



Toward the Next 30 Years Impact and Adaptation Studies in AIM

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The 30th AIM International Workshop

Ohyama Memorial Hall in National Institute for Environmental Studies and Online

August 28 and 29, 2024



Asia-Pacific Integrated Model

<http://www-iam.nies.go.jp/aim/index.html>



• Past 20 years

✓ Global

- Development and application of sector impact models
 - Water resource, Crop productivity, Heat stress mortality, Heating and cooling energy demand, Suitable habitat for plants and animals, Labor productivity
- Economic analyses of climate impacts by linking climate impact models with CGE
- Development of impact emulators

✓ National

- Integrated analyses of climate impacts under the collaboration with sector-specific research teams in Japan and contribution to national climate risk assessment
- Advanced analyses of climate impacts and adaptation

• Next 20 Years

- ✓ Further integrated scenario analyses considering inter-linkage among development, climate impacts, and climate policies
- ✓ Improved consideration of adaptation measures in impact analyses
- ✓ Enhanced analyses of socio-economic aspects of climate change impacts and adaptation including conflicts and migration

• Past 20 years

✓ Global

- Development and application of sector impact models
 - Water resource, Crop productivity, Heat stress mortality, Heating and cooling energy demand, Suitable habitat for plants and animals, Labor productivity, **Wildfire, Seafood, Poverty**
- Economic analyses of climate impacts by linking climate impact models with CGE
- Development of impact emulators (incl. **tools for city-scale impact analyses**)

✓ National

- Integrated analyses of climate impacts under the collaboration with sector-specific research teams in Japan and contribution to national climate risk assessment (**Outputs of CCCA**)
- Advanced analyses of climate impacts and adaptation

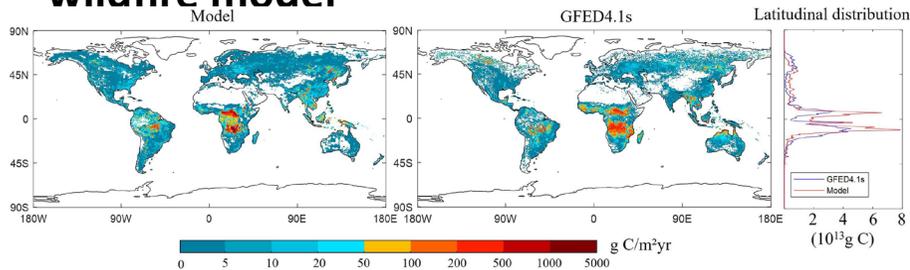
• Next 30 Years

- ✓ Further integrated scenario analyses considering inter-linkage among development, climate impacts, and climate policies
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Wildfire, air pollution and human health impacts

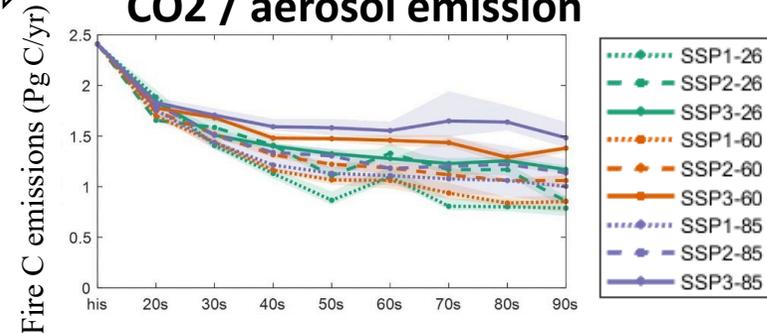
- In present (2006-2015), about 10% of the total PM2.5 in the atmosphere is attributed to wildfire and about 90,000 PM2.5-related deaths are attributed to wildfires.
- In the mid of the century, wildfire's PM2.5 mortality is projected to decrease in most scenarios and regions.
- Toward the end of the century, increase in wildfire's PM2.5 mortality is projected.

Development and validation of wildfire model



- Consideration of socio-economic factors
- Validation of the model (comparison with the obs.)

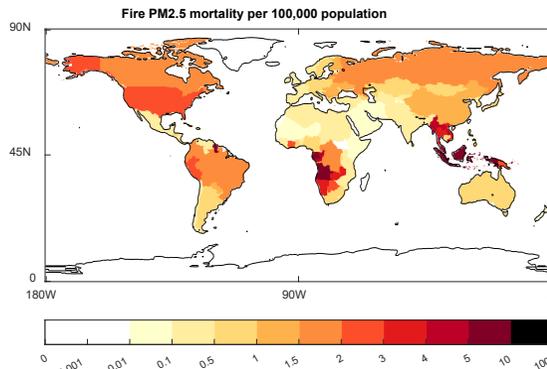
Projection of wildfire and CO2 / aerosol emission



- Larger carbon release under RCP8.5
- General decreasing trend by economic growth

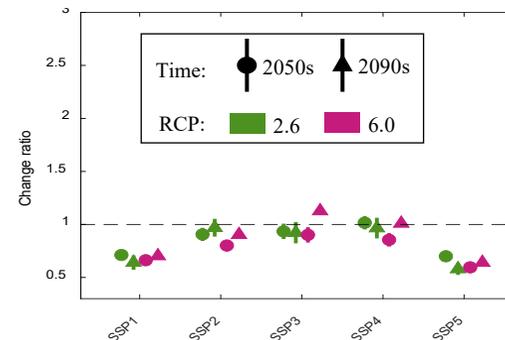
Park et al. (2023) Impact of climate and socioeconomic changes on fire carbon emissions in the future: Sustainable economic development might decrease future emissions. *Global Environmental Change*, 80, 102667.

Mortality caused by wildfire PM2.5 emission



- About 90,000 PM2.5 deaths attributed to wildfires
- Relatively high mortality in tropical

Future projection of health impact



- Mortality increase in 2090s under SSP3-6.0 and SSP4-6.0
- Increase in low-income countries in SSP4 (inequal world).

Park et al. (2024) Future fire PM 2.5 mortality varies depending on climate and socioeconomic changes. *Environmental Research Letters*, 19(2), 024003.

• **Next 30 Years (more in detail)**

- ✓ Further integrated scenario analyses considering inter-linkage among development, climate impacts, and climate policies
 - Development of scenarios focusing on carbon dioxide removal under 1.5 degree climate change mitigation (ERTDF project; FY2024-26; PI: Prof. Fujimori)
 - Climate change impacts assessment considering feedback effects on development rate (Kakenhi project; FY2024-26: PI: Dr. Takahashi)
- ✓ Improved consideration of adaptation measures in impact analyses
 - How to close the gaps between on-the-ground adaptation decision making and academic climate risk analyses considering adaptation?
 - Direction and design of NIES's adaptation research program and other large research projects
- ✓ Enhanced analyses of socio-economic aspects of climate change impacts and adaptation including conflicts and migration
 - ERTDF-SII-11: Evaluation of climate security risks in major cities in the world (ERTDF strategic project; FY2023-25; PI: Prof. Oki)
- ✓ Other keywords potentially worth (re-)attending ...
 - open architecture; social implementation; models for M&E; consideration of singularity; equality/equity; stochastic analyses; emergent constraints; data assimilations; translation between qualitative and quantitative scenarios with the help of AI; ...