

# HIGH-PERFORMANCE AND DISRUPTIVE COMPUTING IN REMOTE SENSING

Working Group of the IEEE GRSS Earth Science Informatics Technical Committee (ESI TC)

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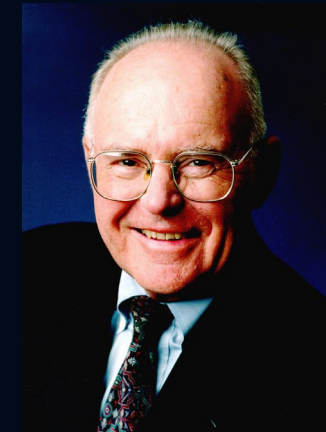
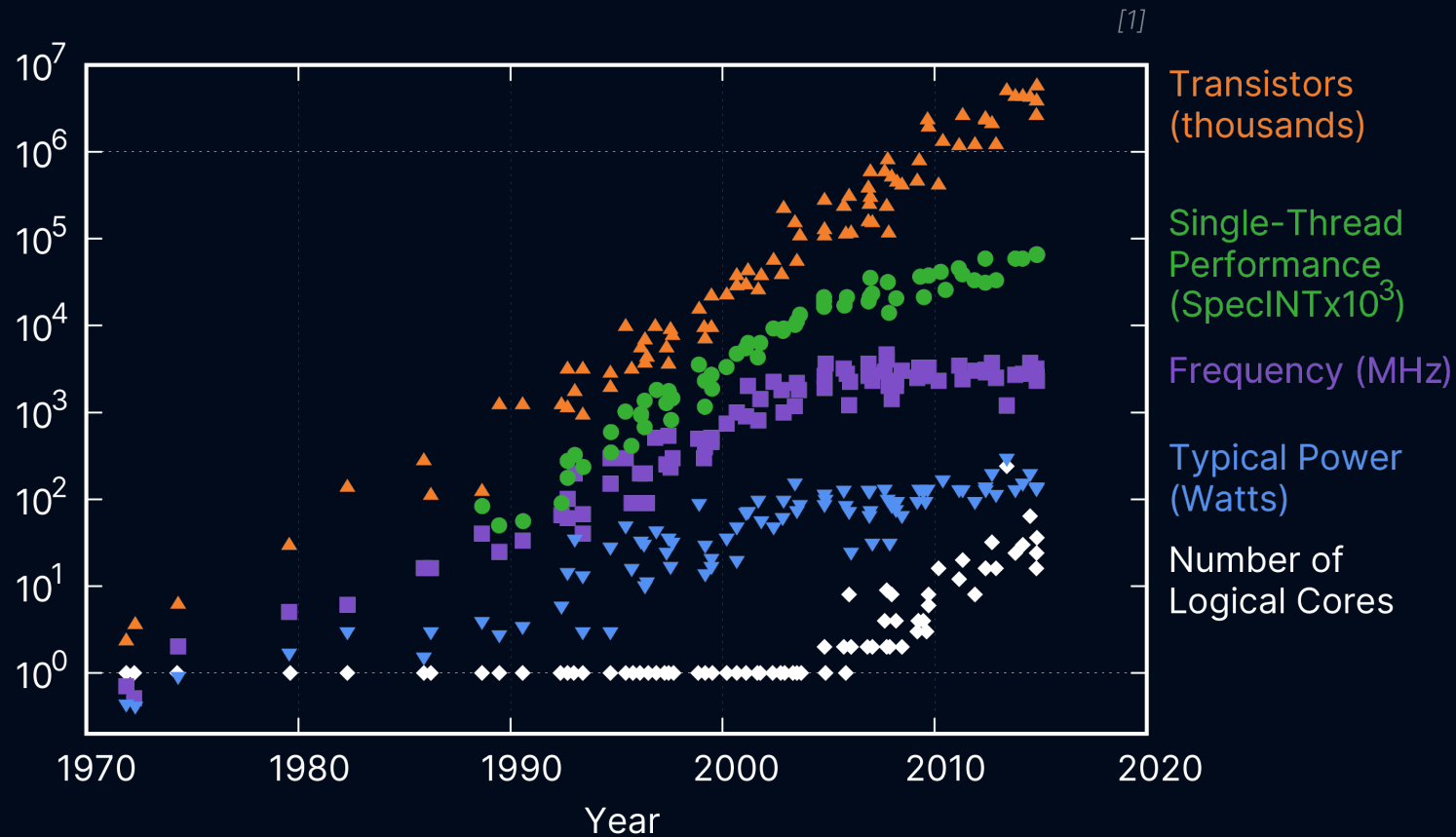


# EXTRACTING KNOWLEDGE IN A TIMELY MANNER

From data acquired by diverse  
observational systems

# MICROPROCESSORS TECHNOLOGY ADVANCEMENTS

Changing hardware constraints and the physics of computing



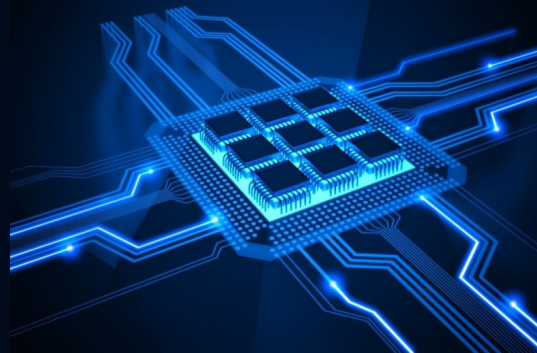
Gordon Moore

# EMERGING COMPUTING PARADIGMS

[2]

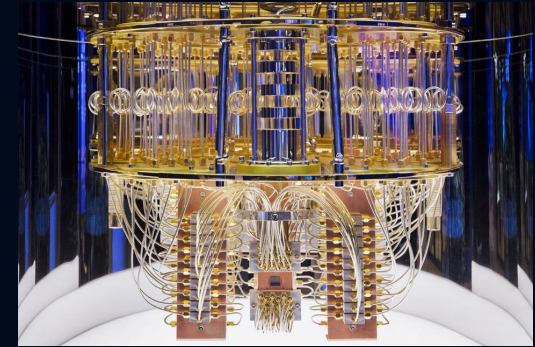


Supercomputing and  
Distributed Computing



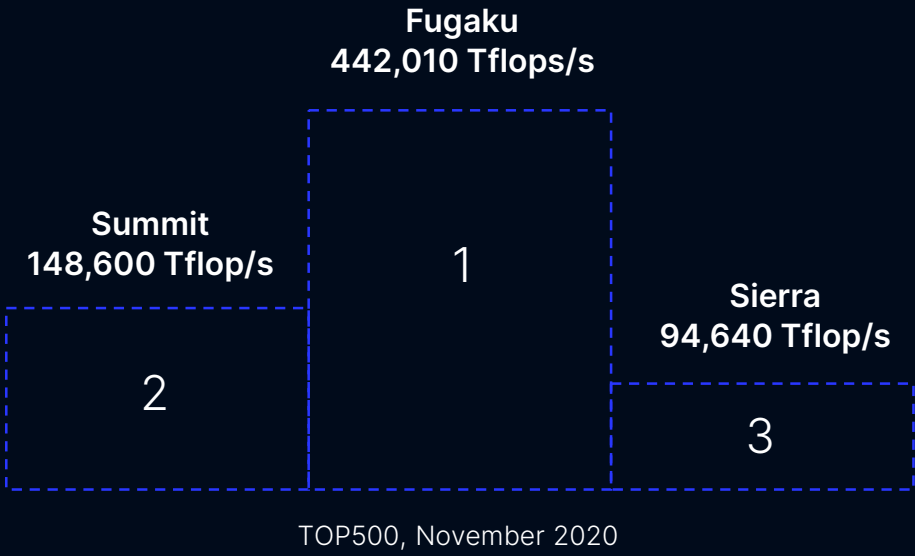
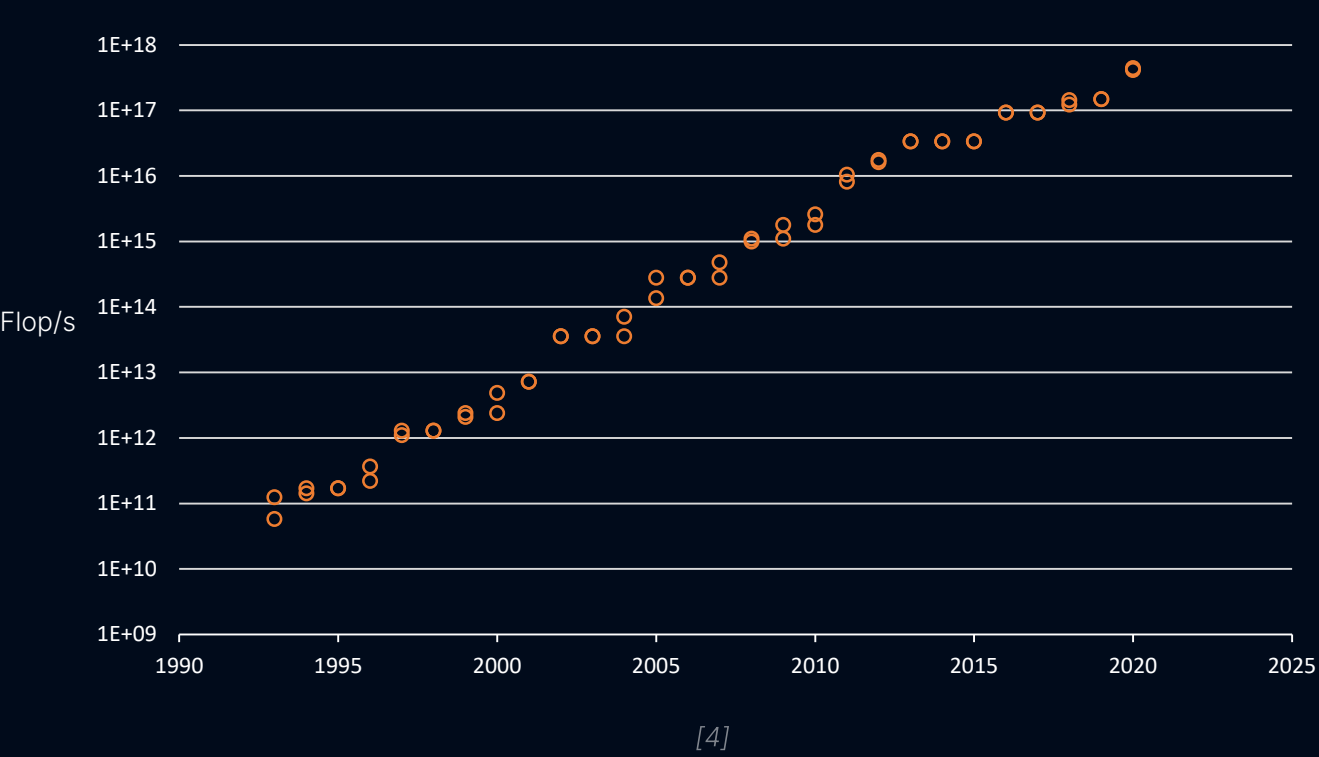
Specialized Hardware  
Computing

[3]



Quantum Computing

# A RACE TOWARD EXASCALE COMPUTING



# CLOUD COMPUTING IS SPREADING LIKE WILDFIRE





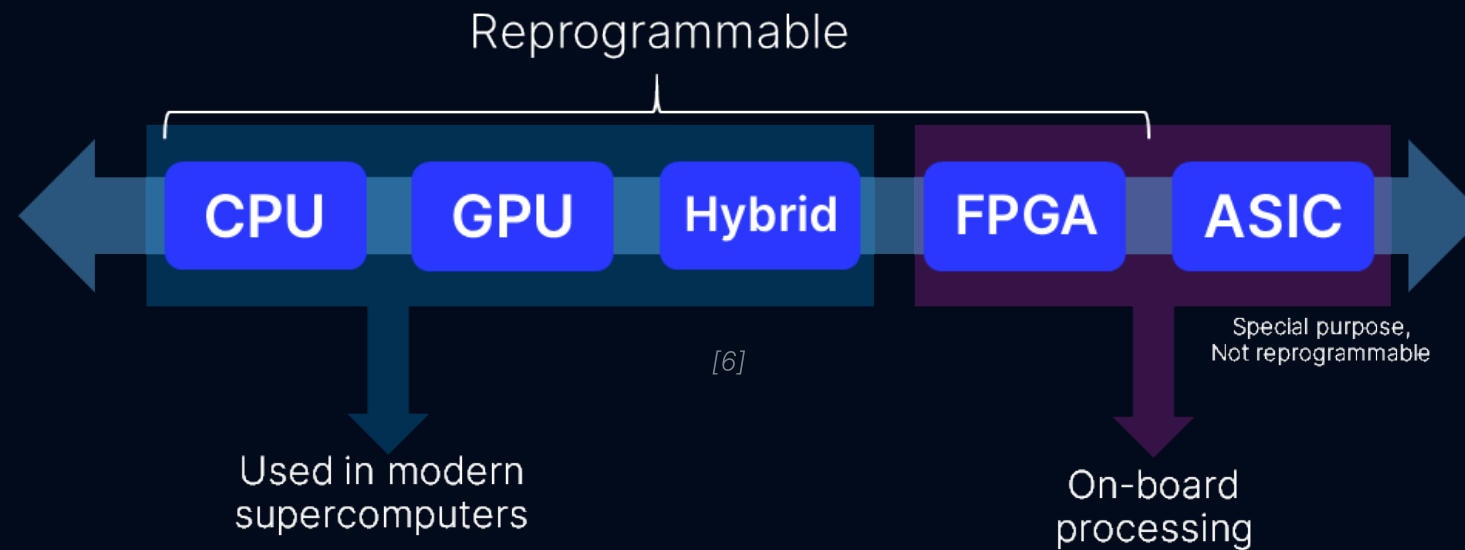


[5]

# CLOUD AND EDGE COMPUTING ARE LAUNCHING THE NEXT SPACE RACE

Process and reduce the data before you send it down

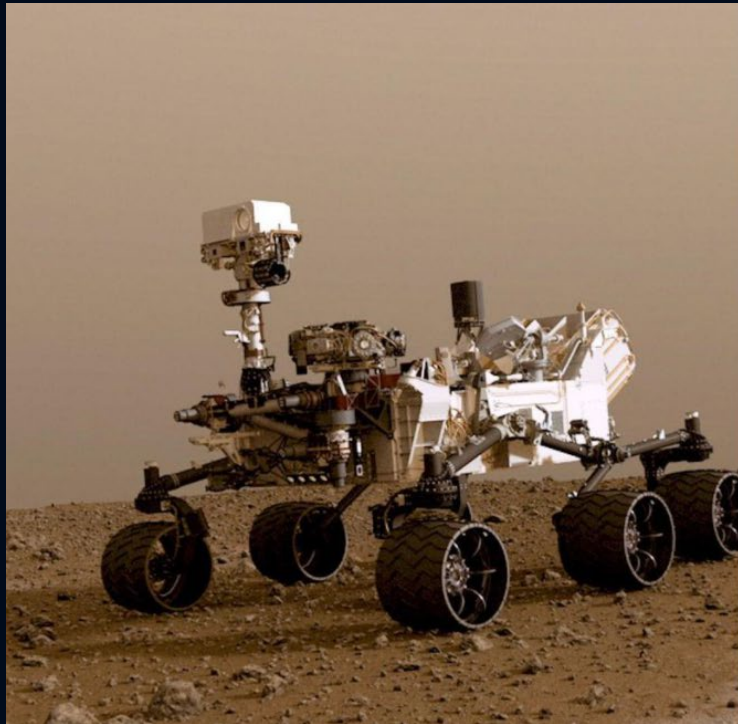
# SPECIALIZED HARDWARE COMPUTING



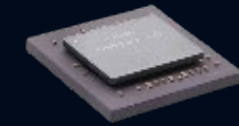
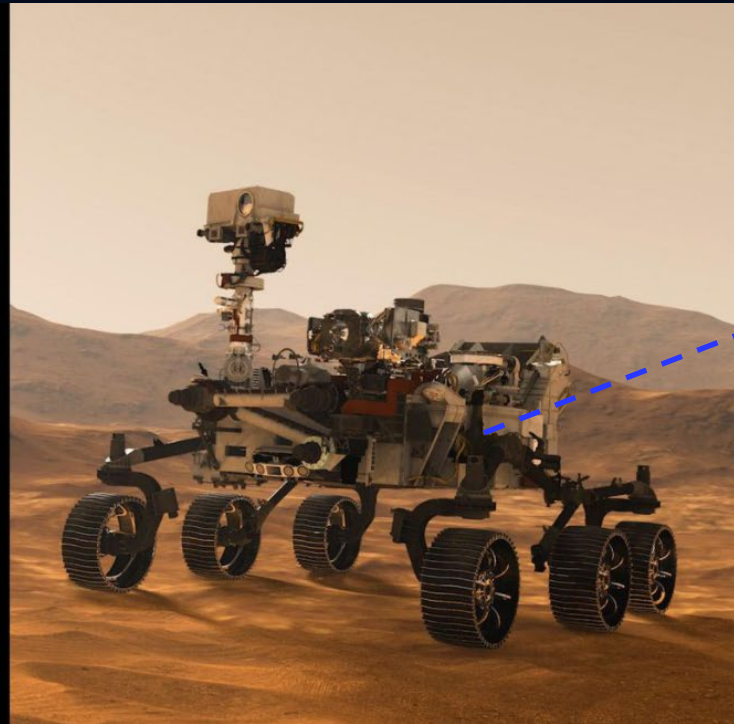


# NEW ROVER HAS COMPUTER VISION

Curiosity



Perseverance

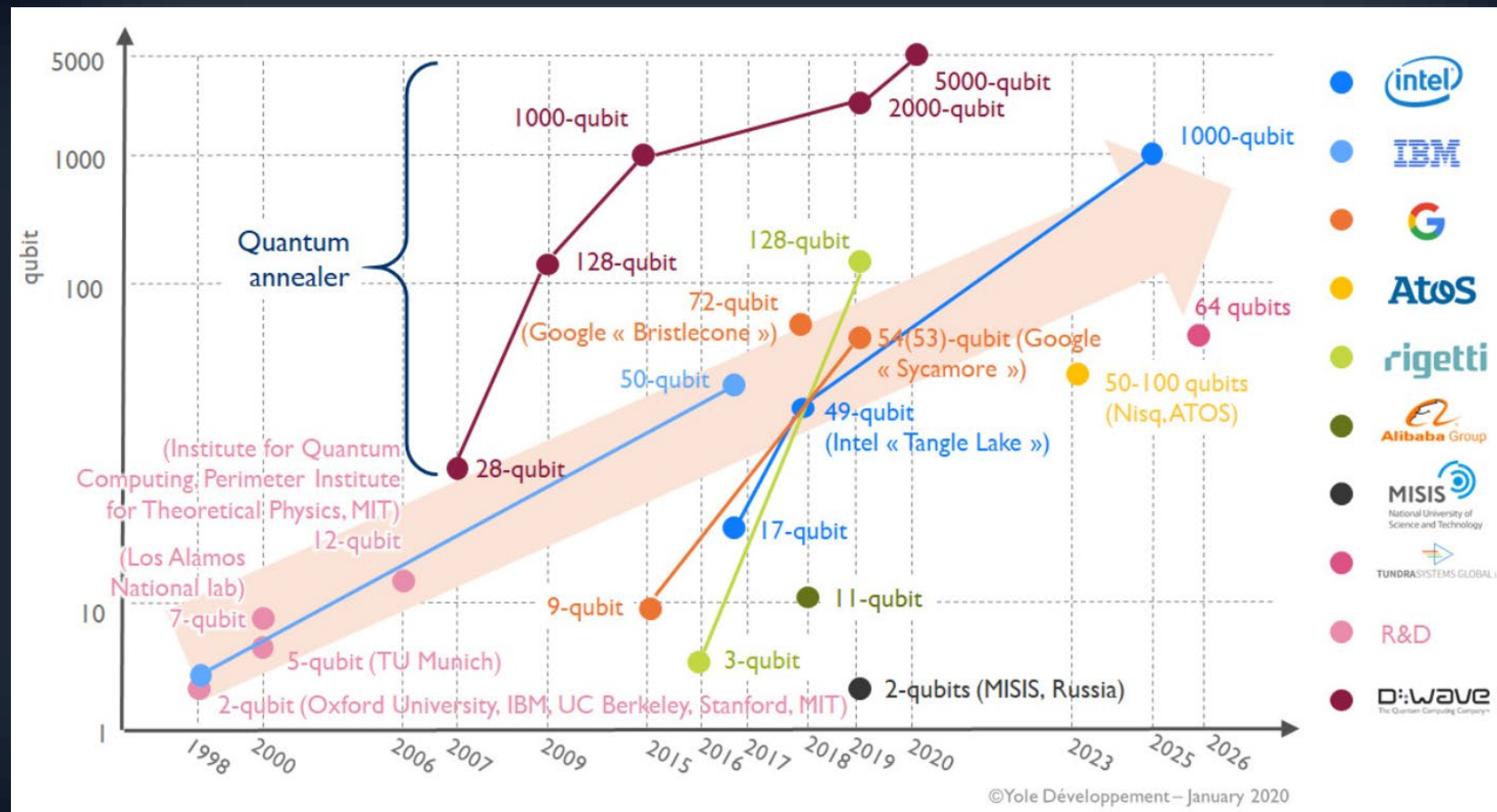


Virtex V5QV  
FPGA

[7]

# QUANTUM COMPUTING

## Physical qubit roadmap



[8]

# IT IS EASY TO TRY OUT!

D-Wave Leap

Take the Leap

Sign up with Leap. Create an account for free time on a D-Wave quantum computer, to learn the basics, and to run your own quantum experiments.

Already have an account? [Log in](#)

FIRST NAME\*

LAST NAME\*

Emily

Smith

EMAIL\*

emily@gmail.com

I AM A...\*

-- Please select a profession --

JOB TITLE\*

CTO

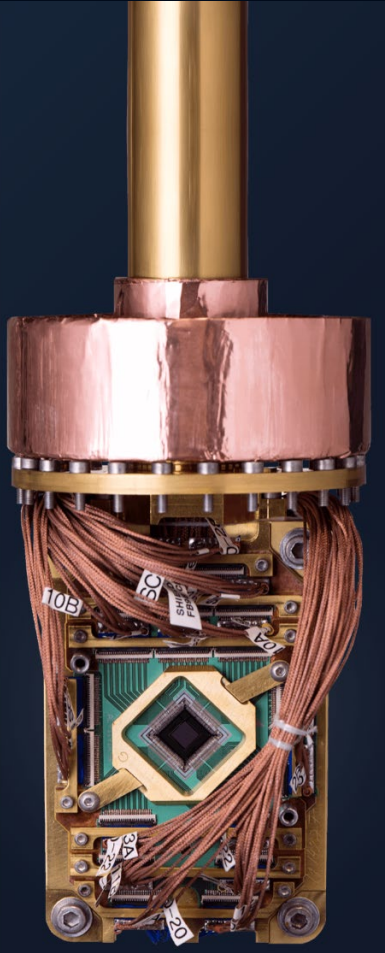
COMPANY\*

Acme Inc.

INDUSTRY\*

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[9]



Real quantum computers.  
Right at your fingertips.

IBM offers cloud access to the most advanced quantum computers available. Learn, develop, and run programs with our quantum applications and systems.

Code with Python

Program and prototype with Qiskit software integrated into Quantum Lab - no installation required.

[10]

Sign in to IBM Quantum

IBMid

G

in

New to IBM Quantum?

Create an IBMid account.



# High Performance and Disruptive Computing in Remote Sensing Working Group

## Main Objective:

Connect and support the community of interdisciplinary researchers in remote sensing who are specialized in emerging computing paradigms.

# ABOUT HDCRS

We are just getting started

## Chairs



Dora Blanco Heras

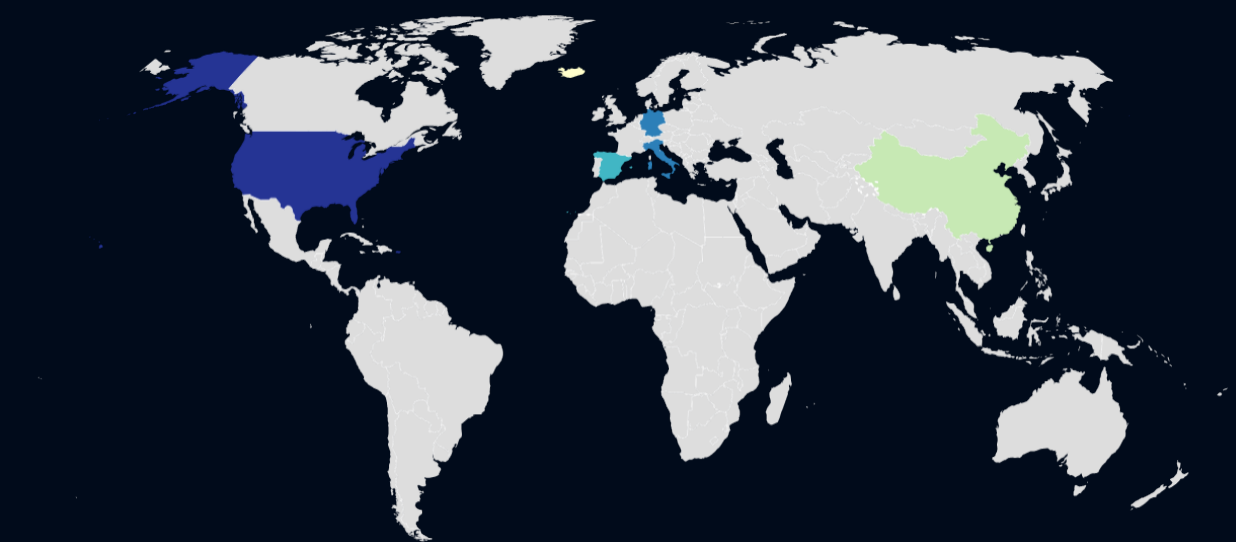


Gabriele Cavallaro



Zebin Wu

## 23 Members



Created with Datawrapper



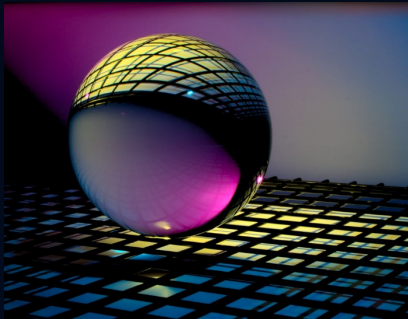
# SUMMER SCHOOL – ONLINE EVENT

From May 31 to June 3, 2021

Participation is free of charge (max 30 participants)

Access to computing resources for the practical sessions

## From HPC to Quantum paradigms in Earth Observation



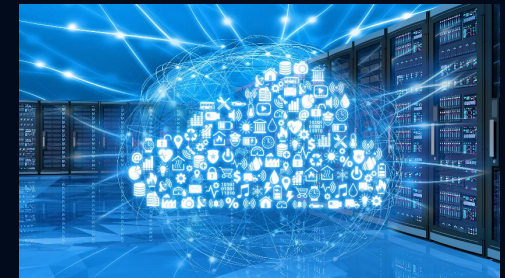
Prof. Mihai Dactu

## Programming GPUs and Accelerators with Directives



Prof. Sergio Bernabé García, et al.

## Scaling Machine Learning for Remote Sensing using Cloud Computing



Dr. Manil Maskey, et al.

Register here <https://indico-jsc.fz-juelich.de/event/174/>



# TUTORIALS

IGARSS, July 10-11, 2021

## From Big EO Data to Digital Twins: Hybrid AI and Quantum based Paradigms



Prof. Mihai Dactu

## Scalable Machine Learning with High Performance Computing and Cloud Computing



Dr. Gabriele Cavallaro, et al.

Register here <https://igarss2021.com/>


# INVITED SESSION

IGARSS, July 10-11, 2021

## Data Intensive Computing for Remote Sensing



Dr. Gabriele Cavallaro and Prof. Dora Blanco Heras

**Register here**  <https://igarss2021.com/TechnicalProgram.asp>

# SPECIAL ISSUE

IEEE JSTARS

2021

## Quantum Computing for Earth Observation



Prof. Mihai Dactu, Dr. Jacqueline Le Moignes, Dr. Bertrand Le Saux

**More info**  <https://www.grss-ieee.org/publications/call-for-papers/jstars-special-issues/>



## RECURRENT MEETINGS WITH THE MEMBERS



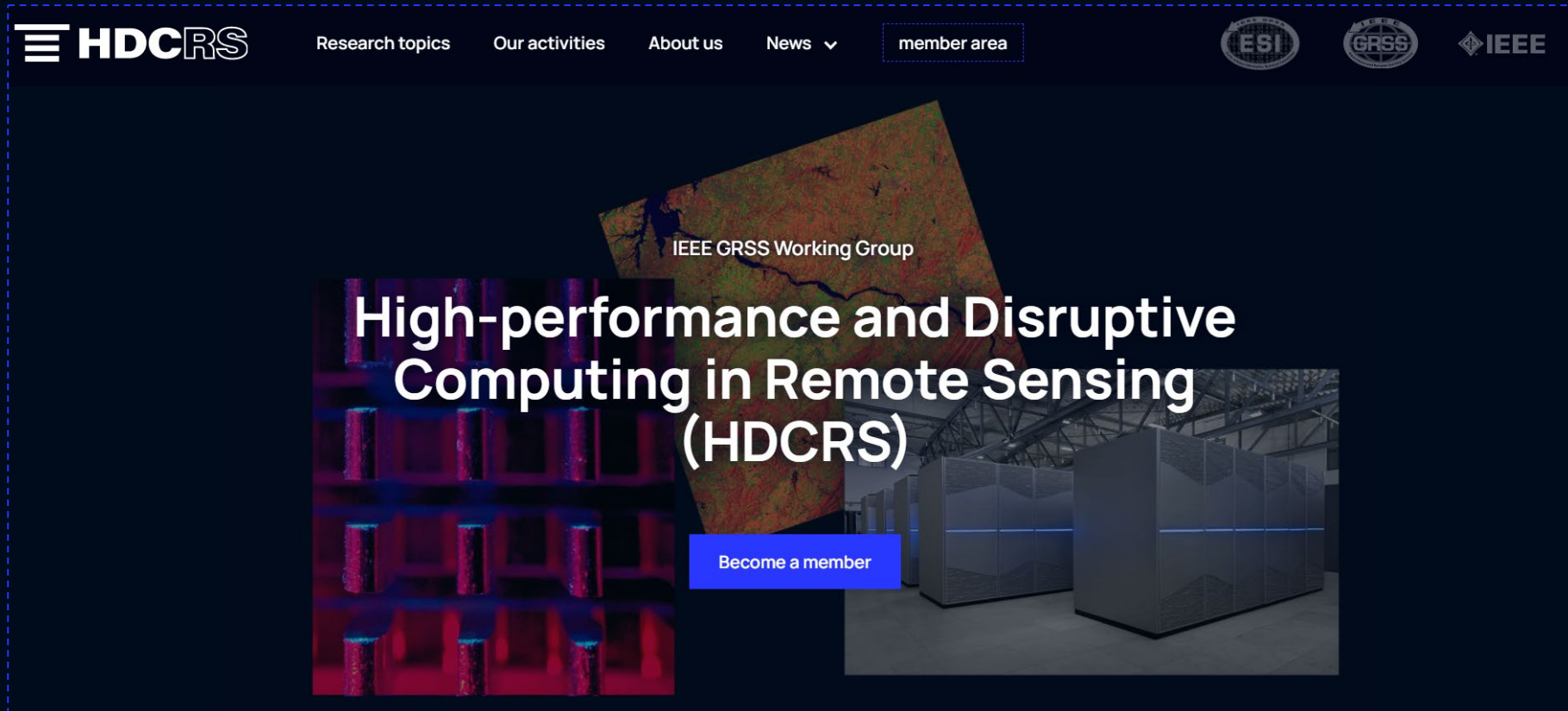


# WE WILL ORGANIZE SPECIAL COMPETITIONS

From 2022

**Come aboard**





www.hdc-rs.com

# JOIN US

Fill out the form

## Become a member

By becoming a member of HDCRS, you also become a member of the [GRSS Technical Committee Earth Science Informatics \(ESI\)](#). The ESI sends out a periodical newsletter and your name will also be listed on the ESI webpage.

First name \*

Last name \*

Email \*

Affiliation \*

☐ I do not wish to have my email visible in the list of members

Website

Title

Select one...



Expertise (max. 3 keywords) \*

Add your expertise in keywords

# COMMUNITY EXCHANGE

Add and learn about events, vacancies and funding opportunities



## Promote related events

Promote your events and publication activities  
(e.g. workshops, conferences, special issues)

[Promote events →](#)



## Offer jobs

Advertise open positions at your institution  
(e.g. PhD, postdoc, professorship, etc.)

[Offer jobs →](#)



## Announce funding

Announce calls for funding  
(e.g. call for proposals, grants, etc.)

[Announce funding →](#)

Upcoming

## Activities



31/05/2021 - 03/06/2021  
University of Iceland (Online event)

### Summer school on High-performance and Disruptive Computing in Remote Sensing

Every year HDCRS organizes a summer school with different instructors to teach about specific research topics.

[See more →](#)



2021  
IEEE JSTARS

### Special Issue on "Quantum Computing for Earth Observation"

This special issue aims to introduce this extraordinary field to the GRSS community, present the current state-of-the-art in quantum technologies, identify challenges and opportunities, and engage the quantum community for EO in the long-term.

[See more →](#)



July 2021  
IGARSS 2021 (Brussels, Belgium)

### Tutorial on "Scalable Machine Learning with High Performance and Cloud Computing"

The tutorial provides a complete overview of supercomputing and cloud computing technologies which can solve remote sensing problems that require fast and highly scalable methods.

[See more →](#)



July 2021  
IGARSS 2021 (Brussels, Belgium)

### Special session on "Data Intensive Computing for Remote Sensing"

This special session collects papers in the most advanced and trendy areas interested in exploiting new high-performance and distributed computing technologies and algorithms to expedite the processing and analysis of big remote sensing data.

[See more →](#)

# ACKNOWLEDGMENTS

## VP of GRSS Technical Activities



Dr. Irena Hajnsek  
2016-2020



Dr. Fabio Pacifici  
2021-2023

## Members of HDCRS

[www.hdc-rs.com/about-us](http://www.hdc-rs.com/about-us)

## Chairs of ESI Technical Committee



Dr. Manil Maskey



Prof. Peter Baumann



Dr. Weiguo Han

# REFERENCES

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Online: <https://github.com/karlrupp/microprocessor-trend-data>
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- [9] D-Wave Systems, Take the Leap  
Online: <https://www.dwavesys.com/take-leap>
- [10] IBM Quantum Experience  
Online: <https://quantum-computing.ibm.com/>

**Thank you for attending our webinar!**