

# King Abdulaziz University initiatives in establishment of climate change research center



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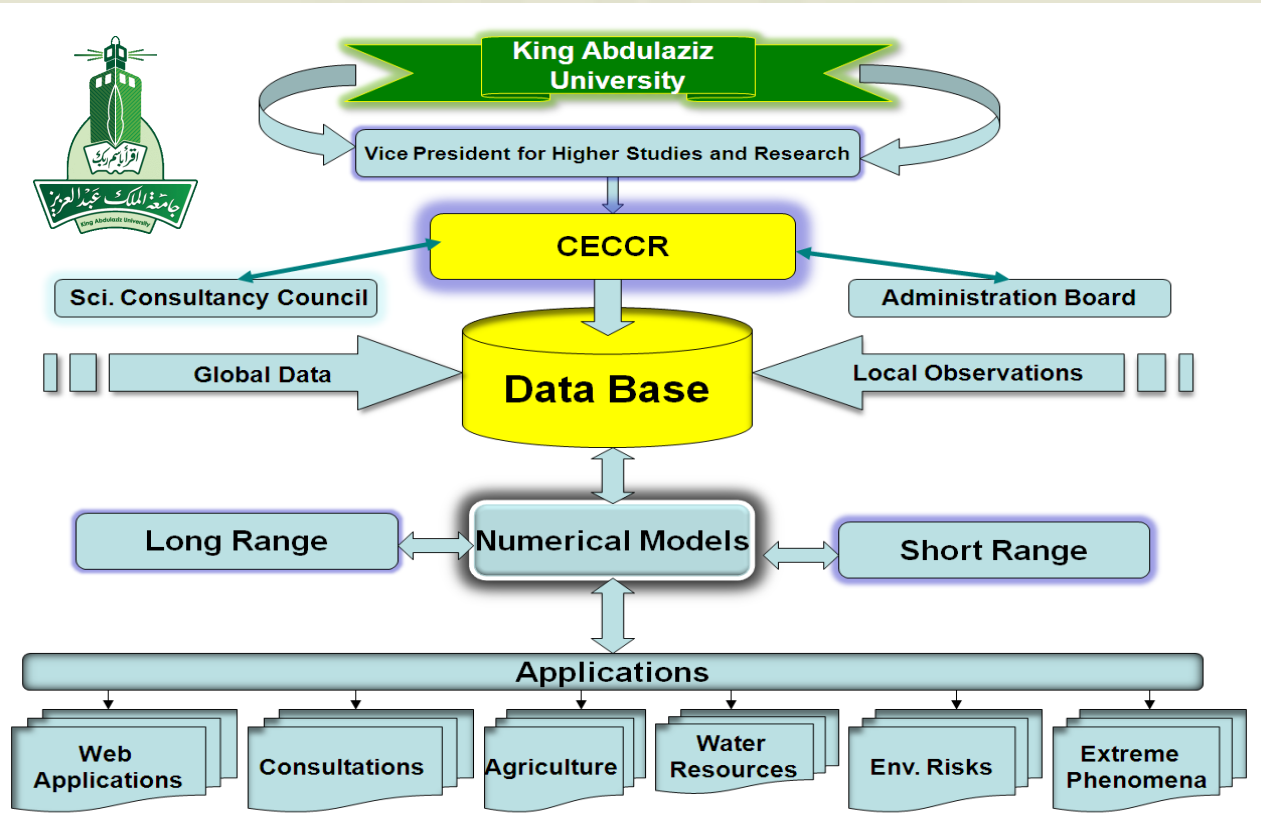
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In 2010, King Abdulaziz University established

*The*

**Center of Excellence for Climate Change Research (CECCR)**

Establishment of CECCR



CECCR is focused on Climate and Climate Change research in the region

### Vision of CECCR

To be a leading center of excellence for climate change research both on local and regional levels

### Mission of CECCR

To study climate change and its possible impacts on the society and to provide consultations for the decision makers

### Strategies of CECCR

- Build climate database
- Develop and utilize Global and Regional Climate Models
- Study the future projections of climate and its possible impacts (e.g. environment, the water resources, the agriculture, etc.)
- Provide seasonal, annual and decadal prediction
- Offer scientific consultations for climate change impact studies

# Objectives of the CECCR

## Devise Comprehensive and Integrated Climate Data Repository

- ❑ Adopt Regional Climate Models (RCMs) and Develop Global Climate Model (GCM) for the region
- ❑ Generate present and future climate information for-
  - Validation, calibration and sensitivity analysis
- ❑ Develop Climate Information Expert System for-
  - Analyze historical observed and model data
  - Trend and pattern analysis
  - Climate extremes
- ❑ Building Climate Database for-
  - Vulnerability assessment
  - Impact studies
  - Adaptation strategy formulation
  - Mitigation policy development

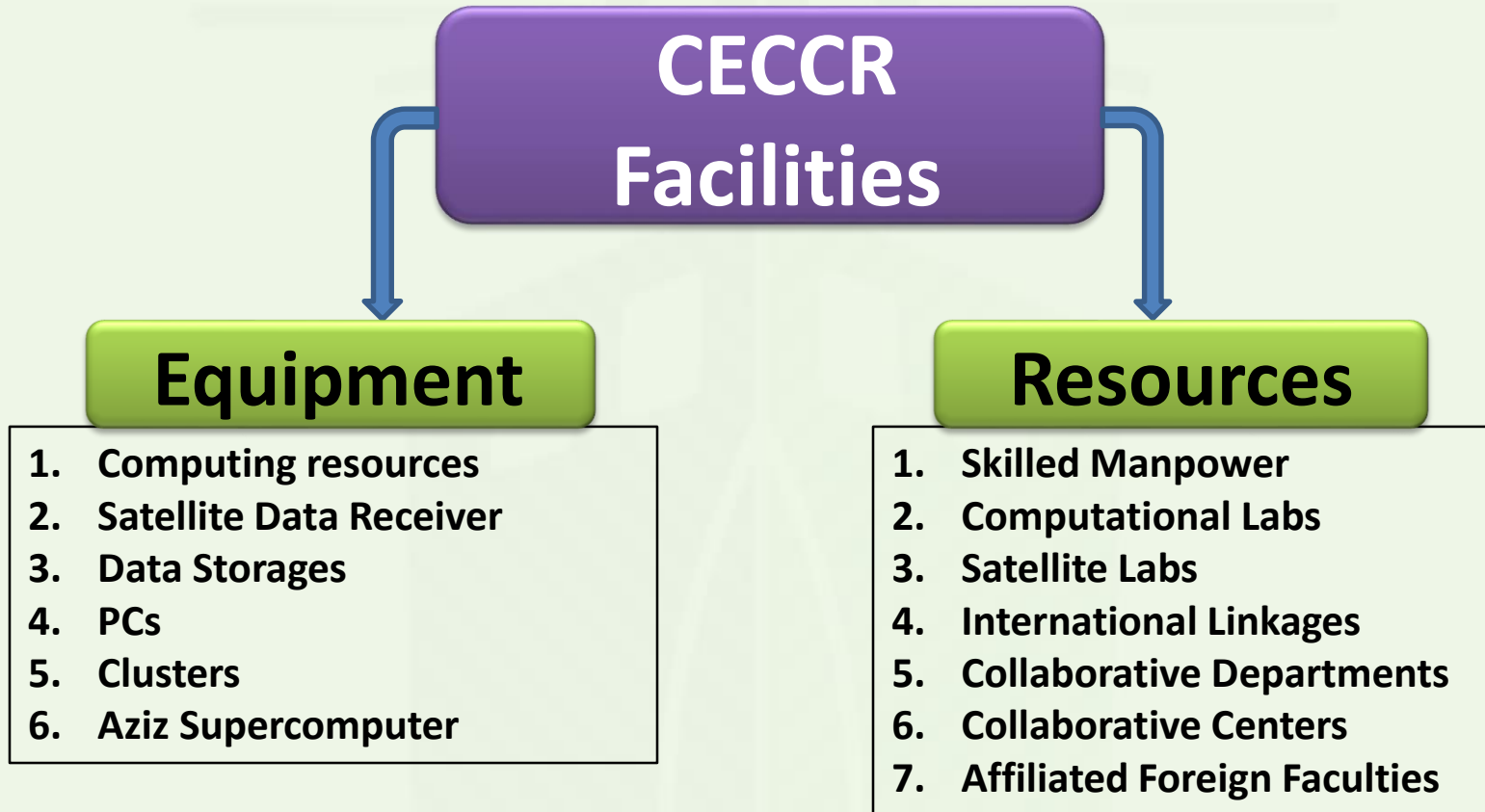
**TARGET: Building Climate Projection DATABASE for community services & decision makers to be used in long-term planning**



**CECCR**

# **Activities & Achievements**

# CECCR Facilities in Climate Research



# CECCR Collaboration in Climate Research



## International

1. Seoul National University, Korea
2. Meteorological Research Institute, Japan
3. Met Office, UK
4. ICTP, Trieste, Italy
5. European Center for Medium-Range Weather Forecasts (ECMWF), UK
6. International Research Institute for Climate and Society (IRI), Columbia Univ., USA
7. Egyptian Meteorological Authority, Egypt

## National

1. General Authority for Meteorology and Environment Protection (GAMEP)
2. The King Abdulaziz City for Science and Technology (KACST)
3. Deanship of Scientific Research, KAU
4. Department of Meteorology, KAU
5. Department of Agriculture, KAU
6. Department of Hydrology, KAU
7. Department of Environment, KAU
8. Department of Marine Science, KAU

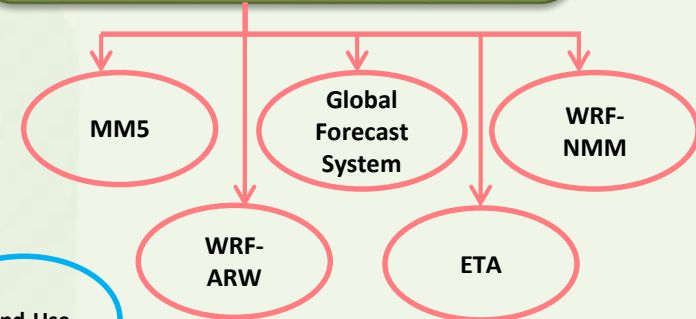
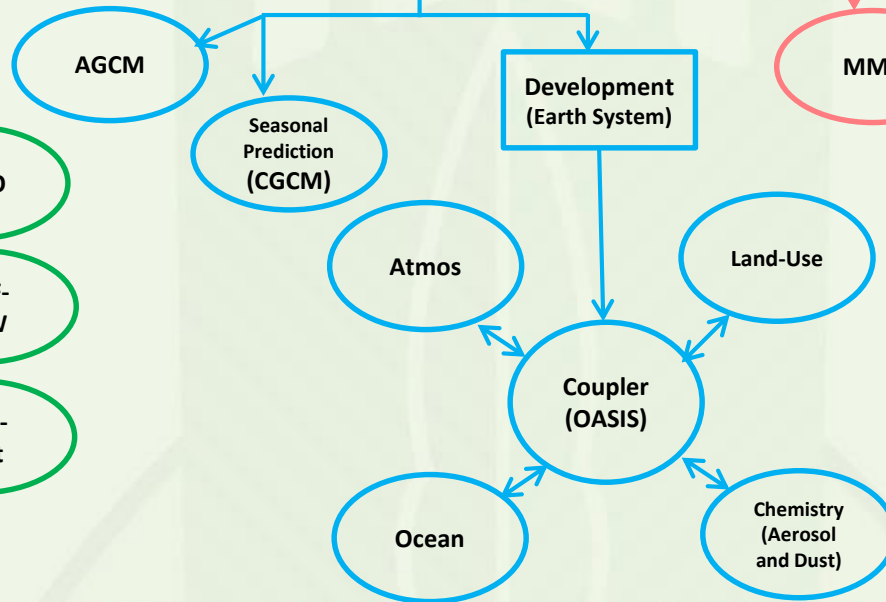
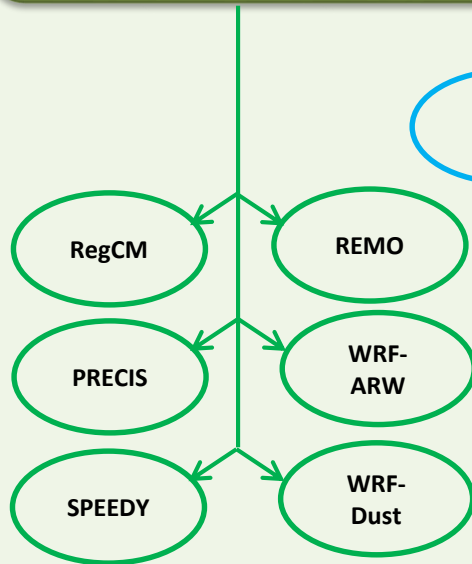
# CECCR Climate Modeling Activities

## Climate Models & Forecasting Activities

### Regional Climate Models (RCMs)

### Global Climate Models (GCMs)

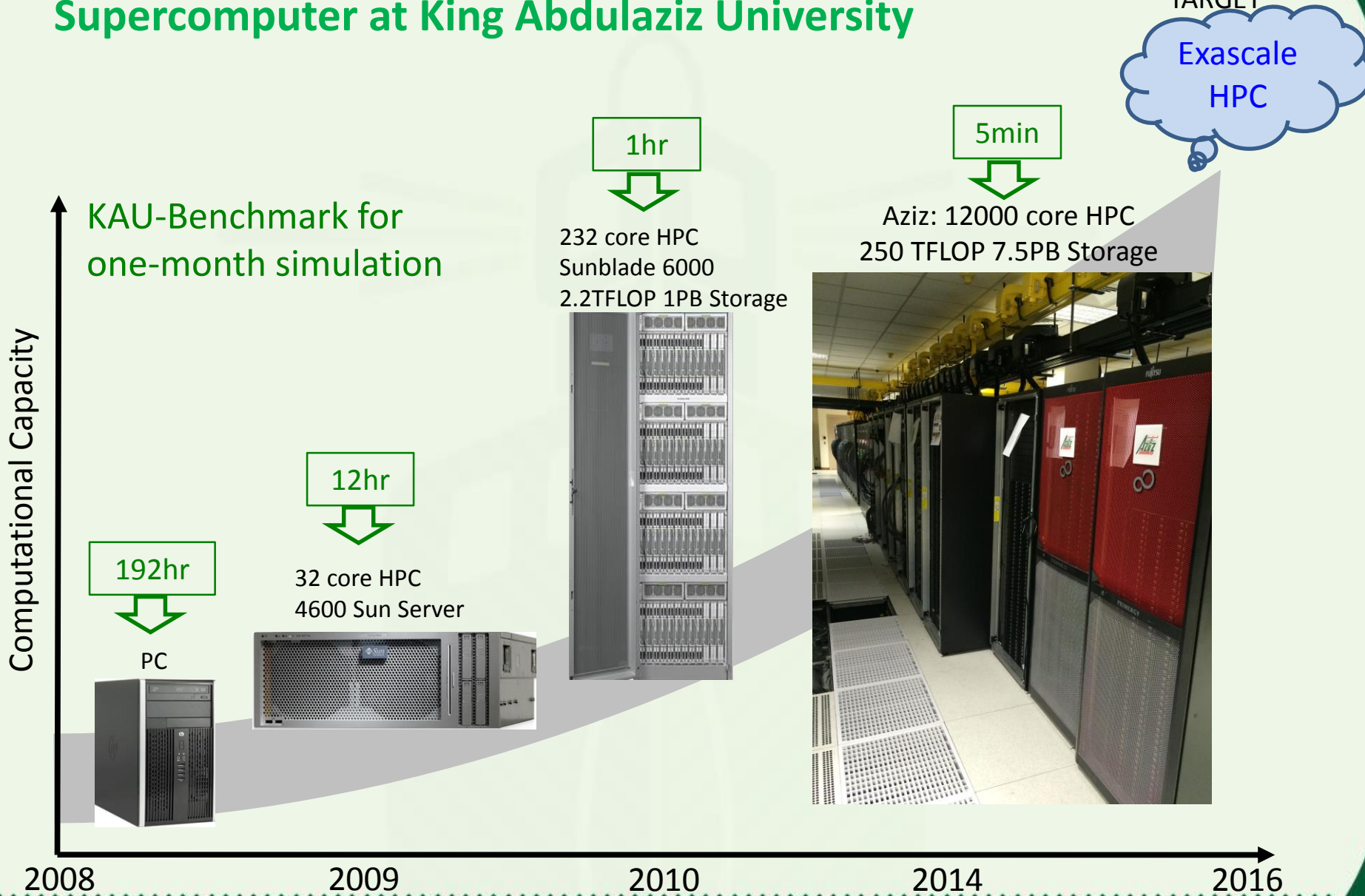
### Numerical Weather Prediction (NWP)



## Supercomputer at King Abdulaziz University

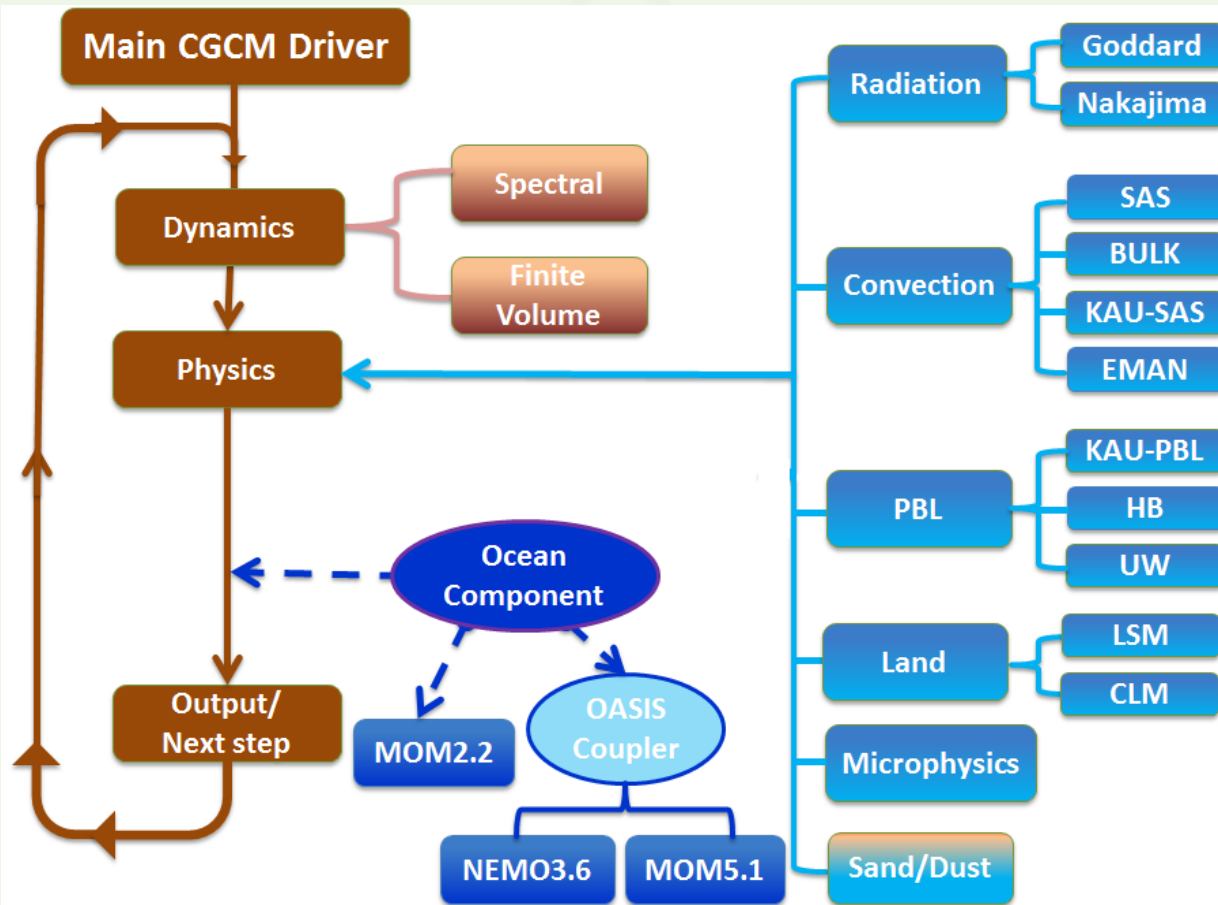
TARGET

Exascale  
HPC



# Saudi-KAU Coupled Global Climate Model

Activities



**Almazroui M**, Tayeb O, Mashat AS, Yousef A, Al-Turki YA, Abid MA, Bafail AO, Ehsan MA, Zahed A, Rahman MA, Mohorji AM, Kang IS, Noaman A, Omar M, Al-roqi AM, Ammar K, Al-Ghamdi AS, Hussein MA, Katib I, O'Brien E, Aljohani NR, Islam MN, Alsaedi A, Yang YM, Alkhalaf AK, Ismail M, Mashat A, Kucharski F, Assiri M, Ibrahim S, Tippet M, Rashid IU, Kamil S, Alahmadi A, Atif RM, Bajunaid MA, Hantoush AS 2017. Saudi-KAU coupled global climate model: Description and performance. *Earth Syst Environ* 1(1), DOI: 10.1007/s41748-017-0009-7.

# CECCR Scientific Achievements

Achievements

## CECCR Achievements

### Projects

10

KACST: 6  
Completed=3  
Ongoing=2  
Accepted=1

KAU: 2

International: 2  
KAU-SNU for 5yrs

### Publications

212

2011=5  
2012=20  
2013=33  
2014=30  
2015=45  
2016=29  
2017=46  
2018=32

Building background

### Workshops

32

International=32  
National=2

This project building huge capacity for CECCR

### Trainings

3

International=2  
National=3

Vision 2030

This training building huge capacity for Nation

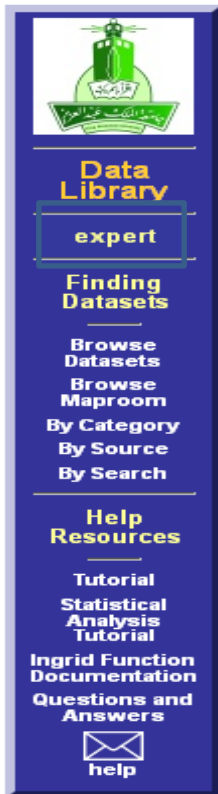
### Reports

1

Under process

# Establishment of Knowledge Hub: KAU Climate Data Library

The KAU Climate Data Library contains over 300 datasets from a variety of earth science disciplines and climate-related topics. Analyses can be done in the [Maproom](#); create visual representations of data, including animations; download data in a variety of commonly-used [formats](#), including GIS-compatible formats. Are you new to the world of climate data? Check out our [Introduction to Climate Data](#) page.



## What's New

### Finding Data

[Datasets by Category](#)

[Datasets by Source](#)

[Dataset Search](#)

[Browse/Search Datasets](#)

[Browse/Search Maproom](#)

### Help Resources

[Introductory Tutorial](#)

[Statistical Analysis Tutorial](#)

[Ingrid Function Documentation](#)

[Questions and Answers](#)

# CECCR Organized Training Programs

Achievements



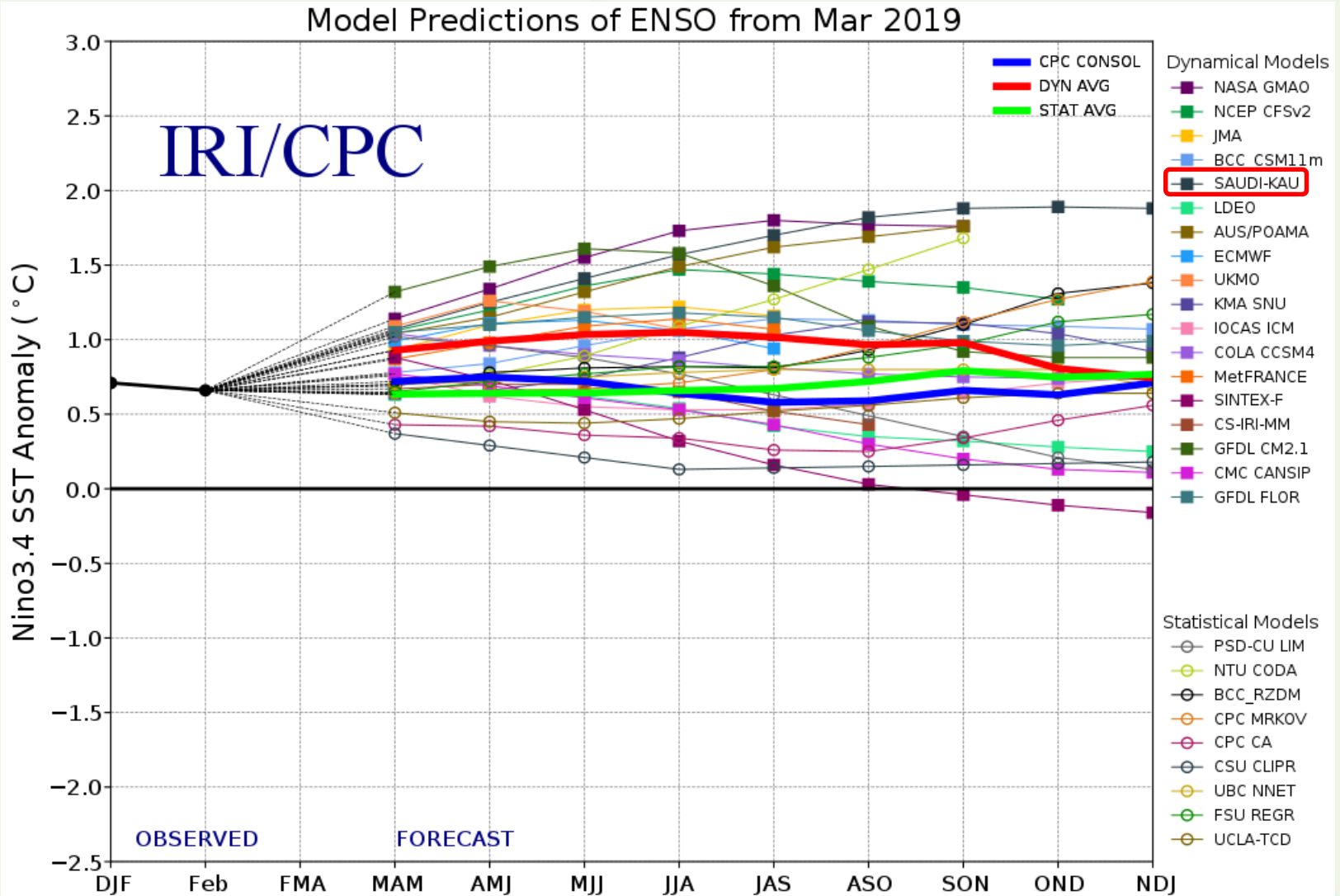
Participants in the First Seasonal Climatic Prediction Workshop



Opening Ceremony of GAMEP training program

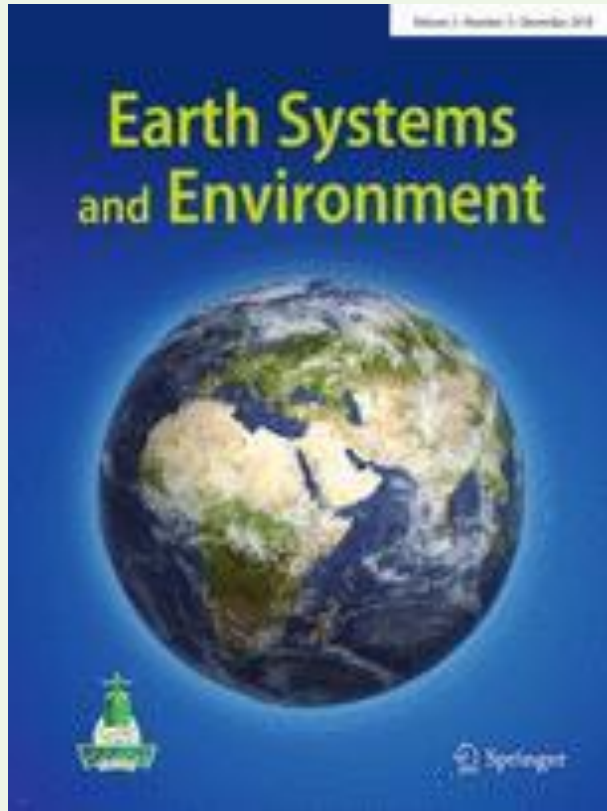
# CECCR contribution to the ENSO Plume

Achievements

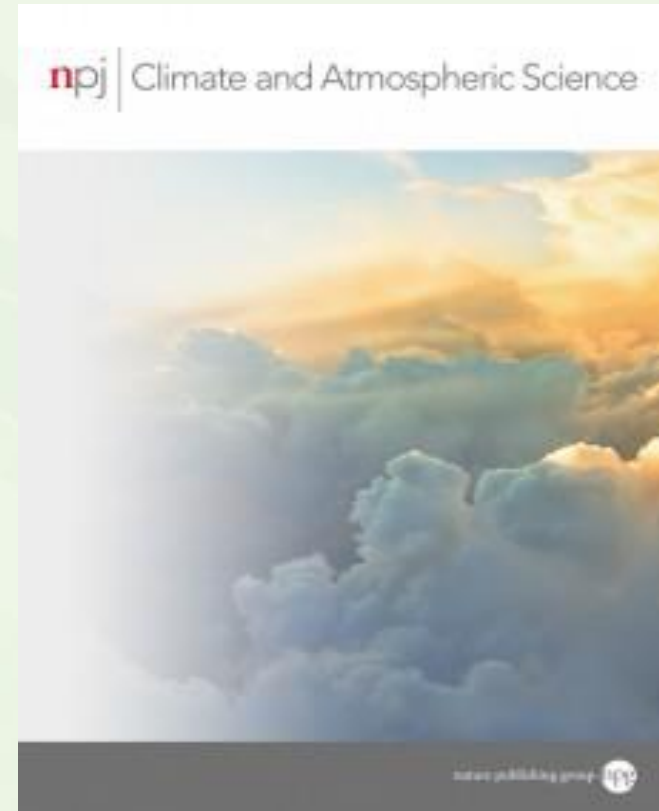


# Establishment of Scientific Journals

Achievements



Earth Systems and Environment  
<https://link.springer.com/journal/41748>  
Publishes with **Springer** science  
2017



Earth Systems and Environment  
<https://www.nature.com/npjclimatSCI/>  
Publishes with **Nature** science  
2017

## Linkage of CECCR and IU GreenMetric World University Ranking

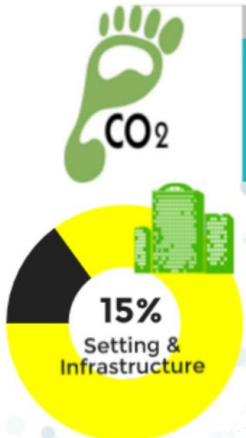
The university's attention to the climate change issues takes the highest weighting in IU GreenMetric World University Ranking.

In questionnaire several indicators for climate change adaptation and mitigation program, greenhouse gas emission reductions policy took places.

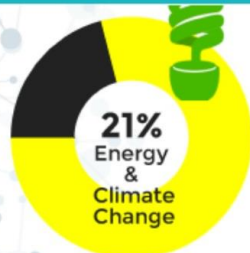
## Linkage of CECCR and IU GreenMetric World University Ranking

### Criteria & Indicator

UI GreenMetric has six categories



The aim is to trigger the participating university to provide more space for greenery and in safeguarding environment, as well as the development of sustainable energy.



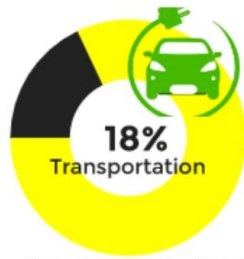
With this indicator, universities are expected to increase the effort in energy efficiency on their building and to care more about nature and energy resources.



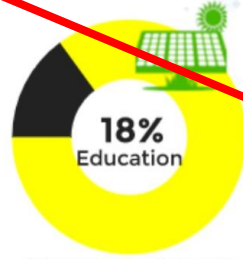
Some programs and waste treatments should be among the concern of the university, i.e. recycling program, toxic waste recycling, organic waste treatment, sewerage disposal, policy to reduce the use of paper and plastic in campus.



The aim is that universities can decrease water usage, increase conservation program, and protect the habitat.



Transportation policy to limit the number of motor vehicles in campus, the use of campus bus and bicycle will encourage a healthier environment.



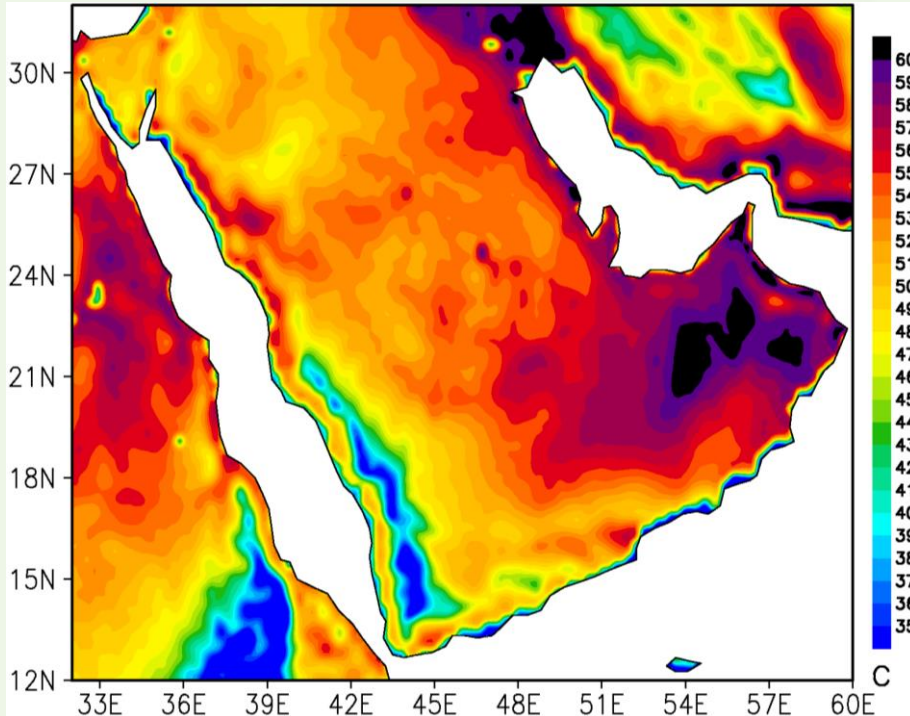
This expansion of the criteria based on the thought that university has an important role in creating the new generation concern with sustainability.

With this indicator universities are expected to increase the effort in energy efficiency on their building and to care more about nature and energy resources

To focus on Nature and Energy resources the Climate Change is very unguent and important needs!

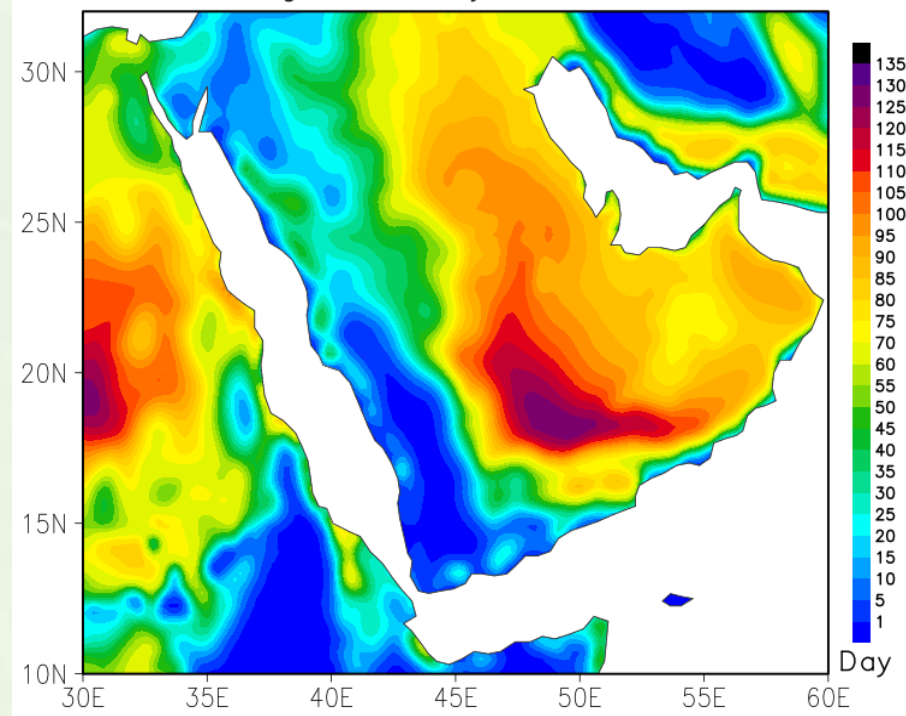
# Climate Prediction & Climate Extremes

Summer Max Temp: RCP8.5 2071-2100



Climatic Prediction

Warm Days Change: RCP8.5 2071-2100



Climatic Extremes

**CECCR focused on local scale climate to care more about nature and energy resources**

Linkage of CECCR and IU GreenMetric World University Ranking

The projection of Precipitation SURPLUS at some areas and DEFICIT at other areas are related to Green and Desertification

The projection of Temperature indicates where to increase POWER GENERATION

The Climate DATA are linked to renewable energy generation and maintenance

Linkage of CECCR and IU GreenMetric World University Ranking

Projected Climate Data can be used for climate change “Adaptation and Mitigation program”

Projected Climate Data can be used for climate change “Greenhouse Gas Emission reductions policy”

Projected Climate Data can be used for Infrastructure, Water, Transportation and Education INDICATORS

## Concluding Remarks

- ❑ CECCR is the KAU initiative to work on the Climate and Climate Change.
- ❑ CECCR is using GCMs, RCMs and NWP models to build Climate Database.
- ❑ CECCR developed Saudi-KAU GCM and developing Saudi-KAU Weather Prediction Model.
- ❑ CECCR is Archiving Climate Data.
- ❑ CECCR Climate Data archive can be used for Climate Change Adaptation and Mitigation program including impact studies.



**Thank You  
for your attention**