will be introduced to the latest numerical methods, parametraizations, skills in HPC and theoretical advances in climate change research. During the 6 month Master thesis it expected that the students run their own climate simulations making use of the methods thought in the first 12 month, and analyse the results also using the advanced techniques introduced. For this purpose, simplified climate models may be also used that will be developed by the group involved in the project. By performing and experimenting with Climate simulations, the students will gain important insights into physics of climate and climate change. They will be able to test their own hypothesis on how climate might look like under different external forcings and atmospheric compositions. Successful students should also have the possibility to enroll in a new phd programme on climate change. The PhD students will be supervised by the scientists involved in this project and may be co-supervised by other international experts. In this phd programme, they will deepen their understanding of the physics of climate change and become international experts in this field. After several years this will produce a group of excellently trained climate modelers, who will be able to make their own judgement on the important subject of climate change. These young scientists are expected to get more expertise outside our country, but also to return to our continent after additional experiences (best at ICTP), and fill the existing gap of climate change experts in our continent/region.

Project Coordinator

Full Name: Fred Kucharski

Institute

Full Name: The Wishful Thinking Institute of Earth Sciences (WTIES) in Nowhereland

Project Research Area

Select: Earth System Physics

Main Scientific Educational/Research Areas

Description: The main areas of our research is Earth System sciences, including Solid Earth Geophysics, Atmospheric Dynamics, Climate Dynamics, Atmospheric Physics, Ocean Dynamics and Environmental Data Analysis.

Faculty Members

Description: Fred Kucharski (Exergy), Adrian Tomkins (climate impacts, convection), Riccardo Farneti (Oceanography), Erika Coppola (Hydrology)

Experimental Facilities

Description: N/A

Computational Facilities

Description: Our Department has a medium-size computing cluster with about 10000 CPUs

Library Support

Description: Not needed, we have access to libraries.

Advanced Courses

Description: Currently, we do have a Masters Programme in Climate Dynamics, with focus on theoretical aspects. This 1-year programme has 10 students per year. As outlined in the Project summary, the aim of this project is to create a new Masters and PhD programme in Climate Change Modelling.

Institute plan

Institute plan: As outlined in the summary of the project, the plan is to establish a new 18 month Master level course on climate change modelling, thus training about 10 students every year in this subject. Also a new PhD programme on the same topic will be established. After several years this will produce a group of excellently trained climate modelers, who will be able to make their own judgement on the important subject of climate change. These young scientists are expected to get more expertise outside our country, and may indeed contribute to the programme itself by getting involved in the teaching, and making the programme self-sustained. We expect that after an initial period where a stronger support from ICTP is necessary, the programme will attract a lot of international and national funding.

In this way the programme will become self-sustained. The number of students in the Master and PhD programme will increase with time to reach a level of 20 students.

Benefits to the Country

Benefits: As explained already in the Institute plan, the idea is to increase the human capacity in judgement on climate change issues. The young researchers produced by our Master course will be, in the long run, help to advise our government on the important issue of climate change, without having to rely exclusively on expert opinions from other regions/continents.

Benefits to the Region

Benefits: As mentioned before, to have the human capacity of an expert group on issues of climate change modelling will greatly benefit the whole region and even the continent. It is expected that the trained scientists will eventually return to the region and will distribute in several institutions and will be able to give advise to the governments of the region regarding climate change related issues/policies.

Postdoctoral fellows

Description: We urgently need a post-doc financially supported by the ICTP to follow the Masters programme, in particular to assist the lecturer in the Assignment sessions as tutor and to provide software/computing assistance within the Master thesis projects. Furthermore, the post-doc will further develop and test the simplified climate model used in the Master theses, and may use this model also for his own world-class research. The Scientists involved will not have enough time available to provide this support, therefore we do need to hire a new post-doc in this area. This post-doc will be an expert himself in the field of climate modelling and will have the opportunity to further develop his career. However, for the moment our Department does not have the funds for this.

Postgraduate Fellowships

Number: 5

Description: 3 Master students and 2 PhD students. From the Master students, we would ask ICTP to fully support 2 of them, which we would ask to fully support 1 PhD student.

Access to Education Programme

Number: 2

Description: We envisage to enroll 5 PhD students in total. I would be very good to have the ICTPs Earth System Section involved in the co-supervision of at least 2 of them. The Climate group of the ESP section has world class climate scientists involved in Climate Modelling. To have their expertise helping in forming PhD students would be crucial in order to train top-level climate modellers.

Access to Associates Programme

Number: 1

Description: The project would also immensely benefit if also the supervisor of the PhD students could participate in the ICTPs Associate programme. They could get further training, particularly in the computational aspects of Climate Modelling, which is an area where ICTP has world-class expertise, but WTIES scientist may profit from getting some further experience by visiting ICTP over extended periods.

Access to Postgraduate Programme

Number: 10

Description: All of our student will in the first 2 years of the new Masters programme profit immensely to follow online the ICTPs ESP diploma programme, while the WTIES scientists are developing their own courses. Since ESP has a programme that is very similar in scope to what we plan at WTIES, our scientists may make use of the lectures provided by ESP to develop them further and tailor them to our own specific needs.

Visiting Scholar

Description: Yes, we definitely need the additional support of international experts while our programme is building up. Such visiting Scholars would be invited to give courses in areas where our expertise is less developed, and also to supervise Master and PhD thesis. Depending on the COVID situation, this could be done in person or virtually (preference in person).

Relation to Partner Institutes

Description: We are planning to start more collaboration with EAIFR within this project. Even though EAIFR does currently not have a programme in Climate, we are considering EAIFR to be an excellent place to organize international schools/workshops that will be part of the Climate Modelling Curriculum. Indeed, such schools have been organized in the past and have had a big success (<https://eaifr.ictp.it/about/news/climate-workshop/>) . We are already in contact with the EAIFR director and ICTP scientists to organize a start-up workshop in Kigali for our new programme.

Hosting PWF Activities

Description: In order to recruit potential candidates for our Master programme it would be very useful to have a PWF Roadshow on Climate at our Department. We know of Climate-related PWF Roadshows in Zimbabwe some years ago (<https://www.ictp.it/physics-without-frontiers/current-country-projects/zimbabwe.aspx>), which was a great success, and has let to an increase in interest in this field.

Support for Virtual Component

Description: Due to COVID, we may need support regarding internet connectivity for the 3 Master Students from the region, at least in the first year.

Local Funds

Local Funds: Our University is supporting this new programme, and is committed to support all local and one foreign

students for the Master and for the PhD programme. There will be also secretarial support provided by the University.

Sustainability

Possible ICTP Help: There is no doubt that this new programme will attract a lot of national as well as international interest. As mentioned before, we envisage that the national support increases for this programme, and that also international support will be guaranteed, once our programme has proven to build international experts in the field of Climate modelling, giving a more important weight to research produced in our region and continent. Also the experts that will be trained within our programme will be able to give guidance to governments from the region and this will make our project indispensable.

Status

From

To

Some Past Applications:

Sm Title

App

Particip

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PR2 2	Proposals 2022	Jan 2022	No
325 2	WCRP Grand Challenge on Clouds, Circulation and Climate Sensitivity: 2nd Meeting on Monsoons and Tropical Rain Belts	Jul 2018	No

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