

EGU23-598, updated on 03 Dec 2023

<https://doi.org/10.5194/egusphere-egu23-598>

EGU General Assembly 2023

© Author(s) 2023. This work is distributed under the Creative Commons Attribution 4.0 License.



## Assessment of energy production potential from ocean currents along the Brazil coastline taking into account climate change

Anderson Soares<sup>1,2</sup>, Djalma Falcão<sup>2</sup>, Raquel Toste<sup>1</sup>, Luiz Landau<sup>1</sup>, and Luiz Assad<sup>1</sup>

<sup>1</sup>Laboratory for Computational Methods in Engineering, Federal University of Rio de Janeiro, Rio de Janeiro, Brazil  
(andersonsoares@poli.ufrj.br)

<sup>2</sup>Electrical Engineering Program, Federal University of Rio de Janeiro, Brazil

The increasing electricity demand, coupled with the global need to reduce greenhouse gases, has made renewable energies an attractive solution to the problem. The oceans offer good alternatives for diversification and expansion of the energy matrix, among the possibilities for energy production is that one comes from ocean currents. Therefore, this work aims to evaluate the harnessing energy from ocean currents on the Brazilian coast based on the results of the global circulation model used in CMIP5, the Brazilian Earth System Model (BESM). Due to low temporal and spatial resolution, BESM results were downscaled using ROMS. In order to evaluate the effects of climate change on hydrokinetic production in the ocean, the simulation must represent the current climate conditions and the future condition, based on the historical scenario and RCP4.5 respectively. For this purpose, these results were used as lateral boundary conditions and surface forcing into a two-way nested model composed of a donor and two receiver grids, with  $1/5^\circ$  and  $1/15^\circ$  of horizontal resolution, respectively. The highest resolution grids embrace the regions with the highest hydrokinetic potential on the southeastern and northern coasts, where the Brazilian current or North Brazilian current predominates. In addition to spatial and temporal variability, the synergy between ocean current as a source of electric power supply and others sources from the Brazilian electrical matrix will be discussed.