Enhancing the Computing Side of the Mathematics Student Journey

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Based on five years' experience

- Teaching XX10190 "Programming and Discrete Mathematics"
- To 250-300 first year Mathematics students
- Many of whom aren't particularly keen on programming

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However, all these are "jam tomorrow" reasons

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+ Have Computer Science teach it (our previous approach)
- Seen as disconnected from the rest

Our Approach (2009—)

- Teach programming integrated with relevant mathematics
- (Therefore we use a team of professors and a team of tutors, from both departments)
- Start with simple weekly exercises, just as in all the mathematics courses
- We expect all students to do all the exercises
- Carrot of help, stick of mark deduction

Team Teaching: 3 out of five tutors visible

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- XX10190 does coding theory, which is linear algebra over finite fields,
- And provides practical uses for “kernel”

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- XX10190 introduces "*O*-notation" early, for algorithm complexity: it seems natural — $O(n^2)$ formalises "grows quadratically"
- Students can see the simplification: *O*(*n*) rather than 15*n*-163

Links to other modules but above all

- XX10190 introduces proof by induction as a natural counterpart of programming by recursion
- There are a lot of non-trivial induction proofs
- Which have “real” applications in programming, showing the efficiency of algorithms

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- Very similar to R, used in Statistics
- (we give a 1-page handout on differences)

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- Used in second year Numerical Analysis
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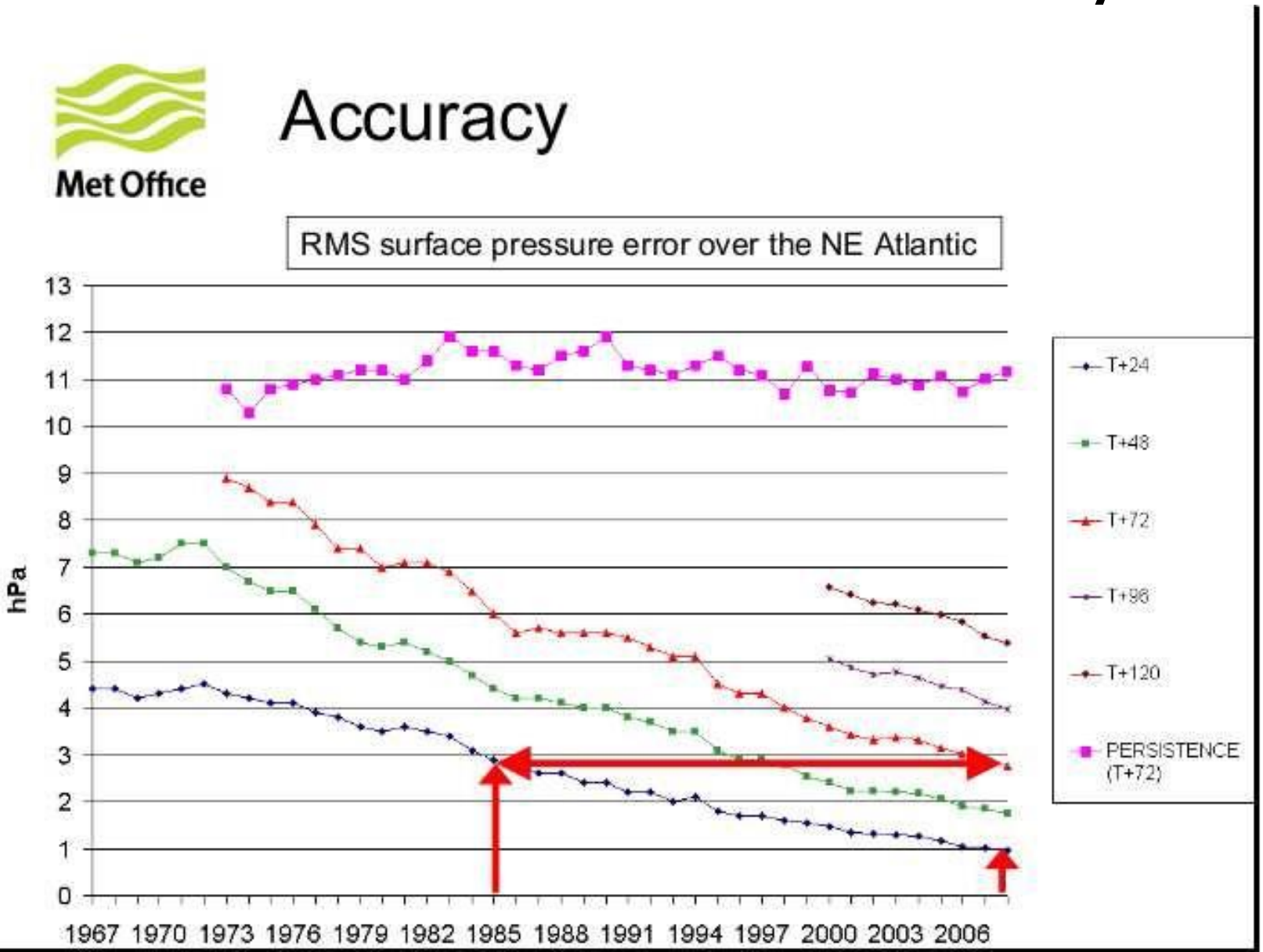
- This fitted our curriculum, others may vary
- The point is that the language is not **necessarily** a mainstream Computer Science one (previously Java)

But also

- We spend a few minutes in problem classes just talking about the relevance of computing to mathematics
- Sometimes by research students (whom the students know as tutors)
- Sometimes by colleagues whom they wouldn't otherwise see

Met Office accuracy



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