

Conference on “Complex Systems and Changes: Water and Life” – a “Frontiers of Science” event –

Life as we know it on planet Earth is based, in its most simple form, on a few key chemical components, the main one of which is Water. It is an amazing molecule, a physical and biological wonder, and it plays a key role in many complex systems, as seen for example in systems biology and also in Earth system science. But at the present time, water is also a threatened resource which will become a potential source of socio-economic / strategic conflicts in the near future.

This joint ESF-COST Conference is dedicated to the link between water and life in all its diversity and complexity, through a journey across many time and space scales.

1 – Origin of Life in a “water” world:

Origins of water on Earth – appearance and evolution of life in liaison with water and climate

In this first topical session, we will touch upon the origin of water in the Universe and on the Earth, look for some of the most ancient traces of life on Earth, and describe the role of water in the most ancient terrestrial climate system and its later evolution.

Suggested subtopics:

- Geochemistry, biochemistry of early life
- Archean Earth and Archean life
- Climate evolution since the Archean

2 – Water and life in extreme environments

Water as a component of natural life cycles and undisturbed ecosystems

As a continuation of “origin of life”, this session will look into life forms adapted to various geochemical, biochemical environments (from molecular biology to geosciences), and to some “extreme environments”, such as the icy world (e.g., Antarctica sub-glacial lakes and Antarctic Ocean), the gaseous, aerial world, and the water-rock interface microenvironments.

Suggested subtopics:

- Life in the deep ocean
- Life in the icy world
- Life in the gaseous world
- Life in rocks

3 – Water and life - changes in the anthropocene*Water and life in ecosystems under human pressure*

We have entered the so-called “anthropocene” era. Many changes have been observed in the environment but one important fact remains: Water is still an essential resource and a biological and physical driver for ecosystem functioning. Several examples of the impacts of human activities on the water-life cycle and interactions will be looked at in this session.

Suggested subtopics:

- Anthropocene in the Earth's history
- Threatened aquatic ecosystem equilibrium in the various kingdoms of life
- The example of Ocean Acidification
- Water in the climate system
- Anthropogenic alterations of biogeochemical cycles
- Changes in the sea level
- Water pollution and bioremediation

4 – Future challenges

It is envisaged that this session will entail a series of presentations followed by a Panel discussion and feedback from the audience

Sustainability of water resources is one of the major global challenges for humanity living in a rapidly changing environment. Key elements will be explored.

Suggested subtopics:

- From Mesopotamia to Megacities - Urban Water
- Global water monitoring
- Water economics
- Water policy and security
- Water and new Life Support Systems