12 Marine Ecosystems & Fisheries

12.1 Experiments

Table 29: Summary of historical runs for global and regional marine ecosystem & fisheries models. Priority should be given to the fishing scenario (time-varying fishing effort). Any other impacts not mentioned here should be held constant at year-2000 levels.

Climate data GCM	Scenario	Fishing effort	Ocean acidification	# runs
GFDL ESM2 (re-analysis)	hist	fishing (time-varying effort/mortality) no-fishing (zero effort/mortality)	time-varying pH	2

12.2 Sector-specific input

Climate-related forcing for historical simulations

Table 30: Historical and future forcing datasets for global and regional models.

Dataset description	Time period	Comments
GFDL reanalysis product CORE-forced MOM-SIS-TOPAZ	1959-2004	observation/re-analysis based time-series (1.0° x 1.0° degree) as described in (Stock, Dunne, & John, 2014) => includes observed climate variability

Table 31: Forcing variables provided as input for global and regional marine fisheries models.

Variable (long name)	Variable name	Unit (NetCDF format)	Resolution	Comments
Sea water X velocity	*uo*	m s-1	Monthly	surface
Sear water Y velocity	*vo*	m s-1	Monthly	surface
Sea water temperature	*to*	K	Monthly	surface and bottom

Sea ice concentration	*sic*	%	Monthly	
Dissolved oxygen concentration	o2	mol m-3	Monthly	surface and bottom
Total primary organic carbon production (by all types of phytoplankton)	*intpp*	mol C m-3 s-1	Monthly	depth-integrated To be calculated as *intpp* = *intpp_lphy* + *intpp_sphy* + *intpp_diaz*
Small phytoplankton productivity	*intpp_sphy*	mol C m-3 s-1	Monthly	depth-integrated
Large phytoplankton productivity	*intpp_lphy*	mol C m-3 s-1	Monthly	depth-integrated
pH	*ph*	1	Monthly	surface and bottom
Salinity	*so*	psu	Monthly	surface and bottom

12.2.1 Historical fishing effort

For this round, modelers will use their own default fishing effort and catch data. In most cases this will be Sea-Around-Us-Project (SAUP) data (http://www.seaaroundus.org/data/#/eez) obtained through a memorandum of understanding (MOU) or data from Regional Fisheries Management Organizations (RFMOs) or local fisheries agencies. Modelers that do not have access to these data are asked to contact the ISIMIP sectoral coordinators.

12.2.2 Spin-up and initialization

Input data is provided from 1950 to 2004. Years until 1970 can be replicated as needed and used for spin-up. Historical reporting is from 1971-2005, but if your model starts later, start when your model normally starts!

12.3 Output data

- **Provide temporally (monthly) and spatially (1 x 1 degree grid) explicit column-integrated time series (1971-2004)** (All files should be saved with .nc4 file extension; a conversion script for .csv files can be found at: http://vre1.dkrz.de).

- **Use variable names as specified in Table** 32**, and check the overall ISIMIP simulation protocol for how to name your files**
- **If there is no data value for outputs, use the value: 1.e+20f**
- **Mandatory output**: this is the priority for first round of model comparisons (provide as many as possible!)
- **Optional output**: if you can, please store or upload all output you receive from your model, we may eventually use it

Table 32: Common output variables to be provided by global and regional marine fisheries models.

Variable (long name)	Variable name	Unit (NetCDF format)	Resolution	Comments
Mandatory output from global and regional models (provide as many as possible)				
TOTAL system biomass density	**tsb**	g C m-2	monthly	all primary producers and consumers
TOTAL consumer biomass density	**tcb**	g C m-2	monthly	all consumers (trophic level >1, vertebrates and invertebrates)
Biomass density of consumers >10cm	**b10cm**	g C m-2	monthly	if L infinity is >10 cm, include in >10 cm class
Biomass density of consumers >30cm	**b30cm**	g C m-2	monthly	if L infinity is >30 cm, include in >30 cm class
TOTAL Catch (all commercial functional groups / size classes)	**tc**	g m-2	monthly	catch at sea (commercial landings plus discards, fish and invertebrates)
TOTAL Landings (all commercial functional groups / size classes)	**tla**	g m-2	monthly	commercial landings (catch without discards, fish and invertebrates)
Optional output from global and regional models				
Biomass density of commercial species	**bcom**	g C m-2	monthly	Discarded species not included (Fish and invertebrates)
Biomass density of large consumers >90cm and <100kg	**blarge**	g C m-2	monthly	

Biomass density of medium consumers >30cm and <90cm	**bmed**	g C m-2	monthly	
Biomass density of small consumers <30cm	**bsmall**	g C m-2	monthly	
Biomass density (by functional group / size class)	**b-<class>-<group>**	g C m-2	monthly	Provide name of each size class (<class>) and functional group (<group>) used, and provide a definition of each class/group
Catch (by functional group / size class)	**c-<class>-<group>**	g m-2	monthly	Provide name of each size class (<class>) and functional group (<group>) used, and provide a definition of each class/group
Catch of large consumers >90cm and <100kg	**clarge**	g m-2	monthly	
Catch of medium consumers >30cm and <90cm	**cmed**	g m-2	monthly	
Catch of small consumers <30cm	**csmall**	g m-2	monthly	
TOTAL Catch of consumers >10cm	**tc10cm**	g m-2	monthly	
TOTAL Catch of consumers >30cm	**tc30cm**	g m-2	monthly	

12.4 Additional information for regional marine ecosystem & fisheries models

12.4.1 Ocean regions

Table 33: Ocean regions

Ocean regions (short name for use in file names)		
North Sea (north-sea)	4°30’W–9°30’E	50°30’N–62°30’N
Baltic Sea (baltic-sea)	15°30’E–23°30’E	55°30’N–64°30’N

North-west Meditteranean (nw-med-sea)	1°30’W–6°30’E	36°30’N–43°30’N
Adriatic Sea (adriatic-sea)	11°30’E–20°30’E	39°30’N–45°30’N
Mediterranean Sea (med-glob)	6°30’W–35°30’E	29°30’N–45°30’N
South-East Australia (se-australia)	120°30’E–170°30’E	47°30’S–23°30’S
Eastern Bass Strait (east-bass-strait)	145°30’E–151°30’E	41°30’S–37°30’S
Cook Strait (cook-strait)	174°30’E–179°30’E	46°30’S–40°30’S
North Humboldt Sea (humboldt-n)	93°30’W–69°30’W	20°30’S–6°30’N

15 References

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