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# Dr. Chia-Wei Hsu

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## PROFILES

- (1) Used Monte Carlo error analysis to show the first detection of sea level fingerprint by using NASA GRACE satellite data. (Highlighted by [Nature](#), [NASA/JPL](#), [AGU](#), and [UCI](#))
- (2) Studied the 21st century global mean surface temperature projection based on various versions of Climate Model Inter-comparison Project (CMIP3, CMIP5, and CMIP6).
- (3) Developed the [process-oriented diagnostic tool](#) in the Model Diagnostic Task Force at NOAA to study the sea level bias over the tropical Pacific in large-scale climate/ocean model simulations (CMIP6 and OMIP).
- (4) Proficiency with various remote sensing including GRACE, Altimetry, and Landsat satellite imagery and in-situ data including mooring, tide gauges, and ocean floats for extracting the useful physical signals like water mass and density changes over the ocean.
- (5) Optimized the simulation of mesoscale atmospheric convection by combining different numerical methods and by introducing parallel computing.

## EDUCATION

UNIVERSITY OF CALIFORNIA, IRVINE, CALIFORNIA – Ph.D. IN EARTH SYSTEM SCIENCE, 2017

Dissertation title: A Study of Ocean Mass and Transport with Remote Sensing.

Advisor: Prof. Isabella Velicogna

UNIVERSITY OF CALIFORNIA, IRVINE, CALIFORNIA – M.S. IN EARTH SYSTEM SCIENCE, 2012

Finished the core courses including cryosphere, fluid dynamics, biogeochemistry, data analysis, etc.

Advisor: Prof. Isabella Velicogna

NATIONAL TAIWAN UNIVERSITY, TAIPEI, TAIWAN – M.S. IN ATMOSPHERIC SCIENCES, 2010

Dissertation title: A Study of Time Integration Techniques in Ooyama's Moist Convection Model.

Advisor: Prof. Hung-Chi Kuo

NATIONAL TAIWAN UNIVERSITY, TAIPEI, TAIWAN – B.S. IN ATMOSPHERIC SCIENCES, 2009

Finished the required courses including but not limited to atmospheric and oceanic dynamics, numerical analysis, statistics, linear algebra, differential equation, climatology, cloud physics, remote sensing, etc.

## PROFESSIONAL SKILLS

- Python programming (7 years) : geospatial data processing, analysis, and visualization (Xarray & Dask etc.)
- Git version control (7 years) : developing statistical models and functions with science teams on GitHub
- Fortran programming (15 years) : atmospheric and gravitational modeling
- Scikit-learn and TensorFlow (1 year) : implement machine learning for advance data analysis
- MPI and OpenMP (1 year) : parallel computing for numerical weather prediction

## HONORS & AWARDS

- Studying Abroad Scholarship, Ministry of Education, Taiwan, 2012-2014 (16000 USD / year)
- Symposium of National Atmospheric Science for Graduate Student 2010 (Honorable mention)
- Subject Competition of Earth System Science 2008 (3rd place)

## JOURNAL PUBLICATION

**C.-W. Hsu** and I. Velicogna (2017), Detection of Sea Level Fingerprints Derived from GRACE Gravity Data, *Geophysical Research Letter*, 44, 8953-8961, [doi:10.1002/2017GL074070](https://doi.org/10.1002/2017GL074070). (Highlighted by [Nature](#) and [NASA/JPL](#))

**C.-W. Hsu** and J. Yin (2019), How likely is an El Niño to break the global mean surface temperature record during the 21st century? *Environmental Research Letter*, 14, 094017, [doi:10.1088/1748-9326/ab3b82](https://doi.org/10.1088/1748-9326/ab3b82).

T Sutterley, I. Velicogna, and **C.-W. Hsu** (2020), Self-Consistent Ice Mass Balance and Regional Sea Level From Time-Variable Gravity, *Earth and Space Science*, 7, e2019EA000860, [doi: 10.1029/2019EA000860](https://doi.org/10.1029/2019EA000860).

**C.-W. Hsu**, J. Yin, S. M. Griffies, and R. Dussin (2021), A Mechanistic Analysis of Tropical Pacific Dynamic Sea Level in GFDL-OM4 under OMIP-I and OMIP-II Forcings, *Geoscientific Model Development*, [doi: 10.5194/gmd-2020-374](https://doi.org/10.5194/gmd-2020-374).

## PROFESSIONAL EXPERIENCE

POSTDOCTORAL FELLOW, COLORADO STATE UNIVERSITY – 2020-PRESENT

Worked on the Department of Energy-funded project by using Energy Exascale Earth System Model (E3SM) to study intra-seasonal air-sea interaction with PI - Dr. Charlotte DeMott.

POSTDOCTORAL RESEARCH ASSOCIATE, UNIVERSITY OF ARIZONA – 2019-2020

Developed the process-oriented diagnostic tool for climate/ocean model validation under the Model Diagnostics Task Force (MDTF) in National Oceanic & Atmospheric Administration.

POSTDOCTORAL RESEARCHER, UNIVERSITY OF CALIFORNIA, IRVINE, CALIFORNIA – 2017-2018

Participated in the NASA sea level team project lead by PI - Isabella Velicogna by providing decadal ice sheets and hydrological data from GRACE to determine the sea level accelerating signal.

GRADUATE RESEARCH ASSISTANT, UNIVERSITY OF CALIFORNIA, IRVINE, CALIFORNIA – 2011-2017

Created a public access [sea level database](#) which provides the decomposed sea level variation from different contributors and performing sea level fingerprint sensitivity test.

RESEARCH ASSISTANT, NATIONAL TAIWAN UNIVERSITY, TAIPEI, TAIWAN – 2010-2011

Studied the relationship between climate and typhoon by analyzing the typhoon-related rainfall in the Taiwan area in the past 40 years. Organized the interdisciplinary education conference lead by prof. Hung-Chi Kuo.

STUDENT ASSISTANT IN REAL-TIME WEATHER FORECASTING LAB

, NATIONAL TAIWAN UNIVERSITY, TAIPEI, TAIWAN – 2007-2008

Organized and updated weather forecasting data provided by various international forecasting centers.

## TEACHING EXPERIENCE

TEACHING ASSISTANT, UNIVERSITY OF CALIFORNIA, IRVINE, CALIFORNIA – 2011-2017

Lead weekly discussions class and taught lab class on using the data analysis tools (e.g., IDL, MATLAB, and ENVI). The courses include : ESS55 Earth's atmosphere, ESS138/128 Remote sensing, ESS15 Climate change, ESS23 Air pollution, and ESS116 Data analysis.

TEACHING ASSISTANT, NATIONAL TAIWAN UNIVERSITY, TAIPEI, TAIWAN – 2009-2010

Helped undergraduates on the atmospheric modeling assignment and assisted the grading of courses include: AtmSci3002 Atmospheric dynamics (II) and AtmSci2018 Atmospheric measurement and instrumentation.

## WORKS IN PROGRESS

**C.-W. Hsu** and C. DeMott (2021), Surface Flux Bias Correction in the Western Tropical Pacific at Intra-seasonal Time Scale, *in prep*

**C.-W. Hsu** and I. Velicogna (2021), Sea Level Fingerprint on Derivation of Atlantic Meridional Overturning Circulation, *Geophysical Research Letter*, *in prep*

L.-W. Chao, M.-H. Lo, J. Reager, Y. Wada, V. Humphrey, H. Chandanpurka, **C.-W. Hsu**, and B. Hamlington (2021), ENSO Modulation of Global Sea Level Variations through Land Hydrological Processes, *Journal of Climate*, *in prep*

M.-H. Lo, Y.-C. Liang, K.-C. Tseng, and **C.-W. Hsu** (2021), Terrestrial Water Storage Anomalies Emphasize Interannual Variations in Global Mean Sea Level During 1997-1998 and 2015-2016 El Niño Events, *in prep*

## INVITED PRESENTATION

AMERICAN GEOPHYSICAL UNION FALL MEETING, SAN FRANCISCO, CALIFORNIA – DECEMBER 2015

C.-W. Hsu and I. Velicogna, Improved regional sea-level estimates from ice sheets, glaciers and land water storage by using GRACE time series and other data.

## CONFERENCES

**Hsu, C.-W.**, Yin, Jianjun., and Griffies, S. M. (2021), Tropical Pacific Dynamic Sea Level in GFDL-OM4 under OMIP-I and OMIP-II Forcings. Virtual talk, NOAA General Modeling Meeting and Fair.

**Hsu, C.-W.** and Yin, Jianjun. (2019), How likely is an El Niño to break the global mean surface temperature record during the 21st century? Poster, AGU Fall Meeting in San Francisco, California.

**Hsu, C.-W.** and Velicogna, I. (2018), On the impact of Sea Level Fingerprints on the estimation of the Meridional Geostrophic Transport in the Atlantic Basin. Poster, Ocean Science Meeting in Portland, Oregon.

**Hsu, C.-W.** and Velicogna, I. (2017), On the impact of Sea Level Fingerprints on the estimation of the Meridional Geostrophic Transport in the Atlantic Basin. Poster, AGU Fall Meeting in New Orleans, Louisiana.

**Hsu, C.-W.** and Velicogna, I. (2016), Terrestrial water cycle induced meridional overturning circulation variability over the Atlantic Ocean. Poster GC33C-1252, AGU Fall Meeting in San Francisco, California.

**Hsu, C.-W.** and Velicogna, I. (2016), Improved regional sea-level estimates from present day mass fluxes from Ice Sheets, Glaciers and land water using GRACE. Oral PO53E-05, Ocean Science Meeting in New Orleans, Louisiana.

**Hsu, C.-W.**, Velicogna, I., Rignot, E., and Wahr, J. (2014), Regional Sea Level Variations from GRACE, InSAR and a Regional Atmospheric Climate Model Output Products. Poster OS33C-1083, AGU Fall Meeting in San Francisco, California.

**Hsu, C.-W.** and Velicogna, I. (2013), Ice sheets and land water mass contributions to the sea level fingerprint from GRACE, InSAR, and a regional climate model output. Poster, Ocean Ice Interaction Workshop in Caltech Keck center, Pasadena, California.

**Hsu, C.-W.** , Velicogna, I., Rignot, E., Wahr, J., van den Broeke, M.(2013), Ice sheets and land water mass contributions to the sea level fingerprint from GRACE, InSAR, and a regional climate model output. Poster G41B-0947, AGU Fall Meeting in San Francisco, California.

**Hsu, C.-W.** , Velicogna, I., Rignot, E., van den Broeke, M., Wahr, J., (2013), Ice sheets and land water mass contributions to the sea level fingerprint from GRACE, InSAR, and a regional climate model output. Oral, GRACE Science Team Meeting in CSR, Austin, Texas.

**Hsu, C.-W.** , Velicogna, I., Wahr, J., van den Broeke, M., Rignot, E. (2012), Ice sheets and land water mass contributions to interannual and long-term regional sea level from GRACE, InSAR and regional climate model output. Poster 1489864, AGU Fall Meeting in San Francisco, California.

**Hsu, C.-W.** , Velicogna, I., Wahr, J., Rignot, E., Tamisiea, M., (2012), Regional sea level variability from ice sheets and land water mass. Oral, GRACE Science Team Meeting in Potsdam, Germany.