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**Swiss Federal Office of Energy SFOE**  
Energy Research

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# EuroSun2018

## 12<sup>th</sup> International Conference on Solar Energy for Buildings and Industry

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**SFOE contract number:** SI/501719-01

**The author of this report bears the entire responsibility for the content and for the conclusions drawn therefrom.**



## Summary

EuroSun is an international scientific conference series of the International Solar Energy Society ISES. This year EuroSun 2018 took place from 10th to 13th September 2018 at the HSR in Rapperswil. The theme of the conference is solar energy for buildings and industry. This includes technical developments of components, innovative systems as well as market development and political framework conditions for solar power and solar heat.

The national Swissolar Solar Heating Conference, the 2nd SIGES Conference on the Simulation of Building-Integrated Energy Systems and the 8th International Conference on Solar Air Conditioning SAC are three conferences that were integrated in the program.

A total of 344 participants took part in EuroSun2018.

## Zusammenfassung

EuroSun ist eine internationale wissenschaftliche Konferenzreihe der International Solar Energy Society ISES. Dieses Jahr fand die EuroSun 2018 vom 10. bis 13. September 2018 an der HSR in Rapperswil statt. Thema der Konferenz ist Solarenergie für Gebäude und Industrie. Das umfasst technische Entwicklungen von Komponenten, innovative Systeme sowie die Marktentwicklung und politische Rahmenbedingungen für Solarstrom und Solarwärme.

Die nationale Swissolar Solarwärme Konferenz, die zweite SIGES Konferenz zur Simulation gebäudeintegrierter Energiesysteme und die achte Internationale Konferenz zu Solarer Kühlung SAC sind drei Konferenzen, die in das Programm integriert wurden.

Insgesamt nahmen 344 Teilnehmer an der Konferenz teil.

## Résumé

EuroSun est une série de conférences scientifiques internationales de l'International Solar Energy Society ISES. Cette année, l'EuroSun 2018 a eu lieu du 10 au 13 septembre 2018 au HSR de Rapperswil. Le thème de la conférence est l'énergie solaire pour les bâtiments et l'industrie. Cela comprend le développement technique des composants, les systèmes innovants ainsi que le développement du marché et les conditions cadres politiques pour l'énergie solaire et la chaleur solaire.

La Conférence nationale Swissolar sur le chauffage solaire, la 2e Conférence SIGES sur la simulation des systèmes énergétiques intégrés aux bâtiments et la 8e Conférence internationale sur la climatisation solaire SAC sont trois conférences qui ont été intégrées au programme.

Au total, 344 participants ont pris part à la conférence.





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## List of abbreviations

SFOE	Swiss Federal Office of Energy
SPF	SPF Institute for Solar Technology
HSR	University of Applied Sciences Rapperswil HSR



## 1 Introduction

EuroSun 2018 was the 12<sup>th</sup> edition of the ISES Europe conference series. It took place from September 10 to September 13 on the Campus of HSR at Rapperswil, Switzerland.

Owner of the conference series is the International Solar Energy Society ISES. Conference Hosts were HSR together with Swissolar, the Swiss section of ISES.

A total of 344 participants registered for the conference that incorporated three events under its roof: the national Swissolar Solar Heating Conference, the 2nd SIGES Conference on the Simulation of Building-Integrated Energy Systems and the 8th International Conference on Solar Air Conditioning SAC.

All information about the conference was made available on [www.eurosun2018.org](http://www.eurosun2018.org), a website which eventually will be integrated in the ISES domain [www.ises.org](http://www.ises.org).

The following report may serve future editions of EuroSun or similar events as a basis for their planning.

## 2 Timeline

Deadline for abstract submissions:	28. February 2018
Extended deadline for abstracts:	09. March 2018
Evaluation of abstract submissions until:	30. April 2018
Start of online registration:	4. May 2018
Early bird discount until:	15. June 2018
Deadline for paper submissions:	07. September 2018
EuroSun2018:	10.-13. September 2018

## 3 Scientific Topics

The following scientific topics were covered by the conference program

1. Solar Buildings
2. Solar Assisted District Heating and Cooling
3. Solar Heat for Industrial Processes
4. Domestic Hot Water and Space Heating
5. Solar Air Conditioning and Refrigeration  
(8th International Conference on Solar Air Conditioning)
6. PV and PVT Systems for Buildings and Industry
7. Solar Thermal Collectors and Solar Loop Components
8. Thermal Storage



9. Testing & Certification
10. System Simulation  
(2nd SIGES Conference on the Simulation of Building-Integrated Energy Systems)
11. Solar Resource and Energy Meteorology
12. Solar Education
13. Renewable Energy Strategies and Policies

## **4 Committees**

### **Scientific Chair**

Andreas Häberle, HSR, Switzerland

### **Steering Committee**

Christof Biba, HSR, Switzerland

Harald Drück, University of Stuttgart, Germany

Andreas Eckmanns, Swiss Federal Office of Energy, Switzerland

Sebastian Herkel, Fraunhofer ISE, Germany

Víctor Martínez Moll, University Balearic Islands, Spain

Daniel Mugnier, Tecsol SA, France

Dave Renné, ISES, USA

Christian Schweigler, Munich University of Applied Sciences, Germany

David Stickelberger, Swissolar, Switzerland

Wolfgang Streicher, University of Innsbruck, Austria

Klaus Vajen, University of Kassel, Germany

Wim van Helden, AEE INTEC, Austria

Andreas Witzig, Zurich University of Applied Sciences, Switzerland

### **Organizing Committee**

Stefan Brunold, HSR, Switzerland

Joanna Costello, ISES, Germany

Mihaela Dudita, HSR, Switzerland

Beatrix Feuerbach, PSE, Germany





Felix Flückiger, HSR, Switzerland

Monica Furrer, HSR, Switzerland

Andreas Häberle, HSR, Switzerland

Jasmin Helbling, Swissolar, Switzerland

Stefanie Hermann, PSE, Germany

Arabella Liehr, ISES, Germany

Jennifer McIntosh, ISES, Germany

David Stickelberger, Swissolar, Switzerland

### **Scientific committee**

A big number of international scientist supported the conference as reviewers in the scientific committee:

Betsy Agar, Canada

Elsa Andersen, Technical University of Denmark, Denmark

Constantinos A. Balaras, National Observatory of Athens, Greece

Chris Bales, Höghskolan Dalarna, Sweden

Riccardo Battisti, Ambiente Italia, Italy

Marco Beccali, Università degli Studi di Palermo, Italy

Liliana O. Beltran, Texas A&M University, USA

Nurettin Besli, Harran University, Turkey

Constanze Bongs, Fraunhofer ISE, Germany

Dwipen Boruah, Global Sustainable Energy Solutions India, India

Alessio Bosio, Università Di Parma, Italy

Francois Boudehenn, CEA, France

Christoph Brunner, AEE Intec, Austria

Hüsamettin Bulut, Harran University, Turkey

Marco Calderoni, Politecnico di Milano, Italy

Francesco Calise, University of Naples Federico II, Italy

Maria João Carvalho, LNEG, Portugal

Laltu Chandra, IIT Jodhpur, India

Daniel Chemisana, University of Lleida, Spain

Manuel Collares Pereira, Universidade de Evora, Portugal

Alberto Coronas, Rovira i Virgili University, CREVER, Spain

Marcelo Cortes-Carmona, University of Antofagasta, Chile

YanJun Dai, Shanghai Jiao Tong University, China

Henrik Davidsson, Lund University, Sweden

Mathieu Davidsson, Université de la Réunion, Réunion

Samuel Luna de Abreu, Instituto Federal de Santa Catarina, Brazil

Pierre Delmas, NEWHEAT SAS, France



Pedro Dias, ESTIF, Belgium  
Vassiliki Drosou, CRES, Greece  
Harald Drück, University of Stuttgart, Germany  
Jiangtao Du, Liverpool John Moores University, UK  
Andreas Eckmanns, BFE, Switzerland  
Ursula Eicker, University of Applied Science Stuttgart, Germany  
Yehia Eissa, Khalifa University, United Arab Emirates  
Ricardo Enríquez, CIEMAT, Spain  
Michael Epstein, Weizmann Institute, Israel  
Jianhua Fan, Technical University of Denmark, Denmark  
Istvan Farkas, Szent Istvan University, Hungary  
Roberto Fedrizzi, EURAC, Italy  
Eduardo F. Fernández, University of Jaen, Spain  
Christian Fink, AEE Intec, Austria  
Stephan Fischer, University of Stuttgart, Germany  
Daniela Fontani, CNR, Italy  
Francesco Frontini, University of Applied Sciences and Arts of Southern Switzerland (SUPSI), Switzerland  
Simon Furbo, Technical University of Denmark, Denmark  
Martín Gaston-Romeo, CENER, Spain  
Federico Giovannetti, ISFH, Germany  
Daniel González i Castellví, AIGUASOL, Chile  
José González-Aguilar, IMDEA, Spain

Chris Gueymard, SolarConsultingServices, USA  
Jean-Christophe Hadorn, Switzerland  
Michel Haller, SPF, Switzerland  
Andreas Hauer, ZAE, Germany  
James Hazelton  
Zinian He, BSERI, China  
Anne Grete Hestnes, NTNU, Norway  
Uli Jakob, Green Chiller, Germany  
Ulrike Jordan, University of Kassel, Germany  
Paul Kaaijk, ADEME, France  
Andreas Kazantzidis, University of Patras, Greece  
Henner Kerskes, University of Stuttgart, Germany  
Christian Kok, Skov PlanEnergi, Denmark  
Wolfgang Kramer, Fraunhofer ISE, Germany  
Roland Krippner, Nuremberg Institute of Technology, Germany  
Rabindra Kumar, Satpathy Emami Power, India  
Chrysovalantou Lamnatou, University of Lleida, Spain  
Ana Lázaro, Unizar, Spain  
Amandine Le Denn, Tecsol, France  
Antonio Lecuona, UC3M, Spain  
Florian Lichtblau, Lichtblau Architekten BDA, Germany  
Roberto Lollini, EURAC, Italy  
Yoann Louvet, University of Kassel, Germany  
Tomas Matuska, Czech Technical University, Czech Republic



Steven Meyers, University of Kassel,  
Germany

Paulette Middleton, Panorama Pathways,  
USA

Andreu Moia-Pol, University Balearic  
Islands, Spain

Mario Motta, Politecnico di Milano, Italy

Daniel Mugnier, Tecsol, France

Urs Muntwyler, Bern University of Applied  
Sciences BFH, Switzerland

Les Nelson, IAPMO, USA

Jan Erik Nielsen, SolarKey Int., Denmark

Philip Ohnewein, AEE Intec, Austria

Janybek Orozaliev, University of Kassel,  
Germany

Philippe Papillon, France

Cedric Paulus, CEA INES, France

Manuel Pérez, Universidad de Almeria,  
Spain

João Pinho, Universidade Federal do  
Pará, Brazil

Kaj Pischow, Savo-Solar Oyj, Finland

Jesus Polo, CIEMAT, Spain

Atul Raturi, The University of the South  
Pacific, Fiji

Jan Remund, Meteotest, Switzerland

Dave Renne, ISES, USA

Esther Rojas, CIEMAT, Spain

Roberto Román Latorre, Universidad de  
Chile, Chile

Celestino Ruivo, University of Algarve,  
Portugal

Radim Rybár, Slovakia

Bastian Schmitt, University of Kassel,  
Germany

Marion Schroedter-Homscheidt, DLR,  
Germany

Eva Schüpbach, Bern University of  
Applied Sciences BFH, Switzerland

Alessandra Scognamiglio, ENEA, Italy

Luis M. Serra, Universidad de Zaragoza,  
Spain

Manuel Silva, University of Sevilla, Spain

Manolis Souliotis, University of Western  
Macedonia, Greece

Gerald Steinmaurer, ASiC, Austria

Wolfgang Streicher, University of  
Innsbruck, Austria

Uroš Stritih, University of Ljubljana,  
Slovenia

Christian Tantolin, CEA INES, France

Danjana Theis, htw saar, Germany

Alexander Thür, University of Innsbruck,  
Austria

Costas Travasaros, Prime Laser Tech,  
Greece

Alexandra Troi, EURAC, Italy

Kyriakos Tsiftes, University of Cyprus,  
Cyprus

Klaus Vajen, University of Kassel,  
Germany

Loreto Valenzuela, CIEMAT, Spain

Wim van Helden, AEE Intec, Austria

Nieves Vela, CIEMAT, Spain

Werner Weiss, AEE Intec, Austria

Stephen White, CSIRO, Australia

Stefan Wilbert, DLR, Germany



## 5 Co-operations

Three events were included in the program of EuroSun2018:

- 7<sup>th</sup> Swissolar Solar Heating Conference



- 2<sup>nd</sup> SIGES Conference on the Simulation of Building-Integrated Energy Systems



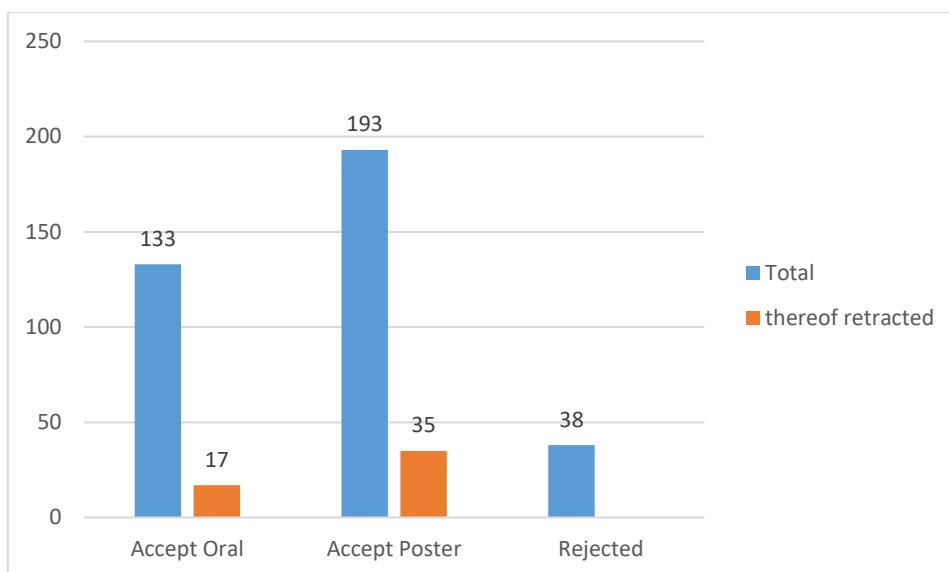
- 8<sup>th</sup> International Conference on Solar Air Conditioning



Generally it was appreciated to concentrate several related events under one roof. For SIGES and SAC the concept worked well but the number of participants who were specifically interested in the Swissolar conference was disappointingly low.

## 6 Abstract submissions

A total of 364 abstracts were submitted to the conference. After the abstract review process 38 thereof were rejected due to insufficient quality. A total of 133 abstracts were accepted for oral presentation whereof 17 were retracted by the authors. A total of 193 abstracts were accepted as poster presentations whereof 35 were retracted by the authors.



Unfortunately 5 oral presenters and about 40 poster presenters did not show up at the conference. The number of no shows should be reduced at future conferences. A means to reduce these numbers is to make registrations mandatory prior to finalising the conference program. This advice was forwarded to ISES Headquarters.

### Distribution of abstract submissions

Topic	Number of Abstracts
Thermal Storage	34
Testing & Certification	15
System Simulation (2nd SIGES Conference on the Simulation of Building-Integrated Energy Systems)	29
Solar Thermal Collectors and Solar Loop Components	26
Solar Resource and Energy Meteorology	34
Solar Heat for Industrial Processes	29
Solar Education	11
Solar Buildings	37
Solar Assisted District Heating and Cooling	14
Solar Air Conditioning and Refrigeration (8th International Workshop on Solar Air Conditioning)	41
Renewable Energy Strategies and Policies	29
PV and PVT Systems for Buildings and Industry	36
Domestic Hot Water and Space Heating	29



## 7 Program overview

Program Overview EuroSun 2018

	Monday September 10, 2018	Tuesday September 11, 2018	Wednesday September 12, 2018	Thursday September 13, 2018
		Room 3.011 Room 3.010 Room 3.008 Aula	Room 3.011 Room 3.010 Room 3.008 Aula	Room 3.011 Room 3.010 Room 3.008 Aula
08:30				
09:00				
09:30		Opening Session (Aula)	Keynote Lectures (Aula)	Keynote Lectures (Aula)
10:00		Keynote Lectures (Aula)		Solar Resource Collectors Components Hot Water Space Heating SAC
10:30		Coffee Break	Coffee Break	Coffee Break
11:00		Keynote Lectures (Aula)	Solar Resource Process Heat Education SAC	Strategies Policies Collectors Components District Heating SAC
11:30				
12:00		Poster Session 1 (1 <sup>st</sup> floor building 1 + Rooms 4.112/4.113)	Poster Session 2 (1 <sup>st</sup> floor building 1 + Rooms 4.112/4.113)	
12:30				
13:00		Lunch	Lunch	Closing Session (Aula)
13:30				
14:00		PV / PVT Thermal Storage Solar Buildings Swissolar Solar Heating Conference	Solar Resource Process Heat SIGES SAC	
14:30				
15:00		Coffee Break	Coffee Break	Technical Tours
15:30	Workshop: Breaking the Vicious Circle of Poverty in the Nepal Himalayas (Room 5.002)	PV / PVT Thermal Storage Solar Buildings Swissolar Solar Heating Conference	Testing Certification Hot Water Space Heating SIGES SAC	
16:00				
16:30				
17:00				
17:30	Welcome Reception Pre-Registration		Happy Hour	
18:00	Young ISES Welcome	Apéro Riche		
18:30				
19:00				
19:30			Conference Dinner	

The conference program lasted from Monday afternoon to Thursday evening. The morning sessions offered plenary talks by invited speakers. Oral presentations were given in four parallel sessions. Additionally workshops and social events complemented the program.

Posters were displayed throughout the conference and poster authors were asked to be at their poster during the dedicated poster sessions. Additionally poster authors had the opportunity to produce a short video about their poster that was then made available on the conference website (ISES YouTube channel). This service was offered free of charge. Only about 20 poster authors used this service but in the feedback questionnaire, about 80% were generally in favour of the idea.



## 8 Registrations

A total of 344 participants registered for EuroSun 2018.

Ticket	Number	%	Price
Early Bird Ticket	59	17,1%	820 CHF
Membership Early Bird Ticket	49	14,2%	710 CHF
Student Early Bird Ticket	47	13,6%	460 CHF
Regular Ticket	22	6,4%	940 CHF
Regular Membership Ticket	13	3,8%	820 CHF
Regular Student Ticket	11	3,2%	530 CHF
At the Door Ticket	1	0,3%	1'130 CHF
At the Door Membership Ticket	3	0,9%	1'010 CHF
At the Door Student Ticket	0	0,0%	660 CHF
Committee Ticket	1	0,3%	710 CHF
Day Ticket	14	4,1%	470 CHF
Membership Day Ticket	9	2,6%	380 CHF
Student Day Ticket	3	0,9%	380 CHF
At the Door Day Ticket	0	0,0%	560 CHF
Half Day Ticket Tuesday Afternoon	5	1,4%	350 CHF
Half Day Member Ticket Tuesday Afternoon	11	3,2%	290 CHF
Half Day Ticket Wednesday Afternoon	5	1,4%	350 CHF
Half Day Member Ticket Wednesday Afternoon	4	1,2%	290 CHF
Half Day Ticket Thursday Morning	2	0,6%	350 CHF
Half Day Member Ticket Thursday Morning	0	0,0%	290 CHF
Free Conference Ticket	68	19,7%	0,0 CHF
Free Day Ticket	18	5,2%	0,0 CHF
<b>Total</b>	<b>345*</b>	<b>100,0%</b>	

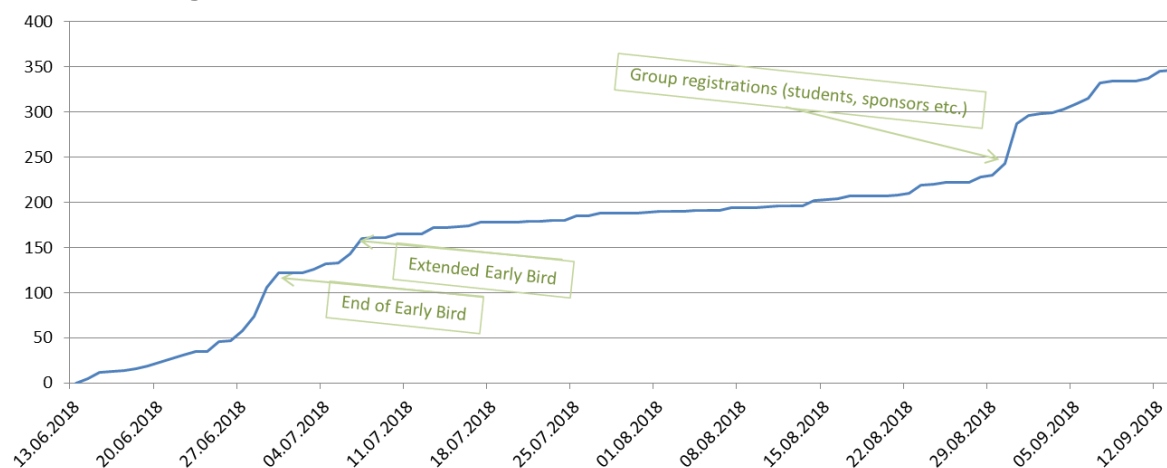
*\*One person bought two day tickets, therefore there is one ticket more than the participants total*

### Other offers for the conference participants:

Dinner / Tours / Train	Number	Price
Conference Dinner	94	100 CHF
Conference Dinner Accompanying Person	6	100 CHF
Free Conference Dinner	34	0 CHF
Technical Tour: HSR Labs	30	0 CHF
Technical Tour: EMPA Labs	12	20 CHF
Rapperswil City Tour	6	10 CHF
EuroSun Train Ticket	72	49 CHF
EuroSun Train Ticket Accompanying Person	5	49 CHF



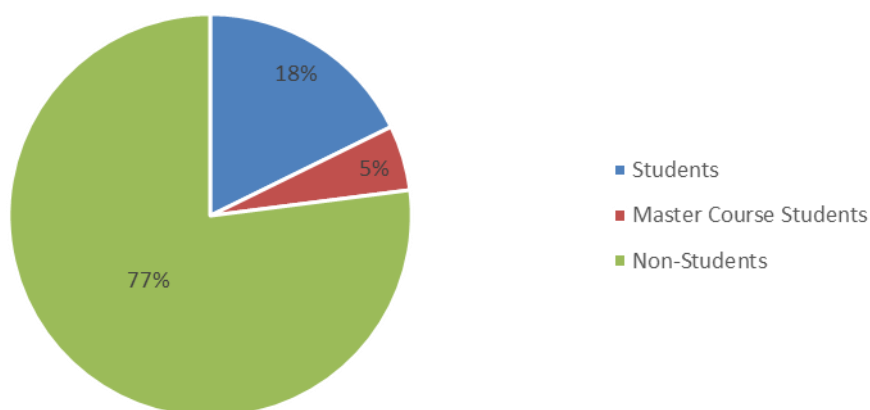
## Timeline of registrations



## Student registrations

A high number of students participated in the conference. Also a master course was offered to international students and was very well received.

### Students at EuroSun 2018







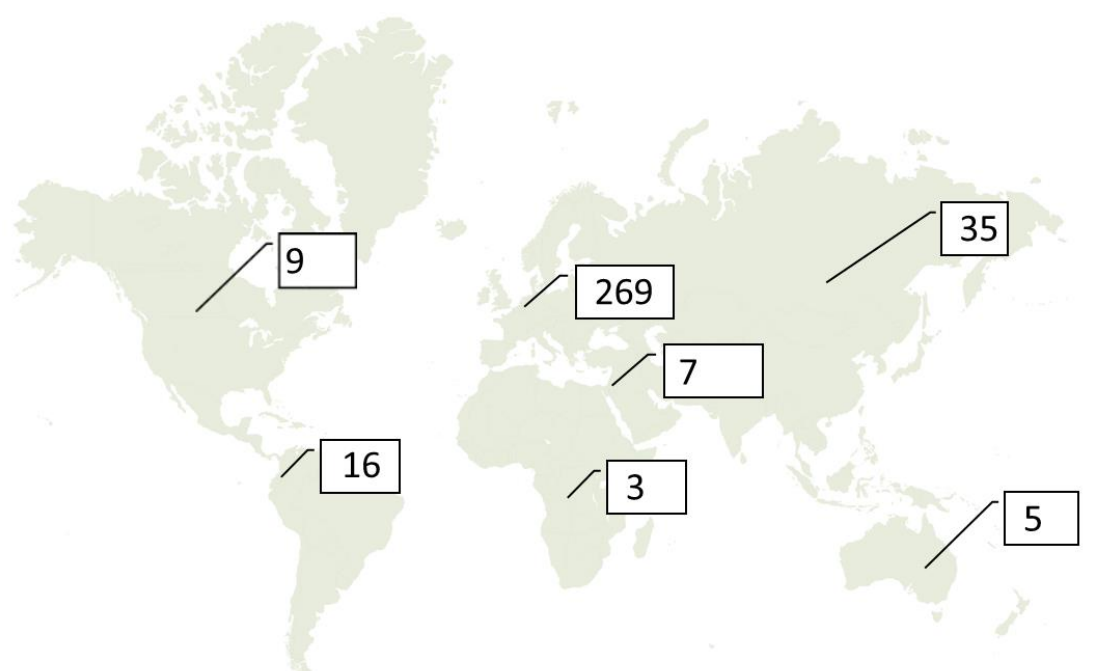
## Countries of origin of the conference participants

The participants originated from 49 countries with the highest number coming from Switzerland. This reveals that the conference was truly international but was also well recognised on a national level.





The participants came from all continents:





## 9 Sponsorship

Financial support was received from the following sponsors, promoters and supporters

### Silver sponsors



### Bronze sponsors



### Welcome Reception Sponsor



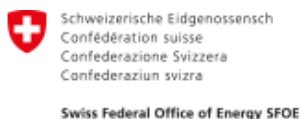
### Coffee Break Sponsor



### Promoters



### Supporters





## 10 Proceedings

The conference proceedings will be published in January 2019.

Publisher: ISES

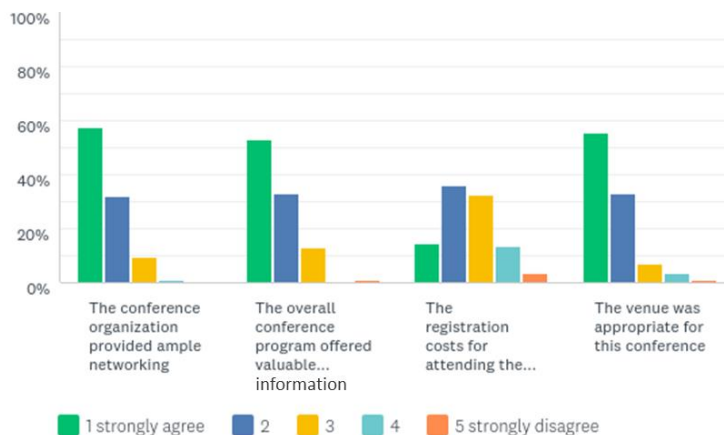
Quantity of papers: 187 full papers were submitted

Access: perpetually free-to-read for all researchers

Online publication: <http://proceedings.ises.org/>

## 11 Conclusions

A survey among participants confirmed a high degree of satisfaction with EuroSun2018.



Interestingly more than 50% of the attendees participated for the first time in an ISES conference.

The feedback about the three conferences that were integrated into EuroSun was mixed. Generally it was agreed that a concentration of related events under one roof is a positive approach. All three conference organisers appreciated the reduced effort for organising their events.

While SAC and SIGES were very satisfied with the high interest and participation in their sessions, it must be acknowledged that for the Swissolar Solar Heating conference the participation numbers were far below expectations. The guess is that German speaking participants were repelled by the international approach of EuroSun. Only about 60 persons attended the Swissolar Session compared to more than 100 the year before, when it was organised as a standalone event.

Other things to improve for future events are:

- The number of no shows, especially of poster presenters, must be reduced by making registrations mandatory prior to finalising the program.



- The invited speakers were only male. This happened by mistake. Future events should have a better eye on gender equality.

The registration statistics confirm a high degree of internationality with participants coming from 49 countries. Still one third of the participants were from Switzerland, which confirms the impact that the conference had on a national level in Switzerland.

All in all EuroSun2018 was a very successful conference. The beautiful HSR campus, its good facilities and hospitality of the people were impressive. EuroSun2018 was certainly a good advertisement for HSR and also for Switzerland.

## 12 Some Impressions

