BEHAVIOUR OF STEEL STRUCTURES IN SEISMIC AREAS
7th International Conference, Santiago Chile

STESSA 2012

Held at the
Intercontinental Hotel, Santiago, Chile
January 9-11, 2012

Organized by
University of Naples “Federico II”, Italy
Department of Civil Engineering, Universidad de Chile, Chile

Sponsored by
CChC – Cámara Chilena de la Construcción
Gerdau Aza
Alacero – Latin American Steel Association
ECCS CECM EKS – European Convention for Constructional Steelwork
ACHISINA – Asociación Chilena de Sismología e Ingeniería Antisísmica
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Preface

The International Specialty Conference on Behaviour of Steel Structures in Seismic Areas, called STESSA, has reached its seventh edition.

The seventh edition of STESSA has been organized by the University of Chile (Department of Civil Engineering), in cooperation with the University of Naples “Federico II” (Department of Structural Engineering).

The Conference, as in the past, is devoted to the behaviour of steel structures in seismic areas. Santiago (Chile) was selected for the venue of the Conference. Previous editions of the Conference were held in Timisoara (Romania, 1994), Kyoto (Japan, 1997), Montreal (Canada, 2000), Naples (Italy, 2003), Yokohama (Japan, 2006) and Philadelphia (United States, 2009).

The results of recent research from all over the world in the field of steel structures in seismic areas are represented by over a 150 papers from experts from 23 countries. The papers included in the proceedings are subdivided into chapters with titles corresponding to the names of the Working sessions of the STESSA’12 Conference. The papers are categorized into the following areas:

1. Performance-Based Design: engineering descriptions of performance levels; conceptual design for multiple performance objectives; reliability-based design procedures; methods for analytical prediction of performance.
2. Seismic, Wind and Exceptional Loads: seismic load; wind load; fire; fire after an earthquake; explosions; impact.
3. Material Behaviour: material properties; use of special steel grades; strain rate; welded affected zones; fatigue; brittle fracture.
4. Member Behaviour: rotation capacity; local buckling; overall buckling; classifications of sections; deterioration of strength, stiffness, ductility.
5. Connection Behaviour: cyclic behaviour of joints; analytical models; test results; pros and cons of welded and bolted connections; new innovations; data bank; influence of fully and partially restrained connections; seismic demands and capabilities of frames with welded, bolted, or innovative connections.
6. Global Behaviour: moment resisting frames; braced frames; new and innovative structural systems; collapse mechanisms; redundancy of structures; dynamic influence of P-Δ effects; modeling of deterioration; evaluation of reduction factors; damageability; large span structures, bridges, and space frames; influence of non-structural elements.
7. Analytical and Experimental Methods: dynamic analysis; geometrical nonlinearity and material nonlinearity; optimization; static tests, shaking table tests; online real-time tests; distributed hybrid collaboration tests via the Internet.
8. Mixed and Composite Structures: concrete filled tube (CFT) construction; steel encased in reinforced concrete (SRC) construction; mixed structures with reinforced concrete; mixed structures with timber; steel pile foundation and foundation problems.
9. Passive, Semi-active, and Active Control: behaviour of isolated structures; bridge bearings; energy dissipation; special devices; control algorithms; smart structures; design models; criteria for detailing.
10. Strengthening, Repair, and Monitoring: examination of damage; criteria for retrofitting; structural health monitoring; improvement of structural strength and ductility; ordinary buildings; historical buildings; bridges.
11. Design, Fabrication, and Practice: national practices case studies; cost-benefit ratio; design aids, fabrication and erection; aesthetics and habitability.
SESSION SCHEDULE SUMMARY

Sunday 8th

17:00 - 19:00  Registration – Foyer
19:00 - 21:00  Welcome Reception

Monday 9th

9:00 - 9:30  Opening ceremony  
            Centroamerica Room
9:30 - 10:00  Keynote Lecture: A. Martelli  
              Chair: J. Ricles  
              Norteamerica Room
10:00 - 10:30  Session 1a: Passive, semi - active and active control  
               Chair: J. Ricles  
               Norteamerica Room
10:00 - 10:30  Session 1b: Performance - Based Design of Structures  
               Chair: C. Aguirre  
               Centroamerica Room
10:30 - 11:00  Coffee break – Foyer
11:00 - 13:00  Session 2a: Passive, semi-active and active control  
               Chair: M. Moroni  
               Norteamerica Room
11:00 - 13:00  Session 2b: Performance-Based Design of Structures  
               Chair: G. Ayala  
               Centroamerica Room
13:00 - 14:00  Lunch – Tupungato, Parinacota, Llaima
14:00 - 16:00  Session 3a: Strengthening, Repair and Monitoring  
               Chair: L. Calado, Massone  
               Norteamerica Room
14:00 - 16:00  Session 3b: Performance-Based Design of Structures  
               Chair: M. Iwata, A. Formisano  
               Centroamerica Room
16:00 - 16:30  Coffee break – Foyer
16:30 - 18:30  Session 4a: Analytical and Experimental Methods  
               Chair: D. Dubina, M. Sarrazin  
               Norteamerica Room
16:30 - 18:30  Session 4b: Connection Behaviour  
               Chair: J.M. Aribert, B. Faggiano  
               Centroamerica Room
19:00 - 20:00  Technical visit  
               Titanium Tower
### Tuesday 10th

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<thead>
<tr>
<th>Time</th>
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<tbody>
<tr>
<td>9:00 - 9:30</td>
<td><strong>Keynote Lecture: K. Kasai</strong></td>
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<td>Chair: R. Saragoni</td>
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<td>9:30 - 10:30</td>
<td><strong>Poster Session</strong></td>
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<td>Chair: K. Kasai</td>
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<td>10:30 - 11:00</td>
<td><strong>Coffee break – Foyer</strong></td>
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<td>11:00 - 12:45</td>
<td><strong>Session 5a: Member Behaviour</strong></td>
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<td>Chair: B. Stojadinovic, V. Stoian</td>
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<td>11:00 - 12:45</td>
<td><strong>Session 5b: Self Centering Seismic Systems</strong></td>
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<td>Chair: R. Sause, C. Aguirre</td>
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<td>12:45 - 13:15</td>
<td><strong>Lunch – Tupungato, Parinacota, Llaima</strong></td>
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<td>13:15 - 14:15</td>
<td><strong>Keynote Lecture: J. Ricles</strong></td>
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<td>Chair: K. Kasai</td>
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<td>14:15 - 16:00</td>
<td><strong>Session 6a: Analytical and Experimental Methods</strong></td>
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<td>Chair: A. Reinhorn, J.F. Beltran</td>
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<td>14:15 - 16:00</td>
<td><strong>Session 6b: Self Centering Seismic Systems/ Member Behaviour</strong></td>
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<td>Chair: L. Fahnestock, D. Grecea</td>
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<td>16:00 - 16:30</td>
<td><strong>Coffee break – Foyer</strong></td>
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<td>16:30 - 18:30</td>
<td><strong>Session 7a: ECCS - TC13</strong></td>
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<td>Chair: R. Landolfo, F. Mazzolani</td>
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<td>16:30 - 18:30</td>
<td><strong>Session 7b: Connection Behaviour</strong></td>
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<td>Chair: M. Garlock, G. Rassati</td>
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<td>20:00 - 24:00</td>
<td><strong>Banquet - Tupungato-Parinacota-Llaima</strong></td>
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### Wednesday 11th

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<tr>
<td>9:00 - 9:30</td>
<td><strong>Keynote Lecture: C. Clifton</strong></td>
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<td>Chair: F. Mazzolani</td>
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<td>9:30 - 11:00</td>
<td><strong>Session 8a: Global Behavior</strong></td>
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<td>Chair: C. Rogers</td>
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<td>9:30 - 11:00</td>
<td><strong>Session 8b: Mixed and Composite Structures</strong></td>
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<td>Chair: R. Herrera, S. Yamada</td>
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<td>11:00 - 11:30</td>
<td><strong>Coffee break - Foyer</strong></td>
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<td>11:30 - 13:00</td>
<td><strong>Session 9a: Global Behavior</strong></td>
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<td>Chair: R. Tremblay, D. Mistakidis</td>
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11:30 - 13:00  Session 9b: Design, Fabrication and Practice  
Chair: I. Vayas, H. Akiyama  
Centroamerica Room

13:00 - 14:00  Lunch – Tupungato, Parinacota, Llaima

14:00 - 14:30  Keynote Lecture: R. Herrera  
Chair: C. Clifton  
Norteamerica Room

14:30 - 16:00  Session 10a: Global Behavior  
Chair: V. Piluso, C. Christopoulos  
Norteamerica Room

14:30 - 16:00  Session 10b: Seismic, Wind and Exceptional Loads  
Chair: M. Hjiaj, R. Saragoni  
Centroamerica Room

16:00 - 16:30  Coffee break – Foyer

16:30 – 17:45  Session 11a: Global Behavior  
Chair: D. Beg, L. Tirca  
Norteamerica Room

16:30 - 17:45  Session 11b: Seismic, Wind and Exceptional Loads  
Chair: A. Mandara  
Centroamerica Room

18:00 - 18:30  Closing Ceremony

Thursday 12th

9:00 - 19:00  Technical tour  
Marga Marga bridge, Federico Santa Maria University, and Viña del Mar
PRESENTATION SCHEDULE

Sunday 8th

17:00 - 19:00  Registration - Foyer
19:00 - 21:00  Welcome Reception

Monday 9th

9:00 - 9:30  Opening ceremony
             Centroamerica
             Room
             James McPhee, Chairman Department of Civil Engineering, University of Chile
             Federico Mazzolani, Chairman STESSA 2012
             Rodolfo Saragoni, Honorary Chairman STESSA 2012
             Ricardo Herrera, Co-chairman STESSA 2012

9:30 - 10:00  Keynote Lecture
              Chair: J. Ricles
              Norteamerica
              Room
              (KN-01) Recent worldwide application of seismic isolation and energy dissipation to steel and other
              materials structures and conditions for their correct use
              Alessandro Martelli

10:00 - 10:30 Session 1a: Passive, semi-active and active control
                 Chair: J. Ricles
                 Norteamerica
                 Room
                 (S01a-1) Hysteretic behaviour of dissipative devices for seismic resistant steel frames (FUSEIS 2)
                 Calado, Proenca, Espinha, Castiglioni, Vayas
                 (S01a-2) Innovative energy dissipation systems (FUSEIS 1)
                 Dimakogianni, Dougka, Karydakis, Vayas, Calado, Castiglioni

10:30 - 11:00 Coffee break
11:00 - 13:00  Session  2a: Passive , semi-active and active control
  Chair: M. Moroni
  
  Norteamerica Room
  (S02a-1) Seismic resistant composite steel frames with dissipative devices
  Castiglioni, Kanyilmaz, Calado, Vayas, Goncalvez, Rauert
  (S02a-2) Advanced compressed elastomer dampers for earthquake hazard reduction to steel frames
  Sause, Ricles, Mahvashmohamamdi, Michael, Sweeney, Ferro
  (S02a-3) Base isolation mitigating effects
  Prodan, Alexa, Ladar
  (S02a-4) Full-scale testing of the cast steel yielding brace system
  Gray, Christopoulos, Packer
  (S02a-5) Response analysis of a 12 story structural steel building with isolated base subjected to ground motion excitation
  Ojeda, Sanchez, Parra, Lluhen
  (S02a-6) Concurrent design of high-strength TRIP steels and passive damping devices
  Fraley, Olson
  (S02a-7) Solid State Steel Energy Dissipators for Hybrid Structures and Large Equipment
  Stiemer, Tesfamariam, Zhou
  (S02a-8) Force-displacement behaviour of HF2Vdissipaters and possible applications on steel structures
  Chanchí, Chase, Rodgers, MacRae, Clifton

11:00 - 13:00  Session  2b: Performance -Based Design of Structures
  Chair: G. Ayala, R. Boroschek
  
  Centroamerica Room
  (S02b-1) Performance evaluation of three pre-qualified steel systems in Canada
  Yang, Murphy
  (S02b-2) Influence of scalar frequency content parameters on the inelastic seismic demands of steel structures
  Málaga-Chuquitaype, Elghazouli
  (S02b-3) A unitary approach for the design of concentrically braced frames
  Bosco, Marino, Rossi
  (S02b-4) Seismic response of steel columns in MRFs under multi-axial earthquake components
  Di Sarno
  (S02b-5) Reliability-based record selection for steel frames based on different vector-valued IMs
  Bojórquez, Reyes-Salazar, Rivera-Salas, Ruiz Gómez
  (S02b-6) Hybrid buckling-restrained braced frames
  Atlayan, Charney
  (S02b-7) Seismic assessment of a new steel moment frame designed per ASCE 7 with ASCE 41
  Speicher,Harris III
  (S02b-8) Robustness based design of steel building frames under extreme loads
  Dinu, Dubina

13:00 - 14:00  Lunch – Tupungato, Parinacota, Llaima
**14:00 - 16:00**  
Session 3a: Strengthening, Repair and Monitoring  
Chair: L. Calado, L. Massone  

Norteamerica Room  
(S03a-1) Shaking table tests of a timber roof truss model equipped with a post-tensioning SMA-based tie-rod system  
Cardone, Sofia, Nigro  
(S03a-2) Seismic evaluation and retrofit of welded moment connection of early high-rise buildings subjected to long-period ground motions  
Suita  
(S03a-3) Consecutive vibration characteristics monitoring of high-rise steel building  
Hayashi, Sugino, Yamada, Takiyama, Onishi, Akazawa  
(S03a-4) FRP composites for seismic retrofitting of steel-concrete shear walls with steel encased profiles  
Dan, Nagy Gyorgy, Stoian, Fabian, Demeter  
(S03a-5) Estimation of vibration characteristics of steel-structure buildings with damper based on seismic observation records  
Goto, Suzuki, Sugimura, Chiba, Dohi  

(S03a-6) Strengthening of non-seismic reinforced concrete frames of buckling restrained steel braces  
Bordea, Dinu, Dubina  
(S03a-8) Seismic strengthening of R/C buildings with soft storey (pilotis) through dissipative steel links  
Mistakidis, Stylianidis, Barlas, Georgiadi-Stefanidi  
(S03a-9) A suspended steelwork solution for the post-war reconstruction of a building in the historical centre of Naples  
Mazzolani, Marzo, Formisano  

**14:00 - 16:00**  
Session 3b: Performance-Based Design of Structures  
Chair: M. Iwata, A. Formisano  

Centroamerica Room  
(S03b-1) Hybrid moment resisting steel frames  
Charney, Atlayan  
(S03b-2) Validation of a design procedure for failure mode control of MRF-CBF dual systems by means of IDA analyses  
Piluso, Montuori, Longo, Giugliano  
(S03b-3) Influence of the strength in the seismic performance of steel frame buildings  
Aguirre, Salas  
(S03b-4) Multilevel displacement-robustness based seismic design for ductile steel framed structures  
Ayala, López, Hernández  
(S03b-5) Direct damage controlled seismic design of steel framed structures  
Kamaris, Hatzigeorgiou, Beskos  
(S03b-6) Seismic design approach for multi-story frames on the top story of which damage concentrates  
Akiyama  
(S03b-7) A new balanced design procedure for gusset plate connections in SCBF  
Palmer, Roeder, Lehman  
(S03b-8) Methodology for quantifying seismic sustainability of steel framed structures  
Chanchí, MacRae, Chase, Rodgers, Clifton  

**16:00 - 16:30**  
Coffee break - Foyer
16:30 - 18:30  Session  4a: Analytical and Experimental Methods
Chair: D. Dubina, M. Sarrazin
Norteamerica Room
(N04a-1) Seismic failure analysis of a composite girder bridge
Schanack, Reyes, Luco
(N04a-2) Hybrid simulation of a 2-story steel MRF retrofitted with HPFRC infill panels
Lignos, Moreno, Billington
(N04a-3) Estimation of the risk amplification in steel buildings subject to seismic actions using Monte Carlo simulation
Bermudez Mejia, Barbat Barbat, Pujades Beneit, Hurtado Gomez
(N04a-4) Effects of low cycle fatigue on steel moment frames with RBS
Amiri, Rojas, Anderson
(N04a-5) Experimental and analytical modelling of seismic behaviour of braced framed structures with “zipper” mechanism
Reinhorn, Schachter-Adaros
(N04a-6) Application of endurance time method in seismic assessment of mid-rise and high-rise steel moment and braced frames
Hariri Ardebili, Zarringhalam, Yahyai, Mirtaheri
(N04a-7) Study on concentrically V-braced frames under cyclic loading
Serra, Rebeiro, Da Silva, Tenchini, D’aniello, Landolfo
(N04a-8) Influence of friction on the constraints with degrees of freedom on the seismic behavior of steel structures
La Tegola, Mera

16:30 - 18:30  Session  4b: Connection Behaviour
Chair: J.M. Aribert, B. Faggiano
Centroamerica Room
(N04b-1) Cyclic behavior of a new mechanical beam-to-column connection for steel structures
Iyama, Fukushima, Araki, Piao, Hirosawa, Sato, Ohata
(N04b-2) Beam-to-column connection for built-up column using ultra-high-strength steel
Lin, Chung, Okazaki, Nakashima
(N04b-3) Friction T-stub joints under cyclic loads: experimental behavior
Latour, Piluso, Rizzano
(N04b-4) Cyclic behavior of welded T shapes for Double Welded T connections
Bravo, Herrera
(N04b-5) Experimental study on mechanical behavior of weld-free steel structure with knee brace damper using square tube column
Koetaka, Suita, Inoue, Uno, Fukuchi, Kawaii
(N04b-7) Control of bolted beam-to-column connections in moment joints by T-stub properties
Grecea, Muntean, Dubina
(N04b-8) Study on structural behaviour of weldless joint in beam-to-column connection of interior column with knee brace reinforcement
Honma, Ebato, Harada
(N04b-9) Design considerations for braced frames with asymmetrical friction connections – AFC
Chanchí, MacRae, Chase, Rodgers, Mora Muñoz, Clifton

19:00 - 20:00  Technical visit: Titanium Tower
Tuesday 10th

9:00 - 9:30  Keynote Lecture
            Chair: R. Saragoni
Norteamerica Room  (KN-02) Responses of tall buildings in Tokyo during the 2011 Great East Japan Earthquake
                 Kazuhiko Kasai

9:30 - 10:30  Poster Session
            Chair: K. Kasai
Centroamerica Room  (PS-01) Design of large scale wind turbine towers in seismic areas
                Baniotopoulos, Lavassas, Nikolaidis, Zervas
                (PS-02) New aspects concerning the ductility of steel members
                        Anastasiadis, Mosoarca, Gioncu
                (PS-03) Influence of connections on the seismic behaviour of hybrid hot-rolled and cold-formed steel frames.
                        Calderoni, Giubileo, Tarantino
                (PS-04) PTED beam-to-column connections for seismic resistant steel frames.
                        Faggiano, Esposto, Mazzolani
                (PS-05) The influence of cyclic loading on flexural response of steel beams
                        D'aniello, Tortorelli, Landolfo
                (PS-06) Seismic behaviour of dual steel concentric braced frames
                        D'aniello, La Manna Ambrosino, Portioli, Landolfo
                (PS-07) Evaluation of nonlinear static procedures for seismic performance assessment of BRBF structures
                        Ferraioli, Lavino, Avossa, Mandara
                (PS-08) Robustness assessment approaches for steel framed structures under catastrophic events
                        Formisano, Mazzolani
                (PS-09) Finite element modelling of the inelastic cyclic response and fracture life of square tubular steel bracing members subjected to seismic inelastic loading
                        Roufegarinejad, Tremblay
                (PS-10) Seismic testing of concentrically braced frame models for the BRACED Project
                        Hunt, Broderick
                (PS-11) Effect of Local Buckling of Core Plates on Cumulative Deformation Capacity in Buckling Restrainted Braces
                        Matsui, Takeuchi
                (PS-12) Critical accelerations as descriptors of the vulnerability of steel tanks under seismic actions
                        Pérez Rocha, Arzola Nuño, Fernández Torres
                (PS-13) Restoring force characteristics of non-slip-type & generally exposed column-base subjected to bi-axial bending,
                        Yamanishi, Takamatsu, Tamai.
                (PS-14) Proposal of New Column Support System to Perform Complete Beam Yielding Mechanism
                        Kimura, Mutsukura, Kaneda, Wada.

10:30 - 11:00  Coffee break - Foyer
11:00 - 12:45  Session  5a: Member Behaviour  
Chair: B. Stojadinovic, V. Stoian
Norteamerica Room

(S05a-1) Lateral buckling of steel I beams with different boundary conditions by numerical simulation
Sanchez Sanchez, Cortes Salas

(S05a-2) Impact of flange holes on the strength and ductility of steel beams
Sivakumaran, Arasaratnam

(S05a-3) Experimental study on buckling-restrained steel plate shear walls
Jin, Lu, Liu, Sun, Li

(S05a-4) Challenges in designing ultra-lightweight buckling restrained brace
Tinker, Dusicka

(S05a-5) Experimental study on brittle fracture of buckling-restrained braces influences of core plate welding specifications and experimental temperatures
Iwata, Murai, Nakagomi

(S05a-6) Experimental study on the hysteretic behavior of thin-walled H-shaped steel beam-columns under compression and weak-axis bending
Cheng, Chen, Pan, Wu

(S05a-7) Evaluation of plastic deformation capacity of H-shaped steel beams with new value of plate slenderness
Ikarashi, Shinohara, Suekuni, Wang

11:00 - 12:45  Session  5b: Self Centering Seismic Systems  
Chair: R. Sause, C. Aguirre
Centroamerica Room

(S05b-1) Self-Centering truss moment frames with replaceable energy-dissipating elements
Darling, Eatherton

(S05b-2) Behavior of self-centering buckling-restrained braces
Miller, Fahnestock, Eatherton

(S05b-3) Parametric study of self-centering concentrically-braced frame systems with friction-based energy dissipation
Roke, Jeffers

(S05b-4) Effects of energy dissipating capacity on seismic performance of self-centering structures
Zhang

(S05b-5) Seismic energy demands on steel framed structures with rigid and, alternatively, with post-tensioned semi-rigid connections
Lopez-Barraza, Ruiz, Bojorquez, Reyes-Salazar

(S05b-6) Shake table testing of a rocking steel frame designed to mitigate higher mode effects
Wiebe, Christopoulos, Tremblay, Leclerc

(S05b-7) Experimental validation of steel post-tensioned connections with web hourglass pins
Vasdravellis, Karavasilis, Uy

12:45 - 13:45  Lunch – Tupungato, Parinacota, Llaima

13:45 - 14:15  Keynote Lecture  
Chair: K. Kasai
Norteamerica Room

(KN-03) Research on connections on steel and composite structures.
James Ricles
14:15 - 16:00  
**Session 6a Analytical and Experimental Methods**  
Chair: A. Reinhorn, J.F. Beltran  

**Norteamerica Room**  
(S06a-1) Cycling tests of beam-upright connections in racking systems with a new hybrid procedure  
Calado, Castiglioni, Drei  
(S06a-2) Development of standard dynamic loading protocol for buckling-restrained braced frames  
Dehghani, Tremblay  
(S06a-3) Reliability-based seismic response transformation factors for steel frames using Artificial Neural Network  
Bojórquez, Ruiz, Bojórquez  
(S06a-4) A finite element approach for modeling bolted top and seat angle moment connections and components  
Ruffley, Rassati, Swanson  
(S06a-5) Computer-based nonlinear analysis method for seismic performance assessment of 3D frameworks  
Chiorean, Tarta, Barsan, Gobesz, Nedelcu  
(S06a-6) A fast incremental iterative procedure for ultimate strength analysis and design of composite steel-concrete cross-sections  
Chiorean  
(S06a-7) Real-time hybrid simulations of a 3-story steel frame building with magneto-rheological dampers subject to strong ground motions  
Chae, Ricles, Sause

14:15 - 16:00  
**Session 6b: Self Centering Seismic Systems/ Member Behaviour**  
Chair: L. Fahnestock, D. Grecea  

**Centroamerica Room**  
(S06b-1) Seismic performance of a steel self-centering moment resisting frame: hybrid simulations under DBE and MCE  
Lin, Ricles, Sause  
(S06b-2) Evaluation of performance-based design methodology for steel self-centering braced frame  
Chancellor, Akbas, Sause, Ricles, Joó, Tahmasebi  
(S06b-3) Collapse performance of steel self-centering braced frame systems  
Tahmasebi, Chancellor, Ricles, Sause, Joó, Akbas  
(S06b-4) Comparison of welded and post-tensioned steel moment-resisting frames  
Herning, Garlock, Freidenberg  
(S06b-5) Finite element study of the cyclic flexural behavior of hollow structural sections  
Fadden, Mccormick  
(S06b-6) Seismic shear response of slab with distributed mass(linear-elastic bay model to story shear)  
iihoshi,Minagawa,Hanai,Kiriyama  
(S06b-7) Seismic behavior of flanged cruciform columns in moment resisting frame systems  
Mirghaderi, Motallebi

16:00 - 16:30  
**Coffee break – Foyer**
16:30 - 18:30  Session 7a: ECCS - TC13  
Chair: R. Landolfo, F. Mazzolani  
Norteamerica Room  
(S07a-1) Numerical study on welded beam-to-column joints in hybrid-steel building frames  
Cermelj, Beg  
(S07a-2) Seismic design and strengthening of beam-to-column joints with bolted end plates  
Aribert  
(S07a-3) Validation of a design procedure for failure mode control of irregular moment resisting frames by means of IDA analyses  
Piluso, Montuori, Giugliano  
(S07a-4) Comparative assessment of the seismic performance of steel building configurations  
Málaga-Chuquitaype, Elghazouli  
(S07a-5) Efficient formulation for nonlinear dynamics analysis of steel frames  
Hjiaj, Le, Battini  
(S07a-6) Global performance of steel frames of shear walls  
Dubina, Dinu, Neagu  
(S07a-7) Experimental analysis of partially buckling inhibited pure aluminium shear panels  
De Matteis, Brando, D'Agostino, Mazzolani  
(S07a-8) Re-centering capability of dual eccentrically braced frames with removable bolted links  
Stratan, Ioan, Dubina

16:30 – 18:30  Session 7b: Connection Behaviour  
Chair: M. Garlock, G. Rassati  
Centroamerica Room  
(S07b-1) Prequalification of two beam-to-column welded moment connection with reduced beam section in the beam and with cover plate for steel building applications under the action of dynamic load  
Cerón Pino, Areiza Palma, Thomson  
(S07b-2) Cumulative damage models for steel moment frame connections  
Campbell, Richard  
(S07b-3) Finite element simulation of cyclic flexural behavior for braced frame beam-column connections  
Stoakes, Fahnestock  
(S07b-4) Seismic behaviour of the diagonal through plate moment connection  
Torabian, Mirghaderi, Keshavarzi  
(S07b-5) Strength capacity of the gusset plate connection with fillet welds  
Cui, Asada, Kishiki, Yamada  
(S07b-6) Inelastic seismic performance of brace connections in steel tension-only concentrically braced frames  
Hartley, Rogers, Castonguay, Tremblay  
(S07b-7) Experimental research on hysteretic behavior of non-diaphragm joint connecting cold-formed steel tube and H-shaped beam  
Zhang, Chen  
(S07b-8) Shim and bolt size effects on the Asymmetric Friction Connection  
Khoo, Clifton, Butterworth, MacRae

20:00 - 24:00  Banquet - Tupungato, Parinacota, LLaima
Wednesday 11th

9:00 - 9:30  **Keynote Lecture**  
Chair: F. Mazzolani  
Norteamerica Room (KN-04) Multistorey steel framed building damage from the Christchurch earthquake series of 2010/2011  
Charles Clifton

9:30 - 11:00  **Session  8a Global Behavior**  
Chair: C. Rogers  
Norteamerica Room  
(S08a-1) P-Δ effects on the response of steel moment-resisting frame structures  
Ramos-Zela, Sullivan  
(S08a-2) A comprehensive study on the performance of Submerged Floating Tunnels during severe seismic events.  
Martire, Faggiano, Mazzolani, Zollo, Stabile  
(S08a-3) Seismic assessment of existing steel braced frames designed according to the 1980 Canadian code provisions  
Jiang, Balazadeh-Minouei, Tremblay, Koboевич, Tirca  
(S08a-4) Seismic performance of high strength steel moment-resisting frames  
Silva, Serra, Rebele, Silva, Lima, Landolfo, D’Aniello  
(S08a-5) Influence of the initial imperfections on the seismic performance of pitched roof portal frames made of welded non-prismatic plated elements  
Cristutiu, Nunes  
(S08a-6) Contribution of shear connections to the lateral stiffness and strength of steel frames  
Barber, Rassati, Swanson

9:30 - 11:00  **Session  8b Mixed and Composite Structures**  
Chair: R. Herrera, S. Yamada  
Centroamerica Room  
(S08b-1) Study on the shear strength of composite concrete and steel plate shear walls with binding bars  
Zhou,Zhu, Stojadinovic  
(S08b-2) Experimental study on composite steel-concrete shear walls with vertical steel encased profiles  
Dan, Fabian, Stoian  
(S08b-3) Experimental study on mechanical behavior of exposed-type square CFT column base with built-in reinforcing bars  
Matsuo, Qiao, Ninakawa, Kawano  
(S08b-4) Strength of headed studs in composite structural connection with SFRCC  
Yunbiao, Kazuaki, Shuhai, Yao, Masayoshi  
(S08b-5) Strength and ductility of concrete encased composite columns  
Campian, Sav, Chira, Chira  
(S08b-6) Development of Steel-Wood Hybrid Systems for Buildings under Dynamic Loads  
Stiemer, Tesfamariam, Karacabeyli, Propovski

11:00 - 11:30  **Coffee break - Foyer**
Session 9a: Global Behavior
Chair: R. Tremblay, D. Mistakidis

(N09a-1) Interdependence between seismic damage and masonry infill wall topology for steel structures with a bare ground floor
Nanos, Elenas, Tzourmakliotou

(N09a-2) Seismic behavior of setback and pyramid-shaped steel moment resisting frames designed by an energy-based method
Chegini, Mirghaderi, Vahdani, Keshavarzi

(N09a-3) Comparison between field measurements and numerical predictions of the dynamic properties of a low-rise steel building with a flexible steel roof deck diaphragm
Proulx, Boulanger, Bakhti, Shrestha, Tremblay, Rogers, Lamarche, Paultre

(N09a-4) Seismic performance of a high-rack warehouse structure with vertical and horizontal mass asymmetries
Petrovic, Kilar

(N09a-5) Seismic behavior of steel buildings: perimeter vs spatial moment frames
Reyes-Salazar, Rivera-Leyva, Bojorquez-Mora, Rodriguez-Lozoya, Lopez-Barraza

(N09a-6) Seismic simulation and design of low-rise CBF buildings with and without dissipative connections using open sees
Tirca, Caprarelli, Danila

Session 9b: Design, Fabrication and Practice
Chair: I. Vayas, H. Akiyama

(N09b-1) Design of composite slabs with profiled steel sheeting under concentrated loads
Calado

(N09b-2) Design of the Linked Column Frame structural system
Lopes, Dusicka, Berman

(N09b-3) Performance of steel tanks in Chile 2010 and 1985 earthquakes
Pineda, Saragoni

(N09b-4) Steel structure base shear coefficient comparison among the codes
Zandparsa

(N09b-5) Earthquake resistant design of eccentric, braced frame, steel buildings for improved inelastic response
Kyrkos, Anagnostopoulos

(N09b-6) Seismic design and experimental tests of an Italian Cold Formed Steel Structure
Iuorio, Fiorino, Macillo, Landolfo

11:30 - 13:00
Lunch - Tupungato-Parinacota-Llaima

14:00 - 14:30
Keynote Lecture
Chair: C. Clifton

(KN-05) Seismic performance of steel structures during the 2010 Maule earthquake
Ricardo Herrera
14:30 - 16:00  Session 10a: Global Behavior
  Chair: V. Piluso, C. Christopoulos

  Norteamerica Room
  (S10a-1) Control of vibrations by means of independent stiff braces for seismic protection
  Tosoni
  (S10a-2) Cyclic full-scale test of a two-story special steel beam-through braced frame for industrialized steel residential house
  Wang, Zhou, Chen, Tong
  (S10a-3) Local-buckling analysis of lower chord member in steel truss bridge under seismic loading
  Yamaguchi, Yamada
  (S10a-4) Impact of gravity loads on the lateral performance of cold-formed steel frame / steel sheathed shear walls
  Dabreo, Shamim, Rogers
  (S10a-5) Seismic performance of steel concentrically braced frames with bracing members intersecting columns between floors
  Imanpour, Tremblay, Davaran
  (S10a-6) Damage-based seismic performance evaluation of masonry infilled steel frames
  Nanos, Elenas, Tzourmakliotou

14:30 - 16:00  Session 10b: Seismic, Wind and Exceptional Loads
  Chair: M. Hiaj, R. Saragoni

  Centroamerica Room
  (S10b-1) Impact loading tests of steel portal frames with different types of connections
  Komuro, Kishi, Kurihashi
  (S10b-2) Numerical simulation of collapse behavior of tall core-outrigger structures under severe earthquake
  Sun, Ge, Xu
  (S10b-3) Seismic - aeolian optimal design for wind turbines steel structures in Mexico
  Pérez Rocha, López López, Arzola Núñez
  (S10b-4) Damage mechanism of thick fireproof coatings for steel members subjected to monotonic loading
  Chen, Jiang, Li
  (S10b-5) Seismic risk assessment of conventional steel constructions considering three earthquake mechanisms in Southwestern British Columbia
  Piña, Ventura

16:00 - 16:30  Coffee break – Foyer

16:30 - 17:45  Session 11a: Global Behavior
  Chair: D. Beg, L. Tirca

  Norteamerica Room
  (S11a-1) Seismic response of dual eccentrically braced systems designed by Eurocode 8
  Bosco, Ghersi, Rossi
  (S11a-2) Seismic behaviour of a large span welded steel structure considering lateral restraints and initial imperfections: a case study
  Nagy, Cristutiu, Nunes
  (S11a-3) Residual stress and out-of-plumb effects on steel column seismic behaviour
  MacRae, Lu, Masuno, Sadashiva, Ziemian, Wada, Clifton
  (S11a-4) Response behavior of steel buildings under pulsive earthquake ground motion during inland shallow earthquake
  Takiyama, Hayashi, Minami
  (S11a-5) Simplified assessment of the seismic collapse capacity of flexible moment-resisting steel frame structures
  Adam, Jäger
16:30 - 17:45  Session 11b: Seismic, Wind and Exceptional Loads
              Chair: A. Mandara

Centroamerica Room
(S11b-1) Intensity measure parameters for the evaluation of the seismic behaviour of steel
moment resisting frames
Haj Najafi, Tehranizadeh
(S11b-3) Instability problems due to dynamic loading.
Karatzas, Karatzas, Karidis
(S11b-4) Assessment of progressive collapse-resisting capacity of steel moment frames.
Ferraioli, Mandara
(S11b-5) Dynamic response analysis of steel portal frames with semi-rigid connection under
impact loading
Kishi, Komuro

18:00 - 18:30  Closing Ceremony
Norteamerica Room

Thursday 12th

9:00 - 19:00  Technical tour
Marga Marga bridge, Federico Santa Maria University, and Viña del Mar
Technical Tour

Titanium – La Portada
Reinforced concrete and steel structure
Monday, January 9, 2012. 19:00 – 20:00

La Portada is the name of an area where the city narrows - between Santiago’s Metropolitan Park and San Luis Hill. In this zone, wind and water are joined by the rhythm imposed by nature and urban life. Therefore, the tower facades were conceived as wind-filled sails that rotate on their vertical axes, giving the building the dynamism of a great urban door.

It is one of the most technological and modern engineering works built in Chile and it is part of a select worldwide group of buildings certified as sustainable design projects leading energy and environmental efficiency.

The site was chosen for its strategic location, in an area with great symbolism and connectivity, where the structure can be seen from different points of the city.

The design was formulated with the consultancy of experts with extensive experience in the creation of skyscrapers, and it fully complies with strict international standards.

The tower was built with reinforced concrete and steel, structured with a solid core, perimeter framing, and prestressed concrete floors. At both ends of the tower, metallic diagonals with energy dissipaters are placed to reduce deformation during earthquakes.

Energy dissipators make these kinds of building structures possible, by offering a high level of security in the event of a severe earthquake or extreme winds. The dissipation of energy is allowed by special devices in the structure that reduce deformations and structural stress.

Torre Titanium La Portada is the first project approved by the U.S. Green Building Council (USGBC) to enter a process of environmental certification according to LEED CS (Leadership in Energy and Environmental Design for Core & Shell), which honors leaders in sustainable design projects in energy and environmental efficiency.
Technical Tour

Marga Marga Bridge
Seismic Isolation System
Thursday, January 12, 2012. 9:00 – 19:00

The Marga Marga bridge, located at the city of Viña del Mar, was the first chilean bridge designed considering base isolation with high-damping rubber bearings (HDRB).

The bridge consists of a single continuous 383 m superstructure supported on 36 HDRB that rest on two abutments and seven piers. Girder height is 2800 mm; flange thickness and width varies along the length. ASTM A-242-81 steel was used for the girders.

Seven piers support the girders. Pier height varies from 22 to 30 m, the tallest one located near the north abutment. A hollow-box type 2×10 m section, 0.25 m thick, is provided for all piers. Concrete cylindrical strength of 24 MPa was used in all concrete pier elements.

The connections between steel girders and piers, and steel girders and abutments are provided through rectangular, high-damping rubber seismic bearings. All the isolators are 300 mm high, with 204 mm of rubber, 16 reinforcing steel shims of 3 mm thick and two 25 mm steel plates at the top and bottom surfaces.

At the abutments, isolation was provided only in the longitudinal direction. In the transverse direction, steel plate stoppers were provided to restrict motion. Finger joints were provided at each end to accommodate 225-mm displacements in the longitudinal direction to allow for thermal and seismic deformations. Transverse and longitudinal motions are allowed at piers, although an additional safety concrete stopper was provided in the transverse direction.
Author’s Index

A
Adam, C., S11a-2
Aguirre, C., S03b-4
Akazawa, T., S03a-3
Akbas, G., S06b-2, S06b-3
Akiyama, H., S03b-7
Alexa, P., S02a-3
Amiri, A., S04a-4
Anagnostopoulos, S., S09b-5
Anastasiadis, A., PS-02
Anderson, J., S04a-4
Araki, K., S04b-1
Arasaratnam, P., S05a-2
Areiza Palma, G., S07a-1
Aribert, J., S07b-2
Arzola Nuño, I., S10b-3, S11b-5
Asada, H., S07a-5
Atlayan, O., S02b-6, S03b-2
Avossa, A., PS-07
Ayala, A., S03b-5

B
Bakhti, F., S09a-4
Balazadeh-Minouei, Y., S08a-3
Banitopouloous, C., PS-01
Barbat, A., S04a-3
Barber, M., S09a-1
Barlas, E., S03a-8
Barsan, G., S06a-5
Battini, J., S07b-5
Beg, D., S07b-1
Berman, J., S09b-2
Bermudez Mejia, C., S04a-3
Beskos, D., S03b-6
Billington, S., S04a-2
Bojórquez, J., S06a-3
Bojórquez, E., S06a-3, S02b-5, S05b-5
Bojorquez-Mora, E., S09a-6
Bordea, S., S03a-6
Borzi, B., S10b-6
Bosco, M., S02b-3, S11a-3
Boulanger, B., S09a-4
Brando, G., S07b-7
Bravo, M., S04b-4
Broderick, B., PS-10
Bruneau, M., KN-04
Butterworth, J., S07a-8
C
Calado, I., S01a-1, S09b-1, S06a-1, S01a-2, S02a-1
Calderoni, B., PS-03
Campbell, S., S07a-2
Campian, C., S08b-5
Cancelliere, N., S04b-6
Capparelli, C., S10a-1
Cardone, D., S03a-1
Castiglioni, C., S01a-1, S06a-1, S01a-2, S02a-1
Castonguay, P., S07a-6
Castro, J., S03a-7
Ceresa, P., S10b-6
Cermelj, B., S07b-1
Cerón Pino, C., S07a-1
Chae, Y., S06a-7
Chancellor, N., S06b-2, S06b-3
Chanchi, S03b-8, S04b-9, S02a-8
Charney, F., S02b-6, S03b-2
Chase, S03b-8, S04b-9, S02a-8
Chegini, Z., S09a-3
Chen, S., S10b-4
Chen, Y., S07a-7, S10a-3, S05a-6
Cheng, X., S05a-6
Chiba, D., S03a-5
Choirean, C., S06a-5, S06a-6
Chira, N., S08b-5
Chira, A., S08b-5
Christopoulos, C., S02a-4, S05b-6
Chung, Y., S04b-2
Clemente, P., KN-01
Clifton, C., S11a-5, S07a-8, KN-04, S03b-8, S04b-9, S02a-8
Colajanni, P., S04b-6
Cortes Salas, C., S05a-1
Cristiuti, I., S11a-4, S08a-5
Cruz-Mendoza, E., S10a-7
Cui, Y., S07a-5

D
D’Agostino, F., S07b-7
D’aniello, M., S08b-4, S04a-7, PS-05, PS-06
Da Silva, L., S04a-7
DaBreo, J., S10a-5
Dan, D., S08b-2, S03a-4
Danila, N., S10a-1
Darling, S., S05b-1
Davaran, A., S10a-6
De Matteis, G., S07b-7
Dehghani, M., S06a-2
Demeter, I., S03a-4
Di Sarno, L., S02b-4
Dimakogianni, D., S01a-2
Dinu, F., S03a-6, S07b-6, S03b-1
Dohi, H., S03a-5
Douglas, G., S01a-2
Drei, A., S06a-1
Dubina, D., S03a-6, S07b-6, S07b-8, S03b-1, S04b-7
Dusicka, P., S09b-2, S05a-4

E
Eatherton, M., S05b-1, S05b-2
Ebato, K., S04b-8
Elenas, A., S11a-1, S09a-2
Elghazoui, A., S02b-2, S07b-4
Espinha, M., S01a-1
Esposto, M., PS-04

F
Fabian, A., S08b-2, S03a-4
Fadden, M., S06b-5
Faggiano, B., PS-04, S08a-2
Fahnestock, L., S07a-3, S05b-2
Faravelli, M., S10b-6
Fernández Torres, M., S11b-5
Ferraioli, M., S10b-7, PS-07
Ferro, E., S02a-2
Fiorino, L., S09b-6
Formisano, A., PS-08, S03a-9
Forni, M., KN-01
Fraley, G., S02a-7
Freidenberg, A., S06b-4
Fukuchi, Y., S04b-5
Fukushima, Y., S04b-1
Fussell, A., KN-04

G
Garlock, M., S06b-4
Ge, R., S10b-2
Georgiadi-Stefanidi, K., S03a-8
Ghersi, A., S11a-3
Gioncu, V., PS-02
Giubileo, C., PS-03
Giugliano, M., S07b-3, S03b-3
Gobes, Z., S06a-5
Gomez-Bernal, A., S10a-7
Goncalvez, R., S02a-1
Goto, W., S03a-5
Gray, M., S02a-4
Greca, D., S04b-7

H
Haj Najafi, L., S11b-2
Hale, E., S01b-2
Hanai, T., S06b-6
Harada, Y., S04b-8
Harik, I., S11b-3
Hariri Ardebili, M., S04a-6
Harris III, J., S02b-7
Hartley, J., S07a-6
Hatzigeorgiou, G., S03b-6
Hayashi, Y., S03a-3, S11a-6
Hernández, R., S03b-5
Herning, G., S06b-4
Herrera, R., KN-05, S04b-4
Hirosawa, K., S04b-1
Hijaij, M., S07b-5
Honma, S., S04b-8
Hu, J., S11b-3
Hunt, A., PS-10
Hurtado Gomez, J., S04a-3

I
Iihoshi, C., S06b-6
Ikarakasa, K., S05a-7
Imanpour, A., S10a-6
Inoue, K., S04b-5
Ioan, A., S07b-8
Iuorio, O., S09b-6
Iwata, M., S05a-5
Iyama, J., S04b-1

J
Jäger, C., S11a-2
Jeffers, B., S05b-3
Jiang, L., S10b-4
Jiang, Y., S08a-3
Jin, H., S05a-3
Joó, A., S06b-2, S06b-3
Juarez-Garcia, H., S10a-7

K
Kamaris, G., S03b-6
Kaneda, PS-14
Kanyilmaz, A., S02a-1
Karacabeyli, S08b-6
Karatzas, E., S11b-4
Karatzas, V., S11b-4
Karavasilis, T., S01b-2, S05b-7
Karidis, G., S11b-4
Karydakis, P., S01a-2
Kasai, K., KN-02
Kawai, D., S04b-5
Kawano, A., S08b-3
Kazuaki, H., S08b-4
Kerawala, S., S01b-2
Keshavarzi, F., S09a-3, S07a-4
Khoo, H., S07a-8
Kilar, V., S09a-5
Kimura, PS-14
Kiriya, S., S06b-6
Kishi, N., S11b-1, S10b-1
Kishiki, S., S07a-5
Koboevic, S., S08a-3
Koetaka, Y., S04b-5
Komuro, M., S11b-1, S10b-1
Kurirashi, Y., S10b-1
Kyrkos, M., S09b-5

L
La Manna Ambrosino, G., PS-06
La Mendola, L., S04b-6
La Tegola, A., S04a-8
Ladar, I., S02a-3
Lamarche, C., S09a-4
Landolfo, R., S08b-4, PS-05, PS-06, S04a-7, S09b-6
Latour, M., S04b-3
Lavassas, I., PS-01
Lavino, A., PS-07
LE, T., S07b-5
Leclerc, M., S05b-6
Lehman, D., S03b-8
Leon, R., KN-04
Li, G., S10b-4, S05a-3
Liang, R., S01b-1
Lignos, D., S04a-2
Lima, L., S08b-4
Lin, X., S04b-2
Lin, Y., S06b-1
Liu, X., S05a-3
Lluhen, E., S02a-5
Longo, A., S03b-3
Lopes, A., S09b-2
López, S., S03b-5
López López, A., S10b-3
López-Barraza, A., S09a-6, S05b-5
Lu, Y., S05a-3
Lu, A., S11a-5
Lucco, R., S04a-1

M
Macillo, V., S09b-6
MacRae, G., S11a-5, S07a-8, KN-04, S03b-8, S04b-9, S02a-8
Mahvashmohamami, A., S02a-2
Málaga-Chuquitaype, C., S02b-2, S07b-4
Mandara, A., S10b-7, PS-07
Marino, E., S02b-3
Martelli, A., KN-01
Martire, G., S08a-2

O
Ohata, M., S06a-5
OJEDA, J., S02a-5
Okazaki, T., S04b-2
Olson, G., S02a-7
Onida, M., S10b-6
Onishi, Y., S03a-3

P
Packer, J., S02a-4
Palmer, K., S03b-8
Pan, L., S05a-6
Parra, A., S02a-5
Paultre, P., S09a-4
Pérez Rocha, L., S10b-3, S11b-5

PS

S
S01b
S02a
S03a
S03b
S04a
S04b
S05a
S05b
S06a
S06b
S07a
S07b
S08a
S08b
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