NWP Training course,
Data Assimilation

Sophie Marsden

ECMWF Senior Data Support Administrator

sophie.marsden@ecmwf.int

European Centre for Medium-Range Weather Forecasts (ECMWF)

ECMWF is an international organisation with

- 23 Member States

- 12 Cooperating States

ECMWF's role is to address the critical and most difficult research problems in medium-range NWP that no one country could tackle on its own
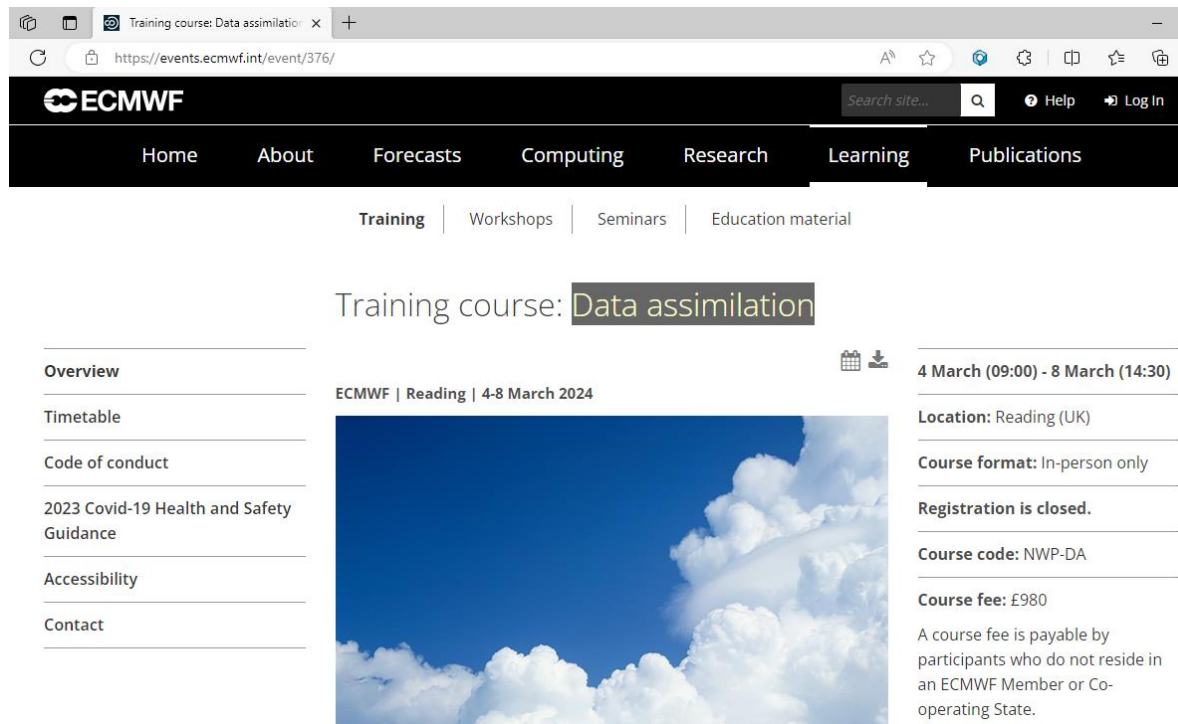
Three sites in UK, Italy and Germany

• Both research institute & 24/7 operational centre

• Established in 1975

• Advanced training = one of ECMWF strategic activities

Reading

Bonn

Bologna

NWP training course: Data Assimilation

- Course webpage: https://events.ecmwf.int/event/376/

- ECMWF training: https://www.ecmwf.int/en/learning

- eLearning resources https://learning.ecmwf.int/

General Housekeeping

Access to Centre

- Please sign in/out each day at reception

Personal belongings

- Do not leave any personal belongings at ECMWF outside office hours.
- We recommend that you do not leave valuables unattended in the classroom or any other part of the building.
- ECMWF will not take any responsibility for items lost at the premises.

Smoking

- Smoking is not allowed inside the building. Please ask at Reception Desk and you will be directed to the outside smoking area.

Enquiries

- If you have any questions, please contact the Reception Desk who will liaise with the course organisers.

Make the most of the training!

- Please don't check emails on the computers, or on other devices ☺
- There are no stupid questions!

General Housekeeping

Fire Escapes and Assembly Area

Legend:
- ● Designated smoking area
- ◐ Fire escape doors or direction of escape down stairs
- *Fire escape* Denotes exit route via external staircase
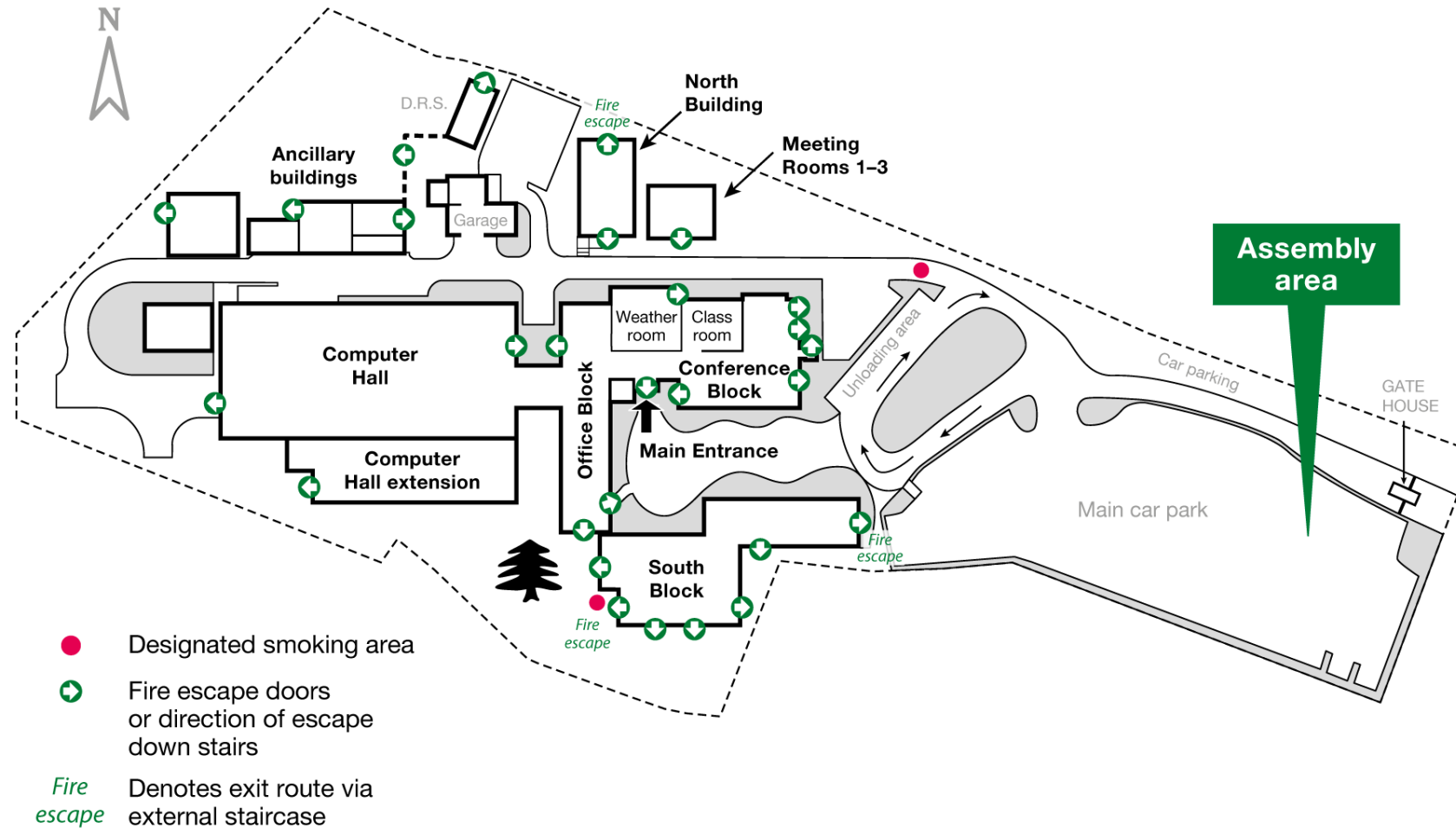
Restaurant

- The restaurant provides the following daily services:
  - Light breakfast from 08:00
  - Lunch: hot counter choices, salads, sandwiches, soup and desserts.

- Please speak to the restaurant staff if you have any special dietary requirements.

- The restaurant can only accept chip and pin and contactless card payments.

- Coffee/tea will be supplied during the breaks as specified on the programme.

Visitor WiFi

Follow these steps to use the visitor WiFi.

1. From the list of available SSIDs, select "ECMWF-Visitors-Self-Register"
2. Enter your details in the appropriate boxes on the registration screen and press the Register button.
3. You will be redirected to a page that informs you of a successful registration and provides your personal Access key.
4. Select "ECMWF-Visitors" from the list of available SSIDs and enter the Access key to connect.

ECMWF EUROPEAN CENTRE FOR MEDIUM-RANGE WEATHER FORECASTS

Data Assimilation. Training course programme

Monday, 4 March

Time	Session		Duration
09:00 → 10:00	**Introductions** Speakers: Students, Stephen English (ECMWF), Sophie Marsden (ECMWF)	📍	🕐 1h
10:00 → 10:20	**Coffee break**	📍	🕐 20m
10:20 → 11:20	**Overview of assimilation methods** Speaker: Massimo Bonavita (ECMWF)	📍	🕐 1h
11:20 → 11:30	**Comfort break**	📍	🕐 10m
11:30 → 12:30	**Assimilation Algorithms: (1) Basic concepts** Speaker: Sebastien Massart (ECMWF)	📍	🕐 1h
12:30 → 13:30	**Lunch break**	📍	🕐 1h
13:30 → 14:30	**Conventional and actively sensed observations** Speaker: Sean Healy (ECMWF)	📍	🕐 1h
14:30 → 14:50	**Coffee break**	📍	🕐 20m
14:50 → 15:50	**Assimilation Algorithms: (2) 3D-Var** Speaker: Sebastien Massart (ECMWF)	📍	🕐 1h
16:00 → 17:30	**Welcome cocktail**	📍	🕐 1h 30m

Icebreaker

Tuesday, 5 March

Time	Session		Duration
09:00 → 10:00	**Assimilation Algorithms: (3) 4D-Var** Speaker: Sebastien Massart (ECMWF)	📍	🕐 1h
10:00 → 10:20	**Group photo / Coffee break**	📍	🕐 20m
10:20 → 11:20	**Bias correction methods** Speaker: Patrick Laloyaux (ECMWF)	📍	🕐 1h
11:20 → 11:30	**Comfort break**	📍	🕐 10m
11:30 → 12:30	**Assimilation Algorithms: (4) Ensemble Kalman filters** Speaker: Massimo Bonavita (ECMWF)	📍	🕐 1h
12:30 → 13:30	**Lunch break**	📍	🕐 1h
13:30 → 14:30	**Parametrization and data assimilation** Speaker: Philippe Lopez (ECMWF)	📍	🕐 1h
14:30 → 14:50	**Coffee break**	📍	🕐 20m
14:50 → 15:50	**Tangent linear and adjoints** Speaker: Marcin Chrust (ECMWF)	📍	🕐 1h
15:50 → 16:45	**Practical session: Tangent linear and adjoints** Speakers: Marcin Chrust (ECMWF), Sebastien Massart (ECMWF)	📍	🕐 55m

Group photo

Data Assimilation Training course programme

Wednesday, 6 March

09:00 → 10:00	**Background error modelling in data assimilation** Speaker: Elias Holm (ECMWF)
10:00 → 10:20	**Coffee break**
10:20 → 11:20	**Radiance observations** Speaker: Tony McNally (ECMWF)
11:20 → 11:30	**Comfort break**
11:30 → 12:30	**Model error in Data Assimilation** Speaker: Patrick Laloyaux (ECMWF)
12:30 → 13:30	**Lunch break**
13:30 → 14:30	**Assimilation Algorithms: (5) Hybrid data assimilation methods** Speaker: Massimo Bonavita (ECMWF)
14:30 → 14:50	**Coffee break**
14:50 → 16:50	**Practical session: DA experiments** Speakers: Marcin Chrust (ECMWF), Massimo Bonavita (ECMWF), Patrick Laloyaux (ECMWF)

Thursday, 7 March

09:00 → 10:00	**Data assimilation diagnostics - forecast sensitivity** Speaker: Bruce Ingleby (ECMWF)
10:00 → 10:20	**Coffee break**
10:20 → 11:20	**Coupled data assimilation: opportunities and challenges** Speaker: Phil Browne (ECMWF)
11:20 → 11:30	**Comfort break**
11:30 → 12:30	**Data assimilation of atmospheric composition** Speaker: Melanie Ades (ECMWF)
12:30 → 13:30	**Lunch break**
13:30 → 14:30	**Practical Session: DA experiments** Speakers: Marcin Chrust (ECMWF), Massimo Bonavita (ECMWF), Patrick Laloyaux (ECMWF)
14:30 → 14:50	**Coffee break**
14:50 → 15:50	**Land data assimilation** Speaker: Patricia de Rosnay (ECMWF)

Friday, 8 March

09:00 → 10:00	**Ocean data assimilation** Speaker: Hao Zuo (ECMWF)
10:00 → 10:20	**Coffee break**
10:20 → 11:20	**Reanalysis methods** Speaker: Dinand Schepers (ECMWF)
11:20 → 11:30	**Comfort break**
11:30 → 12:30	**Data Assimilation and Machine Learning** Speaker: Alan Geer (ECMWF)
12:30 → 13:30	**Lunch break**
13:30 → 14:30	**Final discussion and Q&A** Speakers: Elias Holm (ECMWF), Marcin Chrust (ECMWF), Massimo Bonavita (ECMWF), Patrick Laloyaux (ECMWF), Sebastien Massart (ECMWF)

Good luck with the training!