# A sustainable future for all requires some big decisions….

**Every day we make decisions based on the best available evidence at the time. Such a decision might be eating healthily because scientific advice suggests this will protect us from illness and contribute to a longer, healthier life. Policy makers also require reliable scientific evidence before they commit to major decisions to protect the environment and ensure global sustainable development in the long term. This is because such decisions may have considerable short-term impacts on their country's people, industry and economy.**

## The time has come…..

This summer policy makers from across the world will come together at 'Rio 20+' to discuss and commit to policies that will lead to a more sustainable future for us all. Seven areas have been highlighted as requiring priority attention; jobs, energy, cities, food, water, oceans, and disaster risks; the impacts of climate change will be an important factor affecting each of these areas.

At the 'Rio Earth Summit' in 1992 a commitment by the world's policy makers to curb carbon emissions was achieved despite a large degree of uncertainty in the scientific evidence. Twenty years on, and in the midst of a global economic crisis, even greater reliability of future climate projections is required to support difficult decision making.

## This is where EMBRACE can help……

The Earth's climate system is extremely complicated. Earth System Models (ESMs) try to describe all important processes in the climate system (atmosphere, oceans, ice, forests, soil and so on). These models are the only way of estimating what will happen to the Earth's climate in the future as a result of increasing global carbon emissions.

There have been great advances in the performance of these ESMs over the last 20 years, nevertheless they remain a very simplified representation of the real earth system. Indeed some processes vital to the workings of the climate system are missing altogether . Such problems reduce the ability of ESMs to provide reliable projections of the future climate.

The EMBRACE project, funded by the European Union Framework Programme 7, works to address these limitations in European ESMs, with a focus on areas that are the most uncertain or unrealistic in present-day models. By the end of the four year project, improvements made will lead to more reliable projections, helping policy makers make informed decisions on how to best limit, and adapt to, future climate change. Without such action the sustainable development goals of Rio 2012 may be jeopardised.

***Turn over for an example of what EMBRACE hopes to achieve***

# Improving our models for a clearer picture of the future

## An example problem

Representing the extreme complexity of processes underpinning interactions between the land surface and atmosphere is a major challenge for Earth System Models. For example, current models simulate spring and summer soil conditions significantly drier than seen in reality, indicating the difficulty models have in realistically representing the key processes controlling spring/summer climate over continental regions.

PIERRE-PHILIPPE MARCOU/AFP/GETTY IMAGES

Photo by Andy Hall/Oxfam

## Why is it important?

Such problems in simulating these key climate processes reduce the reliability of future estimates of extreme events; such as droughts, flooding, and heat waves; particularly on regional scales. This could mean that future drought risks over southern Europe, with potentially significant impacts for their agricultural industry, are poorly estimated

Such extreme events have catastropic impacts on the lives and livelihoods of millions of people around the globe being a particularly serious impediment to sustainable development in the poorest and most vulnerable regions of the world.

## How EMBRACE will help

One group of EMBRACE scientists aims to improve the way vegetation and soil processes are represented in ESMs. By improving the description of how rainfall and water in the soil will respond to a changing climate we can provide more reliable estimates of the future drought and heat wave risk over Europe and other vulnerable continental regions of the world. Further development by the project team will also enable models to provide increased regional detail, which is vital for individual countries to plan future strategies to help respond to such disasters.


***Project coordinator:*** **SMHI**

Swedish Meteorological and Hydrological Institute, SE-601 76 Norrköping, Sweden, Telephone: +46 11 495 80 00


***Partner organisations***

Royal Netherlands Meteorological Institute (NL); European Centre for Medium-Range Weather Forecast (UK); Karlsruhe Institute of Technology (DE); Max-Planck Institute for Meteorology (DE); Max Planck Institute for Biogeochemistry (DE); Deutsches Zentrum für Luft- und Raumfahrt (DE); Finnish Meteorological Institute (FI); Eidgenössische Technische Hochschule Zürich (CH); University of East Anglia (UK); University of Exeter (UK); UK Met Office (UK); Université catholique de Louvain (BE); CNRS—Institute Pierre Simon Laplace (FR); Météo France (FR); Natural Environment Research Council Centre for Ecology and Hydrology (UK); Wageningen University and Research Centre (NL); University of Split (HR); Imperial college (UK); University Amsterdam (NL)


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**Find out more at www.embrace-project.eu**