The Weather Ahead

Reimagining knowledge, skills and attitude for the next generation of meteorologists

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What will a meteorologist need to know, do and be in 2040?

KNOWLEDGE

Forecast: stable, with physics as the anchor

SKILLS

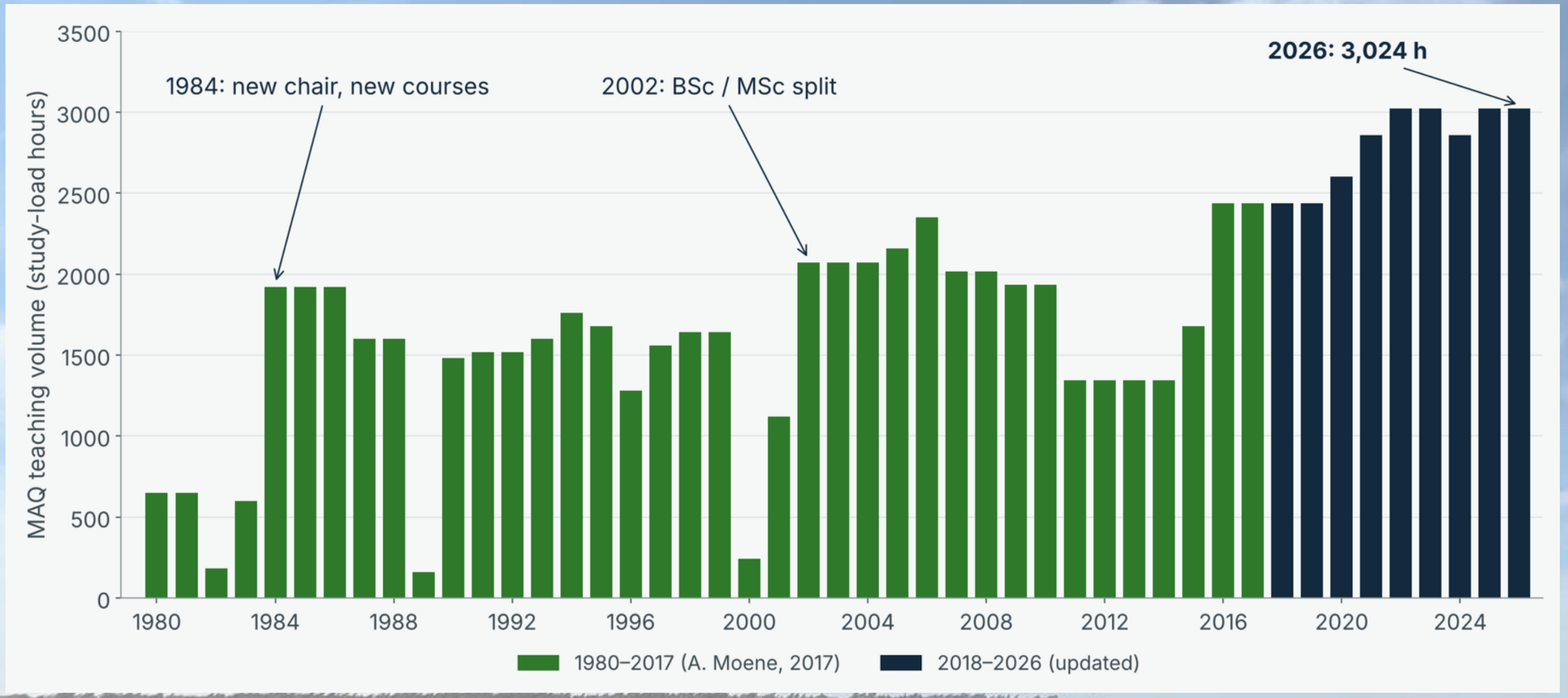
Forecast: changing fast with data, models and AI

ATTITUDE

Forecast: high uncertainty, so build resilience

WHERE WE COME FROM

A century of meteorology in Wageningen



1918 Meteorology starts at the new Landbouwhogeschool

1978 Own chair in agricultural meteorology

1989 BWA: you can graduate as a meteorologist

2002 BSc/MSc split, MSc Meteorology and Air Quality

2011 Merged into MSc Earth and Environment

2026 Current programme: 18 courses (2 shared)

Sources: study handbooks 1980–2026

WHERE WE COME FROM: CONSTANT

What stayed constant: learning by doing



Our own stations

Loobos tower: Measuring carbon & water fluxes, and air quality



Field education

Hupsel & Veenkampen: measuring the atmosphere yourself



Excursions

KNMI, RIVM, Cabauw, and met institutes in Germany

Courtesy of: Wouter Peters & Imme Benedict

WHERE WE COME FROM: CHANGE

From course content to what students become

1985

Nature and content of the course

2001

Learning outcomes added

2017

Outcomes, learning activities and assessment aligned

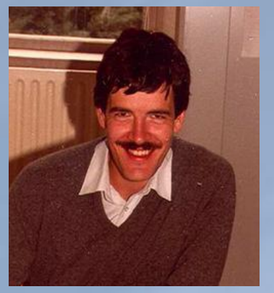
Beyond 2026

Programme vision: deepening knowledge, expanding the toolkit, building identity

The question shifted from **what we teach** to **what our graduates can do and who they are**.

Source: WUR study handbooks

A FORECAST FROM 2017: LEO KROON



"Door ontwikkelingen in waarnemingen, modellen en computers, krijgt de meteoroloog steeds meer mogelijkheden, maar wordt er ook steeds meer geëist op het gebied van kennis en vaardigheden."

Observations, models and computers give meteorologists more and more possibilities, but also demand more and more knowledge and skills.

HIS PREDICTION

Teaching moves towards applications and data analysis, and meteorologists look beyond their own field

HIS WARNING

Keep enough attention on the core of meteorology: processes in the atmosphere

Leo Kroon, Het onderwijs in de meteorologie in Wageningen vanaf 1918 (2017)

WHAT THE FIELD ASKS

The WMO standard for a meteorologist: BIP-M

THE CORE

Physical meteorology

Dynamic meteorology

Synoptic and mesoscale meteorology

Climatology

LEO'S PREDICTION

2023 revision

Communication impacts for users

Seamless data and products

Professional development

Societal issues

Foundations

Mathematics · physics · other sciences · **communication and teamwork** · **data analysis and programming**

Source: WMO-No. 1083, Vol. I (2023) & WMO INFCOM-2 Review of BIP-M

WHAT THE FIELD ASKS

Who our students are, and where they go

Stronger than before

More independent, better writers, much stronger digital skills

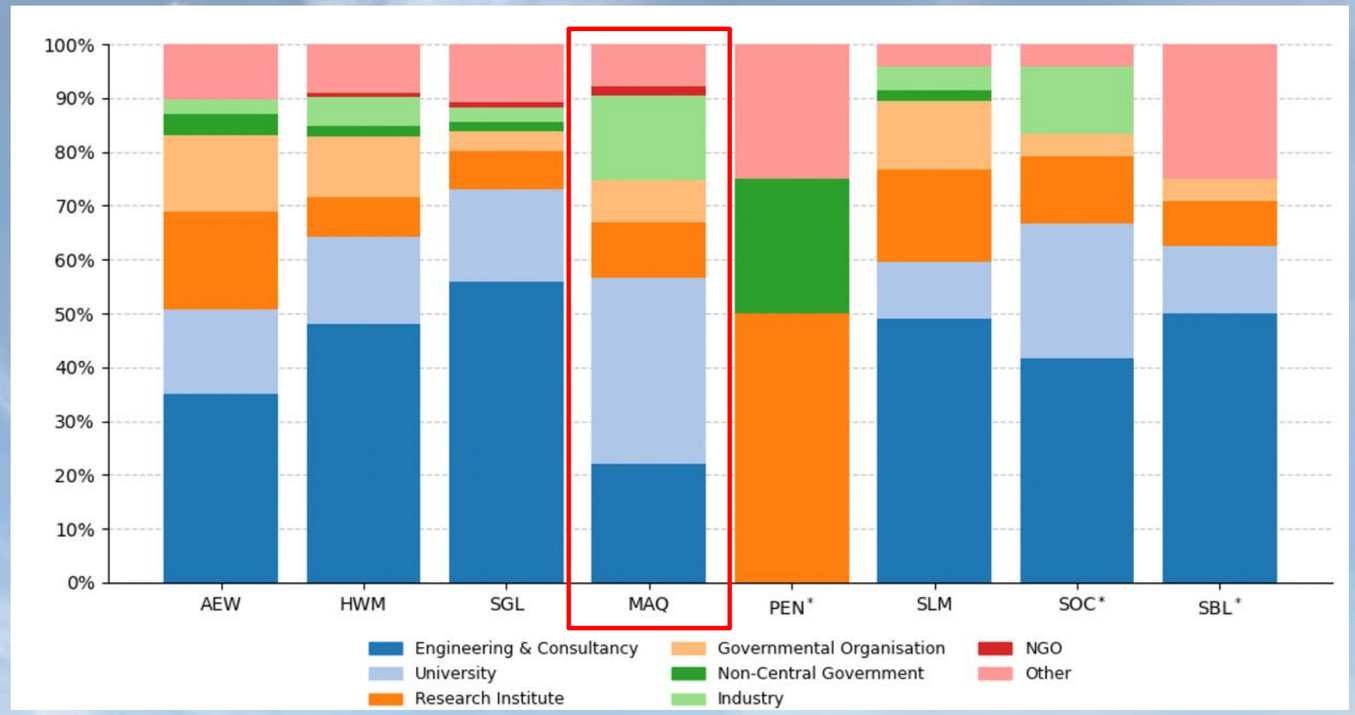
Weaker than before

Gaps in maths and physics, and **often unsure about their own knowledge and abilities**

Today’s graduate profile:

meteorologists, numerical weather prediction specialists, energy yield forecasters, air quality consultants

First job of about 200 meteorology graduates since 2006 - 2025



Source: L. Kroon, Het onderwijs in de meteorologie in Wageningen vanaf 1918 (2017) & ESS Life after graduation (n.d.)

WHAT THE FIELD ASKS

Three layers of a meteorologist

Knowledge

The physics of the atmosphere: dynamics, thermodynamics, boundary layer, chemistry, climate

Skills

Data and models, the scientific method, writing, presenting and arguing with evidence

Attitude

Curiosity, honest self-assessment, responsibility, and resilience under uncertainty

Source: Vision on the BSc programme ESS (2025)

HOW WE TEACH IT · KNOWLEDGE & SKILLS

Meteorology across our BSc and MSc

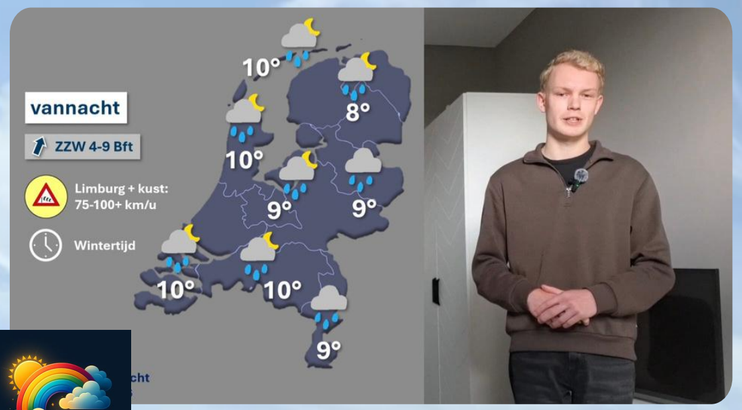
Stage	Explicit: the atmosphere is the topic	Implicit: the atmosphere as context or data
BSc year 1	Introduction Atmosphere; Introduction ESS	Integration course ESS
BSc year 2	Meteorology and Climate; Atmosphere-Vegetation-Soil Interactions	System Earth; Field research water and atmosphere
BSc year 3	Atmospheric Practical; Boundary layer meteorology; Clouds and climate; Atmospheric composition	LTSM; Fluid mechanics
MSc	Atmospheric Dynamics; Atmospheric Modelling; Earth System Modelling; Remote sensing and atmospheric composition; Urban hydrometeorology	EDCA; WANT; Field training SWA interactions

SKILLS

Every year Longitudinal: PDP in BSc years 1–3, continued as the MSc personal development path · 1 ECTS per year from 2027–2028

HOW WE TEACH IT · SKILLS & ATTITUDE

A personal development line through the bachelor



Cas Meijer

Publishes his own Weather forecast



Stijn Westerbeek

Builds his own historical record



Eva Horsten

Debates climate politics at Model UN

The question:

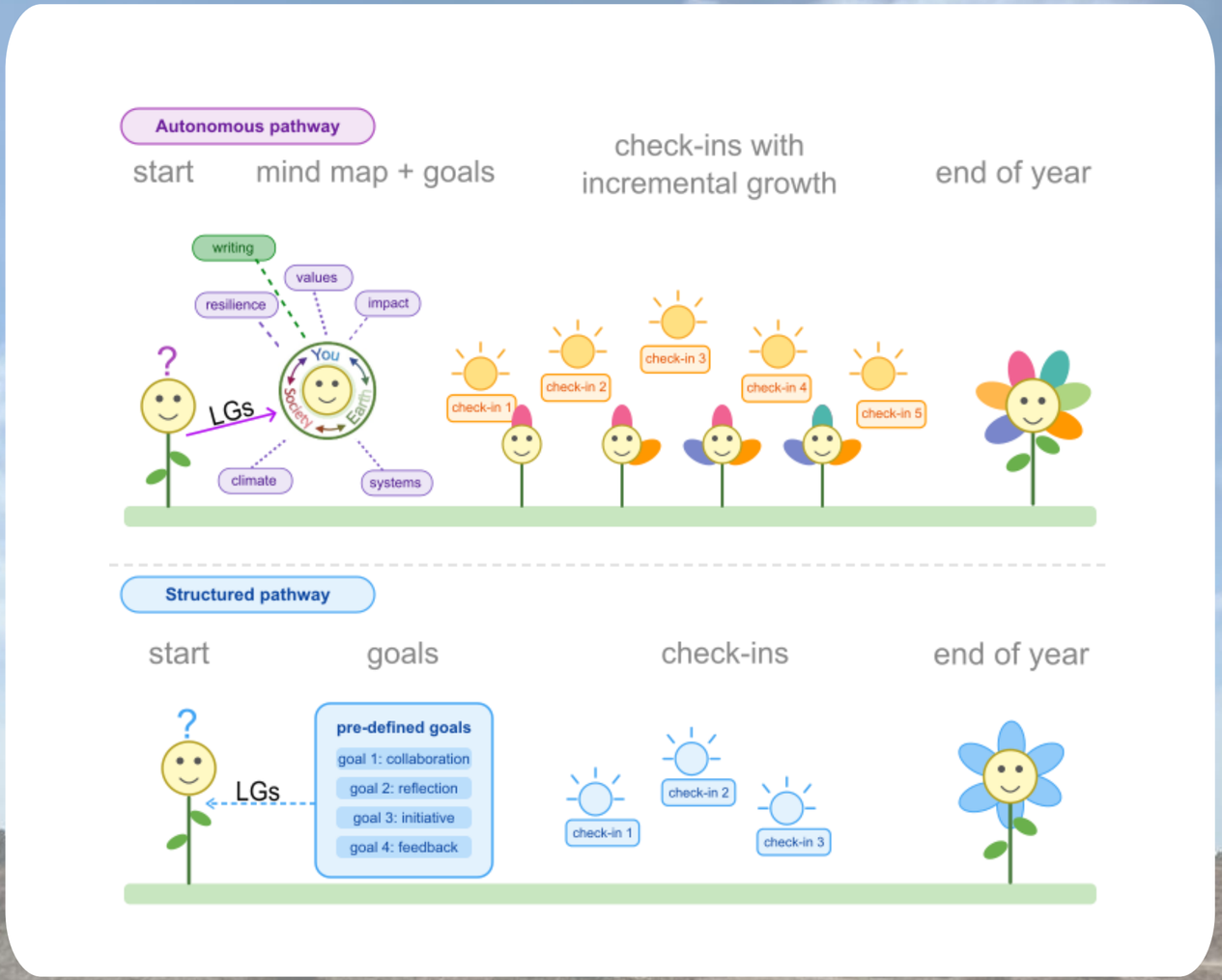
How do students see this growth, and connect it to who they want to become?

Courtesy of: Cas Meijer, Stijn Westerbeek and Eva Horsten

HOW WE TEACH IT · ATTITUDE & SKILLS

PDP: Seeing your growth while it happens

Why PDP: Students grow, but in our 2022 cohort most saw it only in hindsight. PDP is one line, from the first year through all BSc years, and from 2027 through the MSc year.

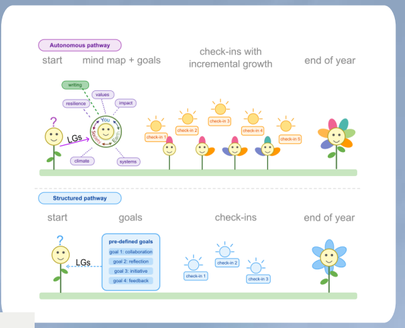


Rimac, A.: "Your leadership in motion" WUR education innovation grant (2026)

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AR **Antonija Rimac**
YWU00300 · Earth System Sciences v1 · 2026–2027

Structured pathway

⚙ Setup | Goals | Profile | Check-ins | Mind map

THIS YEAR'S GOALS

KNOWLEDGE
By the end of this academic year, I will be able to quantify the energy we have at the ocean surface, and i will be able to state what influences this energy (wind or tides), and if the resolution of the ocean model or wind stress data influences the power input.
30% · developing

SKILLS
By the end of the academic year, I will be able to structure my text using the IMRaD method. I will also use the CARS method to stress the knowledge gap.
10% · early stage

ATTITUDE & VALUES
By the end of the academic year, i will ensure that i have a positive attitude towards giving and receiving feedback. I will structure my feeldack based on Feed-up, Feed-back and Feed-foreward method.
15% · early stage

Update progress

Knowledge	30%
Skills	10%
Attitude & values	15%

Save progress

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YWU00300 · Earth System Sciences v1 · 2026–2027

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Activity timeline

Study adviser meeting — Make private | Remove

Programme choices (electives, minor, internship, exchange, Master's track)

Preparation: Somewhat prepared
Felt: Overwhelmed

Learned: I learned that looking at the skills that i have it would be better to choose for several elective courses or minors first, and then look at the RO's.

Next steps: Make a good electives selection that would allow me to develop writing and presenting skills.

28 Oct 2026

PDP session — Make private | Remove

Skills workshop

In this session, we focused on the writing an introduction and methods section. We did not fully cover the IMRaD method but looked at Cars method and how NOT TO avoid stating what a gap in the knowledge is and how it can be filled with the current research. We learned how to structure our methods section in three steps starting with Model used, then data that were collected and how the data was analyses using statistics.

08 Oct 2026

Study adviser meeting — Make private | Remove

Study progress / falling behind | Programme choices (electives, minor, internship, exchange, Master's track)

Preparation: Somewhat prepared
Felt: Anxious or stressed

Learned: That i need to plan more in advance.

Next steps: I will make a concrete plan of which courses i wish to follow this year, i will also motivate why and i will indicate which skills i plan to develop through these courses.

07 Oct 2026

PDP session — Make private | Remove

Goal-setting

Today we learned how to write SMART learning goals.

07 Oct 2026

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HOW WE TEACH IT · ATTITUDE & SKILLS

An honest mirror: students learn to judge their own work

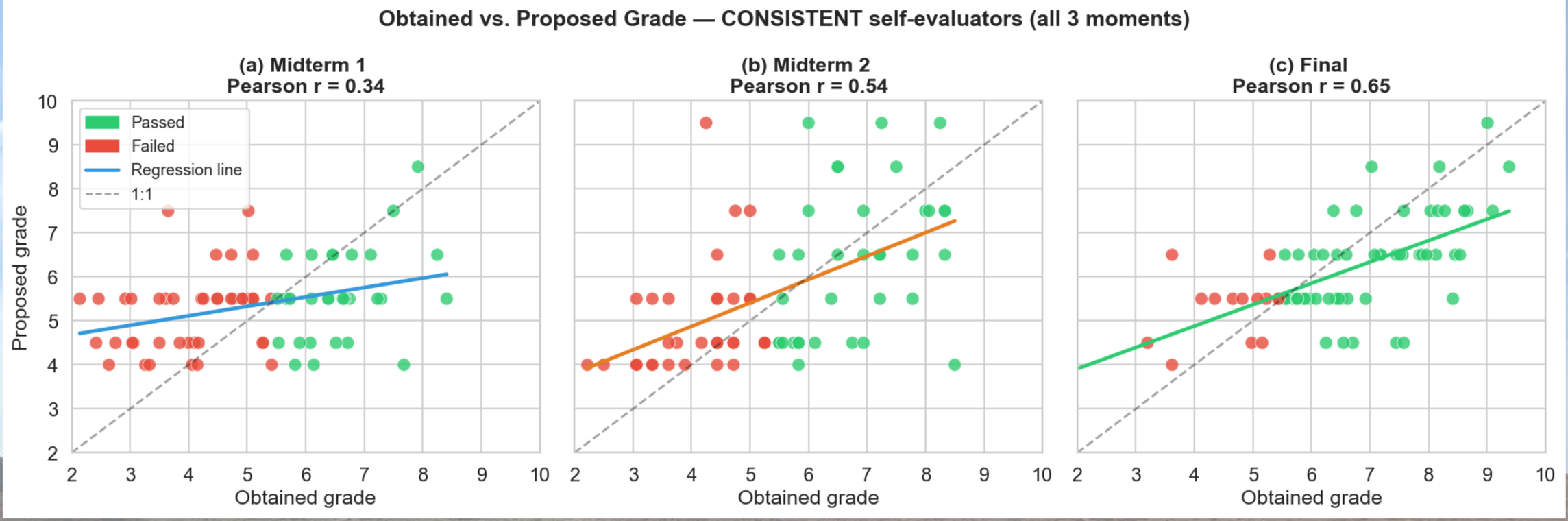
Year 1
Peer- and self-assessment
integration course ESS

Year 2
Peer- and self-assessment
AVSI & System Earth

Year 3
Self-assessment
LTSM course & BSc thesis

AVSI: N = 70

r = 0.34 → 0.54 → 0.65, with 76% passing rate

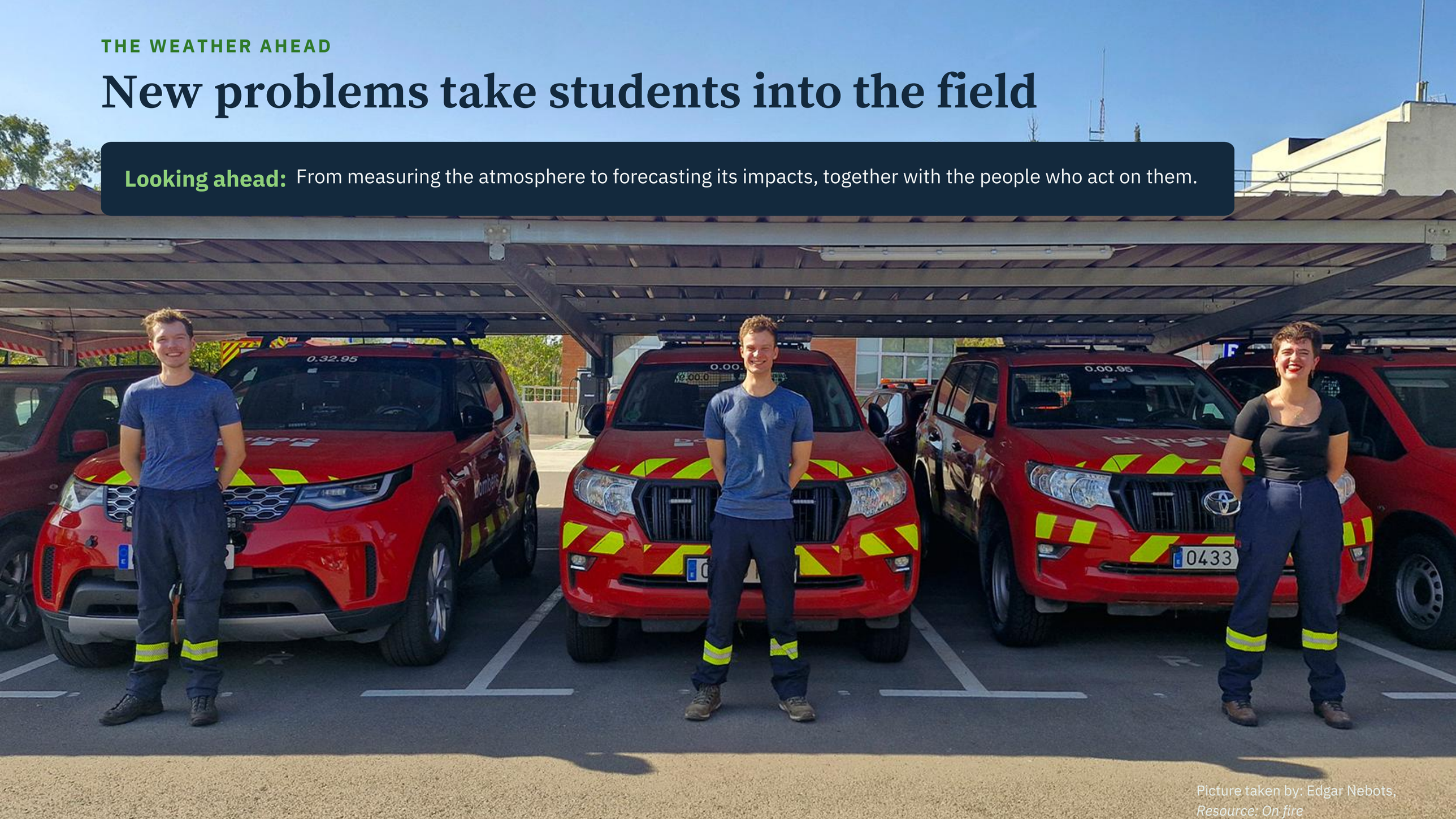


Rimac & Moene, Developing self-assessment accuracy through structured repetition: a longitudinal intervention in undergraduate ESS, in prep.

THE WEATHER AHEAD

New problems take students into the field

Looking ahead: From measuring the atmosphere to forecasting its impacts, together with the people who act on them.



Picture taken by: Edgar Nebots,
Resource: On fire

THE WEATHER AHEAD

Do we teach what the field asks for, and beyond?

Knowledge

Physics of the atmosphere
MAQ courses, field practicals

Covered for decades

Skills

Data and programming
Data skills practicals

Research and reasoning
Projects, RO's, Electives, PDP

Communication
PDP, presentations

Now explicit

Attitude

Judging your own work
Honest Mirror

Professional growth
PDP years 1–3, MSc path

Newest, growing

Next step

Impacts for users and society
Now in the new vision's LO's

Already emerging
Collaboration with fire services

Building it into courses

Leo Kroon:

"The only constant factor in Wageningen education is change."

So, we prepare meteorologists who don't just follow the change. They actively help shape it in collaboration with the field.



