SARS-CoV-2 Detection in Wastewater & Sludges of Turkey

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SARS-CoV-2 DETECTED IN WASTEWATER CAN BE A VALUABLE INFORMATION

- Infected individuals even the ones who are asymptomatic shed the virus in their stool. The virus can be detected in manholes and at the wastewater treatments plants (WWTPs).

- The increase and decrease of the cases of the area served by WWTPs can be monitored almost two weeks before the medical reports.

- Localizations of Concern (Nursing homes, Prisons, Army, Schools, Tourism Complexes) can be monitored instead of testing each individual.

- Continuous monitoring can warn about the second wave (1918 & 1957 influenza resurgence).

SARS-CoV-2 Measurement in Wastewater & Sludge
One test lasts 36 hours (70 USD/test)

250 ml of Wastewater

Centrifugation

7471G for 30 min. at 4℃

(45 min)

Supernatant Collection

filtration through

0.45 µm and 0.2 µm

(30 min)

Addition of PEG 8000 (10% w/v)

(15 min)

Overnight incubation

at 4℃ with 100 rpm

(12 hours)

Centrifugation

7471G for 120 min at 4℃

(2 hours)

re-suspension of Pellet with 200 µl RNase free water

(15 min)

(40 min)

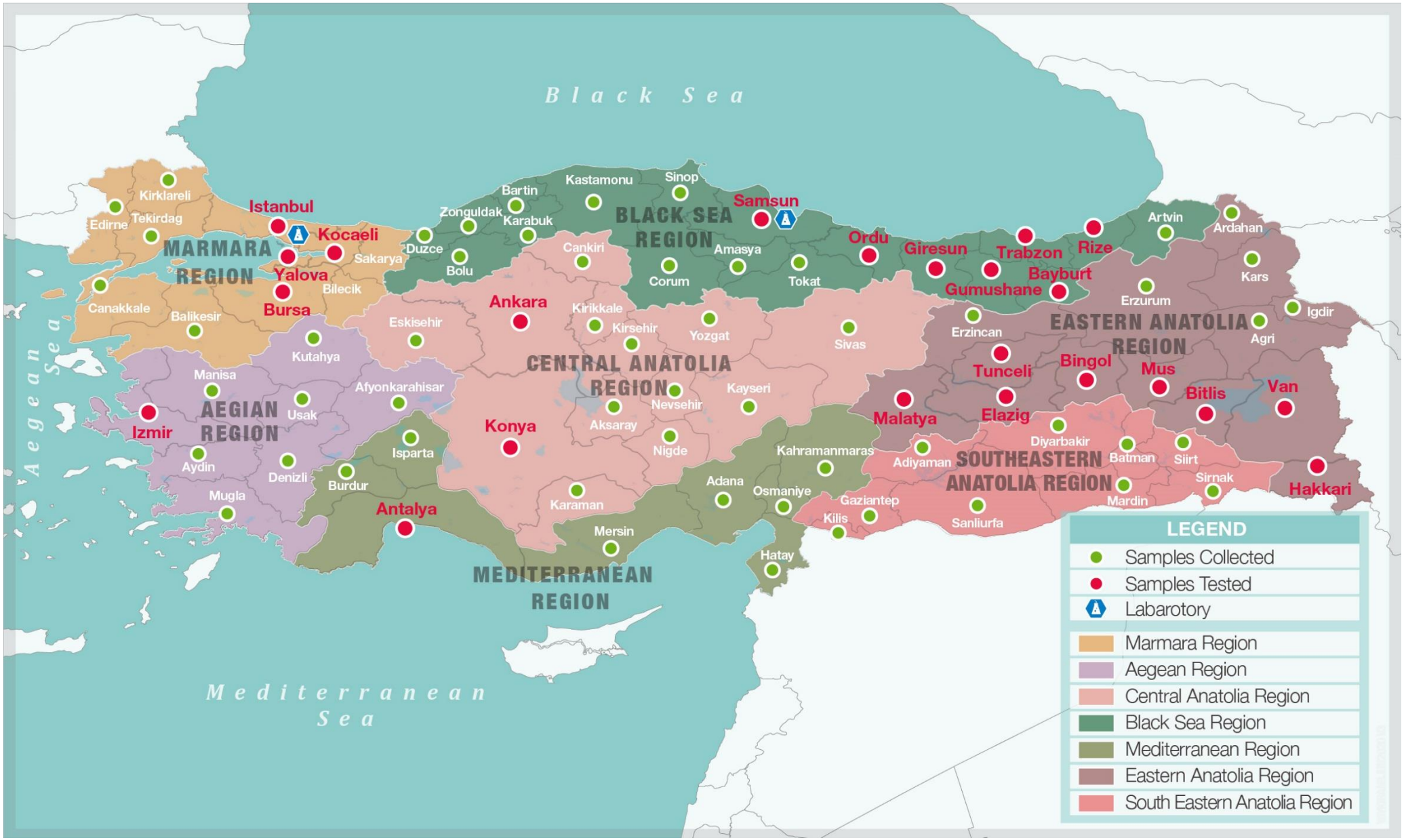
Total viral RNA isolation

(90 min)

RT-qPCR targeting

SARS-CoV-2 RdRp gene

CITIES SAMPLED: 81 DISTRICT WWTPs:INFLUENT, EFFLUENT, PRIMARY AND WASTE SLUDGE



Pilot City: ISTANBUL Population: 16 Million

Pre-print Publication-I

First Data-Set on SARS-CoV-2 Detection for Istanbul Wastewaters

https://www.medrxiv.org/content/10.1101/2020.05.03.20089417v1

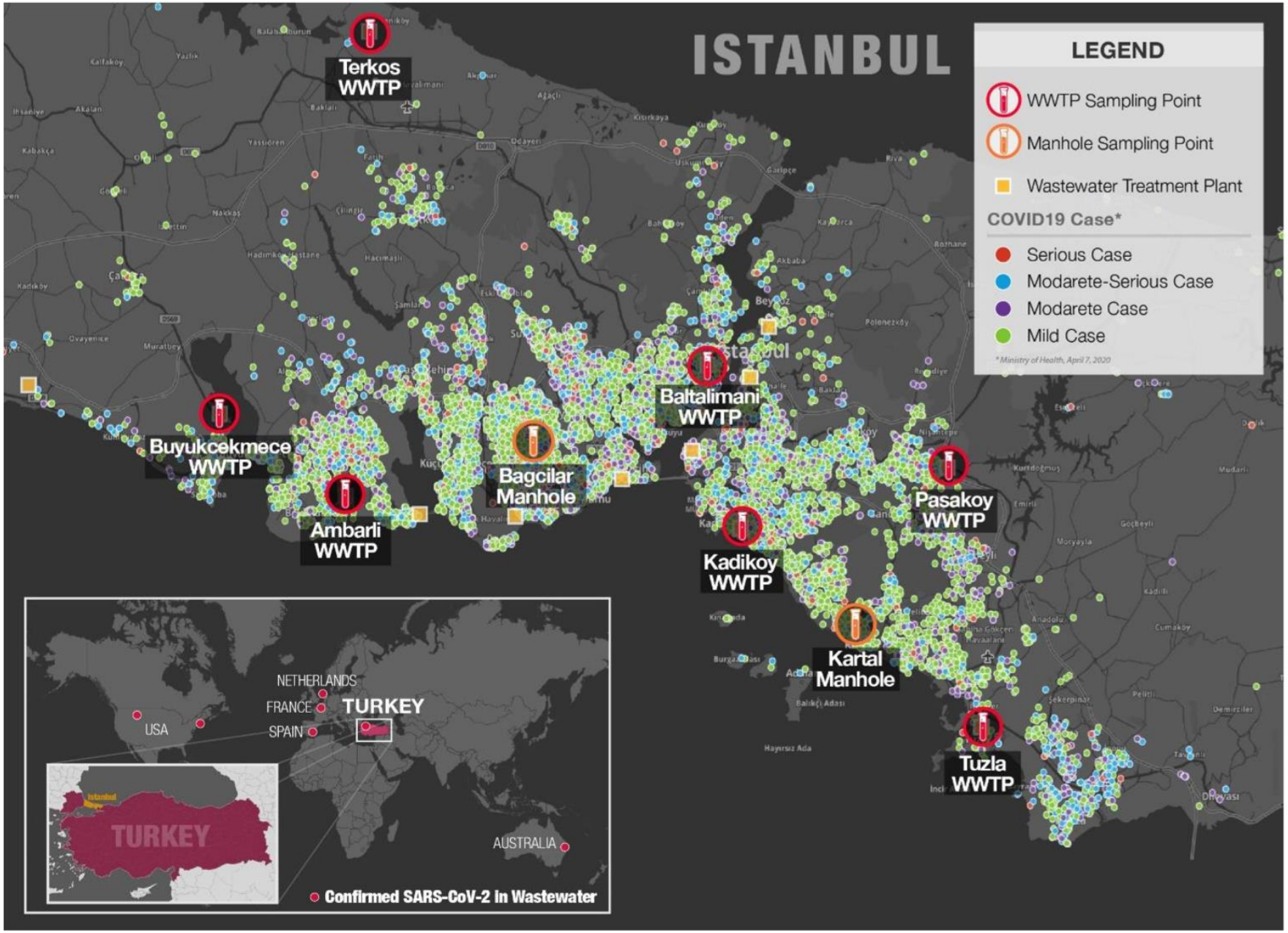
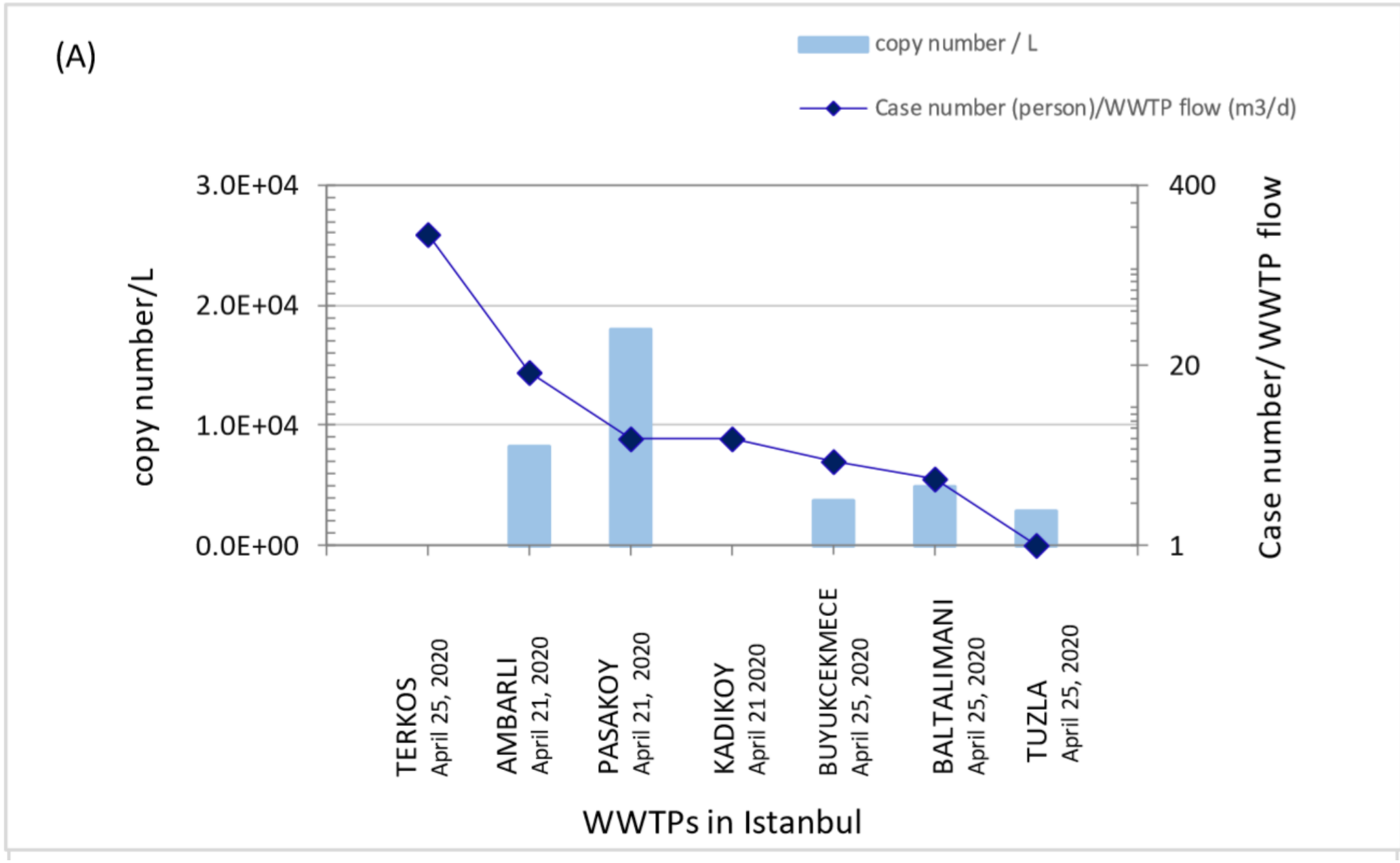


Figure 2. SARS-CoV-2 detection studies in wastewater around the world and in Turkey (Cases from https://geomatic.org/koronovirus on 21st April, 2020.)

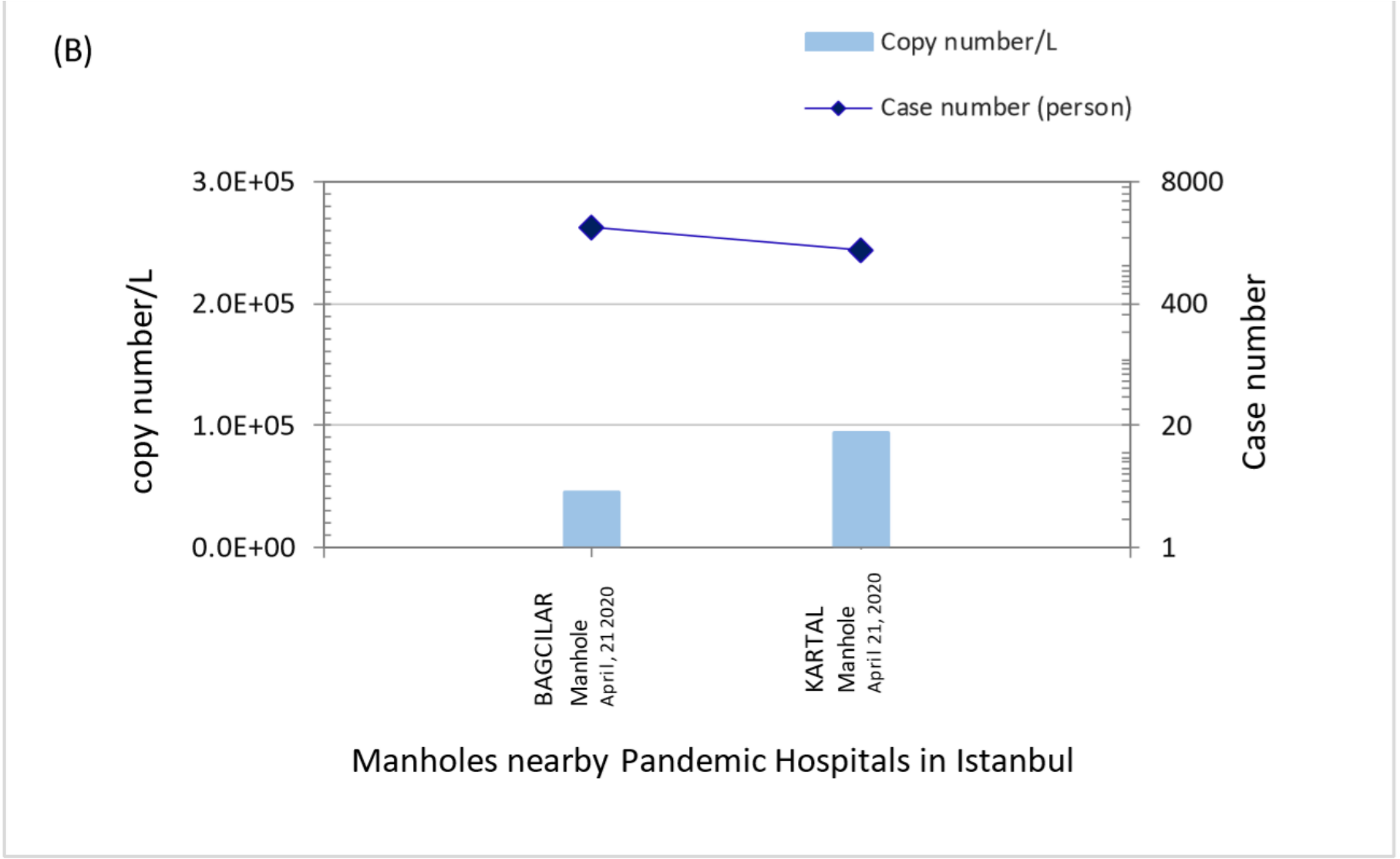
Data-Set on SARS-CoV-2 Detection for Istanbul Wastewaters

Sampling Point	Virus titer per liter	Sampling Point	Virus titer per liter
Terkos WWTP	ND	Baltalimani WWTP	4.95E+03
Ambarli WWTP	8.26E+03	Buyukcekmece WWTP	3.73E+03
Pasakoy WWTP	1.80E+04	Tuzla WWTP	2.89E+03
Kadikoy WWTP	ND	Bagcilar Manhole	4.49E+04
Baltalimani WWTP	4.95E+03	Kartal Manhole	9.33E+04

SAR-Cov-2 Levels in Istanbul wastewaters at the inlet of WWTPs



SAR-Cov-2 Levels in Istanbul wastewaters at the manholes nearby pandemic hospitals



Value of the Data

- Istanbul has 16 million inhabitants and a very high population density (2987 persons/km^2). The dataset presents Covid-19 case numbers against wastewater SARS-CoV-2 titers.
- Can monitor the epidemic not only with the blood tests but also wastewater monitoring. May have chance to catch the districts not exhibiting too many cases but under risk.
- The study has quite potential for verifying the reported number of Covid-19 cases with the real situation.
- Continuous monitoring of wastewater for SARS-CoV-2 may provide an early warning sign before an epidemy starts in case of infection resurge.

Pre-print Publication-II

SARS-CoV-2 Detection in Istanbul Wastewater Treatment Plant Sludges

https://www.medrxiv.org/content/10.1101/2020.05.12.20099358v1

Figure 2. Primary and waste sludge sampling WWTPs in Istanbul

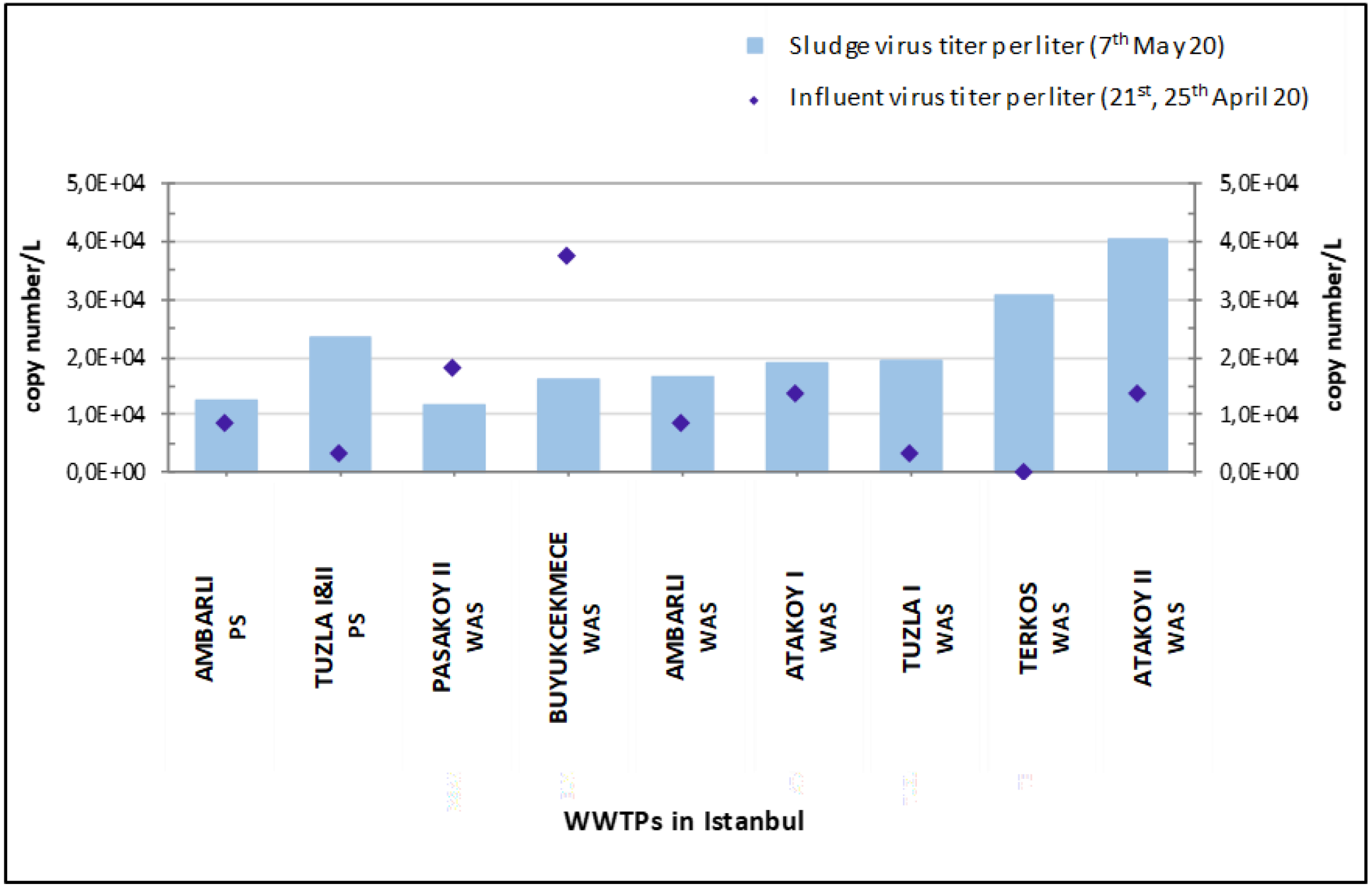


Figure 1. SAR-CoV-2 Levels in primary and waste activated sludges of Istanbul WWTPs.

Results of the Paper 1

(https://www.medrxiv.org/content/10.1101/2020.05.25.20112706v1)

- «……keeping in mind that the presence of SARS-CoV-2 genetic material ***does not imply that it is in an infective state***».
- « ……..most of SARS-CoV-2 particles ***cannot be detected in the water effluent as they are retained by the sludge line***. “

Results of the Paper 2

- «SARS-CoV-2 RNA was systematically detected in the influent to the primary settler (between 7.5 and 15 cp/ml) but not in the secondary treatment effluent, ***confirming that the effluent is safe for reuse and discharge to water bodies***… «
- «Given the rare occurrence of SARS-CoV-2 RNA in the inflow to the secondary treatment, ***the potential of dispersion by aerosols created during aeration can be ruled out***»

Further Research

- The data provided should not be concluded as information on active or inactive SARS-CoV-2 RNA concentrations in the WWTP effluents, in primary or waste activated sludge.

- We have started the active/inactive tests to see whether the SARS-CoV-2 is active at the effluent of WWTPs.

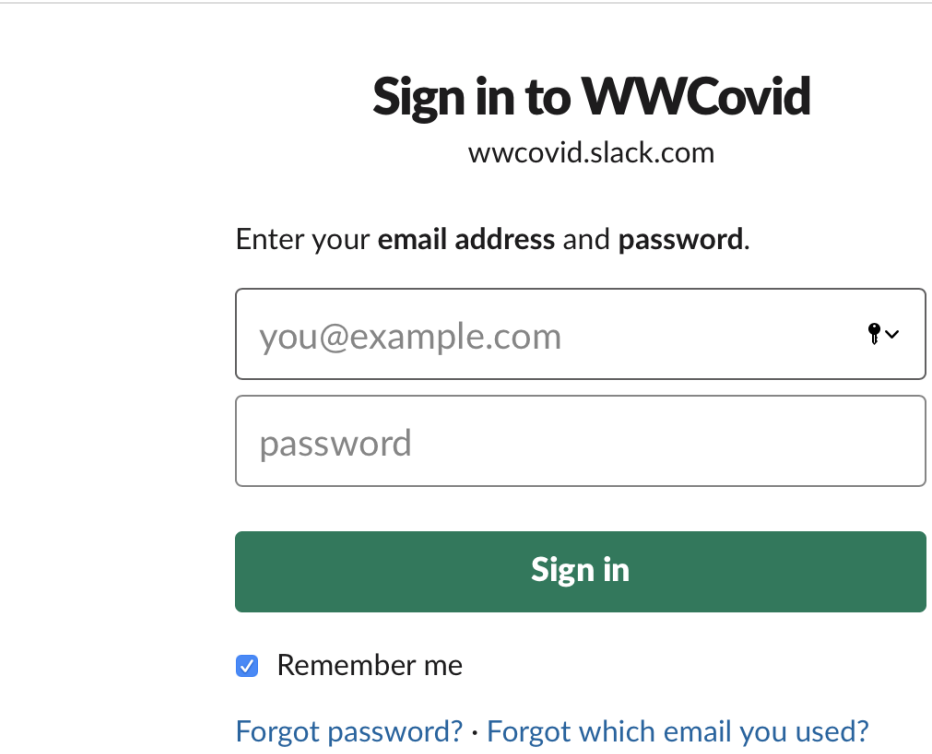
- All districts of Turkey (81 major cities) will be covered in this survey.

Further Research Topics

- Comparison of various virus concenration methods
- Various disinfection methods (SARS-Cov2 active? inactive?)
- Biosensors

ON-LINE INFORMATION SHARING PLATFORM

slack



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THANK YOU……