



Newsletter of the Unesco Land Subsidence International Initiative

Vol.2 May 2020

Introduction

Although COVID-19 is still keeping most of us (maybe all?) still at home, publications and activities related to land subsidence are going on. Collaboration between countries is also going on. Webinars are organized and projects teams discuss by e-mail or teleconferencing. For this issue, contributions were received from Pietro and Roberto, thanks a lot. I hope, however to receive contributions from all.

The newsletter will be made available on our website and Alice offered to make it also available on the Unesco-IHP site: <https://groundwaterportal.net/>. (This website contains also a lot of valuable information).

In this issue we want to highlight following important issues:

Roberto asks us to pay attention for our twitter-account: @Land_Subsidence

https://twitter.com/land_subsidence. We have 461 followers now but want this number to grow!

Workshops (Webinars) on land subsidence in 'the Gulf area' will be held on 3, 4 and 5 June.

Some members of the LASII (Gerardo, Pietro and Roberto) participate in an EU project about land subsidence that started two months ago:

Sustainable groundwater RESources managEment by integrating eaRth observation deriVed monitoring and fLOW modeling Results (RESERVOIR)

Also, I want to highlight the possibility to publish in a special issue of Applied Geoscience (deadline September 30th, 2020)

And there is much more, such as the results of the EGU Conference.

I hope you will enjoy reading and find something useful. In the meantime, I am open for comments, suggestions and contributions.

Special Issue Applied Geosciences

Ryszard Hejmanowski and Pietro Teatini are the guest-editors of a special issue of 'Applied Geosciences'. Deadline for manuscript submission is **September 30th, 2020**.

Special Issue Information

Dear Colleagues,

Recently, land subsidence has become one of the important risk factors. Taking into consideration global warming and sea-level rise, many regions of the world, large cities, and land users will be affected by the changes. In many of those areas, the land subsides because of water pumping, gas, and oil extraction, soft soils or peat compaction and additional building load. On the other hand, there are terrains where the mining of raw materials is or was lately active. Mining is one the most important factors of subsidence, sinkholes, and other related damage. It can affect buildings and infrastructure, threatening and decreasing quality of life. In any area transformed by human activity, the ground movements should also be considered. New ideas in modeling approach development, rock mechanics, and civil engineering have emerged in many countries. Novel measurement technics, sensors, and expanding availability of remote sensing data pushes the monitoring of land subsidence towards new possibilities.

This Special Issue of *Applied Sciences* is intended for specialists and an interdisciplinary audience and covers recent advances in the following topics:

- Land subsidence innovative monitoring technologies and untypical case studies
- Prediction of land subsidence: case studies for different kind of raw materials
- Modeling: new and improved approaches, parametrization, accuracy, and reliability

Prof. Ryszard Hejmanowski

Prof. Pietro Teatini

Guest Editors

Manuscript Submission Information

Manuscripts should be submitted online at www.mdpi.com by [registering](#) and [logging in to this website](#). Once you are registered, [click here to go to the submission form](#). Manuscripts can be submitted until the deadline. All papers will be peer-reviewed. Accepted papers will be published continuously in the journal (as soon as accepted) and will be listed together on the special issue website. Research articles, review articles as well as short communications are invited. For planned papers, a title and short abstract (about 100 words) can be sent to the Editorial Office for announcement on this website.

Submitted manuscripts should not have been published previously, nor be under consideration for publication elsewhere (except conference proceedings papers). All manuscripts are thoroughly refereed through a single-blind peer-review process. A guide for authors and other relevant information for submission of manuscripts is available on the [Instructions for Authors](#) page. *Applied Sciences* is an international peer-reviewed open access semimonthly journal published by MDPI.

Please visit the [Instructions for Authors](#) page before submitting a manuscript. The [Article Processing Charge \(APC\)](#) for publication in this [open access](#) journal is 1800 CHF (Swiss Francs). Submitted papers should be well formatted and use good English. Authors may use MDPI's [English editing service](#) prior to publication or during author revisions.

Keywords

- land subsidence, modelling, uplift, sea-levelrise, rock mechanics, monitoring, geodesy, remote sensing, GIS, risk assessment and prediction

Special Issue Remote Sensing

Also a special issue of *Remote Sensing* on Ground deformation patterns Detection by InSAR and GNSS techniques is announced; one of the key words of this issue is: subsidence. Guest editor is Dr. Mimmo Palano.

Deadline for manuscript submissions: **31 October 2021**.

https://www.mdpi.com/journal/remotesensing/special_issues/Ground_Deformation_Patterns_Detection_by_InSAR_GNSS

Congresses, meetings, workshops

EGU

The EGU conference was held on-line on May, 8th. One of the topics was: Coastal subsidence: Natural versus anthropogenic drivers, with Pietro as one of the co-conveners.

Click here and you will be able to download all presentations.

<https://meetingorganizer.copernicus.org/EGU2020/session/35341>

The presentations are:

Masaatsu Aichi,

A smoother algorithm with a multiple calibration-constrained null-space Monte Carlo method toward land subsidence prediction with uncertainty analysis.

Carsten A. Ludwigsen,

Importance of Northern Hemisphere Vertical Land Motion for Geodesy and Coastal Sea Levels.

Kazunori Tabe,

Experimental technique for visualization of aquitard compaction over aquifer caused by excess pumping.

Eleonora Vitagliano,

Integration of geodetic observations and geological models for investigating the permanent component of land subsidence in the Po Delta (northern Italy)

Kento Akitaya,

One dimensional numerical modelling of land subsidence caused by seasonal groundwater level fluctuations in Kawajima, Japan.

Philip Minderhoud,

Unravelling and quantifying natural and anthropogenic subsidence drivers in a mega delta.

In the same conference, Mahdi was convener of the topic SAR and InSAR for earth and environmental science research.

Workshop announcement (the Water Institute of the Gulf)

Neotectonics and Subsidence Expert Panel to meet virtually in June: Workshop 3

NEW ORLEANS, La. (May 20, 2020) – The Water Institute of the Gulf has assembled an expert panel composed of recognized experts in the fields of neotectonics/subsidence and geomorphic/sedimentary response in the Louisiana coastal region. The panel is charged with weighing the data, interpretations and conclusions presented to them by scientists conducting research related to this topic during the workshop in the context of fostering open discussion of neotectonics and coastal restoration at the planning time scale. The panel will provide a forum for the discussion of neotectonics and its potential impacts on management of coastal natural resources. This is the third of three planned workshops.

Due to COVID-19 disruptions to in-person meetings, the third workshop will be held virtually over the course of three days. Local experts from Louisiana State University (Frank Tsai), the U.S. Geological Survey (Julie Bernier) and Tulane University (Simone Fiaschi) will present to the panel at the workshop.

When:

June 3, 3-5 p.m. – Dr. Frank Tsai, Louisiana State University

June 4, 3-5 p.m. – Dr. Julie Bernier, U.S. Geological Survey

June 5, 8-10 a.m. – Dr. Simone Fiaschi, Tulane University

How to join:

Frank Tsai

<https://thewaterinstitute.zoom.us/j/91637262307?pwd=cW15YUpzdDNSdXZoUFhzU2VwWE9qUT09>

Meeting ID: 916 3726 2307

Password: 274706

Dial in: +1 346 248 7799

Julie Bernier

<https://thewaterinstitute.zoom.us/j/91342826103?pwd=YzFPZHoyUmNiQ09WRkthUmxtQTUwUT09>

Meeting ID: 913 4282 6103

Password: 317493

Dial in: +1 346 248 7799

Simone Fiaschi

<https://thewaterinstitute.zoom.us/j/93027043306?pwd=KzZaZ2t6a1E2TG1pekRhRFFOeTh2UT09>

Meeting ID: 930 2704 3306

Password: 640953

Dial in: +1 346 248 7799

New Literature

Bangladesh

From Science of the Total Environment: Mohammed Safaraz Gani Adnan et al., How much of the south western delta of Bangladesh can be restored with Tidal River management (RTM)?

Brasil

Recife

Journal of Hyperspectral Remote Sensing, vol.10, No.1 (2020)

Enton Bendini, Persistent Scatterer Interferometry of Sentinel-1 time series to detect ground subsidence in the city of Recife, Brazil.

<https://periodicos.ufpe.br/revistas/jhrs/article/view/243974>

India

New Delhi

<https://www.preprints.org/manuscript/202004.0199/v1>

Nandi, D.; Mishra, P.S. Assessment of Land Subsidence in Part of New Delhi Using Sentinel-1 and PS-InSAR Technique. Preprints 2020, 2020040199

Indonesia

Peatlands

In: Wetlands Ecol Manage:

Saritha Kittie Uda e al., Towards better use of Indonesian peatlands with paludiculture and low-drainage food crops.

Iran

In Environmental Earth Sciences 79, article number 223 (2020)

Hamid Ebrahimi et al.,

A comparative study of land subsidence susceptibility mapping of Tasuj Plane, Iran, using boosted regression tree, random forest and classification and regression tree methods.

<https://link.springer.com/article/10.1007/s12665-020-08953-0>

In Journal of Atmospheric and Solar-Terrestrial Physics:

Saeid Haji-Aghajany et al.,

Atmospheric phase screen estimation for land subsidence evaluation by InSAR time series analysis in Kurdistan, Iran.

Italy

Valentina Galina et al., A multi-risk methodology for assessment of climate change impacts in coastal zones. Available on mdpi.com.

Also an interesting contribution about observations in the Po Delta:

<https://www.mdpi.com/2072-4292/12/9/1465>

Our members Roberto and Gerardo are co-authors in Sensors, vol. 20, Issue 10, of:

Pablo Ezquerro et al.,

Vulnerability Assessment of buildings due to land subsidence using InSAR Data in the ancient historical city of Pistoia (Italy).

<https://www.mdpi.com/1424-8220/20/10/2749>

Our member Luigi is co-author of following article in Science of the Total Environment:

J.Boaga et al., Resolving the thickness of peat deposits with contact-less electromagnetic methods: a case-study in the Venice coastland.

<https://www.sciencedirect.com/science/article/pii/S0048969720328783>

Pietro is one of the co-authors of a 'brief article':

Frigo, Matteo, et al. "Numerical simulation of land subsidence above an off-shore Adriatic hydrocarbon reservoir, Italy, by Data Assimilation techniques." *Proceedings of the International Association of Hydrological Sciences*, vol. 382, 2020, p. 449. *Gale Academic OneFile*, Accessed 22 May 2020.

<https://go.gale.com/ps/anonymous?id=GALE%7CA621638759&sid=googleScholar&v=2.1&it=r&linkaccess=abs&issn=01447815&p=AONE&sw=w>

Kenya

A study to relate rainfall in 2018 and subsidence

Ashraf Rateb and ElSayed Hermas, The 2018 Long Rainy season in Kenya: Hydrological Changes and Correlated Land Subsidence.

https://www.google.com/search?q=land+subsidence&rlz=1C1GCEA_enNL857NL857&source=Int&tbs=qdr:d&sa=X&ved=2ahUKEwj1gPr1q43pAhURKewKHcl8AVIQpwV6BAgREB0&biw=1680&bih=939

the Netherlands

Our members Peter Fokker and Gilles Erkens contributed as editors to:

Gini Ketelaar et al., Integrated monitoring of subsidence due to hydrocarbon production.

<https://repository.tudelft.nl/islandora/object/uuid%3A650dd53e-764c-41f5-9490-a99381daa012>

PR China

Yuncheng Basin

From: Advances in Space Journal:

Chengsheng Yang et al., Ground deformation and fissure activity of the Yuncheng Basin (China) revealed by multiband time series INSAR.

<https://www.sciencedirect.com/science/article/pii/S027311772030291X>

Beijing

Yanbo Cao et al., Experimental study of land subsidence in response to groundwater withdrawal and recharge in Changping District of Beijing.

<https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0232828>

And also in:

Science of the Total Environment:

Hairuo Yu et al., Analysis of the influence of groundwater on land subsidence in Beijing based on the geographical weighted regression (GWR) model.

<https://www.x-mol.com/paper/1262894722527109120>

Handan

In following article in Water, land subsidence has been used as one of the indicators for valuation of Ecosystem Services.

Xuyang Yang et al., Assessment and valuation of groundwater Wcosystem Services: A case study of Handan City, China.

Russia

Qiang Wang et al.,

Investigation of the ground displacement in Saint Petersburg, Russia, using multiple-track differential synthetic aperture radar interferometry.

The main subsidence is caused by land reclamation.

https://www.researchgate.net/figure/a-Location-of-St-Petersburg-the-tracks-of-the-ascending-and-descending-Sentinel-1A-B_fig1_341080922

Switzerland

The following article in Nature describes how peatland degradation coincides with the organic matter content of the peat-soil.

<https://www.nature.com/articles/s41598-020-64275-y>

USA

Mississippi Delta, Louisiana

In: Science Advances, 22 May 2020

Tjorborn E. Turnqvist et al.,

Tipping points of Mississippi Delta marshes due to accelerated sea-level rise.

This paper predicts that loss of about 15,000 km² marshland will probably be inevitable.

<https://advances.sciencemag.org/content/6/21/eaaz5512>

Modelling

Ata Allah Nadiri et al.,

In Bulletin of Engineering Geology and the Environment (2020)

A study of subsidence hotspots by mapping vulnerability indices through innovatory 'ALPRIFT' using artificial intelligence at two levels.

<https://link.springer.com/article/10.1007/s10064-020-01781-3>

From the Press

Indonesia

- The Geodesy Research Team of the Bandung Institute of Technology estimates that more than 100 coastal cities and districts have the potential to be submerged by sea flooding.
 - The Climate Central report predicts that 23 million Indonesians will be affected by sea flooding due to rising sea levels by 2050.
 - The trigger for sea flooding in Indonesia is contributed more by the rate of land subsidence than the increase in sea level.
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<https://majalah.tempo.co/read/lingkungan/160389/kota-kota-di-pesisir-indonesia-yang-terancam-tenggelam-oleh-rob>

Pakistan

A newspaper article about land subsidence in the Indus Delta.

<https://www.thethirdpole.net/2020/05/05/ignored-by-pakistan-the-indus-delta-is-being-lost-to-the-sea/>

Turkey

Land subsidence, caused by over-exploitation of the water-bearing aquifer is reported from the Serekaniye district in Turkey. Where groundwater levels used to be at a depth of 0,50 m below surface, one has to drill now more than 20 meters deep.



Photo derived from ARF news.

<https://anfenglishmobile.com/rojava-syria/turkish-state-policies-cause-land-subsidence-in-serekaniye-28961>

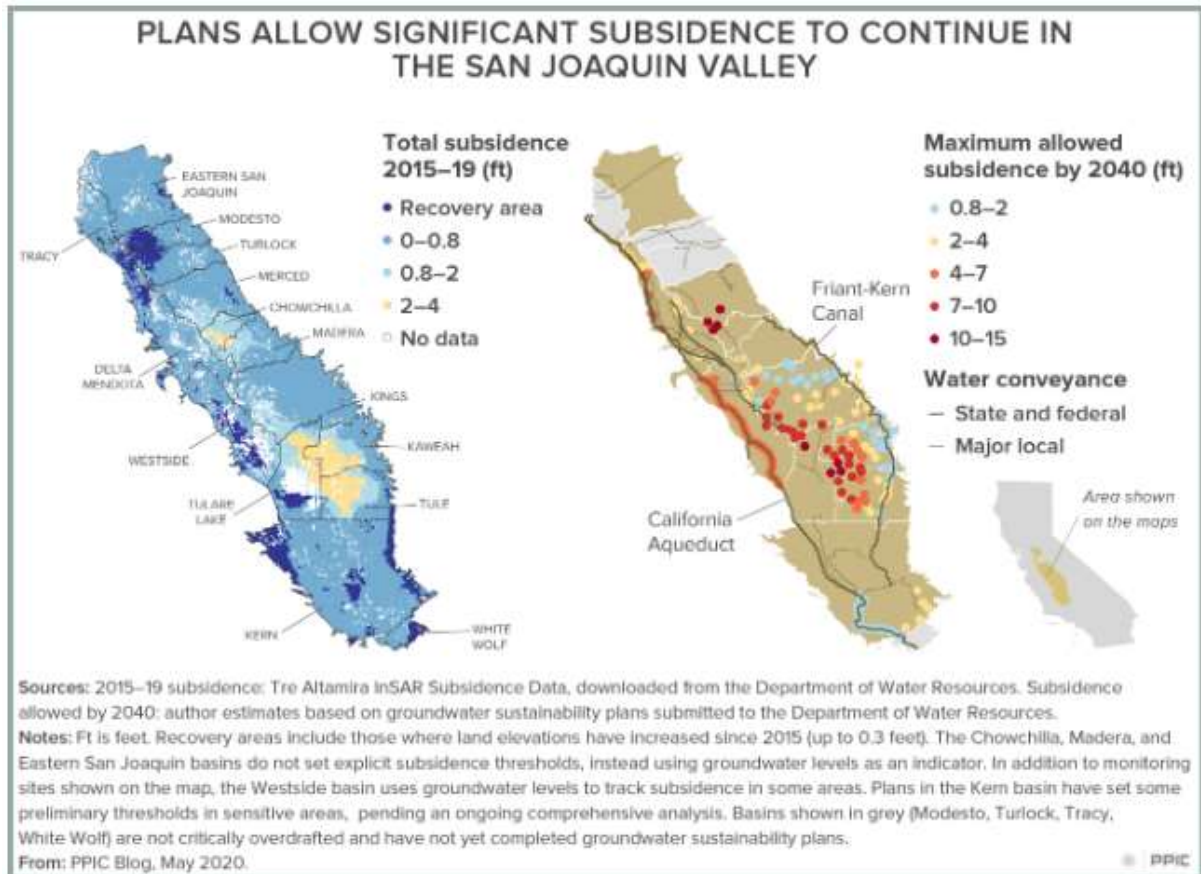
USA

North East Coast

https://tidesandcurrents.noaa.gov/news_posts/article.html?post=962

California

Will better groundwater management End subsidence?



Read the whole article in PPIC: <https://www.ppic.org/blog/sinking-lands-damaged-infrastructure-will-better-groundwater-management-end-subsidence/>

May 21 2020

Washington—Senator Dianne Feinstein (D-Calif.) today introduced the *Restoration of Essential Conveyance Act*, a bill to authorize \$800 million in federal funding to repair critical canals in the San Joaquin Valley damaged by land sinking from overpumping of groundwater, known as subsidence, and for environmental restoration.

Richmond

The city of Richmond prepared a flood protection plan taking into account apx. 1.0 m sea-level rise and 0.2 m subsidence until 2100.

<https://www.richmond.ca/services/rdws/dikes.htm>

Vietnam

The city of Can Tho strengthens capacity to develop a climate action plan (CAP); a first workshop was held on May 6th.

<https://www.asian-mayors.eu/2020/05/vietnam-can-tho-strengthens-capacity-to-develop-climate-action-plan/>

Also in Vietnam, a project started in Ca Mau to fix subsidence and erosion (see picture below, derived from the website).

<https://vnexplorer.net/ca-mau-spends-us-639094-to-fix-subsidence-erosion-a202034692.html>



Excessive drought in Vietnam has caused collapse of roads also in Kien Giang:

<https://vnexplorer.net/subsidence-occurs-on-main-road-in-kien-giang-a202039346.html>

Subsidence occurs on main road in Kiên Giang

19/05/2020



Ho Chi Minh City

Ho Chi Minh City faces rising risk of flood disasters.

https://www.mdpi.com/journal/remotesensing/special_issues/Ground_Deformation_Patterns_Detection_by_InSAR_GNSS

Projects

Some members of the UNESCO LASII (Gerardo, Pietro and Roberto) participate in an EU project about land subsidence that started two months ago:

Sustainable groundwater RESources managEment by integrating eaRth observation deriVed monitoring and fLOW modelling Results (RESERVOIR)

More info: <https://www.era-learn.eu/network-information/networks/prima/section-1-call-2019-management-of-water/sustainable-groundwater-resources-management-by-integrating-earth-observation-derived-monitoring-and-flow-modeling-results> (I will provide the webpage of the project as soon as it is available)

Others

Indonesia

An extensometer installed on youtube:

<https://www.youtube.com/watch?v=lTvShmqo8YI>

United States

Coachella Valley

Reports show increasing groundwater levels in the Coachella Valley.

Reported on the website of Coachella Valley Water District:

<http://cvwd.org/CivicAlerts.aspx?AID=342>

Thesis

the Netherlands

a master thesis from Marion Snijders (Wageningen University): Researching mathematics in policy making: a case study of peat meadow farming in the central Netherlands.

And from Marc Bruna (TUDelft): Analyzing subsidence in the Netherlands with attribute-enriched InSAR data.

<https://repository.tudelft.nl/islandora/object/uuid%3A90970051-1c2c-4bfa-8862-051c4cdf3b5a>