WCRP Workshop on

Improving climate models and projections using observation

Location: MIT, Cambridge MA, USA

Dates: June 12 – 14, 2023

June 12, 2023	WCRP Workshop, MIT, Cambridge MA, USA		
Session	**Time**	**Presenter**	**Subject**
Session 1: Opening and Overview Talks 9 – 10:40 (100 minutes)	9:00 – 9:25	Stammer Detlef	Improving Earth System Models through Adjoint Model Parameter Estimation
	9:25 – 9:50	Wunsch Carl	Where We Started, Where We Are (Maybe) Going
	9:50 – 10:15	Tegtmeier Susan	Short overview of ESMO related plans and ideas regarding observing systems
	10:15 – 10:40	Kushner Paul	WCRP Explaining and Predicting Earth System Change Lighthouse Activity
10:40-11:00	Coffee Break		
Session 1: Opening and Overview Talks 11 – 12:40 (100 minutes)	11:00 – 11:25	Vinogradova Shiffer Nadya	Modeling needs for NASA ocean physics and climate science
	11:25 – 11:50	Fujii Yosuke	Collaborative OSE activity in the UN Ocean Decade Project, SynObs
	11:50– 12:15	Zanna Laure	A new paradigm for data-informed climate simulations
	12:15 – 12:40	Fu Lee-Lueng	The status of the SWOT mission and its potential for observing small-scale ocean variability.
12:40 – 14:00	Lunch		
Session 2: Reanalysis related Work 14:00 – 15:40 (100 minutes)	14:00 – 14:25	Slivinski Laura	The 20th Century Reanalysis: Capturing 200 years of weather using surface observations
	14:25 – 14:50	Köhl Armin	Using synchronization for state estimation
	14:50 – 15:15	Mazloff Matthew	Regional assimilations and coupling efforts to inform model errors, predictability, and sensitivities
	15:15– 15:40	Fukumori Ichiro	ECCO Modeling Utilities (EMU): Modeling Tools for Modelers and Non-Modelers Alike
15:40 – 16:00	Coffee Break		
Session 2: Reanalysis related Work 16:00 – 17:40 (100 minutes)	16:00 – 16:25	Counillon Francois	Constraining error in Earth System Model with parameter estimation and supermodelling.
	16:25 – 16:50	Gaikwand Shreyas	MITgcm-AD v2: adjoint and tangent linear modeling framework using open source AD tool Tapenade
	16:50 – 17:15	Hill Chris	Accelerated Assimilation using Emulators
	17:15– 17:40	Nakamura Hisashi	An overview of regional atmospheric reanalysis for Japan: ClimCORE Project
	17:40– 18:00	Discussion	
18:30	**Reception, 9th Floor Green Building**		

June 13, 2023	WCRP Workshop, MIT, Cambridge MA, USA		
Session	**Time**	**Presenter**	**Subject**
Session 3: New ideas about developing data informed models of ocean and climate **9 – 10:40** **(100 minutes)**	9:00 – 9:25	Heimbach Patrick	Looking beyond data assimilation as an initial condition control problem
	9:25 – 9:50	Alonso Balmaseda Magdalena	Towards consistent representation of boundary forcing in reanalyses, forecasts and climate integrations.
	9:50 – 10:15	Amrhein Dan	Identifying dominant atmospheric drivers of ocean variability using ECCO and the MITgcm adjoint: Implications for reducing model bias
	10:15 – 10:40	Cessi Paola	Lagrangian analysis using ECCO reveals diabatic transformations along the global routes of the mid-depth meridional overturning circulation
10:40-11:00	Coffee Break		
Session 3: New ideas about developing data informed models of ocean and climate **11 – 12:40** **(100 minutes)**	11:00 – 11:25	Gettelman Andrew	A new perspective on Model Data Fusion for improving climate models, especially clouds
	11:25 – 11:50	Gebbie Jake	Is knowledge of the past multi-centennial ocean evolution necessary for climate projections?
	11:50– 12:15	Harrison Mathew	Global 1/12 degree MOM6 ocean hindcast simulations forced by reanalyses with consistent hydrologic cycle representation
	12:15 – 12:40	Molod Andrea	Initialization of Decadal Forecasts using a GEOS/ECCO coupled model and data assimilation system
12:40 – 14:00	Lunch		
Session 4: Earth System Reanalysis **14:00 – 15:40** **(100 minutes)**	14:00 – 14:25	Subramanian Aneesh	Impact of ocean observing systems on ocean state estimates and coupled climate forecasts
	14:25 – 14:50	Yang Xiating	Lagrangian analysis of the origin and fate of Bering Strait transport.
	14:50 – 15:15	Nguyen An	Synthesis of Arctic observations in state estimation framework: Successes, Challenges, and Opportunities
	15:15– 15:40		
15:40 – 16:00	Coffee Break		
Session 4: Earth System Reanalysis **16:00 – 17:40** **(100 minutes)**	16:00 – 16:25	Menemenlis Dimitris	Data-constrained global-ocean biogeochemistry model
	16:25 – 16:50	Moseley Lauren	Optimizing simulated biogeochemistry in the subpolar North Atlantic using BGC-Argo & ship-based observations
	16:50 – 17:15	Polkova Yulia	How good should the initial conditions for decadal climate predictions be in terms of the Atlantic meridional overturning circulation
	17:15– 17:40	Penny Steve	Improving forecasts at the air-sea interface through coupled atmosphere-wave-ocean modeling, coupled data assimilation, and Sofar's unique global network of Spotter buoys."
17:40– 18:00	**Discussion**		

June 14, 2023	WCRP Workshop, MIT, Cambridge MA, USA		
Session	**Time**	**Presenter**	**Subject**
Session 5: Where are we going from here? **9 – 10:40** **(100 minutes)**	9:00 – 9:25	Bonavita Massimo	Improving models with Data Assimilation and Machine Learning
	9:25 – 9:50	Buontempo Carlo	Current status and future plans for Copernicus reanalysis products at ECMWF
	9:50 – 10:15	Hersbach Hans	Prospects for Earth system reanalysis at ECMWF: ERA6 and beyond
	10:15 – 10:40	Breen Kathy	New Deep Learning Techniques to Constrain GCM Parameterizations with Observations
10:40-11:00	Coffee Break		
Session 5: Where are we going from here? **11 – 12:40** **(100 minutes)**	11:00 – 11:25	Gentine Pierre	Integration of data in climate models: beyond standard data assimilation in the era of machine learning
	11:25 – 11:50	Lu Feiyu	Bias correction for coupled climate models via data assimilation and machine learning
	11:50– 12:15	Shiklomanov Alexey	Challenges and opportunities for effective storage and dissemination of Earth System model outputs
	12:15 – 12:40	Fenty Ian	ECCO: The Next 5+ Years
	12:40 – 13:00	Ferrari Raffaele	Ocean modeling 2.0: building on the legacy of ECCO at MIT
13:00 – 14:00	Lunch		
14:00 – 16:00	*Open Science Questions and Workshop Outcome*		
16:00	*Closing of Workshop*		