



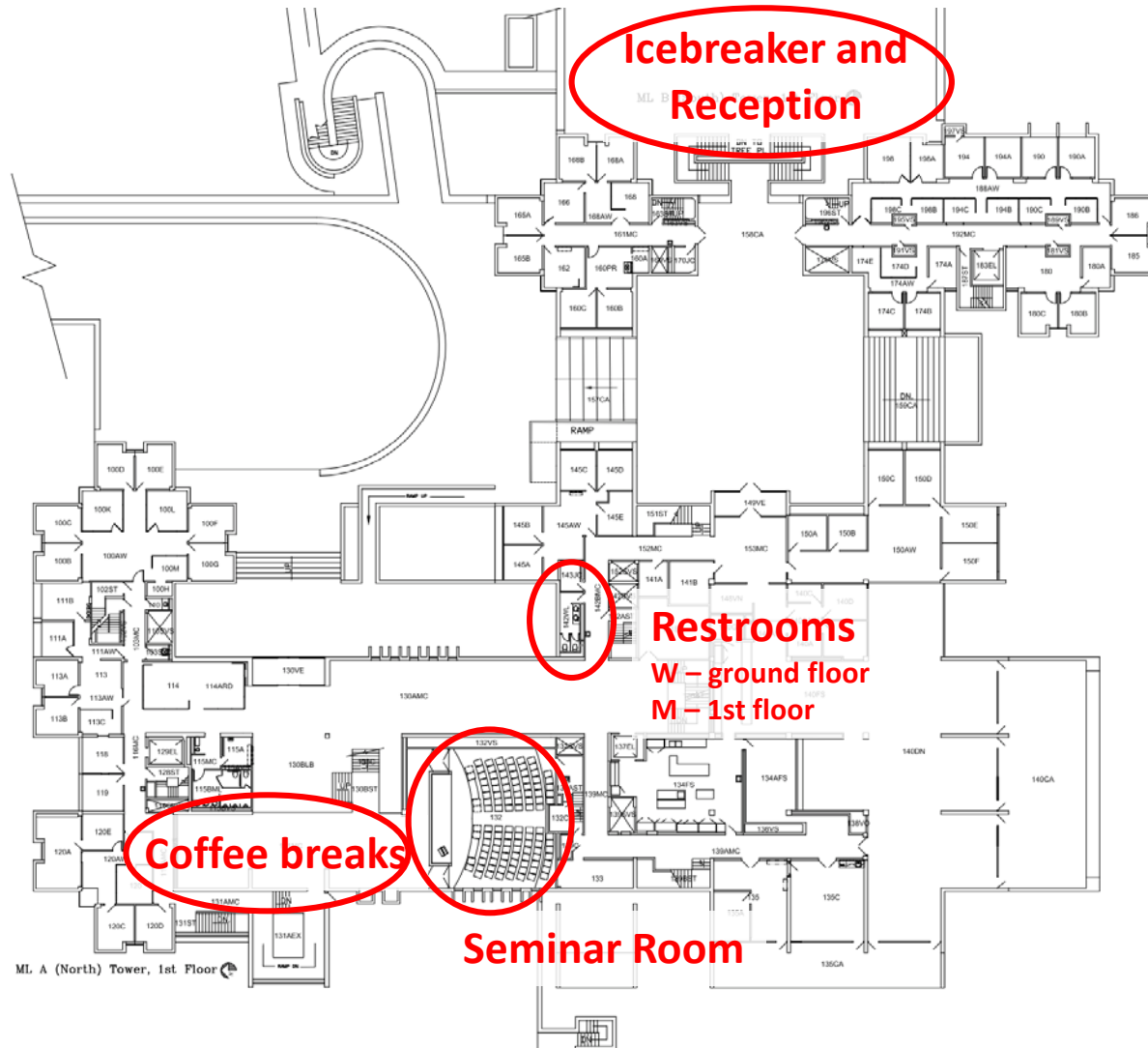
# 2<sup>nd</sup> GEWEX Convection-Permitting Climate Modeling Workshop

## Housekeeping and Scope

Andreas F. Prein ([prein@ucar.edu](mailto:prein@ucar.edu))

NCAR, Boulder, CO, Sept. 4-6, 2018

# NCAR's Mesa Lab





## Connecting to Wi-Fi (Visitors and Guests)

Connect to the SSID

**"UCAR Visitor"**

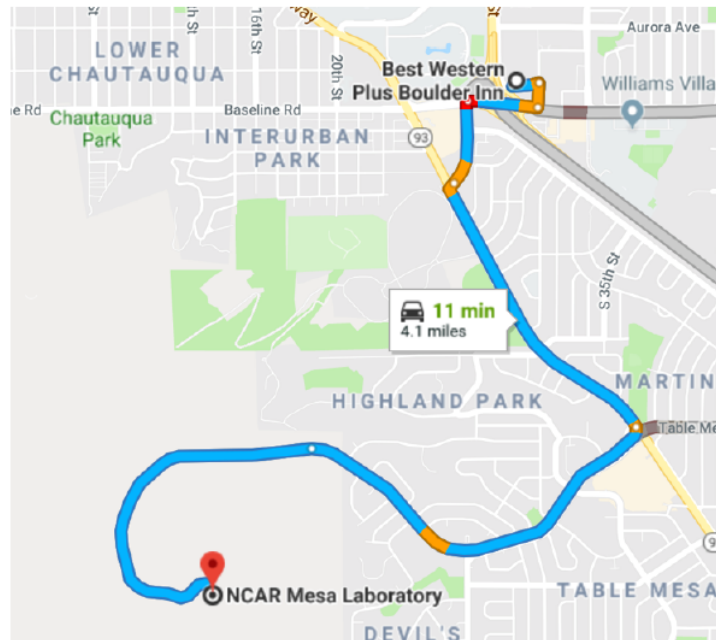
An authentication dialog will prompt for your name and email address for 4-hour short-term access. Go to your email to set up 90-day access.

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## Connecting to Wi-Fi (Staff and Emeritus)

See Garth or Tim with your personal device and we can set it up for 1 year of access via the **"eduroam"** SSID. This also enables your device to work at CU and some other educational and research institutions.

# Hotel Shuttle



Direction from Best Western Plus Boulder  
Inn, 770 28th St, Boulder, CO 80303

to

NCAR Mesa Laboratory, 1850 Table Mesa  
Dr, Boulder, CO 80305

Tuesday, Sept. 4<sup>th</sup>, 2018

Date	Time	From	To
Tue. Sept. 4	12:00 pm	Best Western Plus	NCAR Mesa Lab
Tue. Sept. 4	6:50 pm	NCAE Mesa Lab	Best Western Plus
Wed. Sept. 5	8:00 am	Best Western Plus	NCAR Mesa Lab
Wed. Sept. 5	6:50 pm	NCAR Mesa Lab	Best Western Plus
Thu. Sept. 6	8:00 am	Best Western Plus	NCAR Mesa Lab
Thu. Sept. 6	5:15 pm	NCAR Mesa Lab	Best Western Plus

## Oral Sessions

- Please upload your slides latest in the break before your session
- Keynote talks are 30 min. | regular talks are 20 min.
- You will get a 5 min. and a 2 min. signal
- Please allow time for questions

## Poster Sessions

- Session 1  
Tues. 5:15-6:15 pm
- Session 2  
Wed. 5:00-6:00 pm

Please remove your poster after the poster session

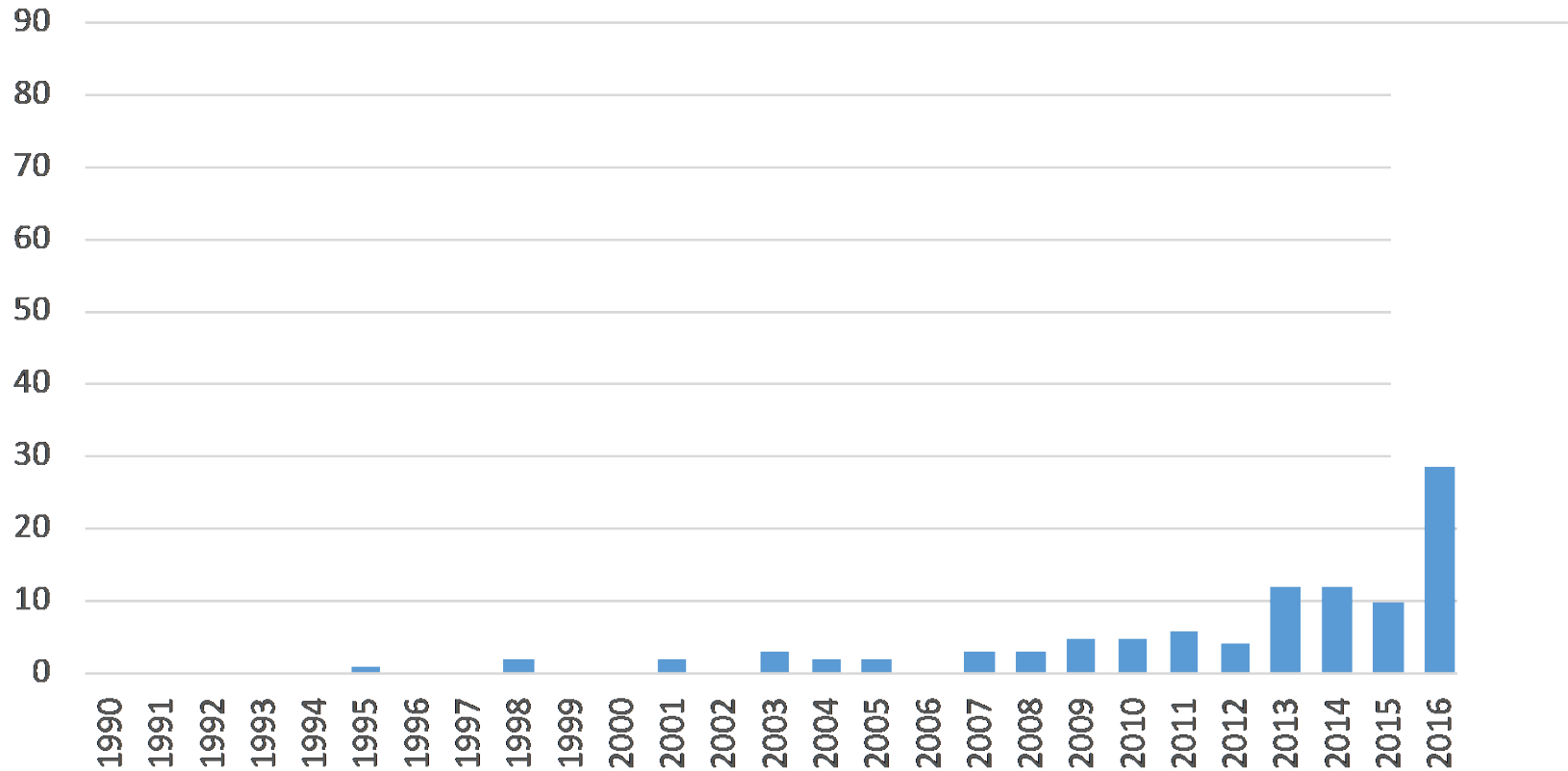
- Tuesday, 7 p.m.  
Dinner at Under the Sun  
627 South Broadway Street, Boulder, CO 80305 (cash or check only)
- Thursday, 6 p.m.  
Dinner at Dushanbe teahouse  
1770 13th St, Boulder, CO 80302
- Friday, 8:30 a.m. – 5:00 p.m.  
Trip to Rocky Mountain National Park





**GEWEX Convection-Permitting Modeling  
2016 to 2018**

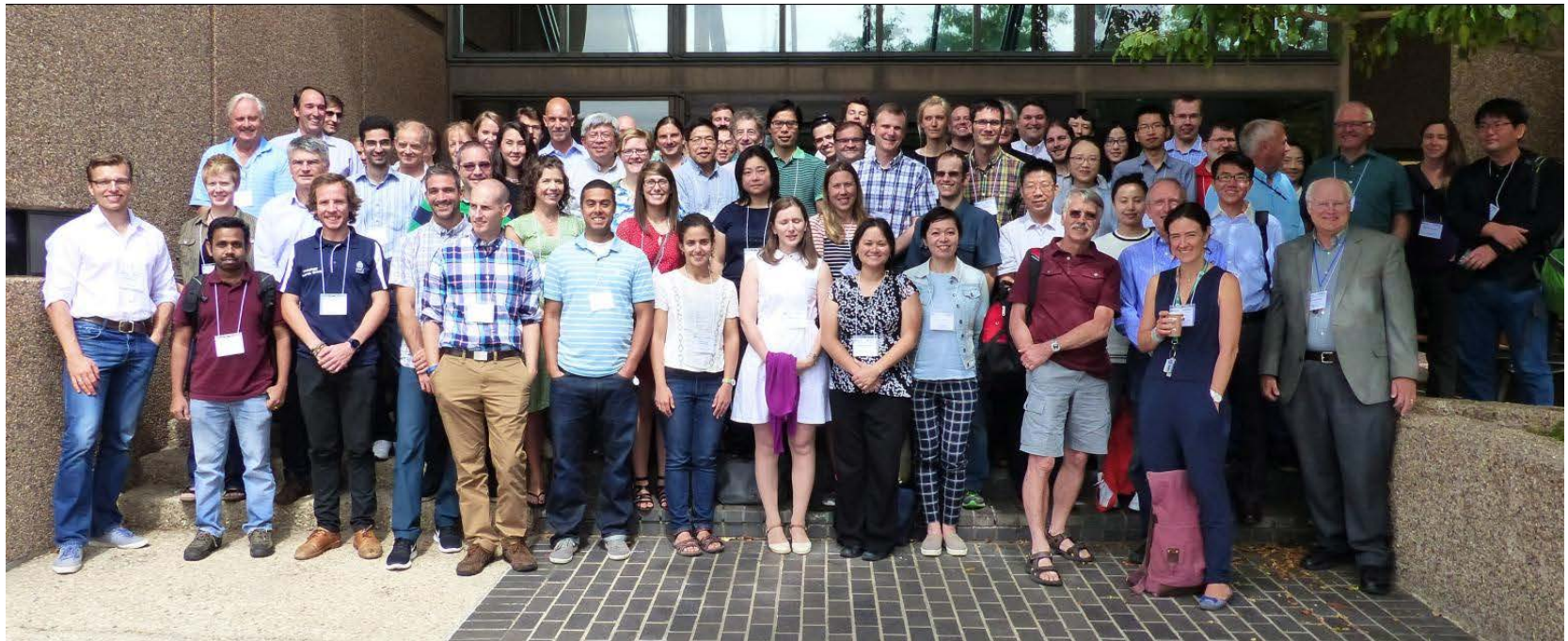
## Google Scholar search for convection permitting/resolving climate modeling





# 1<sup>st</sup> GEWEX Convection-Permitting Climate Modeling Workshop

- 6–8 September 2016
- 70 scientists from 13 countries



# 1<sup>st</sup> GEWEX Convection-Permitting Climate Modeling Workshop

## Workshop website:

<https://ral.ucar.edu/events/2016/gewex-convection-permitting-climate-modeling-workshop>

Video recordings and slides of most presentations and posters are archived

- We aim to make the slides, posters and recorded presentations available on the workshop website
- Please let us know if you do not want your presentation to be recorded or your slides to be shared

## GEWEX CONVECTION-PERMITTING CLIMATE MODELING WORKSHOP

### GEWEX Convection-Permitting Climate Modeling Workshop



SEPTEMBER 6, 2016 TO SEPTEMBER 8, 2016 | NATIONAL CENTER FOR ATMOSPHERIC RESEARCH FOOTHILLS LAB

[About](#) [Agenda](#) [Presentations](#) [Logistics](#) [Registration](#) [Contact](#)

#### PRESENTATIONS

##### Welcome

by Roy Rasmussen, Graeme Stephens, and James Hurrell (NCAR Director)

##### Invited Talks

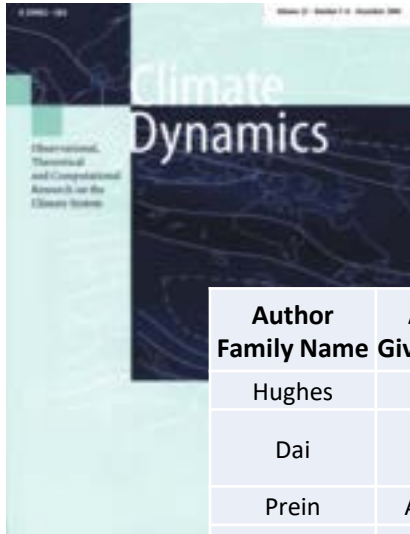
- Christoph Schaefer: Challenges in Convection-Resolving Climate Modeling PDF
- Roy Rasmussen: Changes in the Western U.S. snowpack with a CONUS-scale convection-permitting model PDF
- Bill Skamarock: Variable-resolution global atmospheric modeling spanning convective to plane PDF
- Graeme Stephens: Satellite observations PDF
- Gary M. Lackmann: High-Resolution Numerical Studies of Tropical Cyclones and Climate Change
- Stefan Sobolowski: CORDEX Flagship Pilot Study: Convective phenomena at high resolution over the Mediterranean PDF

##### Model Evaluation

- Prein: Simulating convective storms: An object based evaluation of a continental-scale convection-permitting climate simulation PDF
- Trier: Influences of PBL Parameterizations on Warm-Season Convection-Allowing Simulations PDF
- Chaboureaud: Object approaches for exploring high-resolution simulations PDF
- Cook: Improved Simulation of the Diurnal Cycle of Precipitation with Convection-Permitting Climate Modeling
- Iguchi: Precipitation Variability and Diurnal Cycle of Convection-Permitting Deterministic Simulations versus Mesoscale Multi-Physics Ensemble Simulations PDF
- Mahoney: The role of "gray zone" convective model physics in high-resolution simulations of the Colorado Front Range Flood PDF

##### Climate change assessments

- Dai: Changes in Precipitation Characteristics over North America by the Late 21st Century Simulation with a Convection-Permitting Model
- Di Luca: Using convection permitting simulations to study the intensity of extreme East Coast US precipitation events PDF
- Hoogewind: The Impact of Climate Change on Severe Convective Storms in the United States: Implications for High-Resolution Dynamical Downscaling PDF
- K. Rasmussen: High-resolution regional climate simulations of warm season convection in the United States PDF
- Ban: Scaling and Intensification of Extreme Precipitation in Climate Change Simulations at Kilometer Resolution
- Kawase: Challenges of convection-permitting regional climate simulations in Japan PDF
- Gutmann: Internal Variability and Convection Permitting Regional Climate Simulations PDF



- 34 manuscripts have been submitted
- 13 articles are already published online (status July 2018)

Author Family Name	Author Given Name	Article Title
Hughes	Mimi	Dynamical downscaling improves upon gridded precipitation products in the Sierra Nevada, California
Dai	Aiguo	A new mechanism for warm-season precipitation response to global warming based on convection-permitting simulations
Prein	Andreas	Simulating North American mesoscale convective systems with a convection-permitting climate model
Rasmussen	K.	Changes in the convective population and thermodynamic environments in convection-permitting regional climate simulations over the United States
Berthou	Ségolène	Pan-European climate at convection-permitting scale: a model intercomparison study
Knist	Sebastian	Evaluation and projected changes of precipitation statistics in convection-permitting WRF climate simulations over Central Europe
Matsui	Toshi	Impact of radiation frequency, precipitation radiative forcing, and radiation column aggregation on convection-permitting West African monsoon simulations
Panosetti	Davide	Convergence behavior of idealized convection-resolving simulations of summertime deep moist convection over land
Tan	Haochen	Role of topography on the MJO in the maritime continent: a numerical case study
Moyer	Elisabeth	Diagnosing added value of convection-permitting regional models using precipitation event identification and tracking
Kouadio	Kouakou	Does convection-permitting simulate better rainfall distribution and extreme over Guinean coast and surroundings?
Ban	Nikolina	Analysis of Alpine precipitation extremes using generalized extreme value theory in convection-resolving climate simulations
Zhou	Tianjun	The diurnal cycle of East Asian summer monsoon precipitation simulated by the Met Office Unified Model at convection-permitting scales

[ral-cpcm@ucar.edu](mailto:ral-cpcm@ucar.edu)

201 members

The aim of the CPCM mailing list is to enable efficient communication within the CPCM community. Community relevant information such as conference session announcements, relevant job offers, or questions of general concern are shared here. Please do not use this mailing list for lengthy discussions or personal topics.



- AGU 2016, 2017, and 2018
- Dinners at AGU meetings
- EGU 2016, 2017, 2018, and 2019
- 8th GEWEX Open Science Conference 2018



## Meeting summary in BAMS

### MEETING SUMMARIES

#### CHALLENGES AND ADVANCES IN CONVECTION-PERMITTING CLIMATE MODELING

ANDREAS F. PREIN, ROY RASMUSSEN, AND GRAEME STEPHENS

There is an urgent need for more actionable and reliable climate information on regional to local scales that cannot be delivered by state-of-the-art dynamical climate models because of their inability to explicitly simulate key processes such as deep convection or the interaction of atmospheric flow with the surface (e.g., orography). Convection-permitting models (CPMs) are novel and very promising tools to generate more reliable and process-based climate information on small scales owing to their small horizontal grid spacings of  $\leq 4$  km. At this resolution, deep convection can be simulated explicitly and the representation of land-atmosphere interactions is significantly improved [see Prein et al. (2015) for a review].

The goal of the Global Energy and Water Water Exchanges project (GEWEX) Convection-Permitting Climate Modeling Workshop was to foster communication and collaboration among the rapidly growing CPM community. The main focus was on discussing major challenges and future strategies in this research area. More than 70 scientists participated in the workshop from 13 countries,

##### GEWEX CONVECTION-PERMITTING CLIMATE MODELING WORKSHOP

**WHAT:** High-resolution climate information is key to assessing the impacts of climate change and climate variability on society. About 70 representatives from a rapidly growing group of scientists that use convection-permitting models (grid spacings  $\leq 4$  km) to understand the role of mesoscale processes in the climate system met to discuss the most pressing challenges, future perspectives, and opportunities to collaborate within this novel research area.

**WHEN:** 6–8 September 2016  
**WHERE:** Boulder, Colorado

representing a large cross section of the climate and weather community.

**KEY TOPICS AND RESULTS.** The two-and-a-half-day workshop featured six keynote talks and 27 oral and 44 poster presentations. The book of abstracts and recordings from most presentations and posters can be downloaded from the workshop website (<https://ral.ucar.edu/events/2016/cpcm>).

The workshop covered five main scientific topics:

- 1) CPM evaluation and added value,
- 2) climate change assessments with CPMs,
- 3) land-atmosphere interactions in CPMs,
- 4) observational datasets for CPM evaluation, and
- 5) CPM for simulating tropical phenomena.

**AFFILIATIONS:** PREIN AND RASMUSSEN—National Center for Atmospheric Research, Boulder, Colorado; STEPHENS—Jet Propulsion Laboratory, Pasadena, California

**CORRESPONDING AUTHOR:** Andreas F. Prein, [prein@ucar.edu](mailto:prein@ucar.edu)

DOI:10.1175/BAMS-D-16-0263.1

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## Challenges

1. The large demand of **computational resources**
2. Big model output **data volume** online evaluation, cloud-based platforms, analyzing data at central computational systems
3. Assessing **uncertainties in CPM** simulations
4. Missing **high-resolution, high-quality observational datasets**
5. The relevance of CPMs in areas **beyond precipitation**
6. The **model physics** such as turbulence, radiation, microphysics, and land surface processes are adopted from LSMs and have to be reassessed

60 submitted abstracts

- 7 keynote presentations
- 8 oral sessions
- 2 poster sessions

2 breakout sessions

Student presentation award

Lots of breaks and side events

