Status of RTTOV-7 and plans for RTTOV-8

Roger Saunders
Met Office, U.K.

- **Reminder of RTTOV-7 features**

- **Usage of RTTOV-7 and problems**

- **How to get the code**

- **Upgrades planned for RTTOV-8**

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RTTOV changes since ITSC-12

- **RTTOV-7 released by NWP-SAF in Mar 2002.**

- **Update to RTTOV-7 (RTTOV-71 released Jan 03).**

- **Instrument coefficient files released as required on web site.**

  - **NOAA-17 ATOVS & AVHRR**

  - **AQUA AMSU-A, HSB, AIRS & AMSR**

  - **ADEOS-2 AMSR**

- **RTTOV-8 planned for release in Feb 04.**

- **RTTOV-9 planned for early 2007.**

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RTTOV-7 enhancements over RTTOV-6

- **Improved water vapour and ozone optical depth predictors**

- Multi-layer clouds, more realistic emissivities and random overlap assumption have been added for both IR and MW

- Update of microwave sea surface emissivity model FASTEM to FASTEM-2

- Inclusion of cosmic background radiation (mw only)

- Addition of AIRS, SSMI(S) and others (see next slide)

- Separate coefficient files for each sensor makes maintenance easier

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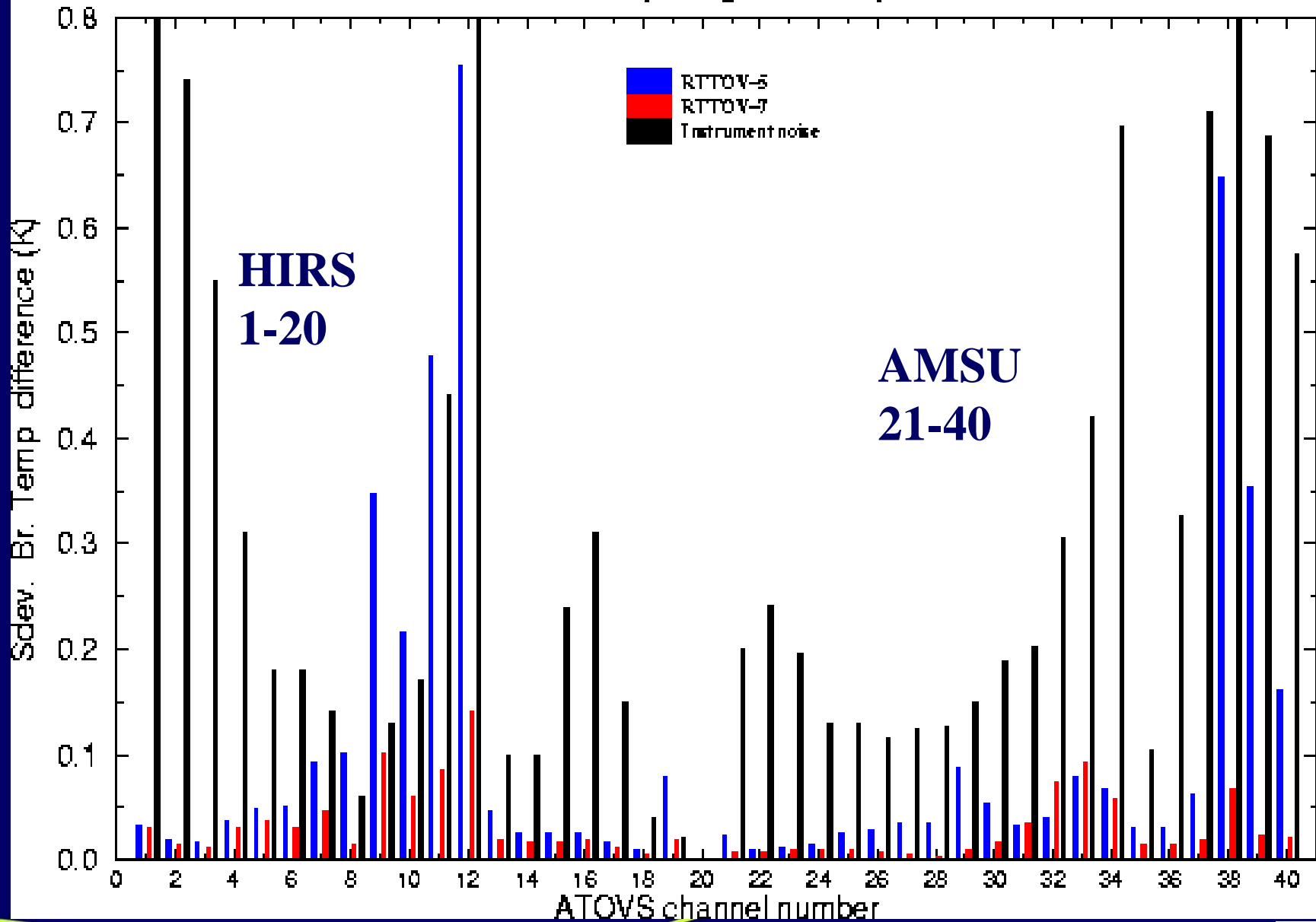Met Office

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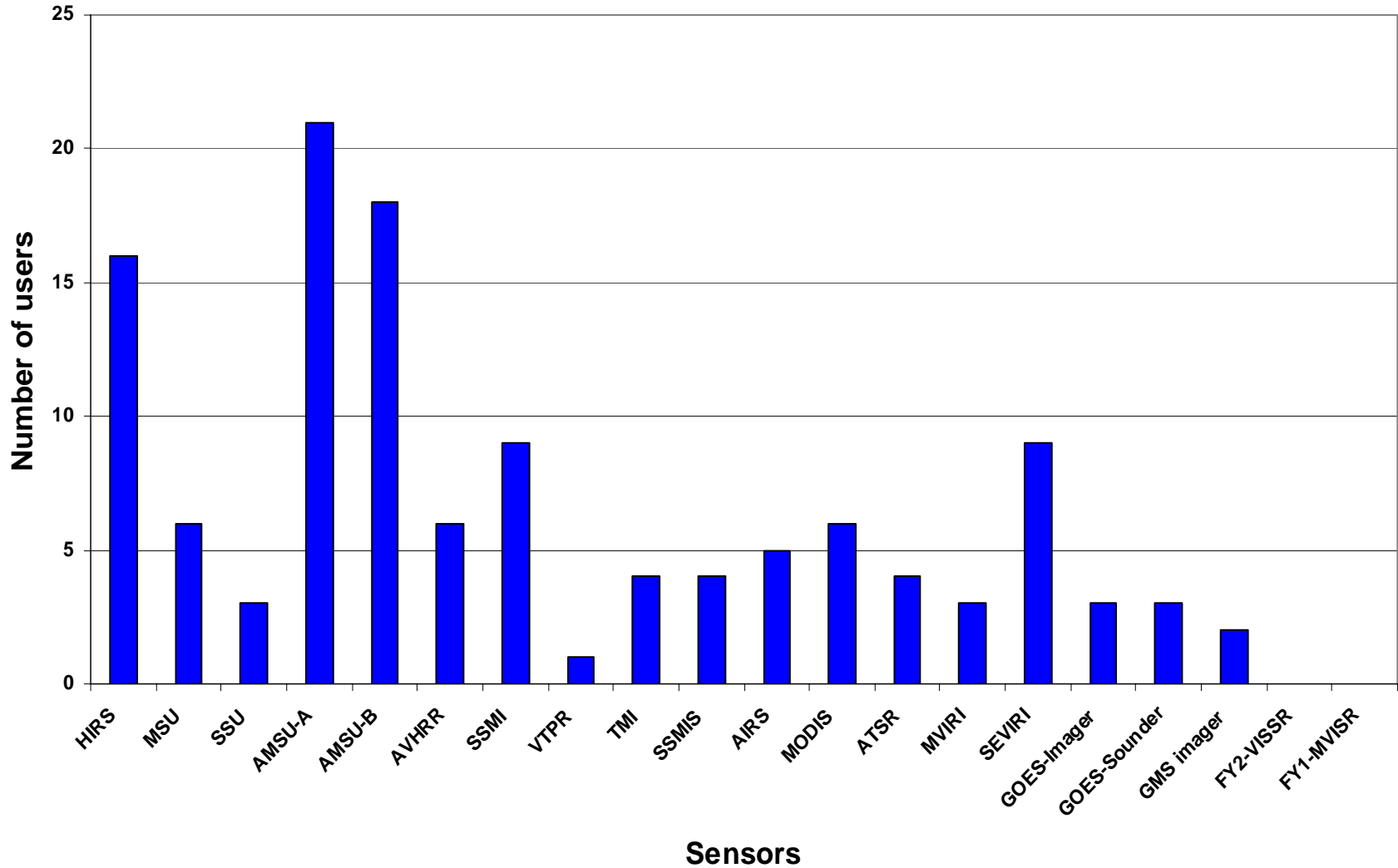Met Office

Satellite sensors supported by RTTOV-7

Sensor	RTTOV id	Channels
HIRS	0	1 to 20
MSU	1	1 to 4
SSU	2	1 to 3
AMSU-A	3	1 to 15
AMSU-B	4	1 to 5
AVHRR	5	1 to 3
SSMI	6	1 to 7
VTPR1	7	1 to 8
VTPR2	8	1 to 8
TMI	9	1 to 9
SSMIS	10	1 to 24
AIRS	11	1 to 2378
HSB	12	1 to 4
MODIS	13	1 to 17
ATSR	14	1 to 3
MHS	15	1 to 5
AMSR	17	1 to 14
MVIRI	20	1 to 2
SEVIRI	21	1 to 8
GOES-Imager	22	1 to 4
GOES-Sounder	23	1 to 18
GMS imager	24	1 to 2
FY2-VISSR	25	1 to 2
FY1-MVISR	26	1 to 3

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NOAA-15

ECMWF 117 profiles genln2/liebe (5 paths)

HIRS 1-20

AMSU 21-40

- RTTOV-5 (blue)
- RTTOV-7 (red)
- Instrument noise (black)

Sdev. Br. Temp difference (K)

ATOVS channel number

RTTOV User Survey

- **>54 users of the RTTOV-7 code worldwide**

- **Used for radiance assimilation in many NWP centres**

- **Feedback on which sensors are being modelled by users (see next slide)**

- **Feedback on what sensors not currently supported users would like to see supported:**

    - **AMSR - now available**

    - **MHS – need channel characteristics**

    - **MTSAT – need channel characteristics**

    - **Windsat – need channel characteristics**

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RTTOV-7 users

RTTOV web site

http://www.metoffice.com/research/interproj/nwpsaf/rtm/

- Profile datasets
    - Documentation (pdf)
    - Diverse 117 profile dataset from ECMWF 50L model fields (0.2 Mb)
    - Diverse 52 profile dataset from ECMWF 60L model fields (0.35 Mb) & associated surface variables (5 Kb)

    New
    - ECMWF 60L profile datasets from model fields and documentation (gzipped tar file, 14 Mb)
- RTTOV code updates, documentation, updated coefficient files and bug reports (click on model version you require)
    - RTTOV-5
    - RTTOV-6
    - RTTOV-7

- To obtain a copy of the latest RTTOV-7 code send an e-mail to rttov.nwpsaf@metoffice.com requesting a copy. In addition the license agreement which can be downloaded here must be completed, signed and faxed to Roger Saunders at: +44-1392-885681. On receipt of the email and fax the code will be made available on CD or by FTP from ECMWF (contact data.services@ecmwf.int).

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RTTOV Distribution

- **Requests: email rttov.nwpsaf@metoffice.com   or**
- **fax request to +44-1392-885681 New number!**
- **I reply with a 2 page licence form to sign which you then fax to number above**
- **RTTOV-7 code is then distributed via ECMWF data services: data.services@ecmwf.int on requested format/medium**
- **Two formats:**
    - » **Compressed unix tar file of F90 code+files**
    - » **CDROM of F90 code+files (separate or tar file)**
- **Media: ftp transfer or CDROM**
- **Documentation + updates available from NWP-SAF web page**
- **http://www.metoffice.com/research/interproj/nwpsaf/rtm**
- **RTTOV-6 is also available (e.g. for F77 users)**
- **Please give feedback on any bugs by email to: rttov.nwpsaf@metoffice.com**

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RTTOV-7 Documentation/Updates

http://www.metoffice.com/research/interproj/nwpsaf/rtm/

- **Email news list if you have requested RTTOV**

- **Users guide** (overview, installation, testing, interfaces)

- **Science and validation plan** (overview of new science and links to papers/reports giving more details, validation results documented here).

- **Technical report** (details of software architecture, file formats and interfaces)

- **SAF reports on RTTOV** (access from web page)

- **Bugs and fixes** (alerts on RTTOV email list, details on web page)

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Problems with RTTOV-7

- **New interfaces require code redesign in users code**

- **Spikes in wv jacobians in stratosphere**

- **Slower than RTTOV-5 on Met Office Cray T3E**

- **'Hardwired' to 43 pressure levels**

- **Conversion from RTTOV-5 to RTTOV-7 has been problematic at Met Office (note S. English's talk)**

- **Need to learn from users problems**

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Plans for RTTOV-8

- **Rewrite code using full F90 features**

- **Allow easier use of different number of levels (~40 ATOVS, 80 AIRS)**

- **Include CO_2 as a variable gas (as an option)**

- **Optimise predictors (number, robustness) + inc water vapour continuum as separate gas**

- **Include precipitation in state vector for microwave channels**

- **Upgrade FASTEM for fully polarimetric simulations**

- **Add IASI/CriS simulation capability**

- **Improve IR cloudy radiance simulations**

- ***Update IR LbL dependent transmittances with latest spectroscopy and EC 60L diverse profiles***

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RTTOV related presentations

- **Operational use of ATOVS at Met Office – S. English (Oral)**

- **RTIASI-4 - Matricardi (Oral)**

- **Use of plank weighted transmittances - Brunel (Poster)**

- **Comparison of RTTOVSCAT and ARTS - English (Poster)**

- **AIRS fast model comparison - Saunders (Poster)**

- **RTTOV_SCATT - Chevallier (Poster)**

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