



## RESEARCH ARTICLE

10.1029/2019MS001791

**Special Section:**The CNRM Climate and Earth  
System Models for CMIP6**Key Points:**

- This study introduces CNRM-ESM2-1 and describes its set-up for CMIP6
- Represented Earth system processes further impact the model response to external forcing than the model performance over present-day
- Represented Earth system processes damp future warming by up to 10%

**Supporting Information:**

- Supporting Information S1

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roland.seferian@meteo.fr**Citation:**Sférian, R., Nabat, P., Michou, M., Saint-Martin, D., Voltaire, A., Colin, J., et al (2019). Evaluation of CNRM Earth-System model, CNRM-ESM2-1: role of Earth system processes in present-day and future climate. *Journal of Advances in Modeling Earth Systems*, 11, 4182–4227. <https://doi.org/10.1029/>

# Evaluation of CNRM Earth System Model, CNRM-ESM2-1: Role of Earth System Processes in Present-Day and Future Climate

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**Abstract** This study introduces CNRM-ESM2-1, the Earth system (ES) model of second generation developed by CNRM-CERFACS for the sixth phase of the Coupled Model Intercomparison Project (CMIP6). CNRM-ESM2-1 offers a higher model complexity than the Atmosphere-Ocean General Circulation Model CNRM-CM6-1 by adding interactive ES components such as carbon cycle, aerosols, and atmospheric chemistry. As both models share the same code, physical parameterizations, and grid resolution, they offer a fully traceable framework to investigate how far the represented ES processes impact the model performance over present-day, response to external forcing and future climate projections. Using a large variety of CMIP6 experiments, we show that represented ES processes impact more prominently the model response to external forcing than the model performance over present-day. Both models display comparable performance at replicating modern observations although the mean climate of CNRM-ESM2-1 is slightly warmer than that of CNRM-CM6-1. This difference arises from