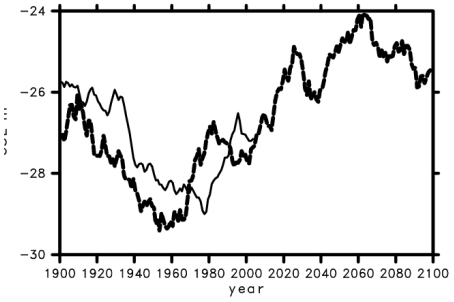
Arpe and Leroy (2007) used scenario simulations forced with the anticipated greenhouse gas emission A1B suggested by IPCC, which were carried out at the Max Planck Institute for Meteorology (MPIM) with the ECHAM5 atmospheric model coupled with models for the ocean, lake, ice and soil. They calculated from these data the Caspian Sea Level changes for the 20th and 21st century. For the 20th century the model simulations reproduced the observed variability astonishingly well giving confidence in the quality of the model. The paper arose quite an interest from the public, e.g. oil & gas companies and authorities responsible for the sea defence along the Iranian coast, as a slight increase of the sea level is predicted for the 21st century.



Caspian Sea level as observed and simulated during the 20th and 21st century (from Arpe and Leroy, 2007)

The south and south-west of the Caspian Sea is bordered by orographically very rough terrain. This is an area of heavy precipitation and may be second in importance to the Volga river discharge for the variability of the Caspian Sea. While the simulation of precipitation and evaporation for the Volga river might be well represented with a T63 resolution (the resolution used in the scenario runs) it is clearly too coarse for the south and south-western coast of the Caspian Sea. In fact the precipitation with a T63 ECHAM5 model is underestimates by almost a factor of 2 for the Iranian mountains, it is better with a T106 model but remains too low.
To get a good estimate for the impacts of increased greenhouse gases from these areas on the Caspian Sea level, higher resolution simulations should be performed. It is suggested to run the REMO model with a ½ and 1/6 degree resolution forced with boundary data from the above mentioned global scenario runs.

For this project help from other persons is needed and a solution would be to cooperate with the BMBF Project 522 suggested by Prof. Dr. Heiko Paeth. To achieve the goals for our project, the areas in the simulations in project 522 need to be extended towards the north and the west to 30°E and 65°N for the ½ deg runs and to 35°E and 47°N for the 1/6 deg runs. This means an increase of grid points from 181*121=21900 to 211*141=29750 for the ½ deg runs and from 181*121=21900 to 252*140=35300. The required resources will increase by about 1/2 when enlarging the areas for that in project 522 to the ones needed here. Only these extra resources are asked for in this request.

A further investigation with these data will be the temperature over the Iranian high plateau. The above mentioned simulations down-scaled with a

poor man’s method suggest that these areas will have an increase of the 2m temperature to monthly means above 40°C in the warmest month of the year which means that large parts of Iran will become inhabitable. As the precipitation in the scenario runs for the present is strongly under-predicted for this area, the estimated temperature may be overestimated as there is not enough water for evaporation available in the ground. A properly down-scaled estimate will shed some light on this.

Arpe, K., Bengtsson, L., Golitsyn, G.S., Mokhov, I.I., Semenov, V.A, Sporyshev, P.V. 2000: Connection between Caspian Sea level variability and ENSO. GRL, 27, 17, 2000.
Arpe, K., Leroy, S., 2007: The Caspian Sea Level forced by the atmospheric circulation, as observed and modelled. Quaternary International, 173–174 144–152.