

# **Changes in the annual cycle of precipitation - Latin America\***

Vitali Diaz, Gerald Corzo, Dimitri Solomatine

IHE-Delft, Hydroinformatics chair group, Delft, Netherlands

\*Being prepared for publication

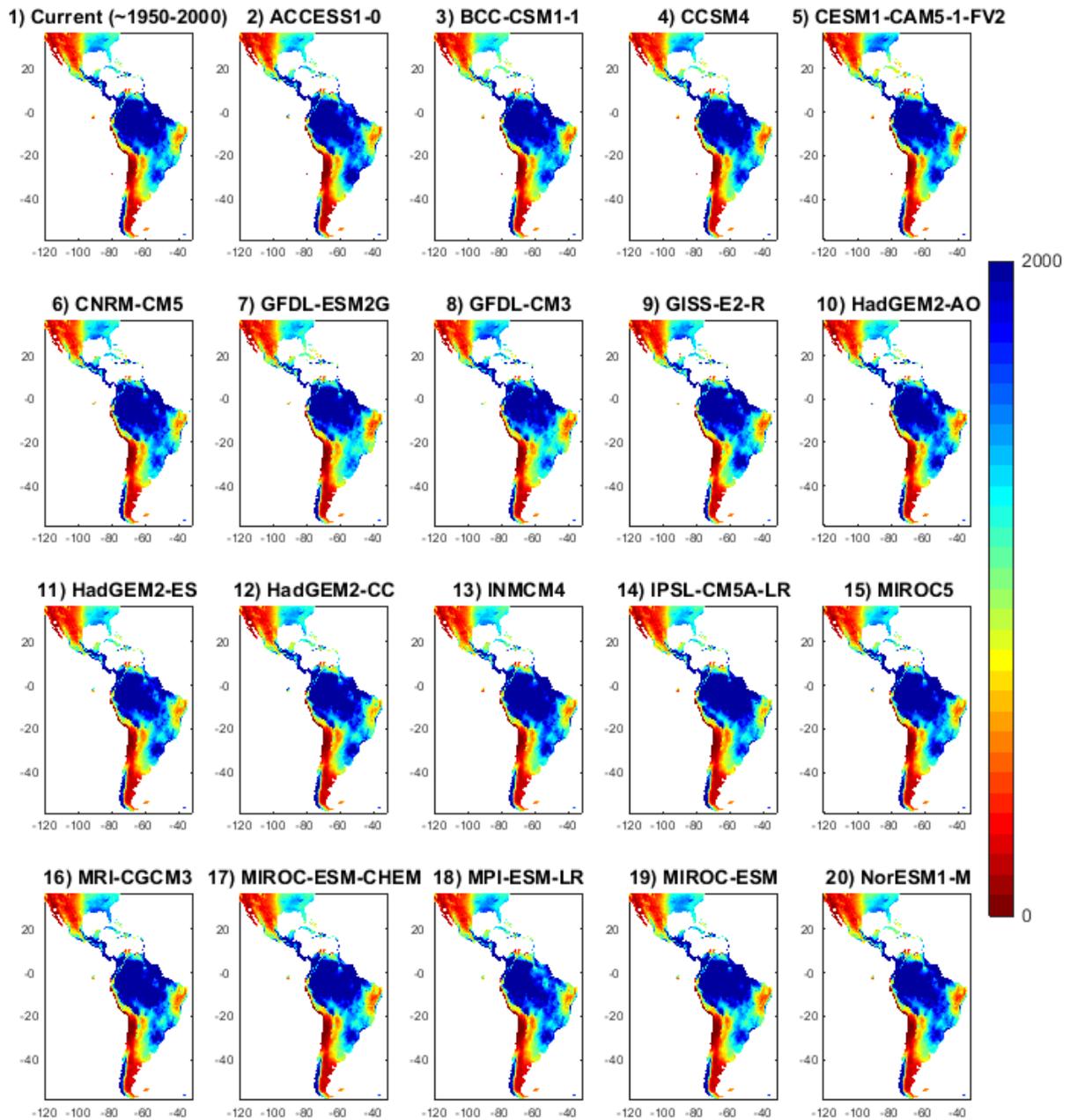
Precipitation patterns are expected to change in space and time in the coming century, modifying considerably the occurrence and magnitude of droughts and floods. Currently, the Latin-America region (LA) is been challenged by both hydrological events. In the case of droughts, it is important to know to what extent and where the monthly distribution may change. This because these changes can contribute to increasing the magnitude and duration of drought, especially in those areas prone to this kind of events.

The aim of this study is to try to answer the above questions. For this purpose, we carried out an analysis of the historical and projected annual and monthly precipitation over LA. The historical precipitation corresponds to the period 1950-2000. Projections in two periods where considered, i.e., 1941-2060 (further indicated as 2050) and 2061-2080 (2070). 19 Global Climate Models (GCM) where taken into account under the Representative Concentration Pathway (RCP) 4.5.

The Caribbean and Brazil show the greatest changes in annual precipitation, while in the west coast of South America, this condition is more stable (Fig. 1). The results show that in some parts of the continent, changes in the spatial distribution of rainfall are negligible; however, the magnitude does undergo alterations. For example, in the case of Mexico, 15 GCM agree on a decrease in yearly rainfall and four on an increment (Fig. 2 and 3) in the 2050/2070 projection. Outcomes clearly indicate a modification of the intensity of the monthly precipitation. According to projections, from June to August precipitation will grow. On the other hand, rainfall of September will reduce. The rest of the year, the condition stands (Fig. 4).

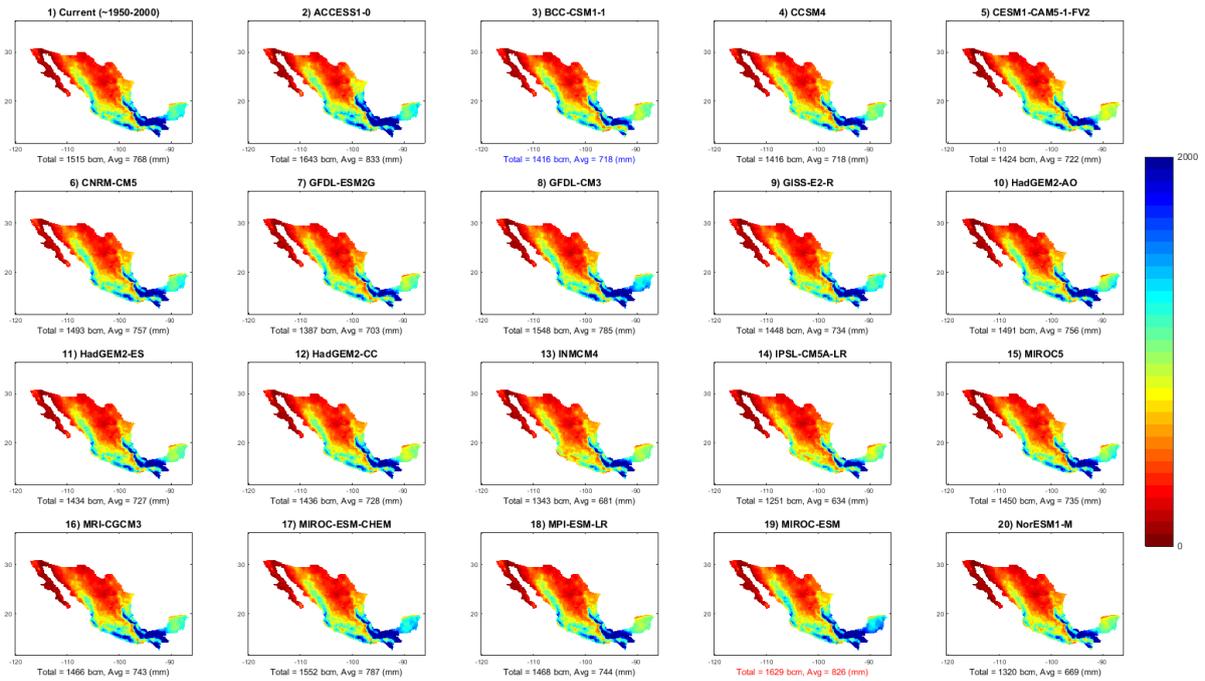
We research the implications of changes in the annual cycle of precipitation over the drought in LA, this will help to better face drought impacts in this region.

Precipitation: Annual (mm), 2050 (2041-2060), RCP 4.5



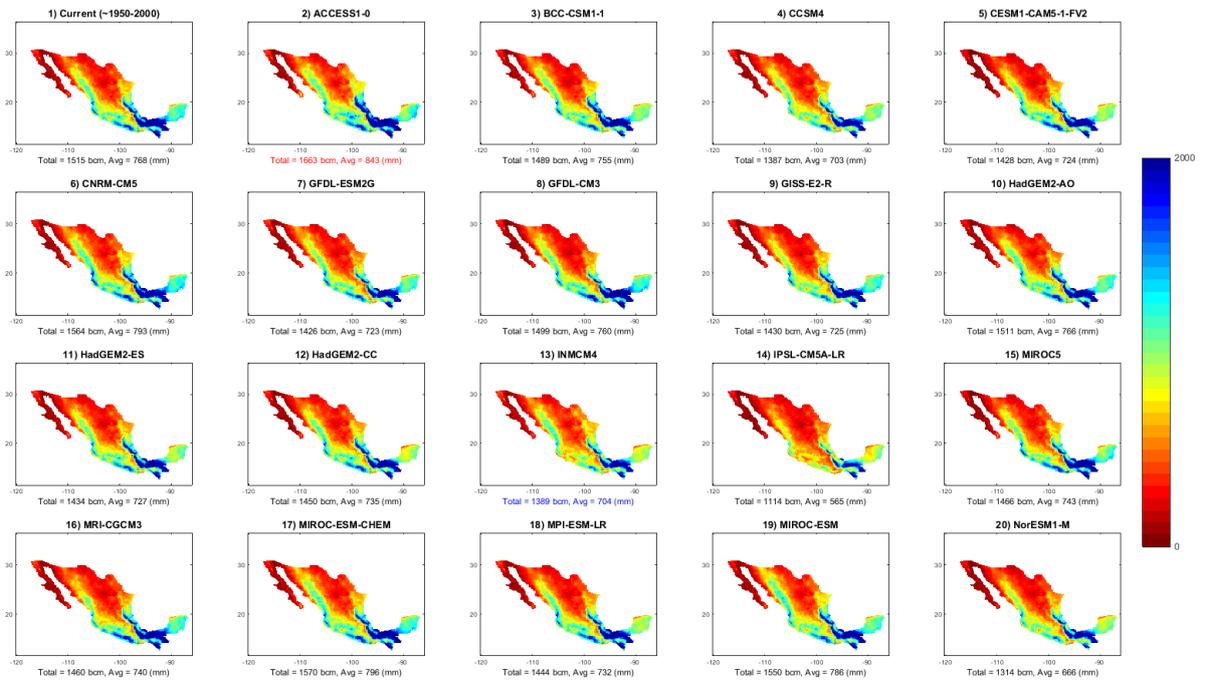
**Figure 1** Annual precipitation projections (2050: 1941-2060) for Latin America from 19 Global Climate Models (GCM) and the period 1950-2000. RCP 4.5

Precipitation: Annual (mm), 2050 (2041-2060), RCP 4.5

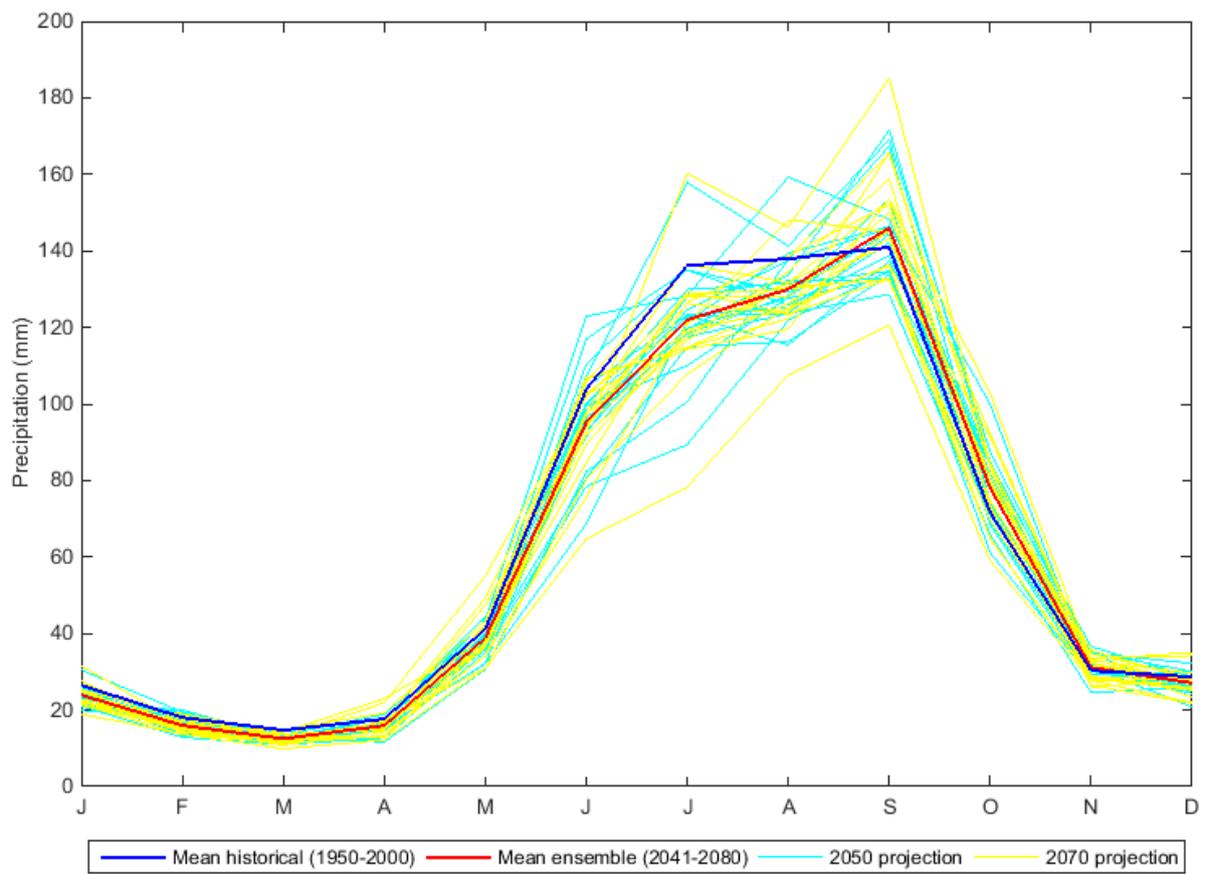


**Figure 2** Annual precipitation projections (2050: 1941-2060) for Mexico from 19 Global Climate Models (GCM) and for the period 1950-2000. Total amount and average precipitation are indicated. With red the maximum and with blue the minimum projected values. RCP 4.5.

Precipitation: Annual (mm), 2070 (2061-2080), RCP 4.5



**Figure 3** The same as Figure 2 but for 2070: 1961-2080.



**Figure 4** Current and projected annual cycle of precipitation in Mexico, 19 Global Climate Models (GCM) and RCP 4.5