The COVID-19 Crisis

Update September 24, 2020
CAVEAT!
I am not THAT kind of doctor.
I study rocks.

Ariel D. Anbar
Professor
School of Earth and Space Exploration
School of Molecular Sciences
Arizona State University
Confirmed COVID-19 Cases by US States/Territories, normalized by population

http://91-divoc.com/pages/covid-visualization/
Confirmed COVID-19 Cases by US States/Territories, normalized by population

Data: Johns Hopkins CSSE; Updated: 06/30/2020
Interactive Visualization: https://91-divoc.com/pages/covid-visualization/

http://91-divoc.com/pages/covid-visualization/
Confirmed COVID-19 Cases by US States/Territories, normalized by population

http://91-divoc.com/pages/covid-visualization/
June 2

New Confirmed COVID-19 Cases per Day by US States/Territories

May 15: Re-opening

http://91-divoc.com/pages/covid-visualization/
July 1

New Confirmed COVID-19 Cases per Day by US States/Territories

May 15: Re-opening

http://91-divoc.com/pages/covid-visualization/
June 17: Local governments can enact masking policies

May 15: Re-opening

http://91-divoc.com/pages/covid-visualization/
June 29: Restrictions on gatherings, bars, restaurants, etc.

June 17: Local governments can enact masking policies

May 15: Re-opening
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June 17: Local governments can enact masking policies

June 29: Restrictions on gatherings, bars, restaurants, etc.

http://91-divoc.com/pages/covid-visualization/
New Confirmed COVID-19 Cases per Day by US States/Territories

Data: John Hopkins University CSSE; Updated: 09/24/2020
Interactive Visualization: https://91-divoc.com by GoroTake
On September 16, 2020, Arizona added antigen testing into its main totals figure. This appears to have raised its Total Tests (PCR) number more than usual.

http://91-divoc.com/pages/covid-visualization/
New COVID-19 Tests Performed per Day by US States/Territories
Daily COVID-19 Test Positivity Rate by US States/Territories

http://91-divoc.com/pages/covid-visualization/
**Effective Reproduction Rate • $R_t$**

$R_t$ is the average number of people who become infected by an infectious person. If it's above 1.0, COVID-19 will spread quickly. If it's below 1.0, infections will slow. [Learn More](https://rt.live/us/AZ).
Arizona has about 1,657 ICU beds. Based on best available data, we estimate that 40% (660) are currently occupied by non-COVID patients. Of the 997 ICU beds remaining, 122 are needed by COVID cases, or 12% of available beds. This suggests there is likely enough capacity to absorb a wave of new COVID infections.
July 1:

Arizona is #1 (but not for innovation)

https://globalepidemics.org/key-metrics-for-covid-suppression/
August 5:

Arizona is #8

https://globalepidemics.org/key-metrics-for-covid-suppression/
Sep. 23:

Arizona is #28

https://globalepidemics.org/key-metrics-for-covid-suppression/
MASK UP ARIZONA

MY MASK PROTECTS YOU, AND YOUR MASK PROTECTS ME.
SARS-CoV-2 is Likely Airborne (as we’ve been saying)

Yes, the Coronavirus Is in the Air

Transmission through aerosols matters — and probably a lot more than we’ve been able to prove yet.

By Linsey C. Marr
Dr. Marr is a professor of engineering.

July 30, 2020

Mounting evidence suggests coronavirus is airborne — but health advice has not caught up

Governments are starting to change policies amid concerns that tiny droplets can carry SARS-CoV-2. And after months of denying the importance of this, the World Health Organization is reconsidering its stance.

Dyani Lewis
A draft version of proposed changes to these recommendations was posted in error to the agency’s official website. CDC is currently updating its recommendations regarding airborne transmission of SARS-CoV-2 (the virus that causes COVID-19). Once this process has been completed, the update language will be posted.

COVID-19 is thought to spread mainly through close contact from person-to-person. Some people without symptoms may be able to spread the virus. We are still learning about how the virus spreads and the severity of illness it causes.

**Person-to-person spread**

The virus is thought to spread mainly from person-to-person.

- Between people who are in close contact with one another (within about 6 feet),
- Through respiratory droplets produced when an infected person coughs, sneezes, or talks.
- These droplets can land in the mouths or noses of people who are nearby or possibly be inhaled into the lungs.
- COVID-19 may be spread by people who are not showing symptoms.

**Updated CDC guidance acknowledges coronavirus can spread through the air**

**Los Angeles Times**

CDC acknowledges risk of coronavirus aerosols in new guidelines, then reverses course

**The Washington Post**

CDC reverses statement on airborne transmission of coronavirus, says draft accidentally published

**Fox News .com**

CDC deletes coronavirus airborne transmission guidance, says update was 'draft version'
“The dominant route of transmission of SARS-CoV-2 is respiratory.”

“Direct contact and fomite transmission are presumed but are likely only an unusual mode of transmission.”

“Growing evidence indicates that infectious virus can be found in aerosols and in exhaled breath samples and it is likely that under certain circumstances, including during aerosol-generating procedures, while singing, or in indoor environments with poor ventilation, the virus may be transmitted at a distance through aerosols.”

“Nevertheless, there is abundant evidence that proximity is a key determinant of transmission risk… That proximity so clearly increases risk for infection suggests that classic droplet transmission is more important than aerosol transmission.”

“The accumulated evidence suggests that most transmission is respiratory, with virus suspended either on droplets or, less commonly, on aerosols.”
Where are we headed?
Herd immunity is a key concept for epidemic control. It states that only a proportion of a population needs to be immune (through overcoming natural infection or through vaccination) to an infectious agent for it to stop generating large outbreaks. A key question in the current COVID-19 pandemic is how and when herd immunity can be achieved and at what cost.

“Assuming an optimistic herd immunity threshold of 50%, for countries such as France and the USA, this would translate into 100,000–450,000 and 500,000–2,100,000 deaths, respectively...”

In the US we are now at 200,000 deaths

“An effective vaccine presents the safest way to reach herd immunity.”

“For countries in the Northern hemisphere, the coming autumn and winter seasons will be challenging with the likely intensification of viral circulation.”

“At this stage, only non-pharmaceutical interventions, such as social distancing, patient isolation, face masks and hand hygiene, have proven effective in controlling the circulation of the virus and should therefore be strictly enforced.”

https://www.nature.com/articles/s41577-020-00451-5
Coronavirus Vaccine Tracker

By Jonathan Corum, Sui-Lee Wee and Carl Zimmer  Updated September 23, 2020

<table>
<thead>
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<th>PHASE 1</th>
<th>PHASE 2</th>
<th>PHASE 3</th>
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Vaccines testing safety and dosage  Vaccines in expanded safety trials  Vaccines in large-scale efficacy tests  Vaccines approved for early or limited use  Vaccines approved for full use

Vaccines typically require years of research and testing before reaching the clinic, but scientists are racing to produce a safe and effective coronavirus vaccine by next year. Researchers are testing 40 vaccines in clinical trials on humans, and at least 92 preclinical vaccines are under active investigation in animals.

Arizona’s Winter Weapon: Ventilation!

Temperature - Tempe, AZ
- High Temp. (°F)
- Low Temp. (°F)

- June: 68°F
- July: 75°F
- August: 75°F
- September: 68°F
- October: 56°F
- November: 45°F
- December: 38°F

- June: 103°F
- July: 105°F
- August: 103°F
- September: 100°F
- October: 89°F
- November: 75°F
- December: 68°F

January: 39°F
February: 42°F
March: 46°F
April: 52°F
May: 60°F
June: 68°F
July: 75°F
August: 75°F
September: 68°F
October: 56°F
November: 45°F
December: 38°F
If true, some possible implications:

• May explain diverse disease outcomes
• Good news for vaccine development
• Closer to “herd immunity”?

T cell reactivity against SARS-CoV-2 was observed in unexposed people; however, the source and clinical relevance of the reactivity remains unknown. It is speculated that this reflects T cell memory to circulating ‘common cold’ coronaviruses. It will be important to define specificities of these T cells and assess their association with COVID-19 disease severity and vaccine responses.
New Confirmed COVID-19 Cases per Day by US States/Territories, normalized by population

Data: John Hopkins University CSSE; Updated: 08/05/2020
Interactive Visualization: https://r81-DIVOC.com/ by @pmlwade...
President’s 25-point plan

• On September 2, President Crow outlined 25 actions that “will be undertaken with the goal of enhancing diversity, growth and opportunity for Black undergraduate and graduate students, faculty and staff, while also expanding our academic offerings, community services and collaborative relationships to the benefit of all underrepresented groups and individuals at ASU.”

• https://president.asu.edu/statements/asus-commitment-to-black-students-faculty-and-staff
News/Communications: On campus presence

- Up to ~30% occupancy allowed in SESE buildings; if you are on campus:
  - Mandatory COVID-19 safety training.
  - Face coverings are REQUIRED at all times on campus.
- Rapid and easy saliva testing (24-48 hr turnaround time) has been implemented; random testing of the ASU population.
- Daily health check implemented.
- ASU COVID-19 case updates provided at:
  
  [https://eoss.asu.edu/health/announcements/coronavirus/management](https://eoss.asu.edu/health/announcements/coronavirus/management)

**As of September 21:** Cumulative number of positive tests since August 1, 2020

- Students: 1,670
- Faculty and staff: 31
News/Communications: Research and Other Ops

• Re-opening protocols implemented for a significant fraction of SESE research operations.

• HQ staff and SESE Leadership are back on campus on a staggered schedule.
  • Staff representing BO-HR-RA-AP will be in office Tuesdays-Thursdays from 8 AM to 2 PM
  • Reception and mail service on Mondays and Fridays.
  • Access is key card only in certain parts of SESE buildings.

• SESE HQ in ISTB4 is staffed as above, SESE HQ in PSF is not staffed. Both are accessible via key card/key access.
News/Communications: Teaching

• Most classes are being taught in **ASU Sync mode** (synchronous teaching via Zoom, allowing students to join remotely or in-person for limited numbers).

• In practical terms, a small subset of our courses have an in-person component this semester.

• Looking ahead, planning for Spring 2021 is underway; similar to this Fall, most of our courses will be taught in Sync mode.
News/Communications: Budget & Finances

• We are past the 21st day of the Fall semester, so financial picture for the university is somewhat clearer.

• Overall total enrollment for Fall 2020 at ASU is up.
  • Overall enrollment in SESE courses (6526, as of the 21st day of the semester) is down by ~4% relative to this time last year.
  • We successfully launched our fully online BS degree in Astronomical and Planetary Sciences. 95 students signed up – represents ~20% increase in our undergrad majors!

• No furloughs or salary cuts are anticipated at the current time, but also no merit increases.

• We implemented a significant and permanent cut (~$300K) to our total annual budget.
News/Communications: Fall Activities

Fall 2020 activities open to ALL in the SESE Community:

• SESE Community Conversations (Noon-1 PM on Oct 29 & Nov 19)
• SESE Colloquium (Wednesdays, 3:30-4:30 PM, weekly)
• Virtual Tea (Thursdays, 3:00-4:00 PM, weekly)
• Engineering Coffee (Fridays, 2:30-3:30 PM, weekly)
• Open listening sessions with SESE leadership (weekly, 9-10 AM Tuesdays)
• One-on-one office hours with the director (weekly, 3-5 PM Thursdays) – sign up for 30 min slots on weekly basis
• Open office hours with AD Inclusive Community (3-4 PM Thursdays)
Light at the end of the COVID-19 tunnel? Or a plasma source in a mass spec?