



INTERNATIONAL WCRP/IOC CONFERENCE 2017  
**Regional Sea Level Changes  
and Coastal Impacts**

# Conference Handbook



**July 10-14, 2017**

Columbia University  
New York City, NY, USA

[sealevel2017.org](http://sealevel2017.org)



THE EARTH INSTITUTE  
COLUMBIA UNIVERSITY



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## ORGANIZING COMMITTEES

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### Scientific Organizing Committee

#### CO-CHAIRS

- Robert Nicholls
- Detlef Stammer
- Roderik van de Wal

#### MEMBERS

- Thorkild Aarup
- Jérôme Benveniste
- Anny Cazenave
- John Church
- Gonéri Le Cozannet
- Catia Domingues
- Natalya Gomez
- Jonathan Gregory
- Jochen Hinkel
- David Holland
- Kevin Horsburgh
- Felix Landerer
- Eric Lindstrøm
- Kathy McInnes
- Mark Merrifield
- Benoit Meyssignac
- R. Steven Nerem
- Tony Payne
- Rui Ponte
- Peter Schlosser
- Mark Tamisiea
- Pietro Teatini
- A. S. Unnikrishnan
- Jianjun Yin
- Kathleen White

### Local Organizing Committee

#### CHAIR

- Peter Schlosser

#### MEMBERS

- Robin Bell
- Jérôme Benveniste
- Nico Caltabiano
- Gregory Fienhold
- Jennifer Genrich
- Lei Han
- Catherine Michaut
- Mike Patterson
- Anne-Lisa Pichler
- Maureen Raymo
- Jill Reisdorf
- Cynthia Rosenzweig
- Mike Sparrow
- Detlef Stammer
- Marco Tedesco
- Kristan Uhlenbrock
- Pamela Vreeland
- Haili Wang





On behalf of the entire Scientific Organizing Committee and our host, Columbia University (CU), we welcome you to New York and thank you for joining us for this event. We comprise over 300 scientists from 36 countries, coming together in this never resting town to review the current status of sea-level research.

The conference will serve as a basis for a new assessment of the state-of-the-art on regional sea-level research that will provide an important input to the next IPCC assessment. With your support and participation, we hope to address the existing challenges in describing and predicting regional and coastal sea-level changes, and in quantifying the intrinsic uncertainties. A major outcome from the conference will be an evaluation of the current state of sea-level science, an outline of future research requirements for improving our understanding of sea-level rise and its variability, and a description of future observational needs. The application of sea-level science to coastal adaptation and management is also carefully considered.

The Scientific Organizing Committee has designed a program to maximize your opportunities to share ideas, foster collaborations and develop future plans. The time devoted each day to posters provides all the participants with the opportunity to discuss their work with colleagues and discover the multiple facets of sea-level research. Town halls have been organized from the community to further the possibilities for exchange of information and technological features. A dedicated peer review team has selected oral presenters for the plenary sessions from the over 350 abstracts that were submitted. One of the important aims of this conference is to engage the future generation and we are delighted that 130 students and early career scientists will participate in the conference.

We thank The Earth Institute, Columbia University and the UC CLIVAR Office for their contribution in organizing this conference. We recognize the important contribution from ESA in supporting the abstract submission and the review and registration processes. We also thank our other major sponsors NASA, NOAA, NSF and EUMETSAT, among others. We thank WCRP, IOC, SCORE as well as FE Coast for providing funds to support the participation of early career and developing country scientists.

We believe that one of the most important outcomes of the conference will be the informal exchange that takes place in the poster sessions, coffee breaks, town halls and social events. We hope that in this way, and through the formal program, the conference will provide you with an interesting, fruitful and enjoyable experience.

Robert J Nicholls

Detlef Stammer

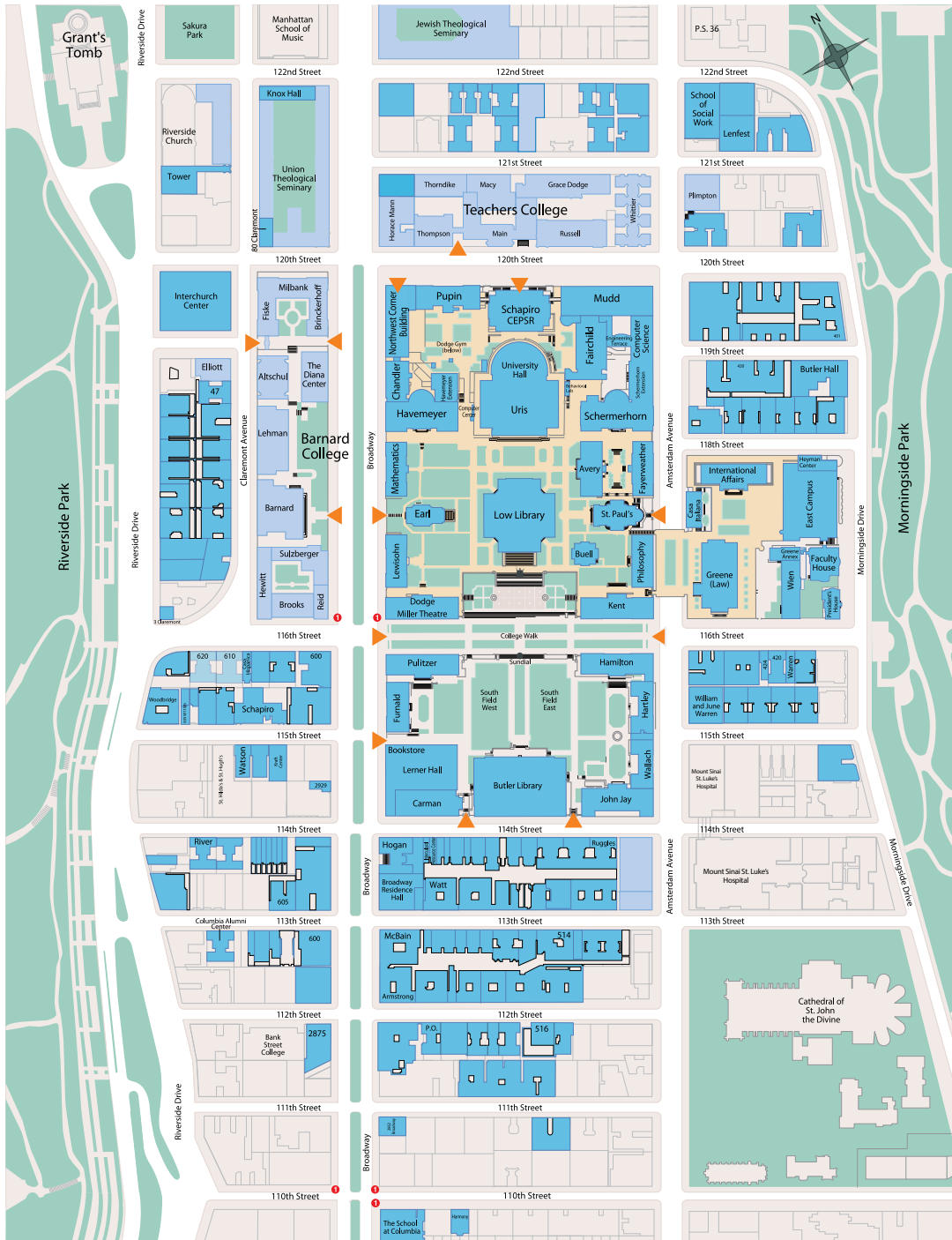
Roderik van de Wal





# MEETING VENUES

## Columbia University Campus Map



## Alfred Lerner Hall

2920 Broadway

New York, NY 10027 USA

Please enter Lerner Hall on Broadway.

- **Broadway Lobby:** Conference registration
- **Roone Arledge Auditorium:** Oral sessions, town halls, public outreach, sponsor tables, poster sessions
- **Party Space:** Poster sessions
- **North Lobby:** Beverage service, sponsor tables, poster sessions





## Low Memorial Library

New York, NY 10027

### **Rotunda:** Icebreaker Reception

To reach the Rotunda, enter Low Library up the stairs via the main entrance on College Walk and proceed through the lobby.

If you need disability access, please notify conference organizers.



## Hornblower Cruises

Hudson River Park Pier 40

353 West Street

New York, NY 10014

### Hornblower Infinity: Dinner Cruise

To reach Pier 40 from Columbia University, take a southbound 1 train to Houston Street and walk west .4 miles/.6 kilometers to Hudson River Park. Total travel time is approximately 45 minutes; please allow extra time to ensure you arrive for boarding.



Please note that the cruise will depart promptly at 7:00 PM / 19:00. Please ensure that you arrive for boarding by 6:30 PM / 18:30.

**Wi-Fi Network: Columbia University** (no password required)

**Program at a Glance**
 Oral session
  Poster session

Date	DAY 1 Monday, July 10	DAY 2 Tuesday, July 11	DAY 3 Wednesday, July 12	DAY 4 Thursday, July 13	DAY 5 Friday, July 14
Venue	Columbia University	Columbia University	Columbia University	Columbia University	Columbia University
AM	8:00-9:00 Registration				
	9:00-10:30 Opening session	9:00-10:30 Oral session: Session 4(a): Contemporary sea-level change	9:00-10:30 Oral session: Session 5(a): Coastal zone	9:00-10:30 Oral session: Session 4(c): Contemporary sea-level change	8:30-10:30 Oral session: Session 6(b): Projections
	10:30-11:00 Coffee break	10:30-11:00 Coffee break	10:30-11:00 Coffee break	10:30-11:00 Coffee break	10:30-11:00 Coffee break
	11:00-12:30 Opening session	11:00-12:30 Poster session: Session 1: Paleo sea-level data and GIA modeling  Session 2: Millennial-scale ice sheet and sea-level interactions  Session 3: Contemporary contributions from ice sheets and glaciers	11:00-12:30 Poster session: Session 5: Coastal Zone	11:00-12:30 Poster session: Session 4(b): Contemporary sea-level change	11:00-13:00 Closing session
Noon	12:30-14:00 Lunch and press conference	12:30-14:00 Lunch 12:30-13:30 Town Hall 1	12:30-14:00 Lunch	12:30-14:00 Lunch 12:30-13:30 Town Hall 2	13:00 End of Conference
PM	14:00-15:30 Oral session: Session 1: Paleo sea-level data and GIA modelling  Session 2: Millennial-scale ice sheet and sea-level interactions	14:00-15:30 Oral session: Session 4(b): Contemporary sea-level change	14:00-15:30 Oral session: Session 5(b): Coastal zone	14:00-15:30 Oral session: Session 6(a): Projections	
	15:30-16:00 Coffee break	15:30-16:00 Coffee break	15:30-16:00 Coffee break	15:30-16:00 Coffee break	
	16:00-17:30 Oral session: Session 2: Millennial-scale ice sheet and sea-level interactions  Session 3: Contemporary contributions from ice sheets and glaciers	16:00-17:30 Poster session: Session 4(a): Contemporary sea-level change	16:00-17:00 Panel discussion: "Sea-level rise adaptation in Greater New York: The Response to Sandy and Beyond "	16:00-17:30 Poster session: Session 6: Projections	
Evening	18:00-20:00 Icebreaker Reception  <i>Venue: The Rotunda, Low Memorial Library</i>		18:00-20:00 Public Outreach Event  <i>Sea-level Rise: Causes, Impacts and Options for Solutions - Perspectives from science and the stakeholder community.</i>	19:00-22:00 Conference Dinner Cruise  <i>with views of the Manhattan skyline, the Statue of Liberty, Ellis Island, and the Brooklyn Bridge</i>	



## Session Descriptions

### 1. Paleo Sea-level data and GIA Modelling

*(Responsible: Natalya Gomez, Tony Payne, David Holland, Mark Tamisiea, Roderik van de Wal)*

The session examines long-term sea-level variations and their implications for past climate change. Results emerging from paleo observations and models will be discussed. This includes paleo sea-level reconstructions, and recent improvements of glacial isostatic adjustment (GIA) models and their applications including data uncertainty.

### 2. Millennial-scale Ice sheet and Sea-level Interactions

*(Responsible: Tony Payne, David Holland, Mark Tamisiea, Roderik van de Wal)*

The session will promote an integral approach to paleo-time scale sea-level change with a specific focus on millennial-scale ice sheet modelling and the coupling between ice dynamics, sea-level changes and the solid Earth. Traditionally millennial-scale ice sheet and sea-level changes have been studied independent from each other, using one as an input to the other. Here the dynamic feedback between ice dynamics, sea-level and solid Earth will be the focus.

### 3. Contemporary Contributions from Ice Sheets and Glaciers

*(Responsible: Natalya Gomez, Tony Payne, David Holland, Mark Tamisiea, Roderik van de Wal)*

The session discusses ice sheets and glaciers, and their contribution to contemporary sea-level change over the last 50 years. Topics covered are mass balance driven changes, atmospheric and ocean driven changes, but also dynamically driven changes of the cryospheric and the interaction between mass balance and dynamics. Results from modelling and observational studies will be presented.

### 4. Contemporary Sea-level Change

*(Responsible: Benoit Meyssignac, Rui Ponte, John Church, Catia Domingues)*

This session focuses on ongoing sea-level variability on timescales of months to centuries, at the local, regional and global levels. Topics of interest include mass and steric budgets and respective uncertainties, differences between coastal and large-scale variability, effects of climate modes and internal variability in general, and attribution of regional change to natural and anthropogenic radiative forcing agents. Model and data analyses addressing causal mechanisms of regional sea-level variability will be considered.

### 5. Coastal Zone

*(Responsible: Robert Nicholls, Jochen Hinkel, Kathy McInnes, Gonéri Le Cozannet)*

Sea-level science requirements of coastal management and planning will be discussed. The session considers multiple perspectives including mean sea-level changes, including subsidence (a non-climate component of relative sea-level rise), extreme sea-levels and waves, and how they are applied to impact and adaptation assessments and wider management. Future needs and opportunities will be a particular focus.

### 6. Projections

*(Responsible: Detlef Stammer, Jonathan Gregory, Roderik von de Wal)*

Projections of sea-level change and its individual components will be presented such as from ocean density and circulation change and land ice and changes in terrestrial water storage. Time scales covered range from decadal to millennial time scales, including studies of the sea-level commitment to long-terms. The session addresses projections of global and regional sea-level change, but will also address changes in the distribution of sea-level extremes.

## Day 1: Monday, July 10

08:00	<i>Registration</i>
09:00	<p><b>Opening Ceremony</b>  <i>Chairs: D. Stammer, R. Nicholls, R. van de Wal</i></p> <ul style="list-style-type: none"> <li>• Conference chairs (15 min)</li> <li>• P. Schlosser, The Earth Institute, Columbia University (5 min)</li> <li>• G.M.Purdy, Columbia University (5 min)</li> <li>• G. Brasseur, WCRP (10 min)</li> <li>• V. Ryabinin, IOC (10 min)</li> <li>• H.E. Ambassador Peter Thomson, President of the 71st UN General Assembly (10 min)</li> <li>• H.S.H. Prince Albert II (Video message, 5 min)</li> <li>• V. Masson-Delmotte: Sea-level change in the 6th IPCC Assessment: a WGI perspective (20 min)</li> </ul>
10:30	<i>Coffee Break</i>
11:00	<p><b>Opening Session</b>  <i>Chairs: D. Stammer, R. Nicholls, R. van de Wal / Rapporteur: Kevin Horsburgh</i></p> <ul style="list-style-type: none"> <li>• J. Church: Achievements and Challenges in Understanding Contemporary Sea-level Change (20 min)</li> <li>• M. Raymo: Sea-level During past Warm Periods – Past is Prologue (20 min)</li> <li>• T. Payne: Why is it so Difficult to Make Projections of the Contribution of the Ice Sheets to Future Sea-level Rise? (20 min)</li> <li>• C. Rosenzweig: Coastal Cities: Preparing for Sea-level Rise and Storms (20 min)</li> <li>• Discussion (10 min)</li> </ul>
12:30	<i>Press Conference and Lunch (on your own)</i>
14:00	<p><b>Oral Session</b>  <b>Session 1: Paleo Sea-level Data and GIA Modeling &amp; Session 2: Millennial-scale Ice Sheet and Sea-level Interactions</b>  <i>Chairs: N. Gomez, M. Tamisiea / Rapporteur: T. Payne</i></p> <p><i>Invited Talks:</i></p> <ul style="list-style-type: none"> <li>• A. Dutton: New Perspectives on “Old” Data: What the Earth’s Past Tells Us about Future Sea-level rise (20 min)</li> <li>• J. Mitrovica: Probing Ancient Ice Sheet Stability Using a Sea-level Lens: A Geodynamic Perspective (20 min)</li> </ul> <p><i>Contributed Talks:</i></p> <ul style="list-style-type: none"> <li>• M. King: Geodetic Evidence for Predominance of a Low Viscosity Upper Mantle in West Antarctica (15 min)</li> <li>• B. Otto-Bliesner: Coupled Long-term Evolution of Climate and the Greenland Ice Sheet During Past Warm Periods: A Comparison for the Last Interglacial and the Late Pliocene (15 min)</li> <li>• G. Grant: Mid-Pliocene Warm Period (3.3-3 ma) Sea-level Reconstructions from the Wanganui Basin, New Zealand (15 min)</li> </ul>
15:30	<i>Coffee Break</i>
16:00	<p><b>Oral Session</b>  <b>Session 2: Millennial-scale Ice Sheet and Sea-level Interactions &amp; Session 3: Contemporary Contributions from Ice Sheets and Glaciers</b>  <i>Chairs: T. Payne, J. Church / Rapporteurs: A. Slangen, M. Tamisiea</i></p> <p><i>Invited Talks:</i></p> <ul style="list-style-type: none"> <li>• N. Gomez: Insights from Coupled Modeling on Ice, Sea-level and Solid Earth changes in Antarctica (20 min)</li> <li>• F. Pattyn: Grounding Line Stability in Antarctic Ice Sheet Models (20 min)</li> <li>• R. Hock: Sea-level Contributions from Glaciers (20 min)</li> </ul> <p><i>Contributed Talks:</i></p> <ul style="list-style-type: none"> <li>• P. Heimbach: A Prediction Approach for Estimating Sea-level Contributions of West Antarctic Ice Streams via Transient Model Calibration (15 min)</li> <li>• G. Marques: Sensitivity of Sub-ice-shelf Melting to Changes in Wind, Topographic Features and Surface Heat Fluxes (15 min)</li> </ul>
18:00	<p><b>Icebreaker Reception</b> (<i>The Rotunda, Low Memorial Library</i>)</p> <p>Join us for a welcome reception in the Rotunda of Low Memorial Library. Built in 1895 by University President Seth Low, the Library is in the United States National Register of Historic Places and is both a National and New York City historic landmark.</p>

## Day 2: Tuesday, July 11

9:00	<p><b>Oral Session</b>  <b>Session 4(a): Contemporary Sea-level Change</b></p> <p><i>Chairs: R. Ponte, C. Domingues / Rapporteur: B. Meyssignac</i></p> <p><i>Invited Talk:</i>  M. Marcos: Drivers of the Spatial and Temporal Variability in Sea-level Extremes (20 min)</p> <p><i>Contributed Talks:</i></p> <ul style="list-style-type: none"> <li>• J.-F. Legeais: Accurate Estimation of Regional Sea-level Changes with the ESA CCI Sea-level Essential Climate Variable (15 min)</li> <li>• M. Menéndez: Examining Extreme Sea-level Variations from In-Situ Tide-Gauge Records and Satellite Observations (15 min)</li> <li>• J. E. Stopa: Wave Driven El Niño Impacts to Water Level Anomalies in the Pacific (15 min)</li> <li>• M. J. Widlansky: Multi-model Seasonal Sea-level Forecasts for Vulnerable Coasts (15 min)</li> </ul>
10:30	<i>Coffee Break</i>
11:00	<p><b>Poster Session</b>  <b>Session 1: Paleo Sea-level Data and GIA modeling</b>  <b>Session 2: Millennial-scale Ice sheet and Sea-level interactions</b>  <b>Session 3: Contemporary Contributions from Ice sheets and Glaciers</b></p>
12:30	<i>Lunch (on your own)</i>
12:30-13:30	<b>Town Hall 1: Operational Monitoring of Global and Regional Sea-level by Satellite Altimetry</b>
14:00	<p><b>Oral Session</b>  <b>Session 4(b): Contemporary Sea-level Change</b></p> <p><i>Chairs: J. Benveniste, K. Horsburgh / Rapporteur: R. Ponte</i></p> <p><i>Invited Talk:</i></p> <ul style="list-style-type: none"> <li>• K. von Schuckman: The Role of Ocean Heat Content on Contemporary Sea-level Change (20min)</li> </ul> <p><i>Contributed Talks:</i></p> <ul style="list-style-type: none"> <li>• B. Meyssignac: 20th Century Observed Regional Sea-Level Changes Compared to Climate Model Simulations (15min)</li> <li>• Y. Sasaki: Sea-level Variability in the Western North Pacific During the 20th Century (15min)</li> <li>• D. Palko: Natural Variability of Regional Sea-level in a High Resolution Global Coupled Climate Model (15min)</li> <li>• C. W. Hughes: How are Open-ocean Dynamic Sea-level Signals Communicated to the Coast? (15min)</li> </ul>
15:30	<i>Coffee Break</i>
16:00-17:30	<p><b>Poster Session</b>  <b>Session 4(a): Contemporary Sea-level Change</b></p>
18:00	End of day

## Day 3: Wednesday, July 12

<b>9:00</b>	<p><b>Oral Session</b>  <b>Session 5(a): Coastal Zone</b>  <i>Chairs: G. Le Cozannet, K. McInnes / Rapporteur: J. Hinkel</i></p> <p><i>Invited Talks:</i></p> <ul style="list-style-type: none"> <li>• S. Ye: Impact of Land Subsidence and Sea-level Rise on Coastal Cities in China (20 min)</li> <li>• H. Yokoki: Global Distribution of Projected Sea-level Changes Using Multiple Climate Models and Economic Assessment of Sea-level Rise (20 min)</li> </ul> <p><i>Contributed Talks:</i></p> <ul style="list-style-type: none"> <li>• D. Rao: Computation of Extreme Sea-levels Along the Indian Coasts Due to Tropical Cyclones in Probabilistic Climate Risk Ccenario (15 min)</li> <li>• S. Muis: Mapping of Coastal Flood Hazard at the Continental to Global-scale (15 min)</li> <li>• I. J. Losada: On the Combined Use of Sea-level Rise, Waves and Storm Surges in Impact Assessment and Decision Making (15 min)</li> </ul>
<b>10:30</b>	<i>Coffee Break</i>
<b>11:00</b>	<p><b>Poster Session</b>  <b>Session 5: Coastal Zone</b></p>
<b>12:30</b>	<i>Lunch (on your own)</i>
<b>14:00</b>	<p><b>Oral Session</b>  <b>Session 5(b): Coastal Zone</b>  <i>Chairs: J. Church, G. Le Cozannet / Rapporteur: C. Domingues</i></p> <p><i>Invited Talks:</i></p> <ul style="list-style-type: none"> <li>• J. Hinkel: Sea-level Information for Coastal Adaptation Decision Making (20 min)</li> <li>• K. McInnes: Global to Local Predictions of Sea-level, Surges and Waves (20 min)</li> </ul> <p><i>Contributed Talks:</i></p> <ul style="list-style-type: none"> <li>• M. Esteban: Adapting to Sea-level Rise: Real Lessons from Examples of Land Subsidence in Japan, Indonesia and the Philippines (15min)</li> <li>• R. Bindschadler: What SLR Stakeholders Really Want: We Asked! (15min)</li> <li>• D. Behar: San Francisco's Approach to Sea-level Rise Planning and Science (15min)</li> </ul>
<b>15:30</b>	<i>Coffee Break</i>
<b>16:00-17:00</b>	<p><b>Panel discussion on "Sea-level rise Adaptation in Greater New York: The Response to Sandy and Beyond"</b>  Members: K. Jacob (Columbia), C. Weisz (W X Y Architecture + Urban Design), J. DeFlorio (Port Authority of New York and New Jersey); Facilitator: R. Nicholls</p>
<b>18:00</b>	<p><b>Public Outreach Event</b>  <b>Sea-level Rise: Causes, Impacts and Options for Solution</b>  <b>Perspectives from science and the stakeholder community</b></p> <p>These discussions on the causes, impacts and options for solutions on sea-level rise features scientists from The Earth Institute, Lamont-Doherty Earth Observatory and representatives from government, NGOs and the private sector.</p> <p>Welcome remarks will be provided by Peter Schlosser, Associate Director of The Earth Institute, Columbia University. The panel discussions on both the science and stakeholder perspectives will be moderated by Gavin Schmidt, Director, NASA/Goddard Institute for Space Studies (GISS), The Earth Institute, Columbia University.</p>

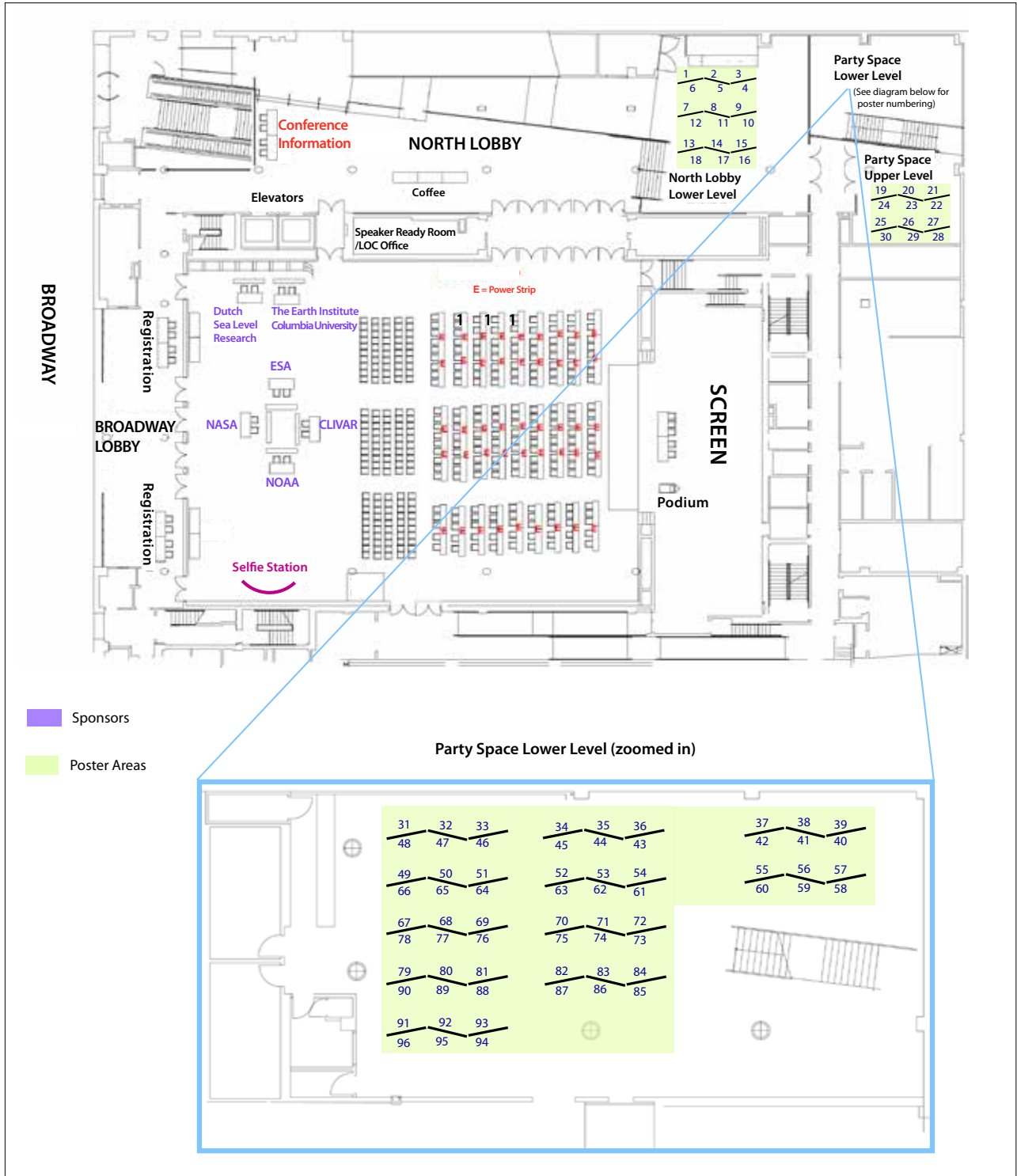
## Day 4: Thursday, July 13

09:00	<p><b>Oral Session</b>  <b>Session 4(c): Contemporary Sea-level Change</b>  <i>Chairs: B. Meyssignac, R. Ponte / Rapporteur: J. Gregory</i></p> <p><i>Invited Talk:</i></p> <ul style="list-style-type: none"> <li>• F. Lanerer: Weighing In: Ocean Mass Changes and their Role in Understanding Sea-level (20min)</li> </ul> <p><i>Contributed Talks:</i></p> <ul style="list-style-type: none"> <li>• A. Proshutinsky: Causes and Consequences of Decadal Sea-level Changes in the Arctic Ocean in 1954-2016 (15min)</li> <li>• S. Griffies: Localized Rapid Warming of West Antarctic Subsurface Waters by Remote Winds (15min)</li> <li>• E. Charles: Observational Constraint on Greenhouse Gas and Aerosol Contributions to Global Ocean Heat Content Changes (15min)</li> <li>• A. Hu: Role of Perturbing Ocean Initial Condition on Simulated Regional Sea-level Change (15min)</li> </ul>
10:30	<i>Coffee Break</i>
11:00	<p><b>Poster Session:</b>  <b>Session 4(b): Contemporary Sea-level Change</b></p>
12:30	<i>Lunch (on your own)</i>
12:30-13:30	<b>Town Hall 2: Meeting Evolving Requirements of Integrated Sea-level Observations for Regional and Local Decision Making</b>
14:00	<p><b>Oral Session:</b>  <b>Session 6(a): Projections</b>  <i>Chairs: J. Gregory / Rapporteur: N. Gomez</i></p> <p><i>Invited Talks:</i></p> <ul style="list-style-type: none"> <li>• B. Kopp: Probabilistic Projections of Sea-level Change (20 min)</li> <li>• A. Slangen: Regional Sea-level Change Projections: Current State and Applications (20 min)</li> </ul> <p><i>Contributed Talks:</i></p> <ul style="list-style-type: none"> <li>• X. Zhang: High Resolution Sea-level Projections in the 21st Century (15 min)</li> <li>• M. Palmer: Towards CMIP5-based Multi-Century Regional Sea-level Projections (15 min)</li> <li>• H. Goelzer: Results of the Greenland Ice Sheet Model Initialisation Experiments ISMIP6 – initMIP-Greenland (15 min)</li> </ul>
15:30	<i>Coffee Break</i>
16:00-17:30	<p><b>Poster Session</b>  <b>Session 6: Projections</b></p>
19:00-22:00	<p><b>Conference Dinner</b> (<i>Optional Dinner Cruise</i>)</p> <p>Dinner cruise aboard the Hornblower Infinity, leaving from 353 West Street, Pier 40, NYC. With views of the Manhattan skyline, the Statue of Liberty, Ellis Island, and the Brooklyn Bridge. The tour includes a three-course meal, wine, beer, and live DJ for after-dinner dancing. Sign-up required.</p> <p><i>NOTE: Participants joining the cruise dinner should be at the dock by 18:30hr.</i></p>

## Day 5: Friday, July 14

08:30	<p><b>Oral Session</b>  <b>Session 6(b): Projections</b>  <i>Chairs: A. Slangen / Rapporteur: K. McInnes</i></p> <p><i>Invited Talks:</i></p> <ul style="list-style-type: none"> <li>• J. Gregory: The Characteristics and Uncertainties of Sea-level Change Due to Ocean Climate Change (20 min)</li> <li>• R. Winkelmann: Projecting the Long-term Sea-level Contribution from Antarctica (20 min)</li> </ul> <p><i>Contributed Talks:</i></p> <ul style="list-style-type: none"> <li>• J. Krasting: Enhanced Atlantic Sea-level Rise under High Carbon Emission Rates (15 min)</li> <li>• S. Price: Antarctic Ocean-Ice Shelf Interactions in High-Resolution, Global Simulations Using the Accelerated Climate Model for Energy (ACME) (15 min)</li> <li>• S. Nowicki: Overview of the Ice Sheet Model Intercomparison Project for CMIP6 (ISMIP6) (15 min)</li> <li>• C. Boening: On the Application of Science Systems Engineering and Uncertainty Quantification for Ice Sheet Science and Sea-level Projections (15 min)</li> <li>• M. Terada: Western Boundary Sea-Level: A Theory, Rule of Thumb, and Application to Climate Models (15 min)</li> </ul>
10:30	<i>Coffee Break</i>
11:00-13:00	<p><b>Closing Session</b>  <i>Chairs: D. Stammer, R. Nicholls, R. van de Wal</i></p> <ul style="list-style-type: none"> <li>• Panel Discussion: Sea-Level Information Requirements to Support Coastal Management  M. Rahman, M. Snoussi, A. Shareef, K. Horsburgh, P. Teatini, D. de Gusmao-Sorensen, K. White. A. Cazenave</li> <li>• Conference Statement (Chairs)</li> <li>• Discussion</li> <li>• Poster Awards (Mike Patterson)</li> <li>• Summary of conference (Conference Chairs)</li> </ul>
13:00	<b>End of Conference</b>

## Poster and Exhibitor Map





## Poster Set up and Removal

Each poster will be on display for a whole day but poster presenters are only required to be at their poster for a single 1.5 hour session on their assigned topic. Posters should be put up starting at 08:00 before the first session begins and should be removed at the end of the day. Please be considerate of your fellow presenters by removing your poster at the assigned time. Posters that are not removed in the evening will be recycled at 07:00 the following morning.

Each poster is assigned a number indicating the location of its panel. A map of the numbered poster panels and lists of poster assignments are provided in the poster room and on the conference website. Staff will be available at registration and in the poster area to help presenters locate their poster space. Pushpins are provided to attach posters to the poster panels.

Poster presenters should plan to stand by their poster during their assigned session. Note that session 4 is split alphabetically into sub sessions (a) and (b). Check the poster assignment sheet to be sure you display in the correct sub-session.

	Tuesday	Wednesday	Thursday
11:00-12:30	<p><b>Session 1:</b> Paleo Sea-level Data and GIA Modeling</p> <p><b>Session 2:</b> Millennial-scale Ice Sheet and Sea-level Interactions</p> <p><b>Session 3:</b> Contemporary Contributions from Ice Sheets and Glaciers</p>	<p><b>Session 5(a):</b> Coastal Zone</p>	<p><b>Session 4(b):</b> Contemporary Sea-level Change</p>
15:30 –16:00	<p><b>Session 4(a):</b> Contemporary Sea-level Change</p>		<p><b>Session 5(b):</b> Coastal Zone</p> <p><b>Session 6:</b> Projections</p>

### 3. Poster Competition

Early career scientists (ECS) and students attending the conference and presenting posters are eligible to be considered for outstanding poster awards. A distinguished committee of scientists will review and identify outstanding posters given by students and early career scientists. Awards will be presented to the best posters during the closing session of the conference on 14 July.

#### CONTEST GENERAL GUIDELINES

- The first author of a poster should be registered as a student or ECS (if in doubt, check your registration) and be the one presenting the poster.
- The presenter has to indicate that s/he wishes to participate in the competition by attaching a sticker to her/his poster; these stickers will be available in the poster session rooms.
- The presenter must be next to her/his poster during the judging period which will be indicated in the poster room.
- The poster must be formatted according to the poster guidelines.
- The presentation by the student or ECS must be original and based on recent research results.
- The prize will be awarded to the poster presenter (who must be the first author and a student or ECS or student.)

#### CONTEST CRITERIA

The posters will be reviewed based on the following criteria:

- Scientific merit, including objectives, background, and conclusions
- Originality and creativity of approach
- Layout and clarity of the poster
- Oral presentation of the poster and responses to questions

Score sheets with comments will be available for pick-up at the information desk by participants following the final conference session.



### **Town Hall 1: Operational Monitoring of Global and Regional Sea-level by Satellite Altimetry**

Over the last 26 years, sea-level has been measured by a host of satellite mission, launched and operated by the various space agencies world wide. Together they clearly identify not only the approximately 3 mm/year rise in global mean sea-level, but also the regional deviations from the global mean. The monitoring has mainly relied on the reference altimeter missions (TOPEX and the Jason family of satellites), but recent efforts like ESA's Sea-level Climate Change Initiative have brought other missions to meet the same high standards required for sea-level change monitoring. In addition, fiducial measurement campaigns have been set up to cross-calibrate the satellite systems with in-situ tide gauges. In this session the various space agencies will present their involvement and commitment to ensure the continuation of the sea-level climate data record from satellite altimetry into the future and the upkeep of the older data with improved knowledge of altimeter data corrections, orbit determination, etc. The moderator and speakers invite the conference participants to share their expectations and possible needs for improvement of current and future services and products delivered by the agencies.

#### *Moderator:*

- John Church, University of New South Wales (UNSW) Climate Change Research Center, Sydney, Australia

#### *Speakers:*

- Eric Leuliette, National Oceanic and Atmospheric Administration (NOAA), College park, Maryland, USA
- Carmen Boening, National Aeronautic and Space Administration Jet Propulsion Laboratory (NASA/JPL), Pasadena, California, USA
- Jérôme Benveniste, European Space Agency (ESA), Frascati, Italy
- Remko Scharroo, European organisation for the exploitation of meteorological satellites (EUMETSAT), Darmstadt, Germany
- Anny Cazenave, Centre Nationale D'études Spatiales (CNES), Toulouse, France

### **Town Hall 2: Meeting Evolving Requirements of Integrated Sea-level Observations for Regional and Local Decision Making**

The 2006 Sea-level Conference provided a comprehensive statement on requirements for Sea-level information and recommendations on sustaining satellite and in situ observations and developing observing system capabilities.

Over 10 years on, the need for information at the regional and local level is more critical, and more complex, requiring for instance the synthesis of Sea-level information with the likelihood of extreme weather events. As technology and analysis methods evolve, how do we extract maximum benefit from the combination of satellite and in situ observing systems? Can we improve the integration of Sea-level, geodetic and hydro-meteorological data to deliver information fit for meeting regional/local decision-making requirements?

#### *Moderator:*

- Katy Hill, Ocean Observations (GCOS-GOOS-JCOMM), c/o World Meteorological Organisation

#### *Speakers:*

- Gary Mitchum (University of South Florida) Emerging requirements for sustained observations of sea-level.
- Melisa Menendez (Universidad de Cantabria), Advances in Satellite and In situ technologies to meet requirements.
- Billy Sweet (NOAA) Products for today's planning decision making on seasonal to multi-decadal timescales.

*Lunch will not be provided at Town Hall meetings. No outside food is permitted in the venue.*





### Introduction to New York

With a population of about 8.5 million people, New York City is the most populous city in the United States. The city covers 784 km<sup>2</sup> and is divided into five boroughs: Manhattan, Brooklyn, Queens, the Bronx, and Staten Island.

#### **PUBLIC TRANSPORTATION**

Public transportation is provided by the Metropolitan Transit Authority (MTA). If you choose to take public transportation as a visitor to New York, the subway is generally your best option. A single ride on the subway is \$2.75, payable via Metrocard. Metrocards may be purchased in the stations.

Columbia University is primarily served by the 1 line, with a station at 116<sup>th</sup> Street & Broadway. Do not use the 2 and 3 express subway trains, which follow a different route and do not stop at Columbia University. If you take the 2 or 3, transfer at 96<sup>th</sup> Street to the 1 local train

For up-to-date information on New York's public transportation system, visit [www.mta.info](http://www.mta.info).

#### **TAXIS**

In New York, yellow and green taxis are widely available, safe to use, and may be hailed on the street. Ride-share apps such as Uber and Lyft are also common.

#### **TOURISM**

[www.nycgo.com](http://www.nycgo.com) is the official tourism website of New York City. There you can find information about museums and galleries, Broadway shows, tours, restaurants, events, and more.

### Medical Services

The closest hospital to the Columbia University campus is Mount Sinai-St. Luke's, located at:  
1111 Amsterdam Avenue  
New York, NY 10025  
212-523-4000  
212-857-9990

### Useful Phone Numbers

Columbia University Public Safety  
212-854-2797  
212-854-5555

Emergencies/Police/Ambulance: 911

NYC Information: 311

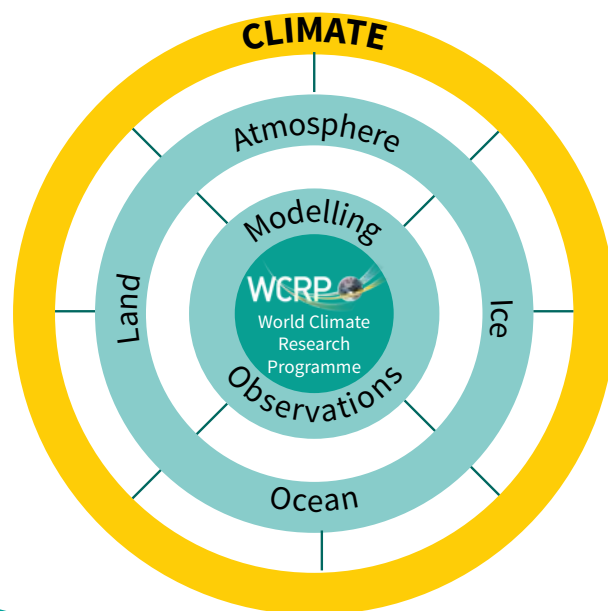


## Dining Information (Lunch/Dinner options)

<b>Amigos</b>	2888 Broadway, between 112 <sup>th</sup> & 113 <sup>th</sup> Streets	Mexican restaurant with lunch specials
<b>Amir's</b>	2911-A Broadway, between 113 <sup>th</sup> & 114 <sup>th</sup> Streets	Falafel, shawarma, kebabs
<b>Bettolona</b>	3143 Broadway, between LaSalle & Tiemann Place	Wood stove pizza & pasta entrees
<b>Brownie's Cafe</b>	Avery Hall (School of Architecture), lower level	Soups, salads, and sandwiches
<b>Café East</b>	Lerner Hall, campus level	Bubble teas, hot teas, smoothies, sushi
<b>Chipotle</b>	2843 Broadway, between 110 <sup>th</sup> & 111 <sup>th</sup> Streets	Burritos, tacos, and salads
<b>Community</b>	2893 Broadway, between 112 <sup>th</sup> & 113 <sup>th</sup> Streets	Seasonal, organic food
<b>Dig Inn</b>	2884 Broadway, between 112 <sup>th</sup> & 113 <sup>th</sup> Streets	Farm-to-table café with hot entrees
<b>El Porton</b>	3151 Broadway, between LaSalle & Tiemann Place	Burritos, tacos, and quesadillas
<b>Famous Famiglia</b>	2859 Broadway, between 110 <sup>th</sup> & 111 <sup>th</sup> Streets	Pizza by the slice
<b>Flat Top Café</b>	1241 Amsterdam Ave, between 121 <sup>st</sup> & 122 <sup>nd</sup> Streets	Café & bistro
<b>Friedman's</b>	207 Amsterdam Ave, between 119 <sup>th</sup> & 120 <sup>th</sup> Streets	Variety of seasonal menu items. Many gluten-free options available.
<b>Hamilton</b>	1129 Amsterdam Ave, between 115 <sup>th</sup> & 116 <sup>th</sup> Streets	Sandwiches, coffee, and snacks
<b>Jin Ramen</b>	3183 Broadway, between Tiemann Pl & 125 <sup>th</sup> Street	Ramen noodle shop
<b>Kitchenette</b>	1272 Amsterdam Ave, between 122 <sup>nd</sup> & 123 <sup>rd</sup> Streets	Soups, salads, burgers, sandwiches, entrees, and desserts
<b>Le Monde</b>	2885 Broadway, between 112 <sup>th</sup> & 113 <sup>th</sup> Streets	French bistro
<b>Lenfest Café</b>	Greene Hall (Columbia Law School), 2nd floor	Breakfast sandwiches, eggs, deli sandwiches, burgers, sushi, and snacks
<b>Massawa Restaurant</b>	1239 Amsterdam Ave, between 120 <sup>th</sup> & 121 <sup>st</sup> Streets	Ethiopian & Eritrean
<b>Max Caffe</b>	1262 Amsterdam Ave, between 122 <sup>nd</sup> & 123 <sup>rd</sup> Streets	Breakfast, panini, salads, coffee, drinks
<b>Mel's Burger</b>	2850 Broadway, between 110 <sup>th</sup> & 111 <sup>th</sup> Streets	Burgers and salads
<b>Milano Market</b>	2892 Broadway, between 112 <sup>th</sup> & 113 <sup>th</sup> Streets	Deli with salads and sandwiches
<b>Morton Williams</b>	2941 Broadway, between 115 <sup>th</sup> and 116 <sup>th</sup> Streets	Grocery store with sandwiches and salads to go
<b>Oasis Jimma Juice Bar</b>	3163 Broadway, between LaSalle & Tiemann Place	Healthy juice and smoothies, salads, Ethiopian food
<b>Pinkberry</b>	2873 Broadway, between 111 <sup>th</sup> & 112 <sup>th</sup> Streets	Frozen yogurt
<b>Serafina</b>	1260 Amsterdam Ave, between 122 <sup>nd</sup> & 123 <sup>rd</sup> Streets	Pizza, pasta, and seafood
<b>Starbucks</b>	2929 Broadway, between 113 <sup>th</sup> and 114 <sup>th</sup> Streets	Coffee, sandwiches, salads
<b>Subconscious</b>	1213 Amsterdam Ave, between 119 <sup>th</sup> & 120 <sup>th</sup> Streets	Made-to-order sandwiches
<b>Sweetgreen</b>	2937 Broadway, at 115 <sup>th</sup> Street	Soups & salads made-to-order
<b>Symposium</b>	544 W 113 St, between Amsterdam and Broadway	Greek restaurant
<b>The Heights Bar &amp; Grill</b>	2867 Broadway, between 111 <sup>th</sup> & 112 <sup>th</sup> Streets	Burgers, salads, & entrees
<b>The Mill</b>	2895 Broadway, between 112 <sup>th</sup> & 113 <sup>th</sup> Streets	Korean cuisine
<b>Tom's Restaurant</b>	2880 Broadway - between 112 <sup>th</sup> & 113 <sup>th</sup> Streets	Traditional NY diner (soups, sandwiches, milkshakes) made famous by Seinfeld
<b>Uris Deli</b>	Uris Hall, (Graduate School of Business), main floor	Sandwiches, pastries, sodas, snacks, coffee, soups, and sushi
<b>Vine</b>	2955 Broadway, between 115 <sup>th</sup> and 116 <sup>th</sup> Streets	Sushi and teriyaki
<b>Westside Market</b>	2840 Broadway, at 110 <sup>th</sup> Street	Grocery store with sandwiches, salads, hot entrees, and deserts to go

The World Climate Research Programme (WCRP) facilitates analysis and prediction of Earth system change for use in a range of practical applications of direct relevance, benefit and value to society.

WCRP organizes meetings, workshops and conferences to coordinate and facilitate climate research. WCRP utilizes a multidisciplinary approach, organizing large-scale observational and modelling projects and providing an international forum to align the efforts of thousands of climate scientists working to provide the best possible climate information.



WCRP recognizes that a changing sea level and its impact on coastal environments is among the most severe societal consequences of anthropogenic climate change. Contemporary global mean sea level rise will continue over many centuries as a consequence of a warming climate, with the detailed pace and final amount of rise depending substantially on future greenhouse gas emissions.



## The European Space Agency



*The face of Europe is shown by this mosaic of true-colour images taken by the Medium Resolution Imaging Spectrometer (MERIS) instrument on ESA's Envisat environmental satellite.*

Since 1975 the European Space Agency, ESA, has been pooling the resources of its Member States and leading cooperation with other nations to build a European space capability, undertaking programmes and activities far beyond the scope of any single European country.

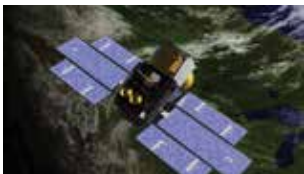
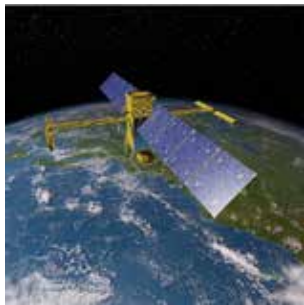
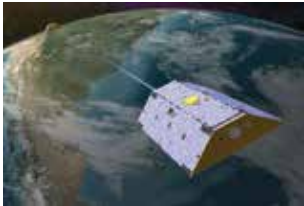
ESA develops the launchers, spacecraft and ground facilities needed to keep Europe at the forefront of global space activities. Today, it launches satellites for Earth observation, navigation, telecommunications and astronomy, sends probes to the far reaches of the Solar System and cooperates in the human exploration of space.

ESA has 22 Member States: Austria, Belgium, the Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Luxembourg, the Netherlands, Norway, Poland, Portugal, Romania, Spain, Sweden, Switzerland and the United Kingdom. Canada takes part in certain programmes under a cooperation agreement.

ESA has signed European Cooperating States Agreements with Slovenia, Latvia, Lithuania, Slovakia and Bulgaria and cooperation agreements with Cyprus and Malta. Discussions are under way with Croatia.

Concerning Sea Level, ESA has launched the Sea Level Climate Change Initiative (SL\_cci), a 6-year Project started in 2010. All output documents and the Sea Level Essential Climate Variable can be found at <http://www.esa-sealevel-cci.org>. ESA just launched the Sea Level Budget Closure Climate Change Initiative (SLBC\_cci). R&D activities exploiting the delay/Doppler radar altimeters of CryoSat-2 (SAR and SARin modes) and Sentinel-3 (SAR mode) are focusing on the Coastal Zone. The Copernicus Sentinel-1, -2 and -3 missions are all used in the Coastal Zone.

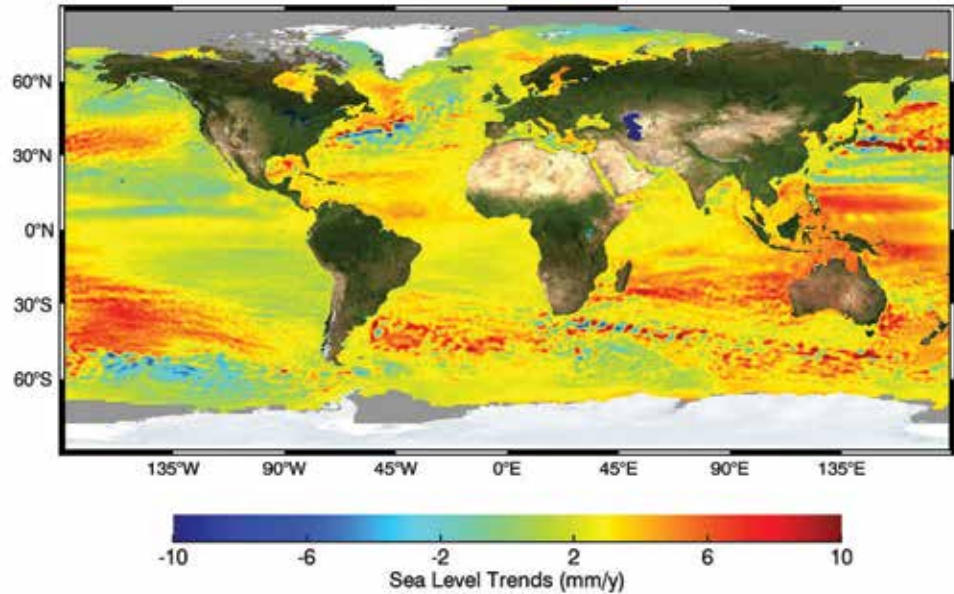




# NASA Sea Level Research

Over two decades of satellite observations

January 1993 - January 2016



For over 20 years, satellite altimeters have measured the sea surface height of our ever-changing oceans. This image shows the 20 year trends of rising seas across the globe from 1993 to 2016. The grids and figures were produced at the Jet Propulsion Laboratory (JPL), California Institute of Technology, under the NASA MEaSUREs program (version JPL 1603).

NASA provides over two decades of satellite observations of sea level change and gravity field variations. These missions offer an extensive record of total sea level changes in the ocean as well as processes contributing to these changes such as ocean dynamics, glacial melt, hydrologic variability, and changes of the earth surface and interior.

The NASA Sea Level Change Team (N-SLCT), established in 2014, is an interdisciplinary team of oceanographers, glaciologists, hydrologists, and geodesists, who are tasked to analyze the available satellite and *in situ* observations to better understand how and why sea level is changing today, and thus better project how it might change in the future.

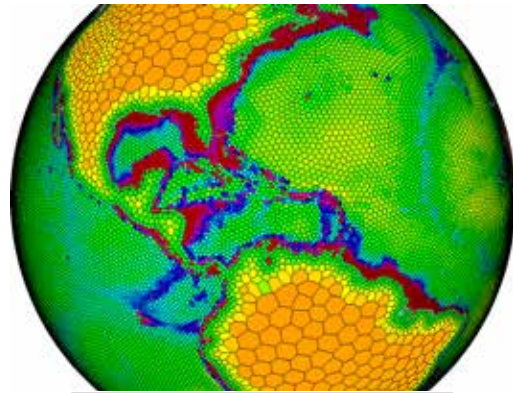
Visit <http://sealevel.nasa.gov> for more information.





## U.S. Department of Energy

The U.S. Department of Energy (DOE), Office of Biological and Environmental Research (BER) has mission-driven and scientific motivations to improve understanding of regional sea level changes and coastal processes. Coastal energy and connected infrastructure is vulnerable to many coastal processes, and DOE science includes modeling and terrestrial research into terrestrial-aquatic interfaces and estuary processes. DOE global modeling research will be increasingly focused on coastal processes. The SciDAC PISCEES project has developed ice-sheet models that place high-resolution along the ice-sheet margins, the Accelerated Climate Model for Energy (ACME) global model is coupling these ice sheets into the global Earth system. ACME's MPAS-Ocean will simulate regional sea-level and can place regional refinement along coastal regions, both along the ice-sheet margins and coastal regions. DOE supports development of estuary dynamical and biogeochemical treatments for the ACME model. A long-term goal is to simulate treatment of sea-level and storm surge in order to investigate their potential effects on coastal infrastructure and ecosystems.



MPAS-Ocean grid courtesy of M. Gunzburger, L. Ju and T. Ringler

DOE/BER: <https://science.energy.gov/BER>

ACME: [climatemodeling.science.energy.gov/projects/accelerated-climate-modeling-energy](https://climatemodeling.science.energy.gov/projects/accelerated-climate-modeling-energy)

Ice sheets: [www.scidac.gov/PISCEES](https://www.scidac.gov/PISCEES)

Coastal and estuary modeling projects:

- Improving tidal-estuary representations in MPAS-ocean (Zhang and Chai)
- Grid generation, Coupling strategies and spatially-dependent time-stepping for ocean tidal-estuary systems





CLIVAR is one of the **World Climate Research Programme's** core project

*We aim to understand the dynamics, interaction, and predictability of the coupled ocean-atmosphere system, facilitating observations, analysis and predictions in the Earth's climate system to the benefit of society.*



To find out more about us, visit: [www.clivar.org](http://www.clivar.org)

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*Two feet of sea level rise above current levels will put almost \$1 trillion and 6,000 square miles of property at risk in the US.*



Sign-up for US CLIVAR's mailing list to get engaged in cutting-edge research collaborations addressing the ocean's role in climate and its interaction with other elements of the Earth system.

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