

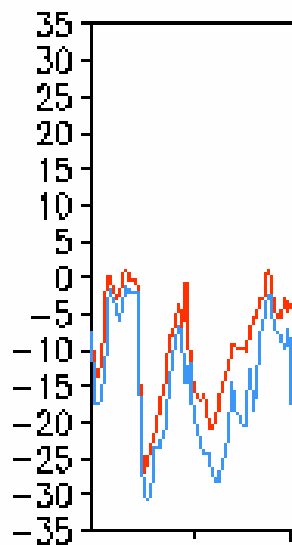
Unusual European Weather of 2006

By Roger Brugge

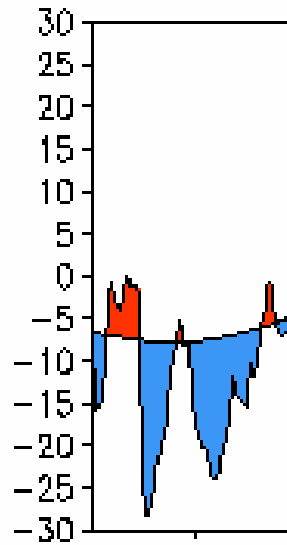
Data Assimilation Research Centre
University of Reading, UK
r.brugge@reading.ac.uk

A cold start in E Europe

- Unusually cold in W Russia from mid-January to mid-February
 - Monthly mean temperature anomalies in Moscow:
 - January -1.5C, February -5.6C
 - The lowest temperatures (-30C) in Moscow since 1978/79 winter (-38C).



Moscow daily temperature and anomaly of the daily mean (C), Jan. and Feb.



- Many anecdotal stories
 - One animal trainer fed his elephant a bucket of vodka to warm it up - the drunken beast then set about wrecking the central heating system.
 - The cold depleted mobile phone batteries, played havoc with lifts and jammed public cash dispensers.

The cold air then spread S and W across Europe.

The canals of Amsterdam froze briefly.

**End of Jan.:
first snow
for parts of
central and
southern
parts of
Portugal
since 1954.**

**Widespread deaths from
exposure to the cold.**

**Bulgaria's two main
ports of Varna and
Bourgas on the Black
Sea closed.**

**Much of Turkey
was covered in
snow; shipping
halted on the
Bosphorus.**

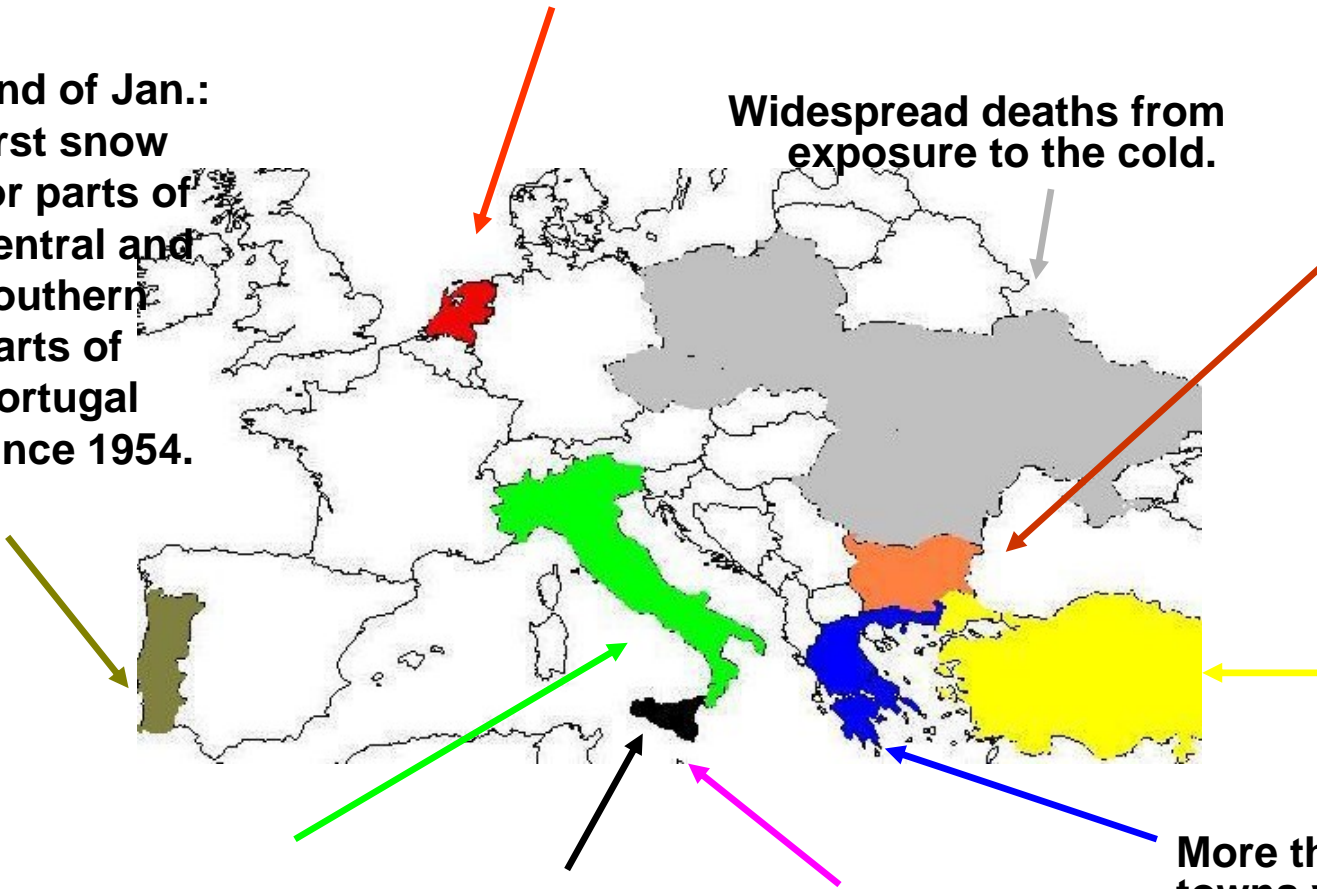
**-35C in
mountains in
the northeast.**

**Heavy
snow
early on
25 Jan.**

**8.7C on the 8 Feb:
lowest max. temp.
in Feb. on Malta
since 1962.**

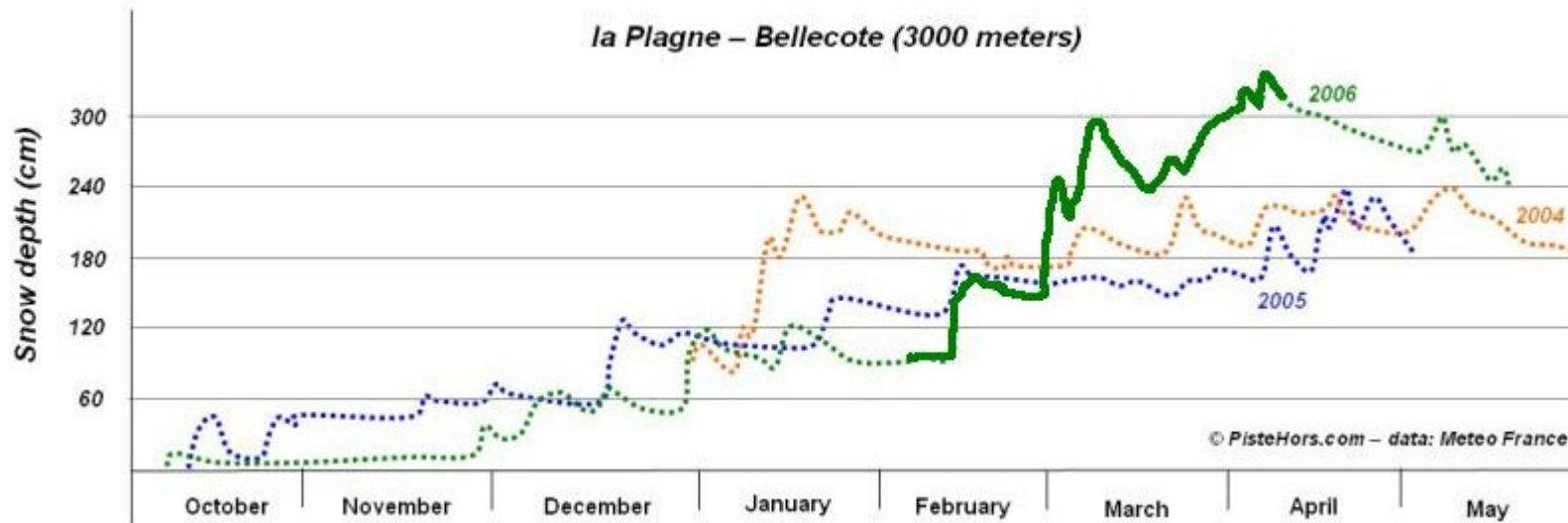
**More than 400 villages and
towns were cut off after 36
hours of continuous snowfall.
A Cambodia-flagged cargo
ship sank.**

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Late winter snowfall in the Alps

- Snow in the Alpine resorts tended to arrive late in the season (mid-February onwards) – **see the green line.**



- 4th-6th March: At least 17 people died as heavy snowfall and strong winds affected central Europe.
 - In the German state of Hessen it was the heaviest snowfall for 15 years, and nearly a metre of snow fell at higher levels in the Bavarian Alps.
 - Heavy snowfall in parts of Romania left several villages without power and blocked major roads.

Snowfall consequences (1)

- Heavy snowfalls led to **roof collapses**:
 - 15 Jan: Ice rink in Bad Reichenhall (Germany) – 15 died
 - 7 Feb: A supermarket in Toeging-am-Inn (S Germany) - many injured
 - 23 Feb: A covered market in Moscow – 65 died.
- ‘Late-season’ snow led to **avalanches**
 - Initial falls of snow early in the season were poor and became consolidated.
 - Later (heavy) falls did not combine with the early falls and were free to slide -> ideal for avalanches, especially when it started to warm up.
 - The season’s final avalanche death total in France of 65 deaths was the highest since 1970.



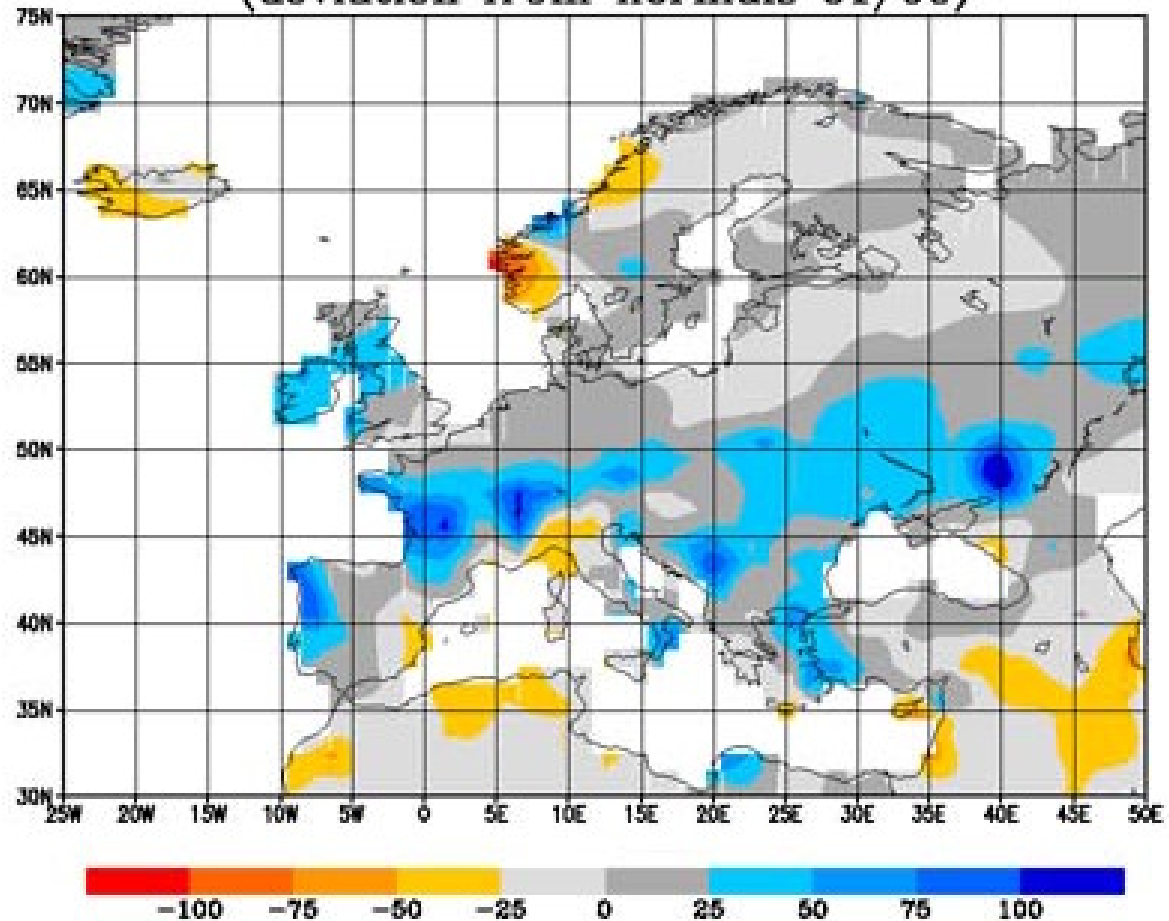
Snowfall consequences (2)

- **Floods**

- **The causes**

- Long periods of cold weather
- Large amounts of snow (1m)
- Sudden warming (20C/3 days)
- Rapid snowmelt
- Large runoff.

First Guess precipitation anomaly in mm/month
for MARCH 2006
(deviation from normals 61/90)



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- **Late February** - A minor warming after heavy snow in Central Europe, and some heavy rain in SE Europe, led to significant flooding in Serbia.
- Temperatures then fell in March with more heavy snowfalls in SE Europe.
- **Initially, early April**
 - Flooding reported in Germany, Poland, Austria, Czech Republic and Slovakia.
 - The Elbe swelled towards a new peak in Germany.
 - Heavy rain caused widespread chaos across Switzerland, with road and rail closures as well as flooding.
- **April**
 - Heavy rainfall and snowmelt produced extensive flooding along the River Danube in April.
 - The Danube reached its highest level in more than a century in places.
 - Areas of Bulgaria, Hungary, Romania and Serbia were among the hardest hit
 - Tens of thousands of people affected.



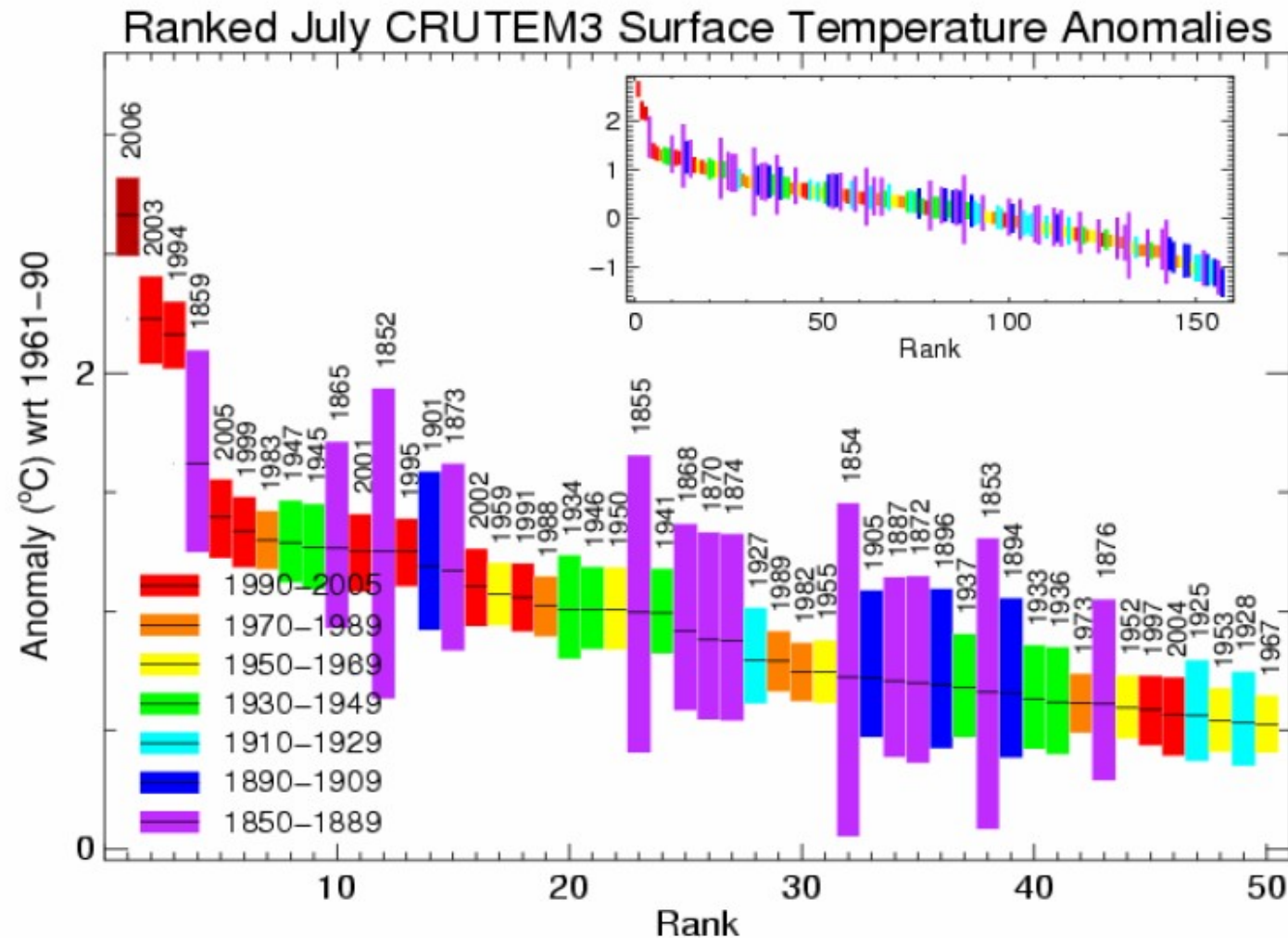
Summer starts early – in May

- **During May Europe started to warm up and dry out**
- Temperatures in parts of central Spain set record highs for May in the third week.
 - All-time high temperature records for May were logged in nine places on 17 May, including Toledo, which reached 38.4C and Cordoba, 39.5C.
- On 13 June, the French Government declared a state of drought in 15 departments— mainly in the south or central areas near Paris.
 - Groundwater levels in the Paris region were at their lowest level in 20 years and water restrictions were in place for nearly half of France by the end of July.
 - Dry conditions had been affecting parts of W Europe since November 2004, and Iberia/France in particular during 2005.
 - Early summer drought orders issued in the UK.

A record-breaking July

- Warmest month on record in Belgium, UK (**record starts in 1659**) and Germany (also the sunniest).
- Warmest July on record in Denmark (also the sunniest) and Holland.
 - Anomalies for July >5C in Holland, France, Germany and Poland
 - Warsaw had its hottest July in a 227-year record, anomaly +5C.
 - 36.5C at Wisley, the highest UK July temperature on record.
 - On 18 July the "Nijmeegse Vierdaagse" - an annual 4-day long distance walk held around Nijmegen in the Netherlands - was called off.
 - 44,000 walkers started out, 300 became ill, 30 taken to hospital, 2 died.
 - Forest fires, water restrictions, damaged farmland across the continent.
 - The level of the river Elbe dropped below 90cm at Dresden, making navigation almost impossible. Normally the level is some 2.2m – **in contrast to April floods.**

- The fifty warmest Julys.
- The inset shows the whole series.
- Coloured bars indicates the 95% confidence interval.



- The July European-average land-surface air temperature was the warmest on record at 2.7°C above the climatological normal (10W–30E, 35N–75N)

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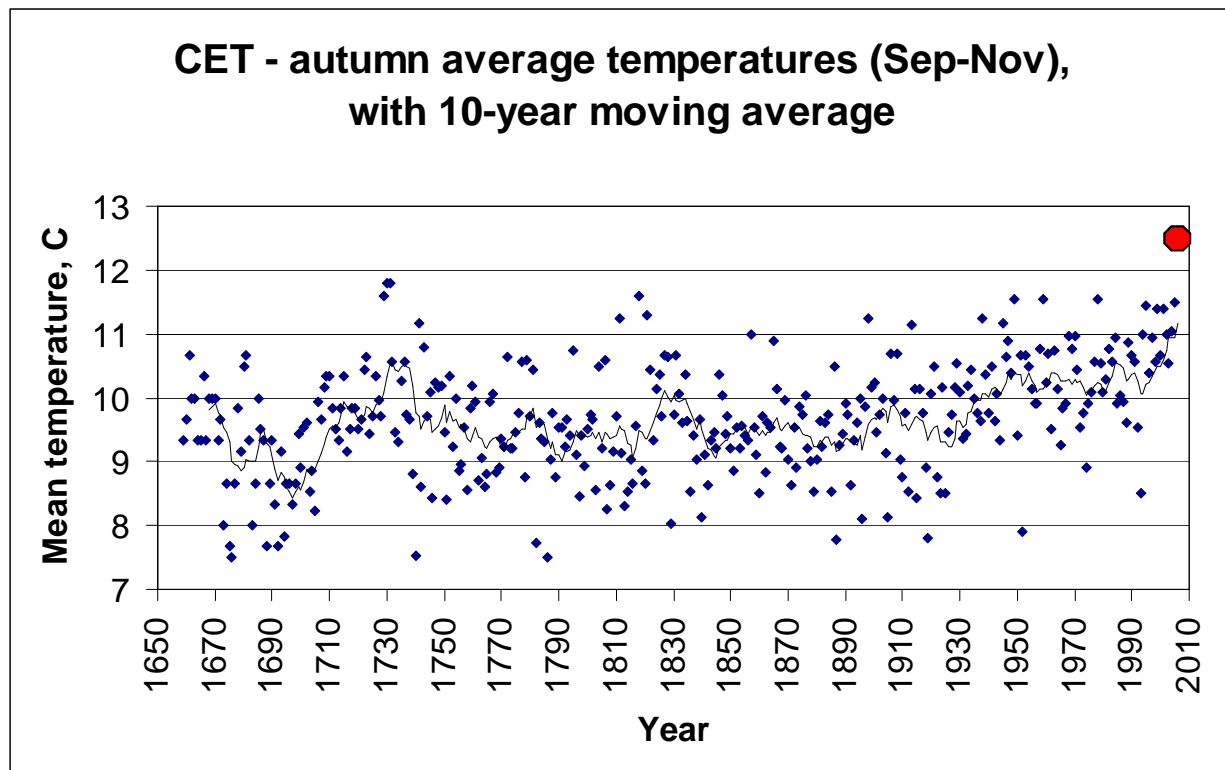
The warmth continues into late Summer...

- **In August there was a hot spell during 19th-20th in SE Europe.**
 - In Greece temperatures reached 40C in places.
 - In Italy, Trapani (Sicily) topped 40C – a new August record high temperature.
 - The heatwave originated in North Africa; scores of people were hospitalized.
- Forest fires continued to burn during the month in Greece, Spain and Portugal – Portugal continued to suffer it's worst drought in 60 years.
- Marine biologists blamed the weather for the plagues of jellyfish which forced the closure of some Spanish beaches.
 - An estimated 30 000 people were stung by the jellyfish throughout the Mediterranean during the summer.



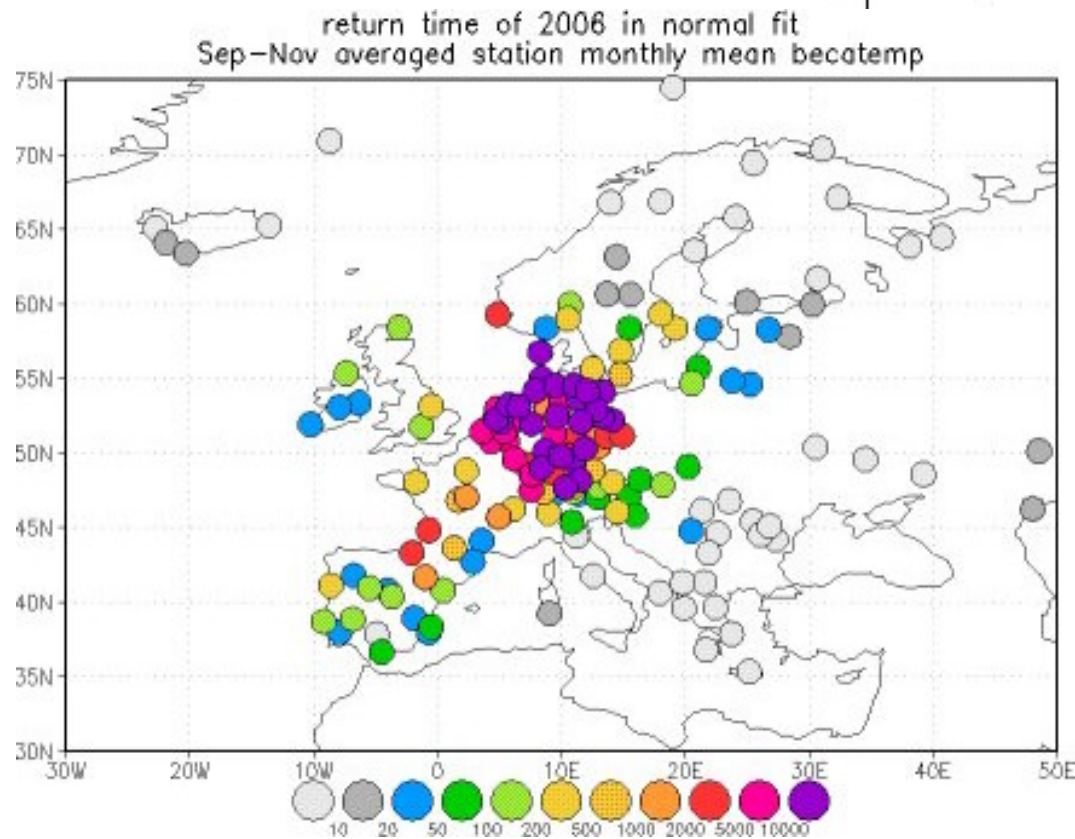
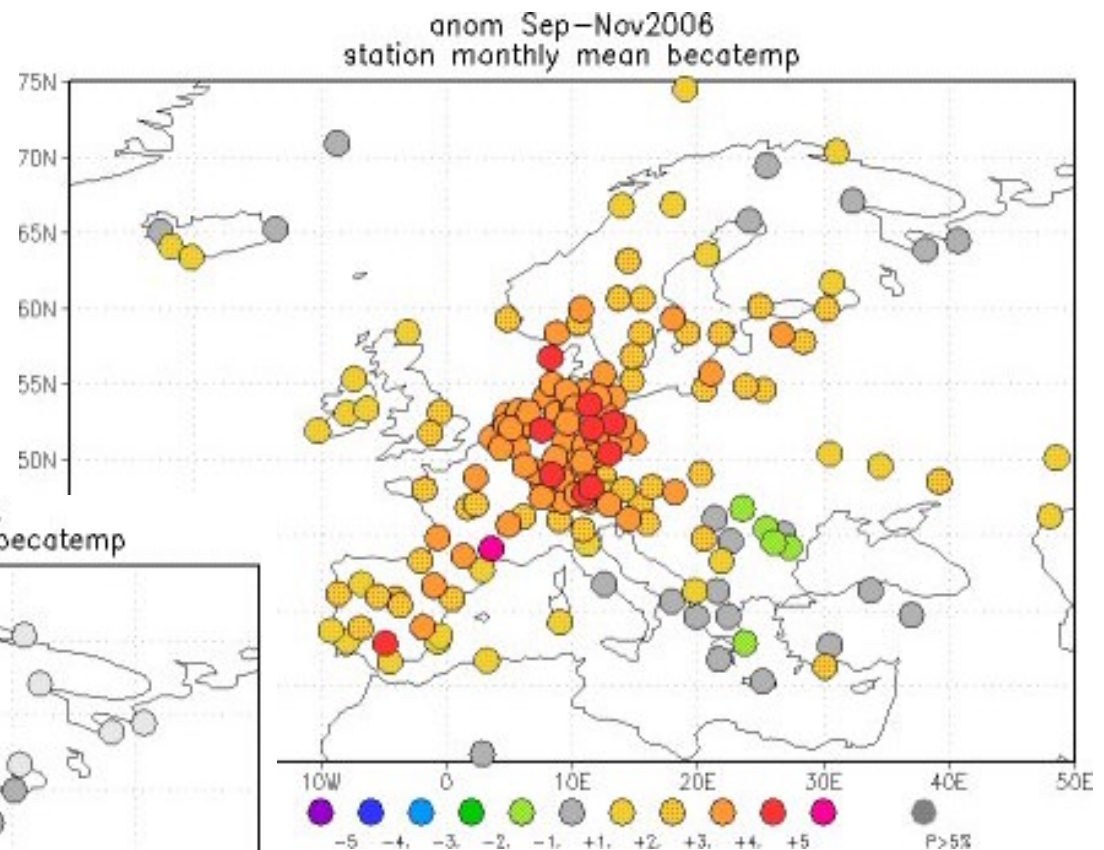
...and Autumn...

- UK: record warm **September** in the UK Central England Temperature series.
 - The daily mean of 16.8C was 3.1C above the long-term average.
 - In the UK the CET series value for **April to October** was the highest on record at 14.6C.
- It was also the warmest **autumn** on record in
 - the UK (1659),
 - Belgium,
 - the Netherlands (1706),
 - Denmark (1768),
 - Germany and Switzerland (1864) (3-4C above average).
 - most of Austria, S Sweden, S Norway and parts of Ireland.



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Autumn 2006 mean air temperature anomaly (C)

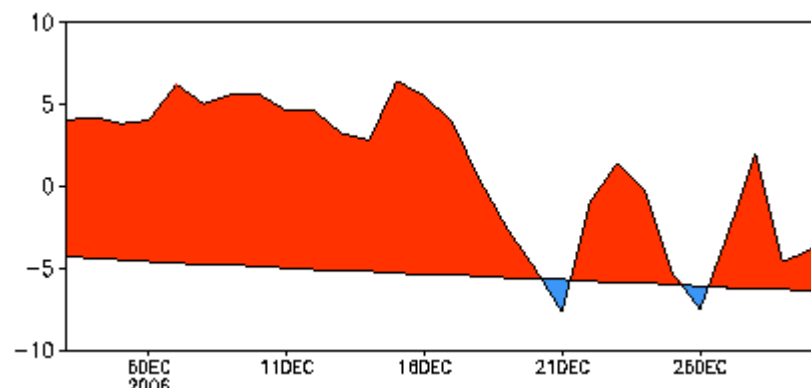


Autumn 2006 mean air temperature return periods, based on an unchanging climate

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...while into December there was a lack of winter snow

- In Moscow, several days early in the month were the warmest ever recorded for December; instead of the temperature dropping to a daily average of -5C, it was still hovering at around 5C until mid-month.



Daily mean Moscow temperature, Dec. 2006

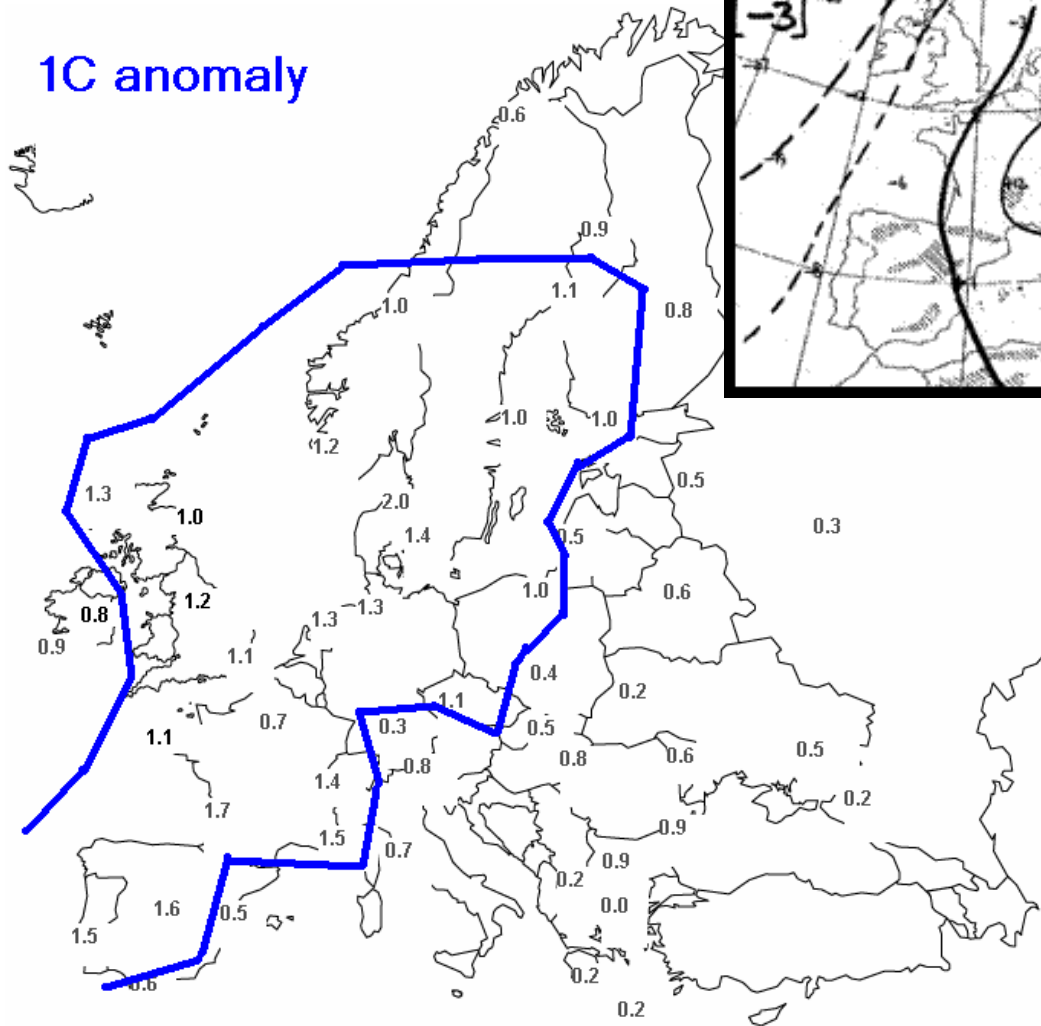
- Only 30% of the Alpine seasonal average of snow had fallen by mid-month.
- Alpine sports events in Austria, Czech Republic, France, Slovakia and Switzerland were cancelled because of the warm weather.
- In much of Finland and Sweden it was the warmest December on record.
 - Monthly temperature anomalies > +5C across Scandinavia and NW Russia
- W'ly winds very dominant in W and N Europe.

Annual statistics

- UK
 - warmest year by 0.2C.
- De Bilt (NL)
 - Warmest year by 0.3C
- France
 - 1.2C above average (2003 warmer)
- Switzerland
 - Fifth warmest

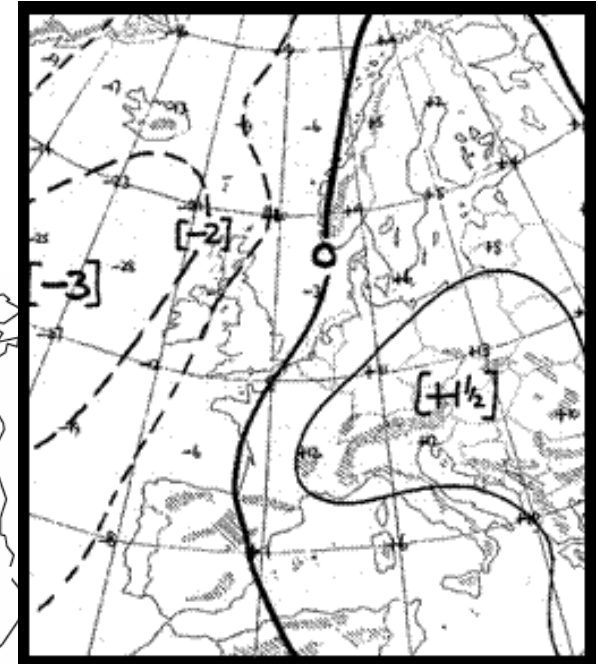
Map shows mean temperature anomalies w.r.t. 1961-1990

1C anomaly



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Annual MSL pressure anomalies w.r.t. 1961-1990
Contour interval 1hPa.



Further information about weather events

- Acknowledgements
 - Numerous met agencies, institutions, and individuals, in particular
 - KNMI, Met Office (UK), NCDC, WMO, NASA
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 - Yahoo, BoM, Météo France, MeteoSwiss, DWD, GPCC
- See www.met.rdg.ac.uk/~brugge/world.html for a regularly updated page of worldwide information – and for more information on the stories presented in this talk.