



UNIVERSITY
OF TRENTO - Italy

Department of Civil, Environmental
and Mechanical Engineering



UNIVERSITÀ
DEGLI STUDI
DI PADOVA



DIPARTIMENTO DI INGEGNERIA
CIVILE, EDILE E AMBIENTALE
DEPARTMENT OF CIVIL, ARCHITECTURAL
AND ENVIRONMENTAL ENGINEERING

RCEM2017 BACK TO ITALY

10th Symposium on River,
coastal and estuarine morphodynamics
Trento - Padova
September 15 – 22, 2017

PROGRAM

September 15 and 16 (Friday-Saturday)

Pre-conference short courses in Trento

September 18 to 21 (Monday – Thursday)

RCEM conference in Padova

September 22 (Friday)

Post-conference field trip on the braided Tagliamento River

Information and contacts

rcem2017@unitn.it

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Organizing and scientific committees

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Guido Zolezzi (*University of Trento*)

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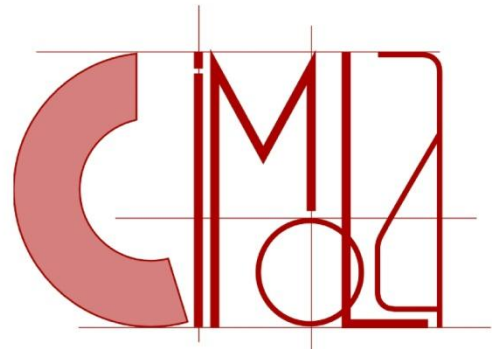
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INTERNATIONAL CENTER FOR TIDAL
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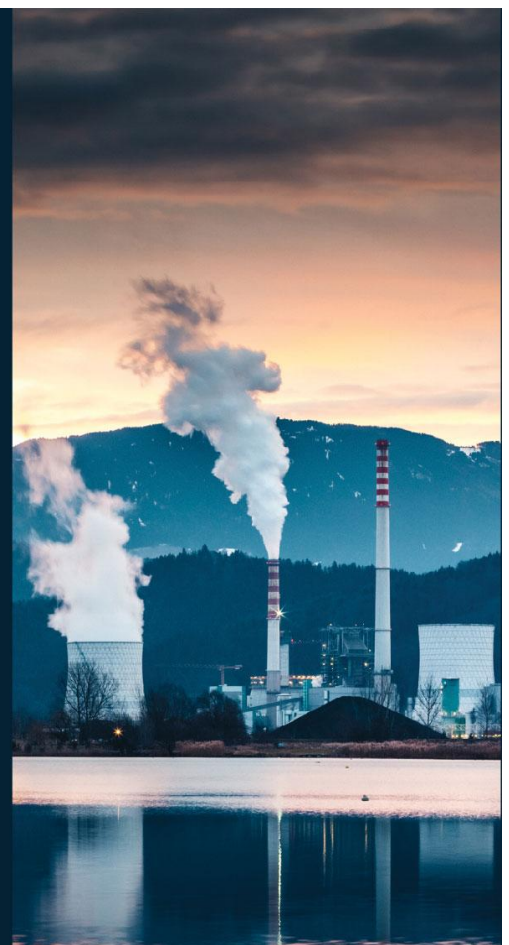
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RCEM venues

Altinate San Gaetano Cultural Centre

Centro Culturale Altinate San Gaetano

Via Altinate 71

The Altinate San Gaetano Cultural Centre is located in the historical centre of the City. It can be reached from the historical centre by foot (~ 10-15 min) through Via Altinate.

Palazzo Bo

Palazzo del Bo - Università di Padova

Via VIII Febbraio 2

The Palazzo Bo is located in the *listòn*, the most important pedestrian street of the historical centre of the city. It is the headquarter of the University of Padova.

Orto Botanico

Orto Botanico

Via Orto Botanico 15

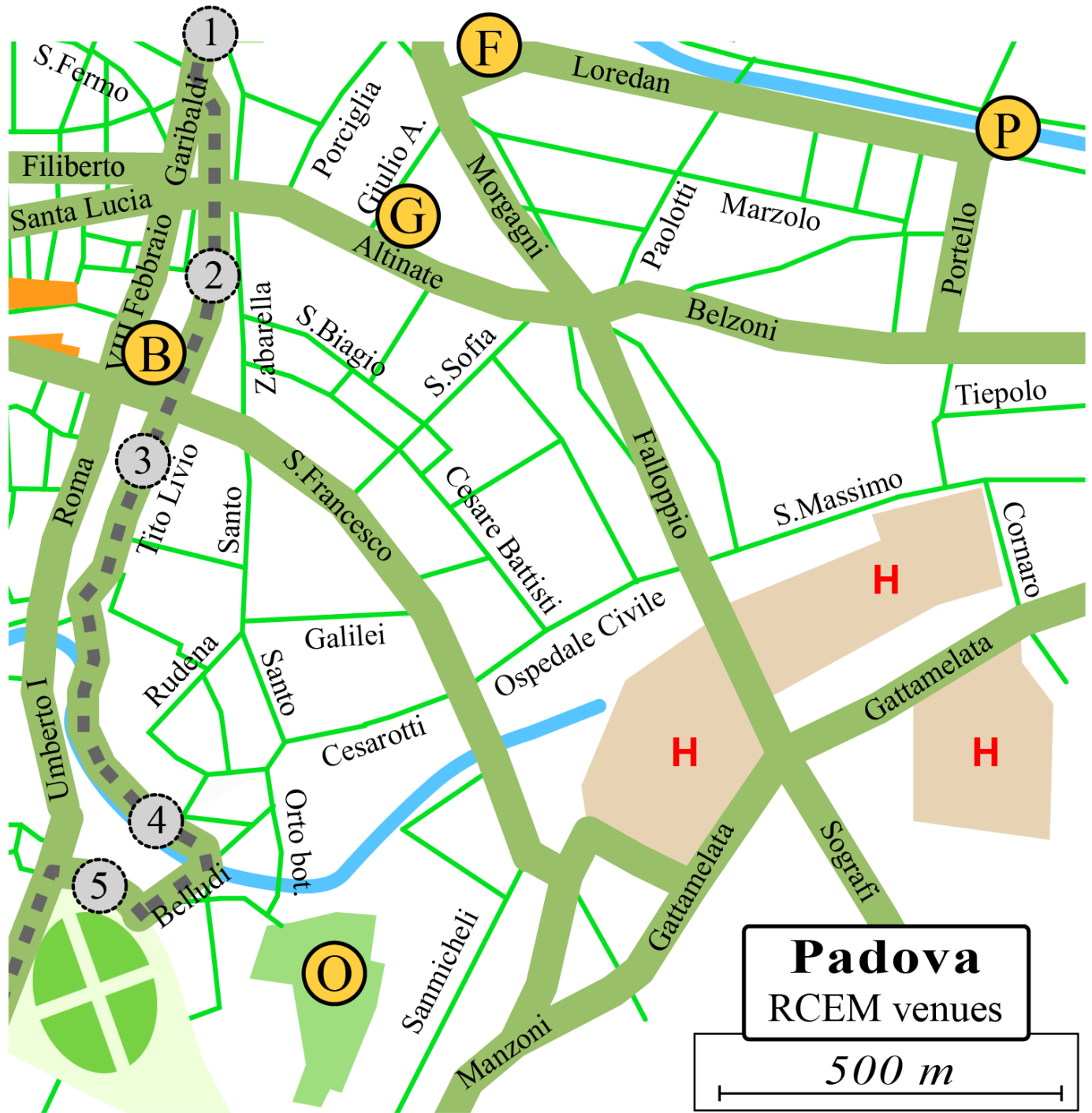
The Orto Botanico is close to Prato della Valle and Basilica of Sant'Antonio. It can be reached from the historic city centre by foot (~ 20-25 min) or by taking the tram (*Santo* or *Prato* stops).

Cruise pier

Imbarcadero

Porta Portello

The meeting point for the cruise to Venice is the north side of Porta Portello, located in the east side of the city centre along the Piovego Canal. It can be reached from the city centre by foot (~ 20-25 min), through via Loredan, via Marzolo, or via Altinate-Belzoni

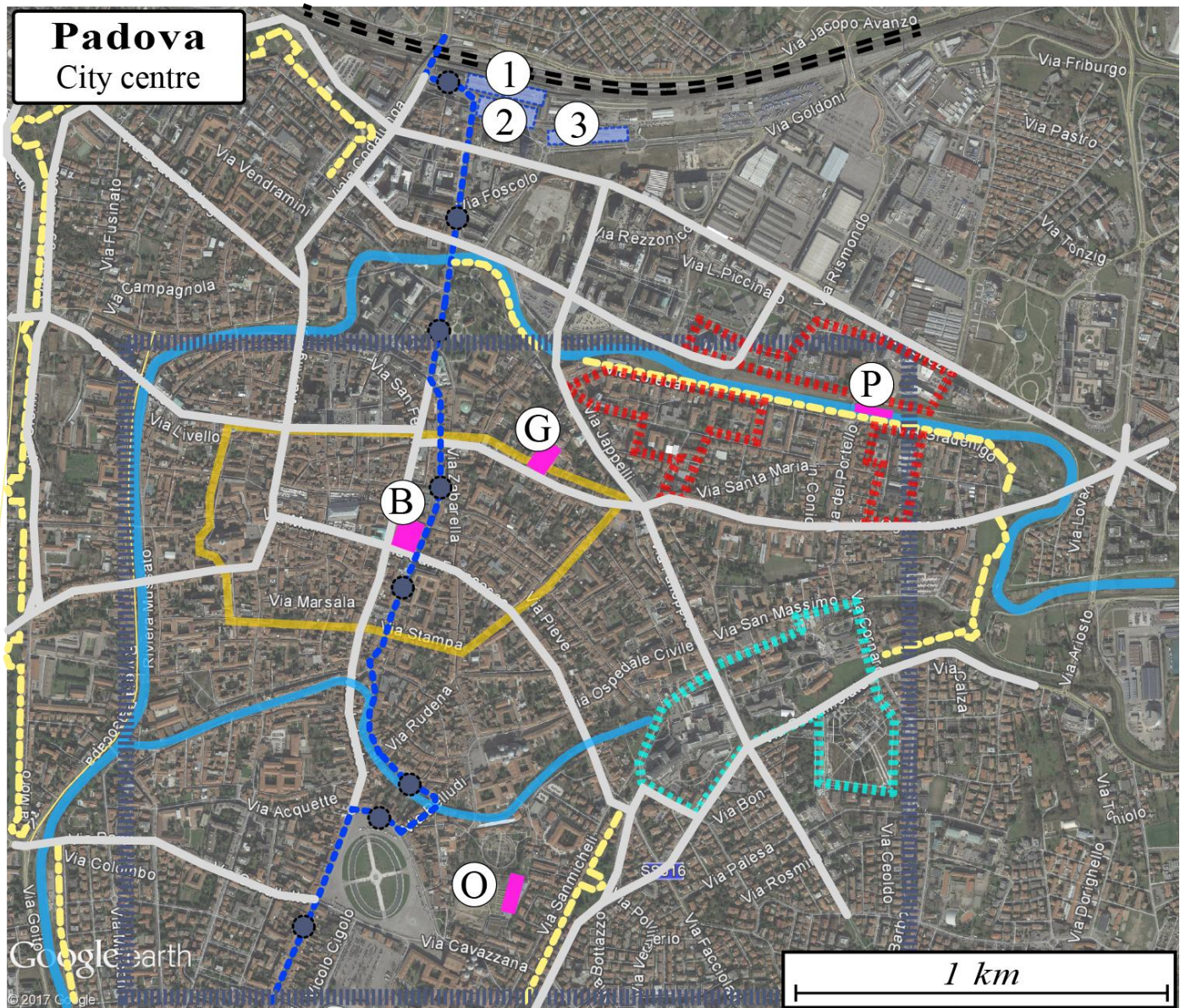


RCEM VENUES

- G - San Gaetano Cultural Centre
- B - Palazzo Bo
- P - Cruise Pier
- O - Orto Botanico
- F - Post-conference field trip meeting point

TRAM STOPS

- 1 - Eremitani
- 2 - Ponti Romani
- 3 - Livio
- 4 - Santo
- 5 - Prato



- historic centre*
- medical centre*
- university facilities*

main streets

railway

tram (stop)

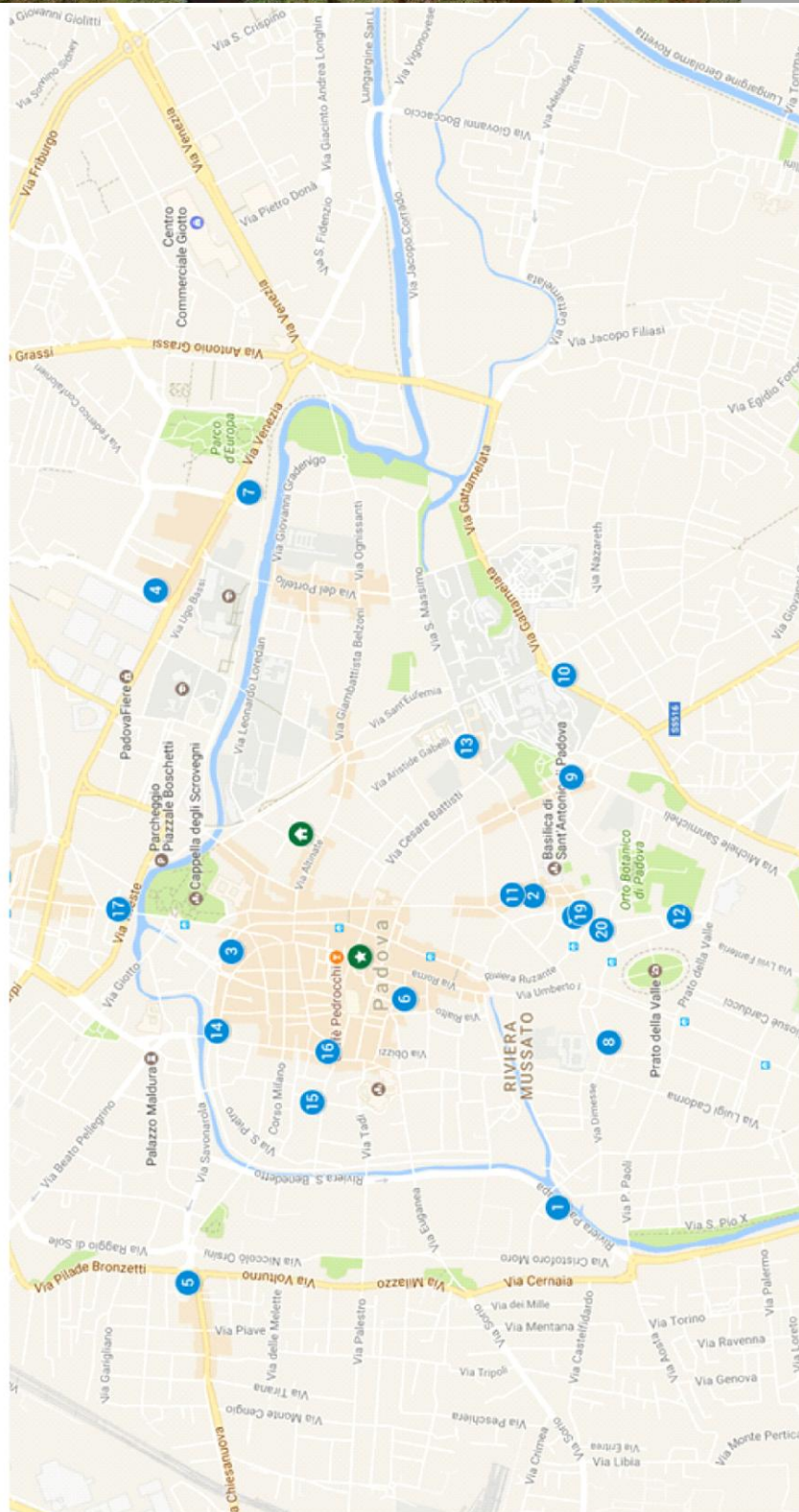
Medieval walls

RCEM venues

- G* *San Gaetano centre*
- B* *Palazzo Bo*
- P* *cruise pier*
- O* *Orto Botanico*

Transportation

- 1* *railways station*
- 2* *city bus hub*
- 3* *intercity bus hub*



- 1 Methia Hotel & SPA
 - 2 Hotel Donatello
 - 3 Hotel Europa
 - 4 Hotel NH Padova
 - 5 Hotel Milano
 - 6 Hotel Majestic Toscanelli Padova
 - 7 Best Western Premier Hotel Galileo
 - 8 Hotel M14
 - 9 Hotel Giotto Padova
 - 10 Hotel Maritan
 - 11 Hotel Al Santo
 - 12 Al Giardinetto
 - 13 Hotel Igea
 - 14 Albergo Sant'Antonio
 - 15 Albergo Verdi
 - 16 Diamantino
 - 17 Hotel Corso
 - 18 Albergo Al Faglano
 - 19 Hotel Belludi 37
 - 20 Hotel Mignon
- Conference Venue**
- 21 San Gaetano (Altinale) Cultural Center
 - 22 Bo Palace

PRE-CONFERENCE SHORT COURSES

Trento, September 15 – 16, 2017

Two pre-conference short courses take place in Trento before the conference days.

Course 1: Process-based mathematical modelling of bio-morphodynamics

The course is meant as an introduction for researchers who are interested in developing and using mathematical models to study quantitatively eco-geomorphic interactions in river systems

At the end of the course, participants should:

- have learned the basic phenomenology of the main biophysical processes governing the interaction among flow, sediment transport and riparian vegetation in river and estuarine environments,
- have acquired the basic tools to develop their own modelling research on biomorphodynamic interactions in rivers

Instructors: Paolo Perona, University of Edinburgh, UK; Walter Bertoldi, University of Trento, IT; Carlo Camporeale, Politechnic of Torino, IT, together with seminar inputs (G. Stecca, F. Caponi, A. Siviglia, M. Toffolon)

Course 2: Structure-from-Motion (SfM) techniques and applications for morphological monitoring

This course provides an introduction and hands-on-experience to the novel photogrammetric technology, Structure-from-Motion (SfM). If used properly, SfM can generate low-cost, high quality elevation models capable of detecting subtle morphological changes (see Figure below). Students will be given a short introduction of SfM techniques, and then guided through the entire dataset lifecycle of planning, acquiring, and processing. Finally, students will learn different opportunities to use the results for morphological detection.

Instructor: Luke Javernick, University of Trento, IT

17 Sept Sunday (San Gaetano)		
17:30 - 19:30	Registration	
18 Sept Monday (San Gaetano)		
8:30 - 9:00	Registration	
9:00 - 9:15	Opening	
9:15 - 10:05	Keynote: Patricia L. Wiberg (Auditorium)	
10:10 – 11:30	Coastal morphodynamics (Ground Floor)	Bars and mixed sediment transport (Auditorium)
11:30-12:00	BREAK	
12:00 – 13:20	Coastal morphodynamics (Ground Floor)	Bars and mixed sediment transport (Auditorium)
13:20 – 14:30	LUNCH	
14:30- 17:10	Estuaries (Ground Floor)	Meandering and bedrock morphodynamics (Auditorium)
17:10 – 17:40	BREAK	
17:40 - 18:30	Keynote: James Brasington (Auditorium)	
18:30	Ice Break party	
19 Sept Tuesday (San Gaetano + Bo Palace)		
8:30 - 9:20	Keynote: Paola Passalacqua (Auditorium)	
9:30 - 10:50	Deltas (Auditorium)	Ecomorphodynamics (Ground Floor)
10:50 - 11:20	BREAK	
11:20 - 12:40	Novel trends in morphodynamics (Auditorium)	Ecomorphodynamics (Ground Floor)
12:40 - 13:40	LUNCH	
13:40 - 14:30	Keynote: Tjeerd J. Bouma (Auditorium)	
14:30 - 17:00	Poster session (Agorà)	
17:00 - 17:30	BREAK – transfer to Palazzo Bo	
17:30 - 18:20	Keynote: Chris Paola (Aula Magna – Bo Palace)	

20 Sept Wednesday (San Gaetano + Orto Botanico)

8:30 - 9:20	Keynote: Hiroshi Takebayashi (Auditorium)	
9:30 - 10:50	Tidal morphodynamics (Ground Floor)	Bifurcations - braiding (Auditorium)
10:50 - 11:20	BREAK	
11:20 - 12:40	Tidal morphodynamics (Ground Floor)	Numerical and physical modelling (Auditorium)
12:40 - 14:00	LUNCH	
14:00 - 16:30	Poster session (Agorà)	
16:30 - 17:00	BREAK	
17:00 - 17:50	Keynote: Maurizio Brocchini (Auditorium)	
20:00	Banquet at Orto Botanico	
	Keynote: Paolo Blondeaux	

21 Sept Thursday (field trip in Venice by boat)

8:30	Boarding at Porta Portello pier
10:10 - 10:30	Oral session: G. Smart
10:30 - 11:20	Keynote: Andrew Ashton
	LUNCH
16:00-17:30	Stop at Riva Sette Martiri for a walk in Piazza San Marco
18:00	Return to Fusina by boat and transfer to Padova by bus
19:00	Arrival in Padova

22 Sept Friday (post-conference field trip on the Tagliamento River)

8:30	Gathering at Largo Egidio Meneghetti 1 (close to San Gaetano)
11:30	Arrival at the viewpoint on Mt. Ragogna
13:00	LUNCH
15:00	Walking tour on the braided river bed at Cornino
16:30	Departure from Cornino
19:30	Arrival in Padova

* All the meals are in Agorà, except if it is indicated in another place.

** Keynote presentation is 50 min (40 min. plus 10 min. for questions/answers). All Keynotes are in Auditorium, except if it is indicated in another place.

*** Contributed oral presentation is 20 min (15 min. plus 5 min. for questions/answers).

**** All posters are hung for the entire duration of the congress. Mounting material will be provided.

FIELD TRIP ON THE TAGLIAMENTO RIVER

Friday September 22nd

The fieldtrip will focus on the middle course of the Tagliamento, with a visit at panoramic sites where scenic views of the braided section of the river can be enjoyed. After getting a flavor of the local cuisine from the Friuli region, a walk on the river bars and vegetated islands is foreseen to stimulate discussion among participants and to provide a direct experience of such a unique river system in Europe.

We will get to the Tagliamento on a dedicated bus leaving from Padova at 9.00 am, and getting back to Padova no later than 7.30pm. Exact timing will be confirmed to the registered participants at the Conference.

More information on the Tagliamento is available on the conference website in the Download box.



Oral Sessions

Monday Morning

- 9.15 – 10.05 **KEYNOTE LECTURE – Auditorium**
**Integrating models and data toward a comprehensive characteri-
zation of hydro-eco-morpho-dynamics in a system of shallow coastal
bays**
Patricia L. Wiberg
Chair: A. Rinaldo

Coastal morphodynamics (Ground floor)

Chair: G. Coco & G. Vittori

- 10.10 - 10.30 **Shoreline changes along the coast of the Sanquianga Natural Park,
Colombian Pacific Ocean**
Cuervo, G.V., Castrillon C.
- 10.30 – 10.50 **A preliminary investigation of spit dynamics at Pagham Harbour, UK**
Townend, I.H., Scott, C.R., Warken, N.
- 10.50 – 11.10 **Laboratory experiments on the hysteresis of wave-generated ripples**
Jin, C., Coco, G., Tinoco, R.O.
- 11.10 – 11.30 **Formation and destruction events of shoreline sand waves**
Arriaga, J., Falqu ez, A., Ribas, F.
- 11.30 – 12.00 **COFFEE BREAK**

Chair: A. Ashton & D. Calvete

- 12.00 – 12.20 **On sand waves and sandy mounds**
Porcile, G., Blondeaux, P., Vittori, G.
- 12.20 – 12.40 **Vegetation impact on bed morphology: Laboratory studies on arrays
of rigid cylinders on a sandy bed under combined flows**
Tinoco, R.O., Coco, G.
- 12.40 – 13.00 **Linear stability analysis of bed waves formed by turbidity currents
with the simple mixing length turbulent model**
Izumi, N., Hagiwara, S.
- 13.00 – 13.20 **Coastal recovery: a numerical investigation**
Leonardi, N., Li, X., Donatelli, C.

Bars and mixed sediment transport (Auditorium)***Chair: A. Blom & M. Redolfi***

- 10.10 - 10.30 **Morphodynamics of downstream fining in rivers with a unimodal sand-gravel feed**
Parker, G.
- 10.30 – 10.50 **Gravel motion and channel evolution due to sand supply to gravel-beds: preliminary results**
Miwa, H., Yamada, K.
- 10.50 – 11.10 **Dynamics of a fine and coarse sediment mixture using a medical CT scan**
Camenen, B., Perret, E., Brunelle, C.B., Francus, P., Des Roches, M., Daigle, L.F.
- 11.10 – 11.30 **Stochastic bedload transport model in mountain streams**
Ancy, C., Bohorquez, P.
- 11.30 – 12.00 **COFFEE BREAK**

Chair: L. Adami & G. Stecca

- 12.00 – 12.20 **Bedload transport and particle motion statistics: insights from direct numerical simulations and stochastic models**
Gonzalez, C., Richter, D.H., Bolster, D., Calantoni, J., Escauriaza, C.
- 12.20 – 12.40 **Interaction of dunes and bars in lowland rivers**
de Ruijsscher, T.V., Naqshband, S., Hoitink, A.J.F.
- 12.40 – 13.00 **Stratigraphic feedbacks on alternate bar morphology**
Brown, R.A., Nelson, P.A.
- 13.00 – 13.20 **Influence of the graded sediment distribution and sediment supply on river bar patterns and dynamics**
Cordier, F., Tassi, P., Claude, N., Crosato, A., Rodrigues, S., Pham van Bang, D.

Monday Afternoon

Estuaries (Ground floor)

Chair: X. Bertin & A. Finotello

- 14.30 – 14.50 **The shape of alluvial estuaries**
Savenije, H.H.G.
- 14.50 – 15.10 **Scaling of estuary biogeomorphodynamics in the Metronome tidal facility**
Kleinhans, M.G., Braat, L., Leuven, J.R.F.W., Lokhorst, I.R.
- 15.10 – 15.30 **Finescale turbulence within mangrove root systems: A comparison between tropical and subtropical environments**
Mullarney, J.C., Horstman, E.M., Bryan, K.R., Norris, B.K., Henderson, S.M.
- 15.30 – 15.50 **Estuary scale experiments with saltmarsh vegetation**
Lokhorst, I.R., van Buiten, G., de Lange, S.I., Braat, L., Leuven, J.R.F.W., Kleinhans, M.G.
- 15.50 – 16.10 **Coupling effects of unsteady river discharges and wave energy on mouth bar morphodynamics**
Gao, W., Shao, D., Wang, Z.B.
- 16.10 – 16.30 **Modelling morphodynamics in mixed sediment environments: management of the morphological factor allowing forcing variability and processes inside the sediment, application to the Seine estuary**
Le Hir, P., Lemoine, J.P., Grasso, F.
- 16.30 – 16.50 **Tidally averaged sediment transport in a semi-enclosed tidal basin: influence of tidal flats**
Boelens, T., De Mulder, T., Shuttelaars, H.M., Schramkowski, G.
- 16.50 – 17.10 **A modified hydrodynamic of shallow tidal systems may temporarily slow down the local sea level rise facilitating the survival of salt marshes**
Silvestri, S., D'Alpaos, A., Carniello, L.

Meandering and bedrock morphodynamics (Auditorium)***Chair: T. Hoitink & S. Zen***

- 14.30 – 14.50 **Interactions between hydrodynamics, bed morphodynamics and bank erosion on a low sinuosity meander bend: Goodwin Creek, Mississippi**
Langendoen, E.J., Ursic, M.E., Mendoza, A., Abad, J.D., Ata, R., El Kadi Abderrezzak, K., Tassi, P.
- 14.50 – 15.10 **Effects of systematic variation of width, bank properties and downstream sediment routing on meander evolution using linearized models**
Howard, A.D., Bryk, A.B., Dietrich, W.E
- 15.10 – 15.30 **Width variation meandering evolution with a physic mathematical and statistical based model**
Lopez Dubon, S., Viero D., Bogoni, M., Lanzoni, S.
- 15.30 – 15.50 **Using time-lapse LiDAR to quantify river bend change on the coastal Trinity River, TX**
Mason, J., Mohrig, D.
- 15.50 – 16.10 **Experimental study of bedrock degradation in annular flume flow**
Taguchi, S., Ozawa, H., Lima, A.C., Izumi, N.
- 16.10 – 16.30 **Tracing bank erosion in a mixed bedrock-alluvial meander**
Inoue, T., Mishra, J., Shimizu, Y.
- 16.30 – 16.50 **Morphodynamics of bedrock canyons carved by megafloods**
Lamb, M.P., Lapotre, M.G.A., Larsen, I.J., Williams, R.M.E.
- 16.50 – 17.10 **Dynamics of migrating alternate bars in large meandering rivers: combining remote sensing and theoretical approaches**
Monegaglia, F., Tubino, M., Zolezzi, G.
- 17.40 -18.30 **KEYNOTE LECTURE – Auditorium**
Shining new light, literally, on river morphodynamics
James Brasington
Chair: W. Bertoldi

Tuesday Morning

- 8.30 – 9.20 **KEYNOTE LECTURE – Auditorium**
Connectivity in river deltas: Observations, modeling, and implications to coastal resilience
 Paola Passalacqua
 Chair: J. Syvitski

Deltas (Auditorium)***Chair: B. Murray & Z. Zhou***

- 9.30 – 9.50 **On the exceptional sediment load of the Huanghe (Yellow River), and its capacity to produce subaerial deltaic landscape**
 Nittrouer, J.A., Ma, H., Carlson, B., Moodie, A., Parker, G.
- 9.50 – 10.10 **Congruent bifurcation angles in river delta and tributary channel networks**
 Shaw, J.B., Coffey, T., Ke, W.
- 10.10 - 10.30 **Geomorphology of scour holes at tidal channel confluence**
 Ferrarin, C., Madricardo, F., Rizzetto, F., Mc Kiver, W., Bellafiore, D., Umgiesser, G., Kruss, A., Foglioni, F., Trincardi, F.
- 10.30 – 10.50 **Delta morphodynamics: Coupling River Avulsions, Coastal Sediment Transport, and Sea-Level Rise**
 Murray, A.B., Ratliff, K., Hutton, E.
- 10.50 – 11.20 **COFFEE BREAK**

Novel trends in morphodynamics (Auditorium)***Chair: Y. Shimizu & M. Tubino***

- 11.20 – 11.40 **Evidence of river morphodynamics on Mars: observations in Gale Crater with the Curiosity Rover**
 Dietrich, W:E.
- 11.40 – 12.00 **Rivers under temperate valley glaciers: does sediment transport matter?**
 Lane, S.N., Egli, P., Ruttiman, S., Perolo, P., Irving, J., Mankoff, K., Rennie, C.D.
- 12.00 – 12.20 **Do we need thermal-dynamic transport models?**
 Syvitski, J.P., Cohen, S., Best, J.L.

- 12.20 – 12.40 **Sediment bed stability re-distributed by bacterial biofilms**
Chen, X.D., Zhang, C.K., Gong, Z., Zhou, Z., Feng, Q.

Ecomorphodynamics (Ground floor)

Chair: D. Vanzo & M. Welber

- 9.30 – 9.50 **Eco-morphodynamics for environmental water allocation in non-perennial rivers: challenges and opportunities**
Grenfell, M.C.
- 9.50 – 10.10 **A mechanism of seeds dispersion and its effects on bed morphodynamics**
Kyuka, T., Yamaguchi, S., Watanabe, K., Shimizu, Y.
- 10.10 - 10.30 **A simple dynamic model for describing the effects of plant root systems on river morphodynamics**
Caponi, F., Siviglia, A., Boes, R.M.
- 10.30 – 10.50 **Experimental investigations on riparian vegetation uprooting**
Calvani, G., Francalanci, S., Solari, L., Gumiero, B.
- 10.50 – 11.20 **COFFEE BREAK**

Chair: M. Bogoni & E. Mosselman

- 11.20 – 11.40 **Morphological effects of plant colonization of near-bank bars**
Vargas-Luna, A., Durò, G., Crosato, A., Uijttewaal, W.S.J.
- 11.40 – 12.00 **Secondary instability of vegetated patterns in river beds**
Bertagni, M.B., Perona, P., Camporeale, C.
- 12.00 – 12.20 **Numerical modelling of bio-morphodynamics in braided rivers: applications to a laboratory test configuration**
Stecca, G., Fedrizzi, D., Hicks, M., Measures, R.J., Zolezzi, G., Bertoldi, W., Tal, M.
- 12.20 – 12.40 **Temporal-spatial variation of sediment and vegetation on sand and gravel beach located between inner bay and open sea**
Uno, K., Nakanishi, H., Tujimoto, G., Kakinoki, T.

Tuesday Afternoon

- 13.40 – 14.30 **KEYNOTE LECTURE – Auditorium**
Small-scale process as driver of large-scale dynamics in coastal vegetation: an ecologist view on biogeomorphology
Tjeerd J. Bouma
Chair: M. Marani
- 14.30 – 17.00 **POSTER SESSION – Agorà**
- 17.30 – 18.20 **KEYNOTE LECTURE - Bo Palace**
The thin blue line: shoreline dynamics as a unifying theme across time and across disciplines
Chris Paola
Chair: A. D'Alpaos

Wednesday Morning

- 8.30 – 9.20 **KEYNOTE LECTURE – Auditorium**
Effect of sediment sorting on river morphology
 Hiroshi Takebayashi
 Chair: M. Tubino

Tidal morphodynamics (Ground floor)***Chair: M. Ghinassi & S. Temmerman***

- 9.30 – 9.50 **Resilience signatures reveal tipping elements in tidal marshes**
 van Belzen, J., van de Kopper, J., van der Wal, D., Herman, P.M.J.,
 Bouma, T.J.
- 9.50 – 10.10 **On the initial formation and long-term equilibrium of tidal channels**
 Xu, F., Coco, G., Tao, J., Zhou, Z., Zhang, C.
- 10.10 - 10.30 **Physical modelling of tidal network evolution: the influence of tide
 asymmetry**
 Gong, Z., Geng, L., Zhang, C., Lanzoni, S., D'Alpaos, A.
- 10.30 – 10.50 **Impact of bended channels on tidal inlet migration: a modelling
 study**
 Bertin, X., Guerin, T., de Bakker, A.
- 10.50 – 11.20 **COFFEE BREAK**
- Chair: J.P Belliard. & N. Tambroni***
- 11.20 – 11.40 **Modeling the role of storms on tidal flat sorting dynamics**
 Zhou, Z., Xu, M., Zhang, C.K., Coco, G.
- 11.40 – 12.00 **Tidal point bar sedimentation: modern and ancient examples**
 Ghinassi, M., D'Alpaos, A., Oms, O., Fondevilla, V.
- 12.00 – 12.20 **Towards ecosystem-based coastal defence: How bio-physical
 interactions determine wave and storm surge protection by tidal
 marshes**
 Temmerman, S., Silinski, A., Heuner, M., Schoutens, K., Stark, J.,
 Meire, P., Trock, P.
- 12.20 – 12.40 **Morphodynamic equilibria of double inlet systems**
 Meerman, C., Olabarrieta, M., Rottschäffer, V., Valle Levinson, A.,
 Schuttelaars, H.M.

Bifurcations – Braiding (Auditorium)

Chair: S. Francalanci & P. Tassi

- 9.30 – 9.50 **The incipient development of topographic expansions**
Tambroni, N., Seminara, G., Paola, C.
- 9.50 – 10.10 **How do Alpine braided rivers respond to sediment-laden flow events?**
Bakker, M., Antoniazza, G., Costa, A., Silva, T.A.A., Stutenbecker, L., Girardclos, S., Loizeau, J.L.
- 10.10 - 10.30 **Free and forced morphodynamics of river bifurcations: a novel theoretical framework**
Redolfi, M., Zolezzi, G., Tubino, M., Bertoldi, W.
- 10.30 – 10.50 **A gravel-sand bifurcation: a simple model and the stability of the equilibrium states**
Schielen, R.M.J., Blom, A.
- 10.50 – 11.20 **COFFEE BREAK**

Numerical and physical modelling (Auditorium)

Chair: L. Solari & D. Viero

- 11.20 – 11.40 **MORSPEED: a new concept for the speedup of morphological simulations**
Carraro, F., Siviglia, A., Vanzo, D., Caleffi, V., Valiani, A.
- 11.40 – 12.00 **Numerical modeling of morphodynamics at diversions: assessing the level of complexity required for capturing the inherent physics**
Dutta, S., Tassi, P., Fischer, P., Wang, D., Garcia, M.H.
- 12.00 – 12.20 **Laboratory study on bedforms generated by solitary waves**
La Forgia, G., Adduce, C., Falcini, F., Paola, C.
- 12.20 – 12.40 **Issues in laboratory experiments of river morphodynamics**
Crosato, A.

Wednesday Afternoon

14.00 – 16.30 **POSTER SESSION – First Floor**

17.00 – 17.50 **KEYNOTE LECTURE – Auditorium**
Wave-forced sediment dynamics in the nearshore and estuaries
Maurizio Brocchini
Chair: G. Coco.

Wednesday Evening

20.00 **KEYNOTE LECTURE - Banquet at Orto Botanico**
Twenty years after (an informal chat on recent achievements and future challenges in Morphodynamics)
Paolo Blondeaux
Chair: G. Parker

Thursday – Boat trip to the Venice Lagoon

10.10 – 10.30 **River, Coastal and Estuarine Morphodynamic change due to Earthquakes. Canterbury, New Zealand examples**
Smart G.

10.30 – 11.20 **KEYNOTE LECTURE**
Some morphodynamics of atolls, reef flats, and the islands atop them
Andrew Ashton
Chair: L. Carniello

Poster session

Tuesday 19 September

14.30 - 16.00 (Agorà)

Tidal and coastal morphodynamics

- 1 **Modelling and tracing of a sub-sea robot geometry in deep Caspian Sea using neuro-fuzzy systems and genetic algorithms**
Alaeipour, A., Harounabadi, A., Morovvati, H.
- 2 **Morphological evolution of estuary mouths with wave-current interactions modelled over centuries**
Albernaz, M.B., Braat, L., de Haas, T., van der Spek, A.J.F., Kleinhans, M.G.
- 3 **Suspended sediment transport and concentration in the delta area of the Magdalena river based on USP-61 and ADCP measurements**
Avila, H. , Amaris, G.
- 4 **Sensitivity of foreland cusplate migration to wave climate**
Barkwith, A., Hurst, M.D., Payo, A., Ellis, M.A.
- 5 **Tidal network morphology: unravelling the potential role of the marsh geomorphic setting**
Belliard, J.-P., Temmerman, S., Carniello, L., Toffolon, M.
- 6 **Flow regime changes in Vietnamese Mekong Delta due to river-damming**
Binh, D.V., Kantoush, S., Sumi, T., Mai, N.T.P., Ata, R., El kadi Abderrezzak, K., Trung, L.V.
- 7 **A modified hydrodynamic of shallow tidal systems may temporarily slow down the local sea level rise facilitating the survival of salt marshes**
Boelens, T., De Mulder, T., Schuttelaars, H.M., Schramkowski, G.,
- 8 **Cohesive sediment in scale-experiments of estuaries**
Braat, L., Leuven, J.R.F.W., Kleinhans, M.G.

- 9 **Large-scale river and estuary modeling with mud and vegetation**
Brückner, M.Z.M., Lokhorst, I.R., Selakovic, S., van Oorschot, M., de Vries, B.M.L., Braat, L., Kleinhans, M.G.
- 10 **Tidal propagation across a muddy mangrove forest in the Firth of Thames, New Zealand**
Bryan, K.R., Haughey, R., Horstman, E.M., Mullarney, J.C.,
- 11 **Shoreline Dynamics Under the Presence of a Rip-Channel System**
Calvete, D., Kakeh, N., Falqués A.
- 12 **Avulsion frequency on backwater-influenced deltas with relative sea-level rise**
Chadwick, A.J.
- 13 **A methodological regional approach for bed-load yield estimation to river mouths along the Emilia-Romagna coast**
Cilli, S., Billi, P., Ciavola, P., Schippa, L.
- 14 **Morphodynamic evolution and stratal architecture of tidal channels in the Venice Lagoon**
D'Alpaos, A., Ghinassi, M., Merlo, G., Finotello, A., Roner, M., Rinaldo, A.
- 15 **Morphodynamics of ebb-delta sandbars at a mixed-energy tidal inlet**
de Bakker, A., Guérin, T., Bertin, X.
- 16 **The role of oblique wave incidence on crescentic bar dynamics**
de Swart, R.L., Ribas, F., Calvete, D.
- 17 **The Inhomogeneous Impact of Low-water Storms on Intertidal Flats**
de Vet P.L.M., van Prooijen, B.C., Walles, B., Ysebaert, T., Schrijver, M.C., Wang, Z.B.
- 18 **Tidal asymmetries, lateral tributaries and overtides: implication for tidal meander morphodynamics**
Finotello, A., Canestrelli, A., Carniello, L., Brivio, L., Ghinassi, M., D'Alpaos, A.

- 19 **Benthic morphologies and sediment distribution in a shallow highly human impacted tidal inlet**
Fogarin, S., Madricardo, F., Zaggia, L., Ferrarin, C., Kruss, A., Lorenzetti, G., Manfè, G., Montereale Gavazzi, G., Sigovini, M., Trincardi, F.
- 20 **Applying geospatial models to investigate the impact of sea level rise on coastal wetland ecosystems: a comparison of two climatically contrasting wetlands**
Grenfell, S.E., Callaway, R.M., Fortune, F.
- 21 **Groin effects on artificial nourishments performance: Laboratory tests**
Guimarães, A., Coelho, C., Veloso-Gomes, F., Silva, P.A.
- 22 **What internal length scale determines the tidal bar length in estuaries?**
Hepkema, T.M., de Swart, H.E., Schuttelaars, H.M.
- 23 **Channel sedimentation causing by grouping waves and wind waves at the fishing port, Japan**
Horie, T., Sasaki, T., Nozaka, Y., Kawamori, A., Tanaka, H.
- 24 **Linear Stability Analysis of Bed Waves Formed by Turbidity Currents with the Simple Mixing Length Turbulent Model**
Izumi, N., Hagsisawa, S.
- 25 **A new shoreline instability mechanism related to high-angle waves**
Kakeh, N., Falques, A., Calvete, D.
- 26 **Do distributaries in a delta plain resemble an ideal estuary? Results from the Kapuas Delta, Indonesia**
Kästner, K., Hoitink, A.J.F., Geertsema, T.J., Vermeulen, B.
- 27 **Scour hole development in tidal areas with a heterogenous subsoil lithology**
Koopmans, H., Huismans, Y., Uijttewaalt, W.S.J.
- 28 **Laboratory study on bedforms generated by solitary waves**
La Forgia, G., Adduce, C., Falcini, F., Paola, C.

- 29 **Coupled topographic and vegetation patterns in coastal dunes from remote sensing**
Lalimi, F.Y., Silvestri, S., Moore, L.J., Marani, M.
- 30 **Autogenic Cohesivity: Modeling Vegetation Effects on Delta Morphology and Channel Network Characteristics**
Lauzon, R., Murray, A.B., Piliouras, A., Kim, W.
- 31 **Cyclic behavior of ebb-tidal deltas from model simulations: the role of waves and tides**
Lenstra, K.J.H., Ridderinkhof, W., van der Vegt, M.
- 32 **Ebb- and flood tidal channels in scale-experiments of estuaries**
Leuven, J.R.F.W., Braat, L., van Dijk, W.M., Kleinhans, M.G.
- 33 **Numerical simulation of dredging and sediment disposal in fluvial and coastal areas**
Louyot, M., Glander, B., Kopmann, R., Kopmann, R., Tassi, P., Brivois, O.
- 85 **Velocity profile and stratigraphy analisys in experimental prograding deltas**
Bateman, A., Medina, V., Galera, D.
- 86 **Using pacific oyster *Crassostrea gigas* for sediment stabilization: how their effectiveness depends on biological and environmental setting**
de Paiva, J.S., Walles, B., Ysebaert, T., Bouma, T.J.

River morphodynamics

- 34 **Contrasting alternate bar patterns under sub- and super-resonant morphodynamic regimes in the Alpine Rhine river**
Adami, L., Zolezzi, G., Bertoldi, W.
- 35 **Discharge measurement and analysis of flow resistance at large-scale flood**
Akiyama, Y., Sasaki, Y., Hashiba, M., Yorozyuya, A.
- 36 **Bankfull paleodepth scaling from clinofolds: a unique dataset from the sandy, braided Missouri National Recreational River, USA**
Alexander J.S., McElroy, B.J., Murr, M.L.

- 37 **A space-marching model to assess the morphodynamic equilibrium behaviour in a river's backwater dominated reaches**
Arkesteijn, L., Labeur, R.J., Blom, A.
- 38 **Sediment transport in vegetated channel: the case of submerged vegetation**
Armanini, A., Nucci, E.
- 39 **Numerical modeling of meandering migration including the effect of slump blocks in river bank erosion**
Arnez, K., Kimura, I., Patsinghasanee, S., Shimizu, Y.
- 40 **Sediment transport processes on transverse bed slopes**
Baar, A.W., Weisscher, S.A.H., Uijttewaal, W.S.J., Kleinhans, M.G.
- 41 **Hydrologic control on the root growth of Salix cuttings at the laboratory scale**
Bau, V., Calliari, B., Perona, P.
- 42 **Study of the 3D flow patterns developed in a bend near a bifurcation in Mezcalapa River, Mexico**
Berezowsky, M., Rivera, F., Soto, G., Mendoza, A.
- 43 **River restoration: a strategy to flush fine clogged sediments?**
Berni, C., Herrero, A., Perret, E., Buffet, A., Thollet, F., Camenen, B.
- 44 **The dynamics of a gravel-sand transition**
Blom, A., Chavarrías, V., Viparelli, E.
- 45 **Numerical modeling of meander morphodynamics affected by internal boundary conditions**
Bogoni, M., Nittrouer, J.A., Cantelli, A., Lanzoni S.
- 46 **The sand dunes of the Colorado River, Grand Canyon, USA**
Buscombe, D., Kaplinski, M., Grams, P.E., Ashley, T., McElroy, B.J., Rubin, D.M.
- 47 **Low-energy stream morphodynamics**
Candel, J.H.J., Makaske, B., Storms, J.E. A., Kamstra, B.R.W., Kijm, N., Wallinga J.

- 48 **Basin-scale temporal evolution of the discharge and angular momentum ratios at confluences: the case of the Upper-Rhône watershed**
Cardot, R., Moradi, G., Fatichi, S., Molnar, P., Mettra, F., Lane, S.N.
- 49 **Field-based gravel fluxes measurements in a wandering river to assess sediment mobility downstream a dam (Durance River, Southern French Alps)**
Chapuis, M., Legrève, K., Kateb, L., Dufour, S., Couvert, B., Doddoli, C., Provansal, M.
- 50 **A strategy to avoid ill-posedness in mixed sediment morphodynamics**
Chavarrías, V., Stecca, G., Labeur, R.J., Blom, A.
- 51 **Limiting the development of riparian vegetation in the Isère River: a physical and numerical modelling study**
Claude, N., El kadi Abderrezzak, K., Duclercq, M., Tassi, P., Leroux, C.
- 52 **Sorting waves in heterogeneous sediment mixtures**
Colombini, M., Carbonari, C.
- 53 **Bedload transport rate fluctuations in a flume with alternate bars under steady state conditions**
Dhont, B., Ancey, C.
- 54 **Cohesive bank erosion processes identified from UAV imagery during an exceptional low water level event**
Duró, G., Crosato, A., Kleinhans, M.G., Uijttewaal, W.S.J.
- 55 **Comparison of flow and sediment transport between a symmetric and asymmetric bifurcation: searching for Bulle-Effect at asymmetric bifurcations**
Dutta, S., Fischer, P., Garcia, M.H.
- 56 **The response of braiding Intensity to Varying Discharge**
Egozi, R., Ashmore, P.
- 57 **Dam-break flow over mobile bed: detailed velocity field measurements**
Fent, I., Soares-Frazão, S.

- 58 **Velocity estimation of high-concentrated flows: sensitivity analysis with main parameters included in the Bagnold equation**
Fichera, A., Termini, D., Castelli, F.
- 59 **Equilibrium width for sand and gravel bed rivers with cohesive erodible banks**
Francalanci, S., Lanzoni, S., Solari, L., Papanicolaou, A.N.
- 60 **Dam-break induced sediment transport in a channel with a 90° bend**
Franzini, F., Abou-Habib, M., Michaux, J., Soares-Frazão, S.
- 61 **Backwater development by wood in lowland streams**
Geertsema, T.J., Torfs, P.J.J.F., Teuling, A.J., Eekhout, J.P.C., Hoitink, A.J.F.
- 62 **Multiscale challenges in bio-geomorphic modeling of tidal marshes**
Gourgue, O., van Belzen, J., Schwarz, C., Bouma, T.J., van de Koppel, J., Meire, P., Temmerman, S.
- 63 **Bedload transport and particle motion statistics: insights from direct numerical simulations and stochastic models**
González, C., Richter, D.H, Bolster, D., Calantoni, J., Escauriaza, C.
- 64 **Sand pulses and sand patches on the Colorado River in Grand Canyon**
Grams, P.E., Buscombe, D., Topping, D.J., Mueller, E.R.
- 65 **Morphological influences on grain-scale roughness across a gravel bar in a fluvial environment**
Groom, J., Friedrich, H.
- 66 **Bed load transport of sediment mixtures in laboratory flume: synchronized measuring with ADCP and Digital Camera**
Guerrero, M., Conevski, S., Bombardier, J., Ruther, N., Rennie, C.D.
- 67 **River morphology and river regime alteration after dam construction in the Kor River, Sothern Iran**
Haghighi, A.T., Yilmaz, N., Darabi, H., Kløve, B.

- 68 **Influence of riverbed deformation on flood flow in the Omoto river flood disaster 2016, Japan**
Harada, D., Egashira, S., Yorozyua, A., Iwami, Y.
- 69 **Setting the stage for levee building processes**
Hassenruck-Gudipati, H.J., Mohrig, D., Passalacqua, P.
- 70 **Initiated natural bank erosion for river bed stabilization, prediction and reality**
Hengl, M.
- 71 **Insight gained from Principal Component Analysis in the analysis of river morphodynamics and associated sediment fluxes**
Heyman, J., Dhont, B., Ancey, C., Lague, D.
- 72 **Influence of bed-load transport on the stability of step-pool systems**
Hohernuth, B., Weitbrecht, V.
- 73 **Coastal System Resilience Under Increased Storminess**
Houseago, R.C., Parsons, D.R., McLelland, S.
- 74 **Development and application of real-time scour monitoring techniques in gravel-bed river**
Hsu, S., Chang, Y., Sun, C., Hung, P.
- 75 **Operational monitoring of turbidity in rivers - Validation of remote sensing data**
Hucke, D., Hillebrand, G., Bascheck, B., Winterscheid, A.
- 76 **Morphological evolution of an artificial spawning pad: Field monitoring and numerical modeling**
Jodeau, M., Besmier, A.L., Vandewalle, F.
- 77 **Morphodynamics of the Mezcalapa bifurcation, in Tabasco, Mexico**
Joselina, E.A., Josè Alfredo, G.V., Jorge, B.Z.
- 78 **Studies on weak secondary flows in sharply curved bends using 3D CFD model**
Kang, T., Kimura, I., Shimizu, Y.

- 79 **Linking fluvial and aeolian morphodynamics in the Grand Canyon, USA**
Kasprak, A., Bangen, S., Buscombe, D., Caster, J., East, A., Grams, P.E., Sankey, J.
- 80 **Numerical modeling of sediment deposition around a finite patch of emergent vegetation**
Kim, H.S., Kimura, I., Park, M., Choi, J.
- 81 **Study on bed variation at a river confluence associated with the barrage water**
Kubo, H., Takata, S., Okamoto, Y., Kanda, K., Michioku, K.
- 82 **Influence of flow resistance change on hydrographs in a basin**
Kudo, S., Yorozuya, A., Harada, D., Fueta, T
- 83 **1D-numerical modelling of suspended sediment dynamics in a regulated river**
Launay, M., Dugué, V., Le Coz, J., Camenen, B.
- 84 **Fine sediment transport dynamics in a heavily urbanized UK river system: a challenge for the 'First-Flush' model**
Lawler, D., Wilkes, M.
- 87 **Temporal variability of deposition and erosion in a strongly regulated reservoir of the upper Rhine River**
Antoine, G., Henault, F., Le-Brun, M., Clutier, A.
- 88 **Sediment transport study for rough sand bed using CT scan and PIV measurements**
Brunelle, C.B., Francus, P., Des Roches, M., Daigle, L.F.
- 89 **Contemporaneity between floods and storms: the case study of the province of Reggio Calabria (Italy)**
Canale, C., Barbaro, G., Foti, G., Puntorieri, P.
- 90 **Quadrant analysis of high-turbulent flows**
Fernandez, C., Bateman, A., Medina, V.

- 91 **Long term effects of water mills on the longitudinal river profile and the trapping efficiency of floodplain study on bed variation at a river confluence associated with the barrage water**
Frings, R.M., Maaß, A.L., Schüttrumpf, H., Blom, A.
- 92 **Effect of cross-channel variation on the uncertainty of bed-load measurements: Universal guidelines for sampling bed-load in sand- and gravel-bed rivers**
Frings, R.M., Vollmer, S.
- 93 **Encontro das Aguas, Manaus, Brazil: Twenty years later**
Gualtieri, C., Ianniruberto, M., Filizola, N., Laraque, A., Best, J.L.
- 94 **Bedforms-ATM, a free software aimed to standardize the analysis of bedforms**
Gutierrez, R.R., Mallma, J.A., Abad, J.D., Nunez-Gonzalez, F.
- 95 **On the sediment scour-deposition mechanism around a new structure for management of river bend bank erosion**
Hajibehzad, M.S., Shafai Bajestan, M.
- 96 **Estimation of riverbed deformation by assimilating water-level and discharge data into quasi-2D fixed bed hydraulic model**
Hoshino, T., Yasuda, H.

Poster session

Wednesday 20 September

14.00 - 16.30 (Agorà)

Tidal and coastal morphodynamics

- 97 **A mechanism for long-runout turbidity currents**
Luchi, R., Balachandar, S., Seminara, G., Parker, G.
- 98 **The pervasive human impacts on the tidal channel seafloor of the Venice Lagoon**
Madricardo, F., Ferrarin, C., Rizzetto, F., Sigovini, M., Foglini, F., Sarretta, A., Trincardi, F., the ISMAR Team
- 99 **Formation of Islands on Deltas from Radially Symmetric Flow Expansion**
McElroy, B.J., Shaw, J.B., Miller, K.
- 100 **Processes creating and maintaining non-estuarine river-mouth lagoons (hapua)**
Measures, R.J., Cochrane, T.A., Hart, D.E., Hicks, M.
- 101 **Salt marsh retreat mechanism at different time scales**
Mel, R., Bondoni, M., Steffinlongo, D., Solari, L., Lanzoni, S.
- 102 **Ecologic and Morphologic Analysis of a Proposed Network of Sediment Diversions**
Meselhe, E., Sadid, K., Jung, H., Messina, F., Esposito, C., Liang, M.
- 103 **Coastal Eco-morphological Real-time Forecasting tool to predict hydrodynamic, sediment and nutrient dynamic in Coastal Louisiana**
Messina, F., Meselhe, E., Twight, D., Buckman, L.
- 104 **Response of engineered beaches to sequences of storms**
Musumeci, R.E., Stancanelli, L.M., Romano, A., Besio, G., Briganti, R.
- 105 **What makes a delta tide-dominated?**
Nienhuis, J.H., Törnqvist, T.E., Hoitink, A.J.F.

- 106 **Descriptions of field measurements for bedforms under combined flow at Gediz and B. Menderes river mouths**
Oguz Kaboglu, S., Kisacik, D., Kaboglu, G.
- 107 **Understanding the primary drivers of atoll morphometrics on a global scale**
Ortiz, A.C.
- 108 **Water and soil temperature dynamic in very shallow tidal environments: the role of the heat flux at the soil-water interface**
Pivato, M., Carniello, L., Gardner, J., Silvestri, S., Marani, M.
- 109 **Importance and challenges of calculating initial sediment distribution for sediment- and morphodynamic modelling in estuaries**
Plüss, A.
- 110 **What drives salt-marsh retreat?**
Roner, M., Tommasini, L., Ghinassi, M., Finotello, A., D'Alpaos, A.
- 111 **Circulation and fine sediment transport patterns in the Montevideo Bay**
Santoro, P., Fossati, M., Tassi, P., Huybrechts, N., Pham van Bang, D., Piedra-Cueva, I.
- 112 **Emergence of complex behaviour of marine natural processes: engineering and environmental implications**
Schinaia, S.A.,
- 113 **Characterizing morphological process connectivity in a river delta using information theory**
Sendrowsky, A., Passalacqua, P., Sadid, K., Meselhe, E.
- 114 **Modelling the plano-altimetric equilibrium morphology of tidal channels: interplay between sediment supply, sea-level rise, and vegetation growth**
Sgarabotto, A., D'Alpaos, A., Lanzoni, S.

- 115 **Satellite Retrieval and Numerical Modeling of Sediment Dynamics in the Yongjiang Estuary, China**
Tao, J., Kuai, Y., Kang, Y.
- 116 **Modelling changes in the wind-wave field within the Venice Lagoon in the last four centuries**
Tommasini, L., Carniello, L., Roner, M., Ghinassi, M., D'Alpaos, A.
- 117 **Modeling morphological changes due to multiple typhoons in the Danshui River Estuary**
Tung-Chou, H., Keh-Chia, Y., Yan, D.
- 118 **Do algae boost landscape formation?**
van de Vijssel, R.C., van Belzen, J., Bouma, T.J., van der Wal, D., van de Koppel, J.
- 119 **Modeling tidal morphodynamics at the channel-mudflat interface**
van der Wegen, M., de Vet, L., Zhou, Z., Coco, G., Jaffe, B.
- 120 **The influence of shoal margin collapses on the morphodynamics of the Western Scheldt Estuary**
van Dijk, W.M., Kleinhans, M.G.
- 121 **Evolution of sand banks in the fully-nonlinear regime**
Vittori, G., Blondeaux, P.
- 122 **Modeling the impact of spatially-variable vegetation on hydrological connectivity in river deltas**
Wright, K., Hiatt, M., Passalacqua, P.
- 123 **Field observations of short-term sediment dynamic processes on intertidal zone of Jiangsu Coast, China**
Xu, B., Gong, Z., Zhang, Q., Zhou, J., Zhou, Z., Zhang, C.
- 124 **On the initial formation and long-term equilibrium of tidal channels**
Xu, F., Coco, G., Tao, J., Zhou, Z., Zhang, C.

- 125 **Characteristics and evolution of ebb-dominated creeks**
Zarzuelo, C., D'Alpaos, A., Carniello, L., Lopez-Ruiz, A., Ortega-Sanchez, M.
- 126 **Analysis of channel deposition and erosion in Yongjiang River, China**
Zhang, Q.
- 193 **Impacts of bed slope factor on large scale fluvio-deltaic morphodynamic development**
Guo, L., He, Q., Zhu, C., Wang, Z.B.
- 194 **Modelling multi-bar system at decadal scale**
Marinho, B., Larson, M., Coelho, C., Hanson, H.
- 195 **Experimental investigation of subaqueous sediment density flows**
Sfouni-Grigoriadou, M., Juez, C., Spinewine, B., Granca, M.
- 196 **Channeling regimes in cohesive coastal sediments**
Tsakiris, A.G., Papanicolaou, A.N., Mooneyham, C.D.
- 197 **Spin-up phenomenon in morphodynamic modelling**
Wang, Z.B., van der Werf, J.

River morphodynamics

- 127 **Stability of parallel river channels created by a longitudinal training wall**
Le, T.B., Crosato, A., Uijttewaal, W.S.J.
- 128 **Study on bedrock river migration and stable countermeasures in the reach of bridge**
Liao, C.T., Yeh, K.C., Jhong, R.K., Li, K.W.
- 129 **Alluvial point bars above a simulated bedrock in annular flume flow**
Lima, A.C., Taguchi, S., Ozawa, H., Izumi, N.
- 130 **3D Morphodynamic Modeling of River Bends in the Lower Mississippi River**
Lu, Q., Kurum, O., Nairn, R.B.

- 131 **Morphological effects of a large flood in a step-pool Andean stream**
Mao, L., Carrillo R.
- 131 **Distribution of grain-related parameters in collisional transport layer of intense bed load**
Matoušek, V., Zrostlík, Š., Fraccarollo, L., Prati, A., Larcher M.
- 133 **Migration of meandering rivers junction modeled numerically**
Mendoza, A.M., Abad, J.D., Li, Z. , Arroyo-Gomez, M.
- 134 **SAR remote sensing of river morphodynamic on a monthly basis**
Miridieri, F., Papa, M.P., Amitrano, D., Ruello, P.
- 135 **A 2 dimensional study and comparison of migration and skewness in alluvial and bedrock meanders**
Mishra, J., Inoue, T., Shimizu, Y.
- 136 **Flow structure at low momentum ratio river confluences**
Moradi, G., Rennie, C.D., Cardot, R., Mettra, F., Lane, S.N.
- 137 **The combined effects of local slope and pressure gradient on bed instability**
Morales, R.B., Izumi, N.
- 138 **Estimation of sediment yield using RUSLE in Japan**
Morita, K., Udo, K.
- 139 **Theoretical bifurcation stability for rivers with adjusting widths**
Mosselman, E.
- 140 **Effects of dam construction on the Ribb River bed topography**
Mulatu, C.A., Crosato, A.
- 141 **River dune morphodynamics at the grain scale**
Naqshband, S., Hoitink, A.J.F., McElroy, B.J.
- 142 **Numerical experiments on the effect of channel curvature and unsteady flow on bed morphology and bed-surface sorting**
Nelson, P.A., Brown, R.A.

- 143 **Role of grainsize sorting in the long-term morphodynamics of sedimentary systems**
Nones, M., Di Silvio, G.
- 144 **Discharge and sediment: dominating factors influencing the path of river - a Case study on Otofuke River in Japan**
Okabe, K., Mishra, J., Shimizu, Y., Hasegawa, K., Shinjo, K., Muranaka, T., Sumitomo, H.
- 145 **Insights on morphological patterns at river contractions**
Oliveto, G.
- 146 **Bed Instability with the effect of density stratification**
Pen, S., Izumi, N., Lima, A.C.
- 147 **Quantifying the active channel dynamics in gravel bed rivers: a laboratory investigation**
Redolfi, M., Bertoldi, W., Tubino, M.
- 148 **Impact of the Weir Geesthacht on bedload transport of the River Elbe between Neu Darchau and Hamburg**
Riedel, A., Reiss, M., Winterscheid, A.
- 149 **Vegetation generated turbulence and 3D coherent structures on oscillatory flows through aquatic vegetation**
San Juan, J., Tinoco, R.O.
- 150 **Experimental investigations on free surface steady dry granular flows**
Sarno, L., Papa, M.P., Carleo, L.
- 151 **A flume study on the effects of flow depth on local scour and deposition at submerged obstacles**
Schloemer, H., Herget, J.
- 152 **Combining analytical theories and aerial image analysis to investigate of alternate bars in the channelized Isère river, SE France**
Serlet, A., Zolezzi, G., Gurnell, A.
- 153 **Downstream morphological effects of sediment bypass tunnel operations: a 1D numerical study**
Siviglia, A., Facchini, M., Boes, R.M.

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The University of Padova

The University of Padova is one of Europe's oldest and most prestigious seats of learning; it is a multi-disciplinary university that aims to provide its students with both professional training and a solid cultural background. A qualification from the University of Padova is a symbol of having achieved an ambitious objective, one that is recognized and coveted by both students and employers alike.

Courses at the University of Padova are constantly updated in order to meet the ever-changing needs of the labour market. Its Healthcare degrees, for instance, cover a wide range of new courses such as Pediatric Nursing (Medical School), or Neuroscience and Neuropsychological Rehabilitation (Psychology). Engineering degree programs are available in the fields of Civil, Architectural, Environmental, Industrial and Information Engineering.

University of Padova degrees also reflect today's needs to safeguard both the environment with courses in Environmental Sciences and Technology (Agriculture Sciences), and consumers with Safety and Hygiene of Food Products (Veterinary Medicine). Research into pharmaceuticals is also covered with Pharmaceutical Biotechnologies (Pharmacy), as is research into hi-tech products with a course in Materials Science (Sciences). Great emphasis is also placed on Humanities, such as History and Conservation of Artistic and Cultural Heritage (Arts and Philosophy), and on teacher training with a course in Primary Education (Education). The University's traditional courses for professionals in Law, Economics, and Business Management are run alongside courses that analyze complex social systems such as Sociological Sciences (Political Sciences) and Statistics, Population and Society (Statistical Sciences).

Furthermore, highly motivated University students may also apply for admission to the Galilean School of Higher Education. After a demanding selection process, each year 30 students are chosen to attend the School's high-level in-house courses and to use its special services.

Numbers

- ✓ 173 undergraduate and graduate courses
- ✓ 32 departments
- ✓ 8 faculties
- ✓ 1 program of excellence for gifted students (Scuola Galileiana)
- ✓ 1 medical centre
- ✓ 1 veterinary hospital
- ✓ 1 experimental farm
- ✓ 33 libraries
- ✓ 537 million euros as public and private funding in 2016

History

The University of Padova was established in 1222, after a group of students and teachers decided to come here from Bologna. They set up a free body of scholars, who were grouped according to their place of origin into nations, in which students approved statutes, elected the rettore (rector, or chancellor) and chose their teachers, who were paid with money the students collected. Defending freedom of thought in study and teaching became a distinctive feature which today lives on in the University motto: *Universa Universis Patavina Libertas*.

The introduction of empirical and experimental methods together with the teaching of theory marked the dawn of a golden age. In the 16th and 17th centuries, Padova became a workshop of ideas and the home to figures who changed the cultural and scientific history of humanity. They included Andrea Vesalio, who founded modern anatomy, as well as the astronomer Copernicus, and Galileo, who observed the skies here. Padova also vaunts the world's first university botanical garden and a permanent anatomical theatre, which was built by Girolamo Fabrici d'Acquapendente. William Harvey, who became famous for describing the circulation of the blood, studied in Padova, and in 1678 Elena Lucrezia Cornaro Piscopia became the first woman in the world to be awarded a university degree. The fall of the Serenissima Republic of Venice in 1797 marked the beginning of a dark age. Padova fell under the rule of first the French and then the Austrians, passing through Italy's tumultuous Risorgimento, which also affected the University.

Between the late 19th and early 20th centuries, the University expanded to include the faculties of Engineering, Pharmacy, and Political Sciences together with its traditional faculties of Law, Medicine, Arts and Philosophy, and Sciences. The advent of Fascism curtailed the University's values of free thought and cultural independence. Its professors swore allegiance to the regime, after which the approval of Italy's racial laws and the expulsion of Jewish professors opened one of the darkest periods in the University's history. Rector Concetto Marchesi shook the University from its slumber and, at the height of the German occupation made a courageous appeal to the students to fight for the freedom of Italy. For its sacrifices in the name of Liberation, the University of Padova was awarded a gold medal for military valour, the only university to receive such an honour.

During the post-war period, the University opened faculties of Education, Agricultural Sciences, and Psychology and, in the 1990s, faculties of Veterinary Medicine, and Economics and Business Administration. In the 20th century, the University of Padova produced great literary figures such as Diego Valeri and Concetto Marchesi; engineers of the stature of Giuseppe Colombo, the "master of celestial mechanics"; mathematicians such as Tullio Levi Civita; jurists Alfredo Rocco and Livio Paladin; philosophers Luigi Stefanini and Enrico Opocher; and doctors like Vincenzo Gallucci, who carried out the first heart transplant in Italy. The new millennium opened with some important new discoveries, particularly in medicine, biomedicine, engineering and aerospace technology.

Palazzo Bo and Anatomical Theatre

Palazzo Bo

via 8 febbraio, 2 - 35122 Padova

For Paduans, it had already been a landmark for almost a century: an inn with the sign of the 'Bo' – the Ox – had already been mentioned in a document of 1364 under the name of Hospitium Bovis. The name may derive from its proximity to the quarter traditionally occupied by the Bechariarum (butchers) or by the fact that cattle were traded there in former times. But the original core of the Bo is much older, as there were buildings on the site as early as the 13th century; according to scholars, parts of these buildings still exist within the Palazzo. Strangely, the link between Bo and University may also have its origin in cattle trading: it seems that in 1405 Francesco, heir of the da Carrara family, lords of Padova, donated the building to a butcher who had assured him of regular supplies of meat. In 1539, the University acquired full ownership.

Architecturally, the 16th century was the key period for the Palazzo Bo. The building underwent a process of enlargement and conversion, with work entrusted around 1550 to the architect Andrea Moroni, who was responsible for the main block of the palazzo we see today, with its monumental courtyard. Also dating from the 16th century is the world's first permanent anatomical theatre. 1446 is the date on the earliest documents mentioning the use of anatomical theatres made of wood, which were erected and dismantled as needed for public dissections. Notable among the great anatomists who taught at the University of Padova is Andreas Vesalius, whose textbook *De humani corporis fabrica* makes reference to a theatre in the city. It was the anatomist Girolamo Fabrici D'Acquapendente who took the initiative of having a permanent anatomical theatre built. It was inaugurated in 1595 and remained in use until 1872.

The best-known room in the Palazzo Bo is the Aula Magna, the Great Hall. First mentioned in a document of 1399 as the 'sala magna' of the Hospitium Bovis, it was a large dining-room: after the University took over the building, it became the Scuola Grande dei Legisti. As a rule, although with a few exceptions – Galileo Galilei was allowed to teach in it – the Aula Magna was the preserve of the jurists. One of the most evocative symbols in the history of the University and of its staff and alumni is undoubtedly the podium which, according to tradition, was used by Galileo himself. It was located in the Aula Magna until mid-way through the 19th century, when it was moved due to renovation work on the hall. The decoration of the Aula Magna as it appears today was completed between 1938 and 1942, with the architect Gio Ponti supervising the work.

The 19th century also saw substantial enlargement of the Bo complex, with the purchase of Palazzo Battaglia (1813). In modern times, the new wing built after 1910 to house the Faculty of Jurisprudence was the work of Guido Fondelli. An important contribution to the aesthetic renewal of the University was also made by Carlo Anti, rector from 1932 to 1943, who called in artists of great renown – architect Gio Ponti, sculptor Arturo Martini, and painter Massimo Campigli – to apply their skills and talent. A competition for a contract to undertake the renovation of the Bo complex was won, in 1934, by architect Ettore Fagioli, who also created the New Courtyard.

Botanical Garden

Orto Botanico

via Orto Botanico, 15 - 35123 Padova

1543: The 'lettura dei semplici', or study of medicinal plants, was taught in Padova by Francesco Bonafede. Following centuries of tradition based on ancient authors, Bonafede recognised a need for the direct observation of nature in this branch of learning. In those days, classical texts on the therapeutic use of herbs were routinely and dangerously misinterpreted, and little trust could be placed in the honesty of apothecaries. Accordingly, Bonafede approached the rector of the universitas artistarum (which taught medical and botanical disciplines), requesting that a public garden be opened for the cultivation and study of medicinal plants and herbs – the so-called 'semplici' (medicamentum simplex). The request came before the Senate of the Venetian Republic, which on June 29 1545 decreed that a suitable plot of land should be purchased. These were the origins of Padova's Botanical Garden, the oldest university garden in the world to have retained its original location and layout over the centuries.

The structure of the Garden (a square within a circle) was enclosed by a wall in 1552 to combat the continual theft of plants, targeted for the rarity of their vegetal properties and the value of the medicines obtained from them. The botanical stock continued to grow, with plants brought in from all parts of the globe, especially from those countries where the Venetian Republic had possessions or trade relations; hence, the importance of Padova as regards the introduction and study of many exotic species.

Since 1997 the Botanical Garden has been part of the UNESCO World Heritage List as a cultural landmark. The listing was justified by UNESCO on the following grounds: "The Botanical Garden of Padua is the original of all botanical gardens throughout the world, and represents the birth of science, of scientific exchanges, and understanding of the relationship between nature and culture. It has made a profound contribution to the development of many modern scientific disciplines, notably botany, medicine, chemistry, ecology, and pharmacy".

Since September 2014, new areas representing the different climates across the Planet have opened to the public. The species in the Biodiversity Garden are about 1,300. They live in environments sharing the same humidity and temperature characteristics, simulating the climatic conditions of the planet's biomes, from tropical to sub-humid, temperate and arid zones. The position of the plants in each environment and of the aquatic plant lake reflects a phytogeographic division – Plant and Environment is a voyage through the Earth's vegetation (in America, Africa and Madagascar, Asia, temperate Europe and Oceania). And the visitor can immediately see a representation of the richness (or poverty) of biodiversity present in each climate zone.

The Botanical Garden is also home to important cultural institutions, namely the Library, opened in 1835, and the Botanical Museum, inaugurated in the same year as a Herbarium, both of which were initiatives of the Garden's then Prefect, Antonio Bonato. Today, the Museum houses about 500,000 dried samples, some of which date from the end of the 18th century.

Discovering Padova

A city definable as truly student-friendly, Padova hosts 58,000 students within a population of little more than 200,000 inhabitants: these are the numbers depicting one of the oldest university towns, where student and city life coexist in close proximity on a daily basis. The student-filled piazzas, the open air of the river banks enjoyed by joggers, a summer aperitif on the Piovego waterfront, not to mention an abundance of cultural, musical and sporting events... all features of a vibrant and welcoming city where students can spend time in places full of history, art and beauty, like the Botanical Garden where they can go free of charge. Many different languages can be heard when walking around the city streets, not least as a result of the continuous flow of foreign tourists, which numbered 688,000 in 2016 alone.

Padova is also well-endowed with parks, green spaces and bicycle lanes (currently 162 km), allowing students to get from A to B quickly and easily, every day. And if the need arises, there is also a car-sharing scheme available, with 28 docking stations. Similarly, people keen on sports are well catered for, with the University Sports Centre (CUS) offering a wide range of activities, individual and team alike.

The History of Padova

Padova claims to be the oldest city in northern Italy. According to a tradition which goes back at least to Virgil's Aeneid, it was founded in 1183 BC by the Trojan prince Antenor, who is believed to have led the people of Eneti, or Veneti, from Paphlagonia (in the north of what is now Turkey) to Italy. In 1274, the authorities of Padova found a large stone sarcophagus in the city centre, and declared that it contained the remains of Antenor. Patavium, as Padova was called by the Romans, was inhabited by the Veneti, and had been known as a Roman municipium since 45 BC. Padova, in common with the rest of north-east Italy, suffered severely from the invasion of the Huns under Attila (452 AD). It then fell under the control of the Gothic kings Odoacer and Theodoric the Great, and later of the Lombards. In the early 7th century (602 AD), after a long and bloody siege, Padova was stormed and burned by Agilulf, the Lombard king. The antiquity of Padova was annihilated: the ruins of an amphitheatre and some bridge foundations are all that remain today of Roman Padova.

After a period of Frankish and Episcopal supremacy, a constitution was established by the citizens in the 11th century. It was composed of a general council or legislative assembly, and a credenza, or executive body. The great families of D'Este and Da Romano from Camposampiero, north of Padova, then became more powerful and divided up the city among themselves. The citizens, in order to protect their liberties, were obliged to elect a potestà (governor), and their first choice fell on one of the D'Este family.

From 1236 to 1256, Padova was ruled by the tyrant Ezzelino da Romano, who practised frightful cruelties on the inhabitants. Ezzelino was unseated in June 1256 without civilian bloodshed, thanks to Pope Alexander IV, and the city then enjoyed a period of calm and prosperity: the University,

founded in 1222, flourished in the 13th century. Jacopo da Carrara was elected Seigneur of Padova in 1318. From then until 1405, nine members of the da Carrara family (also known as the Carraresi) succeeded one another as lords of the city.

In 1405, Padova passed under the rule of the Most Serene Republic of Venice, and mainly remained so until the fall of Venice in 1797. Over the years of its rule, the Serenissima had fortified Padova with new walls, which had a series of six gates (porte) or monumental arches, which exist to this day. In 1797, the Venetian Republic was swept away with the Treaty of Campoformio, and Padova was ceded to the Austrian Empire. After the fall of Napoleon in 1814, it became part of the Kingdom of Lombardy-Venetia. However, the Austrians were not popular in progressive circles in northern Italy: in Padova, the year of revolutions of 1848 saw a student revolt which, on February 8, turned the University and Caffè Pedrocchi into battlegrounds, on which students and ordinary Paduans fought side by side. In 1866, after the Third War of Independence, Italy was able to expel the Austrians from the old Venetian Republic, and Padova and the rest of the Veneto were annexed to the recently united Kingdom of Italy.

When Italy entered the First World War in 1915, Padova was chosen as the main command post of the Italian Army in the north. After Italy's defeat in the battle of Caporetto in autumn 1917, the front line was situated on the river Piave, and the city was within range of the Austrian artillery, but a year later the danger was removed. In late October 1918, the Italian Army won the decisive battle of Vittorio Veneto and the Austrian forces collapsed. The Armistice was signed at Villa Giusti, just outside Padova, on November 3 1918, and Austria-Hungary surrendered to Italy.

In the years immediately following the First World War, the city of Padova developed outside its historical boundaries and its population grew. The city however was still subject to disorder and unrest, and war veterans struggled to re-enter civilian life. Many supported a new political movement: Fascism. As in other parts of Italy, in Padova too the Fascist party soon came to be seen as the defender of property and order against revolution. New buildings, in the typical architecture of the time, sprang up in the city. Examples are the buildings round Piazza Insurrezione (once Piazza Spalato), the railway station, the new part of the town hall, and part of the Palazzo del Bo, hosting the University.

Following Italy's defeat in the Second World War, Padova became part of the Italian Social Republic, the puppet state of the German occupiers. The city hosted the Ministry of Public Instruction of the new state, as well as a military command post and a military airport. During the Resistenza, Italian partisans were very active against both the new Fascist rule and the Germans, and one of the leaders was Concetto Marchesi, Rector of the University. Padova was bombed several times by Allied aircraft, and it was not until spring 1945 that the city was finally liberated by partisans and foreign troops. A small Commonwealth War Cemetery was created in the western part of the city, in memory of the sacrifice of many of these troops. After the war, the city developed rapidly, reflecting the Veneto's rise - from the poorest region in northern Italy to one of the richest and most active in modern Italy.

Basilica di Sant'Antonio

In the Paduan tradition, St. Anthony is 'the Saint' par excellence, for he is the patron saint of the city. The Basilica is visited every year by millions of pilgrims from all over the world. It contains masterpieces by Donatello, Altichiero da Zevio (in the Oratory of St. George nearby) and Titian (in the Scuola del Santo). St. Anthony's Day is celebrated on June 13.

The Oratory of St. George was built in 1377 by the Marquis of Soragna. Next to it is the Scuola del Santo (Saint's School), once the seat of the Arciconfraternita di Sant'Antonio da Padova (Brotherhood of St. Anthony).

Winter opening times: 6.20 am – 7.00 pm

Summer opening times: 6.20 am – 7.45 pm

Caffè Pedrocchi

Caffè Pedrocchi was completed in 1831. Since its foundation, students were able to meet in the Sala Verde (Green Room) without having to buy drinks. One wall of the adjacent Sala Bianca (White Room) has a bullet hole left by an Austrian rifle during the student riots of 1848, recalling the originally highly animated atmosphere of this coffee-house, a meeting point for students and professors.

Cappella degli Scrovegni and the Eremitani

Giotto's decorations for the world famous Scrovegni Chapel were commissioned in 1303 by Enrico Scrovegni to save the soul of his father, a wealthy money-lender. The frescoes, depicting episodes from the life of Christ, were completed in 1305. According to experts, Giotto's work represents the birth of modern painting and culture. For the first time in history, the characters are removed from the canons of Byzantine and medieval art and acquire their own unique features. Particularly worthy of note are the colours, especially the wonderful lapis lazuli blue, used to represent the sky.

Outside is the Roman Arena, still used as an open-air cinema in the summer, and nearby are the Eremitani City Museums with their collections, which include works by Giorgione, Titian, Veronese, Canova, Tiepolo, and many others. Near the Museum stands the Eremitani Church, substantially rebuilt after its almost complete destruction by an Allied bomb in 1944. In the Ovetari Chapel is one of the first frescoed masterpieces by Andrea Mantegna, who originally came from Padova. What little remains of his beautiful work is the result of long and meticulous restoration, carried out by generations of experts using the most modern techniques.

Bookings required by calling +39 049 2010020

Entrance from Eremitani City Museums

Opening times 9 am – 7 pm

Palazzo della Ragione

Construction of this enormous building - the Palace of Reason, or simply Il Salone (Great Hall) - was begun in 1218. Originally conceived as the civic and economic centre of the city, its upper floor was used as a court of law until the fall of the Venetian Republic in 1797. Almost 100 years after it was built, the three rooms of the upper floor were transformed into a single great hall with a unique keel-shaped roof. The walls were decorated by Giotto with a highly detailed and colourful astrological cycle in three bands of frescoes. At one end stands an immense wooden horse, said to be the model for Donatello's statue of the *condottiere* Gattamelata (now outside the Basilica of St. Anthony). Over the centuries, the magnificent Salone has been damaged by several fires and even a hurricane, but always lovingly restored. Its outer medieval porticoes on both sides of the ground floor now house shops selling all kinds of meat, cheese, fish, and other foodstuffs. It is now used for exhibitions and events.

Entrance from "Scala delle Erbe", Piazza delle Erbe; disabled entrance in Palazzo Moroni,

Via del Municipio 1

Winter opening times 9 am – 6 pm

Summer opening times 9 am – 7 pm

closed on Monday

La Specola

Padova was built along the rivers Brenta and Bacchiglione and is crossed by the Battaglia, Scaricatore and Piovego canals. In its heyday, an extensive network of canals flowed around and across the medieval city, supplying and defending it.

Padova's waterways were also essential for its industry, which was powered by mills, and for trade, as goods were transported mainly by water. Via Patriarcato leads to the "riviere", paths flanking the canals, down to *La Specola*. The da Carrara castle stands where the Bacchiglione divides into two. Ezzelino da Romano, the city's 13th-century tyrant, who also appears in Dante's *Inferno*, built an enormous tower called *Torlonga*, in order to defend his castle. This tower remained infamous for centuries after the tyrant's death, due to the terrible acts which were perpetrated in its dungeons. It became the University's Astronomical Observatory in 1777. Today, it houses a Museum, where globes, telescopes and measuring instruments are kept in their original locations. The *Sala Meridiana* (Hall of the Sundial) contains the largest sundial in Italy, constructed in 1779.

Vicolo dell'Osservatorio 5

Tel.: 049.8293469 – 3449

museo.laspecola@pd.astro.it

Guided tours only by appointment:

Winter Sat – Sun 4 pm;

Summer Sat – Sun 6 pm

The Duomo

The *Duomo*, Padova's Cathedral, with its austere façade of red bricks, was consecrated in 1075. Next to it is the *Battistero* (Baptistry), famous for the geometry of its shapes and especially Eremitani Church Piazza delle Erbe for its frescoes, masterpieces by Giusto de' Menabuoi, dating back to the 14th century.

Opening times 10 am – 6 pm

Prato della Valle and Basilica of St. Justine

The largest square in Padova and perhaps in the whole of Europe, for centuries *Prato della Valle* was an unhealthy, malarial marsh until 1775, when the Venetian nobleman, hydraulic expert and architect Andrea Memmo was commissioned by the Serenissima to reclaim the area. He worked on a grand scale, and created first an elliptical island surrounded by a canal, crossed by two avenues with obelisk-decorated bridges spanning the canal and a fountain in the centre; lastly, he surrounded the whole with 78 (originally 87) statues of famous figures of antiquity. This grand space is now a great centre of attraction with its highly popular Saturday market, and at other times is crowded with people, especially on sunny days. At one end of the square stands the majestic Basilica of St. Justine, a national monument and one of the largest in the Christian world. It houses historic treasures and works of art, including a library of 130,000 volumes.

BASILICA DI SANTA GIUSTINA

Summer opening times 7.30 – 12 am
and 3 – 8 pm

Winter opening times 8 – 12 am
and 3 - 5 pm

Piazza dei Signori

Piazza dei Signori (Square of the Lords, or Seigneurs) takes its name from the ancient Reggia dei da Carrara (which no longer exists), once the palace of the lords of Padova in the 14th century. It is one of the most beautiful squares in Padova. On the west side is the Palazzo del Capitano (originally for retired sea captains from Venice) with its Torre dell'Orologio (Clock Tower). On the south is the Loggia del Consiglio, the seat of city council meetings since 1420, and on the east the small church of San Clemente, dating back to 1190.

Piazza delle Erbe and Piazza della Frutta

The cries of the market sellers, their stalls crammed with every possible kind of fruit and vegetable, blend with those of others selling plants and flowers, spices, herbs...all creating two of the most colourful and vital places in the city. Between the two squares stands the immense bulk of the Salone, with its groundfloor shops selling meat, cheese and fish. Nowadays, the stalls also sell clothes of all kinds, costume jewellery, shoes and leather goods, and many natural products. The squares are linked through the Portico dei Caligari, near the Palazzo del Consiglio, a romanesque building with a loggia on the ground floor, and the tall Torre degli Anziani (1215). Completed in 1285 and enlarged in the 16th century, the ground floor of this building was once the salt depot (Magazzino del Sale) for the whole city.

Spritz

SPRITZ is the classic Venetian aperitif, it's a mix of white wine, Aperol (sweeter) or Bitter Campari and Select (bitterer) and a squirt of seltz or Sparkling mineral water. Obviously there are many schools of thought about the better ingredient and the portions of the mix: for this reason it is served in various different ways. SPRITZ is not a Venetian invention as you may think, it was already in use during the Austro-Hungarian administration in Veneto, Friuli and the Balkans.

Originally it was a mix of water and Wine because the Austrian found the Italian Wine too strong. Venetians, on the contrary, found that the drink was lacking character so they added liqueurs: thus the Venetian SPRITZ was born and the idea was exported by Venetian themselves. Often its recipe is taught to bartenders all around the world, so it is not rare to find a bar in the middle of nothing that knows how to prepare it! This is because a Venetian on vacation taught them how to do it so he could have his favourite drink even far from home. You know habits are hard to die...!

SPRITZ for the majority of the Venetians is an unfailling ritual, some bars serve it with olives, and all sort of snacks giving it the same importance that most international cocktails as Negroni or Americano deserve. The Spritz is a popular ritual! It is undoubtedly the most widespread and commonly drunk aperitif in Italy: a traditional ice-breaker and symbol of a lively atmosphere.

