Rome ARENA site testing meeting 11-13 June

Atmospheric transmission at microwaves (ATM, Pardo)

Use of models together with the data (e.g. Valenziano, De Petris, Sabbatini)

Reference model but it needs to be fine tuned to Dome C with spectral data (FTS, e.g. Casper)

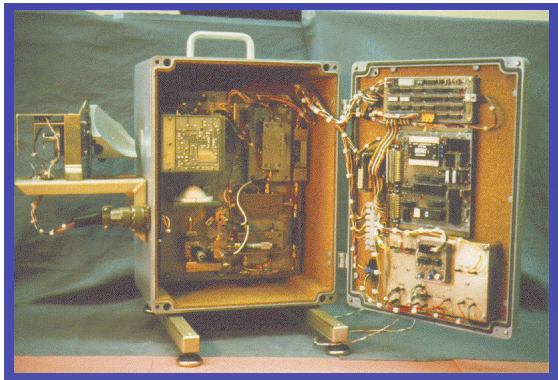
Simon Radford: site testings using radiometers

⇒ Atmospheric monitoring is required

⇒ Boundary layer studies to be linked to sky noise evaluation are important

Vincent Minier: roadmap for site testing: GIVRE & Camistic

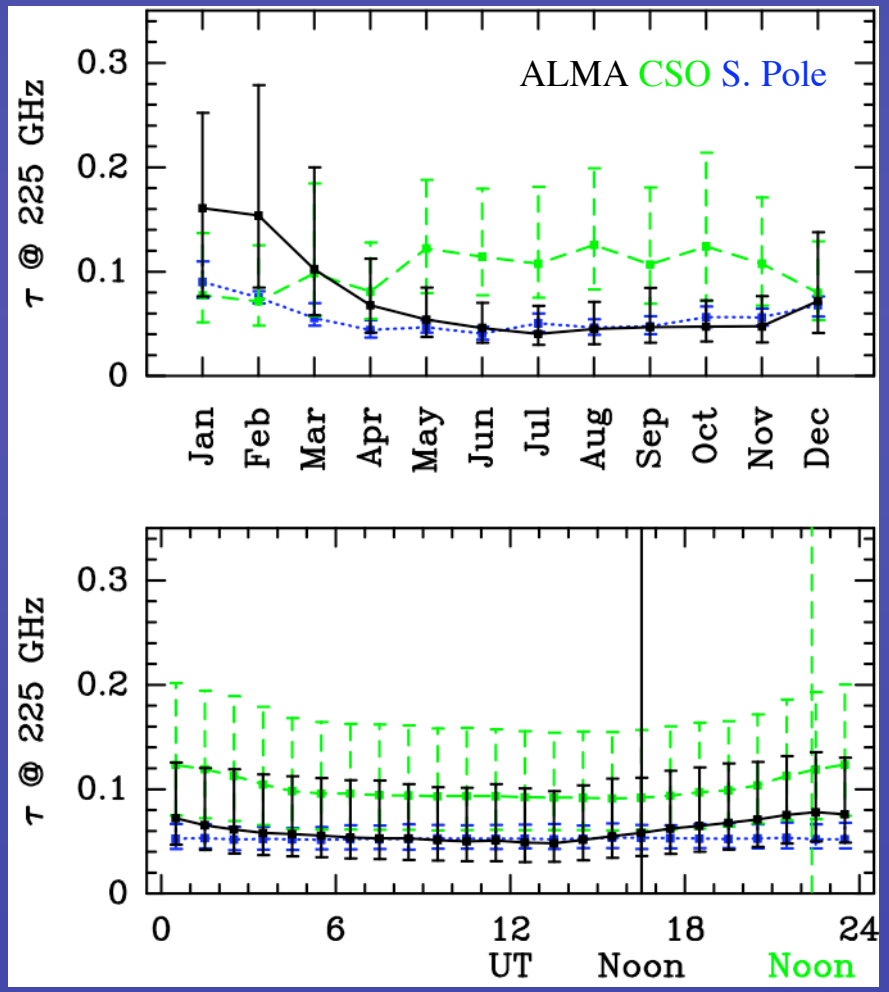
Marc Sarazin: closing remarks



Simon Ratford's talk

225 GHz Transparency Variations

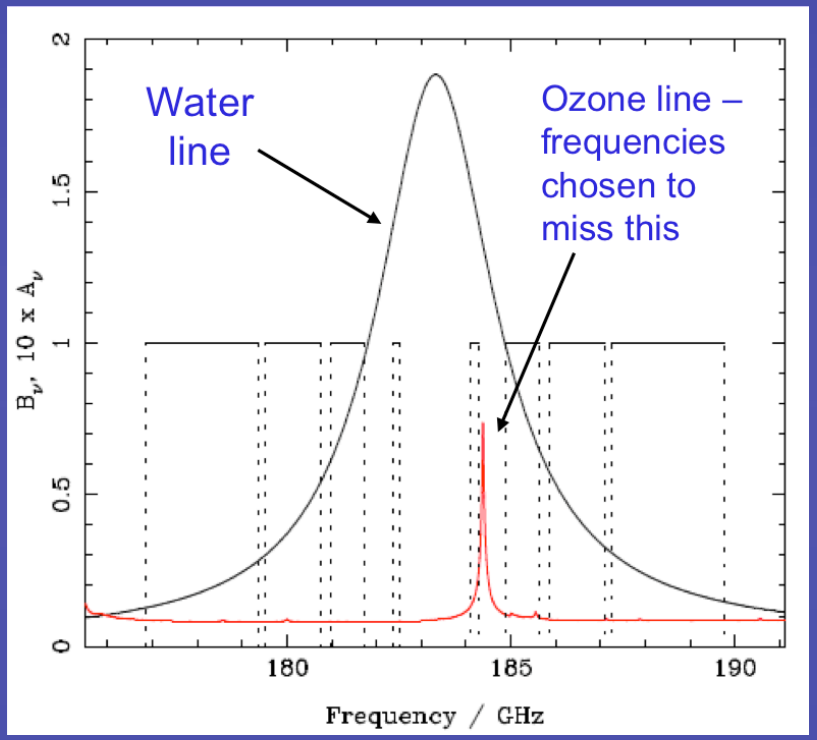
	ALMA	CSO	S. Pole
Alt. [m]	5050	4070	2835
Start	95-04	97-01	92-01
Stop	06-04	07-06	92-12
75%	0.115	0.170	0.066
50%	0.060	0.100	0.053
25%	0.037	0.064	0.043



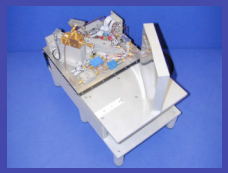
Simon Ratford's talk

Water Line Radiometers

- 183 GHz line
  - 22 GHz weaker (50x)
- Tipping or zenith
- Use model to invert
  - Atmospheric profile
- Commercial instrs.
  - Radiometrics
  - Radiometer Physics
- ALMA prototypes
  - $\delta w \approx 0.8$ μm



$$\tau_\nu = A_\nu + B_\nu w$$

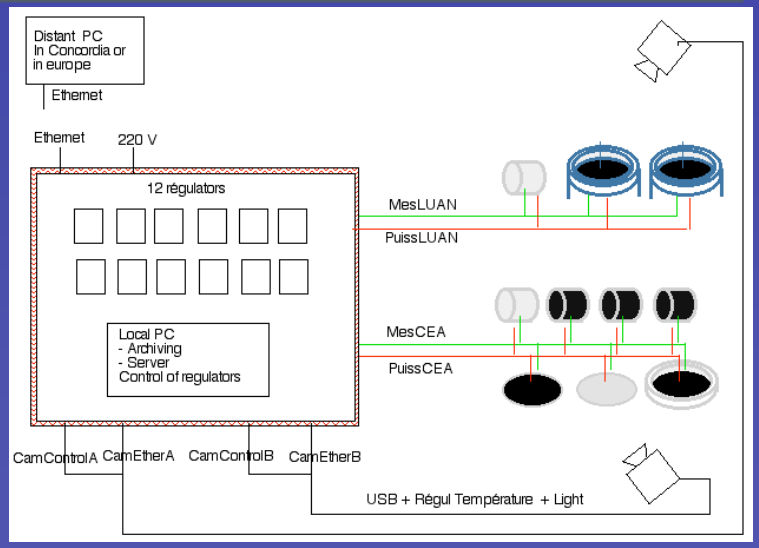


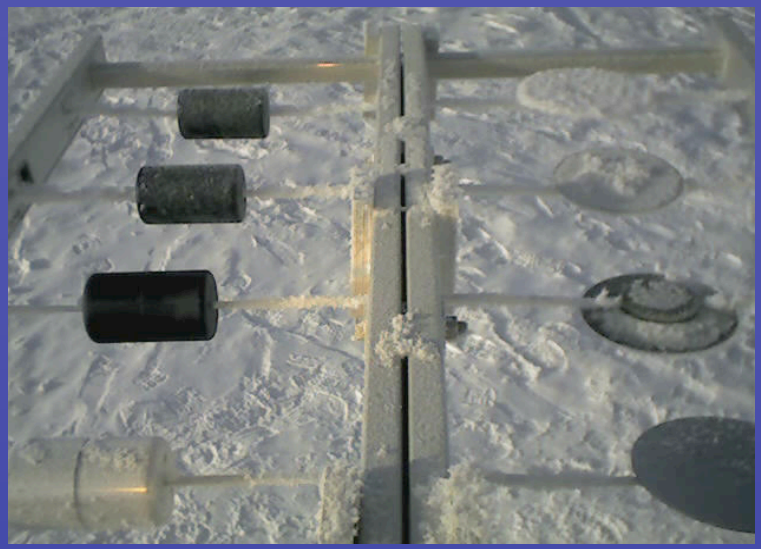
Hills et al. 2006

GIVRE (2006-2008) - objective and first results

V.Minier's talk

- Questions:
  - Which temperature does a black body reach during a polar night ?
  - At which temperature should we keep a black body to avoid frost formation ?
- Aluminium cylinders sense air temperature.
- Black cylinders and disks (snow vs. sky flux) with heaters and sensors.
- At 2 m and 7 m in April 2007:
  - Equilibrium temperature 1.8 °C below air temperature during a clear night.
  - 0.2 W to keep a black cylinder frostless (110x65 mm).
  - Frost forms in a few hours on aluminium cylinder.





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saclay

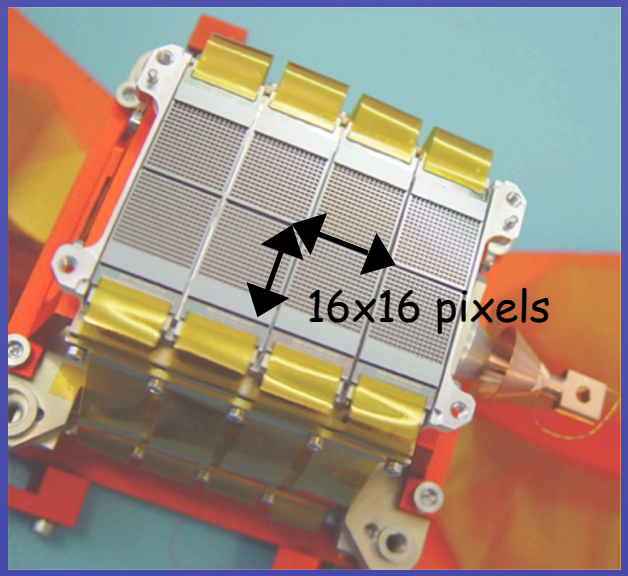
4. CAMISTIC/ArTéMiS

V.Minier's talk

CAMISTIC: imaging quality at 200 µm

- Objective: to test the 200-µm atmospheric window for ground based observations at Dome C, Antarctica.

- Technology highlight:
  - Use PACS/Herschel and ArTéMiS R&D for large bolometer arrays in the THz/submm (60-450 µm).
  - Develop autonomous and automated cryogenic system.



« CCD »-like filled bolometer array built by CEA for the PACS instrument on the ESA Herschel Space Observatory

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Closing Remarks (from Marc Sarazin talk)

- More Field Data
- More Cross-calibration
- More Modeling
- More Information

Closing Remarks

M.Sarazin's talk

- **More Field Data**

Antarctica is different to temperate sites, we are still learning what we need to measure

- wind and temperature temporal power spectrum at 20-30m
- characterize the stable boundary layer (SLODAR, mast, Unmanned Aerial Vehicles)
- outer scale profile (MOSP), Cn2 profile (MASS, new balloons)
- opacity time variability (183 GHz, submm)
- cloud detection in the far IR
- CMB polarization

Even if we could make perfect measurements, we need to accumulate good statistics over many years, preferably simultaneous measurements with different techniques, preferably including instruments similar to those used at other sites

Closing Remarks

M.Sarazin's talk

•More Cross-calibration

No single technique make an unambiguous measurement of every parameter. Some techniques have serious calibration issues. Cooperation between teams on data analysis should be fostered.

• More Modeling

Collected field data need to be transformed into environmental specifications for telescope/instrument project teams design and simulations

- Boundary layer structure and variability
- High atmospheric turbulence
- Enclosure/M1 thermal model
- Atmospheric transmission
- Icing

All the presentations of the Rome ARENA workshop “Site testing at Dome C” at the web page:

http://herschel.ifsi-roma.inaf.it/arena/talks.htm

Workshop page:

http://herschel.ifsi-roma.inaf.it/arena/

Roadmap for site testing and experiments

Tests and goals	Experiments
• Environmental characteristics – Prepare winterizing instruments – Test control/remote command – Get experience of the site	⇒ GIVRE (at Dome C) ⇒ “Green” energy power supply …
• Atmosphere transmission & variability – Modelling – τ-meter experiments	⇒ ATM & MOLIERE ⇒ multi-wavelength Tipper ⇒ FTS (e.g. CASPER) ⇒ 183GHz + 60GHz radiometers ⇒ or other instruments ?
• measure sky noise & transm. – Bolometer camera at 200 and 350 μm.	⇒ CAMISTIC + IRAIT
• Test spectral lines observability	⇒ THz spectrometer + IRAIT ? (see Dan Marrone’s talk)
• Science cases and telescope definition with European astronomers, industries and polar institutes	⇒ Potsdam conference 17 September 2007