PreViBOSS:

PREvision à courte échéance de la Visibilité dans le cycle de vie du Brouillard, à partir de données d'Observation Sol et Satellite

Point hebdomadaire sur les paramètres extraits de la base de données du SIRTA,

Campagne ParisFog 2011-2012

31/10/2011

	Fonction	Nom	Signature	Date
Préparé par	Chef de Projet	**Thierry Elias**		
Approuvé par				
Autorisé par				

Liste de diffusion

INTERNE	EXTERNE	
Prénom NOM	**Prénom NOM**	**Société / Organisme**
Dominique Jolivet	sirtatech	IPSL
Thierry Elias	Frédéric Burnet	CNRM/GAME
	Laurent Gomes	CNRM/GAME

Etat du document

PREvision à courte échéance de laVIsibilité dans le cycle de vie du Brouillard, à partir de données d'Observation Sol et Satellite État d'avancement, année 1			
Edition	**Révision**	**Date**	**Raison de la révision**
1	0		Version initiale

Suivi des modifications				
Ed.	**Rév.**	**Etat***	**Pages modifiées**	**Raison de la modification**

- *I = Inséré* *S = Supprimé* *M = Modifié*

All data are averaged over 15-minute resolution.

1. Particulate pollution

No values of aerosol number concentration (anc) in October other years, we then compare October 2011 with November 2010. Averaged value is smaller in October 2011 than in November 2010, and values larger than 20 000 cm^{-3} are rare (***Figure 1***). October 2011 is clearly characterised by a monomodal distribution with maximum frequency between 4000 and 8000 cm^{-3}. This mode is also observed in November 2010, but a further mode with maximum frequency is observed centered around 10 000 cm^{-3}.

During the night (***Figure 2***), values in October 2011 are close to values in November 2010, but averaged anc reaches only 10 000 cm^{-3} during traffic peak hours, while in November 2010 it reaches 15 000 cm^{-3}, which explains the larger values observed in the frequency distribution (***Figure 1***).

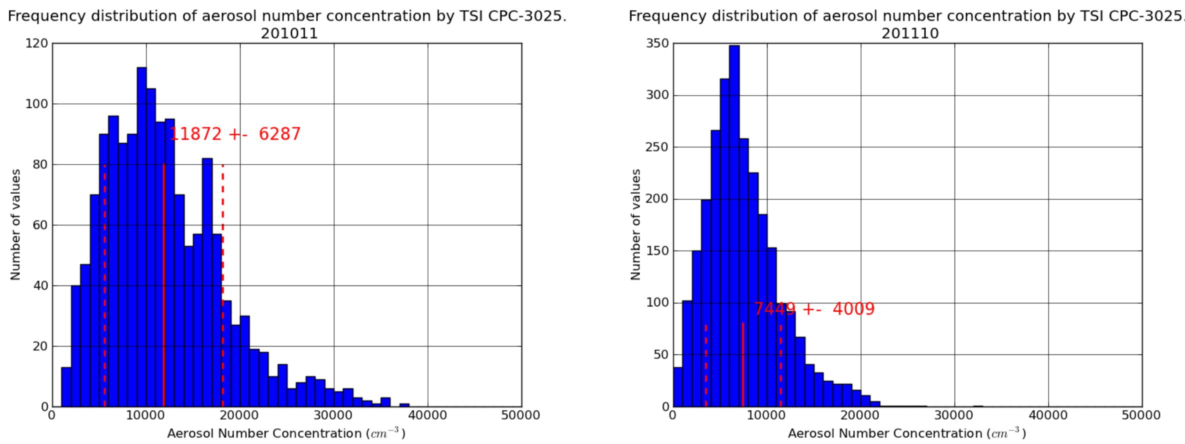

Figure 1. Distribution frequency of anc values measured by CPC in November 2010 and October 2011. Averaged value is written in red, with standard deviation.

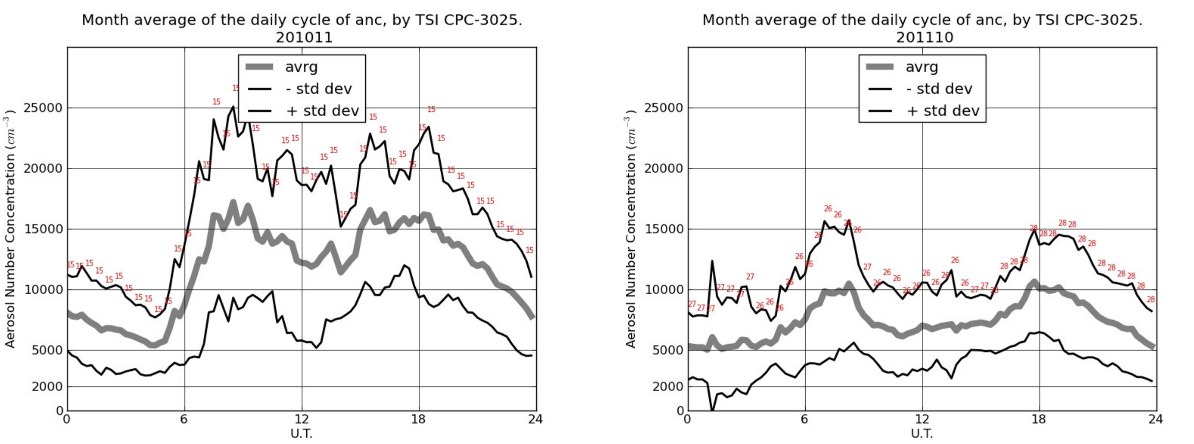

Figure 2. Averaged daily cycle of anc, measured by CPC in November 2010 and in October 2011. Red numbers give the number of values available for averaging.

The aethalometer performed measurements in both October 2010 and 2011. Measured values of BC aerosol mass (amcBC) is overall smaller than in 2010 (***Figure 3***), with an averaged value smaller in 2010 than in 2011, and a maximum frequency between 0.2 and 0.4 µg m^{-3} in October 2011 while it was twice larger in October 2010, included between 0.6 and 0.8 µg m^{-3}. Whatever the time of the day, it seems amcBC is smaller in October 2010 than in 2011 (***Figure 4***). It is twice smaller in 2011, during night and at peak traffic times.

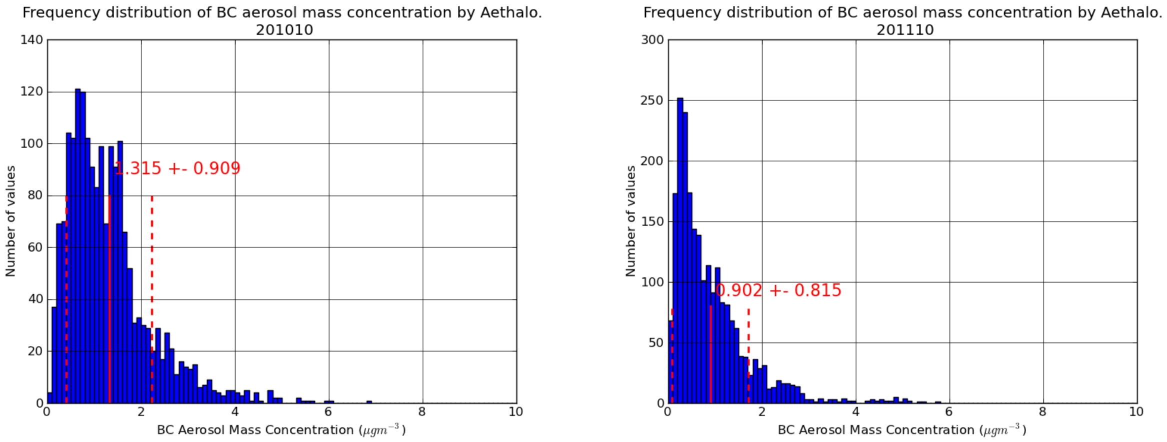

Figure 3. As Figure 1 but for BC component of the dry aerosol mass concentration (amcBC), in October 2010 and in October 2011.

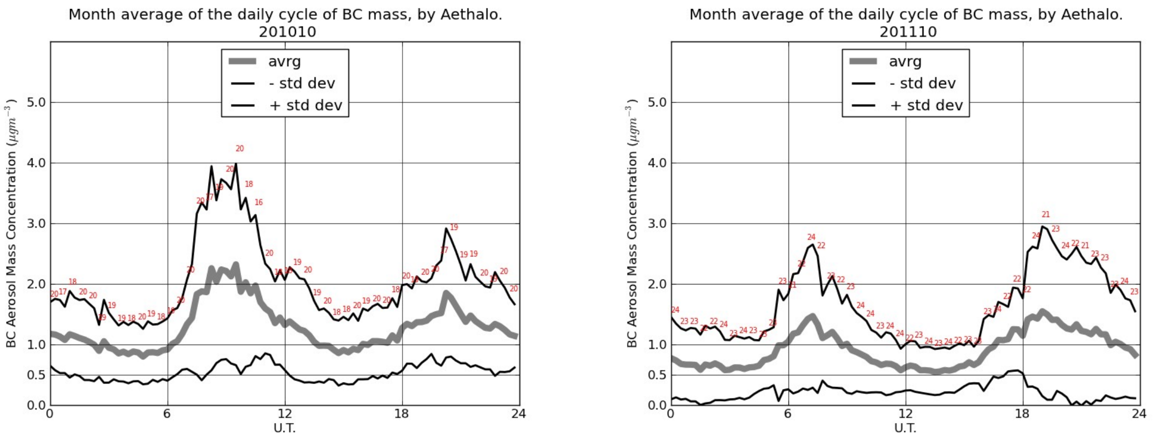

Figure 4. As Figure 2 but for BC component of the dry aerosol mass concentration (amcBC), in October 2010 and in October 2011.

Correlation between anc and amcBC are studied for November 2010 and October 2011. There is a general tendency of amcBC increase with anc increase, but high dispersion in ***Figure 5*** indicates it is not systematic. For example, for anc of 20 000 cm^{-3}, amcBC can vary between almost zero to 6 µg m^{-3}. However correlation is improved if we restrain the aerosol size domain (***Figure 6***), what can be done using SMPS measurements, which are available now only for November 2010 and not yet for October 2011. Size classes are SC2, 40-100 nm diameter, and SC3, 100-400 nm diameter.

For example, we get around 1 µg m^{-3} per 2000 cm-3 40-100 nm aerosols or per 1000 cm^{-3} 100-400 nm aerosols.

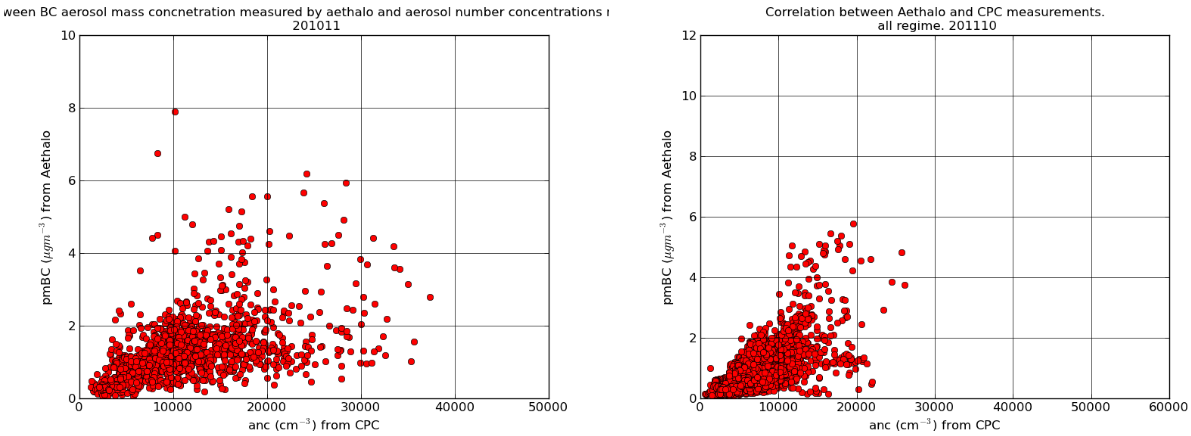

Figure 5. Correlation between BC aerosol mass measured by the aethalometer, and the aerosol number concentration measured by CPC, in November 2010 and October 2011.

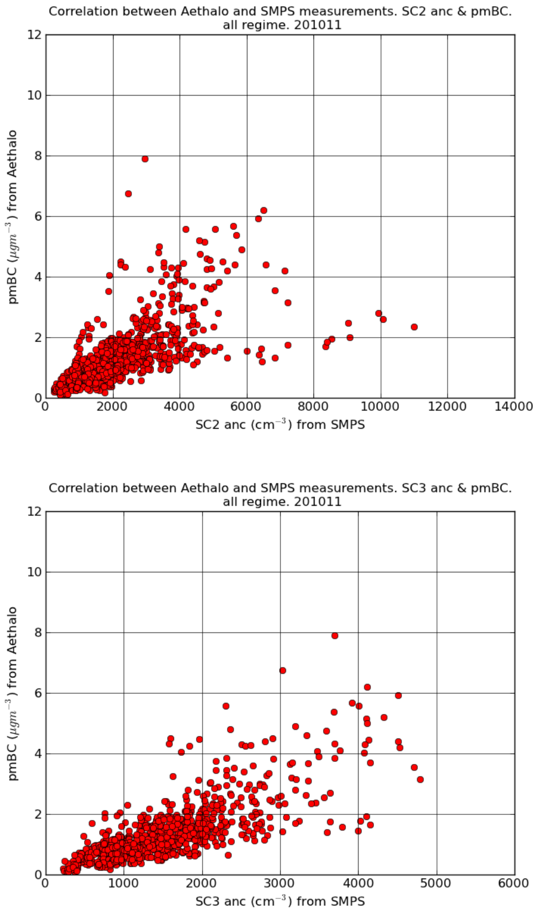

Figure 6. As Figure 5 but for 2 size domains (SC2: 40-100 nm, 100-400 nm) and November 2010.

2. Fog extinction

Fog extinction derived from three instruments, is compared in ***Figures** 7 **and** 8*. Almost no fogs occurred in October 2010, then November and December 2010 data are shown, to be compared to October 2011.

Fog extinction is directly measured by the DF visibilimeter and the PVM instrument, at 550 nm and 708 nm respectively. In fog, spectral dependence is smaller than instrumental uncertainties. Agreement is good in October 2011 while the slope remains around 0.5 in 2011 (***Figure** 5*). Values larger than 10 000 Mm^{-1} are observed by PVM in October 2010 which were not observed by PVM in November 2010. Such values were also observed by PVM in December 2010, but they correspond to more than 15 000 Mm^{-1} according DF, while in October 2011 agreement is better and extinction is smaller than 15 000 Mm^{-1} according DF.

Similarly, the agreement between DF and FM100 is good in October 2011, and much better than in 2010.

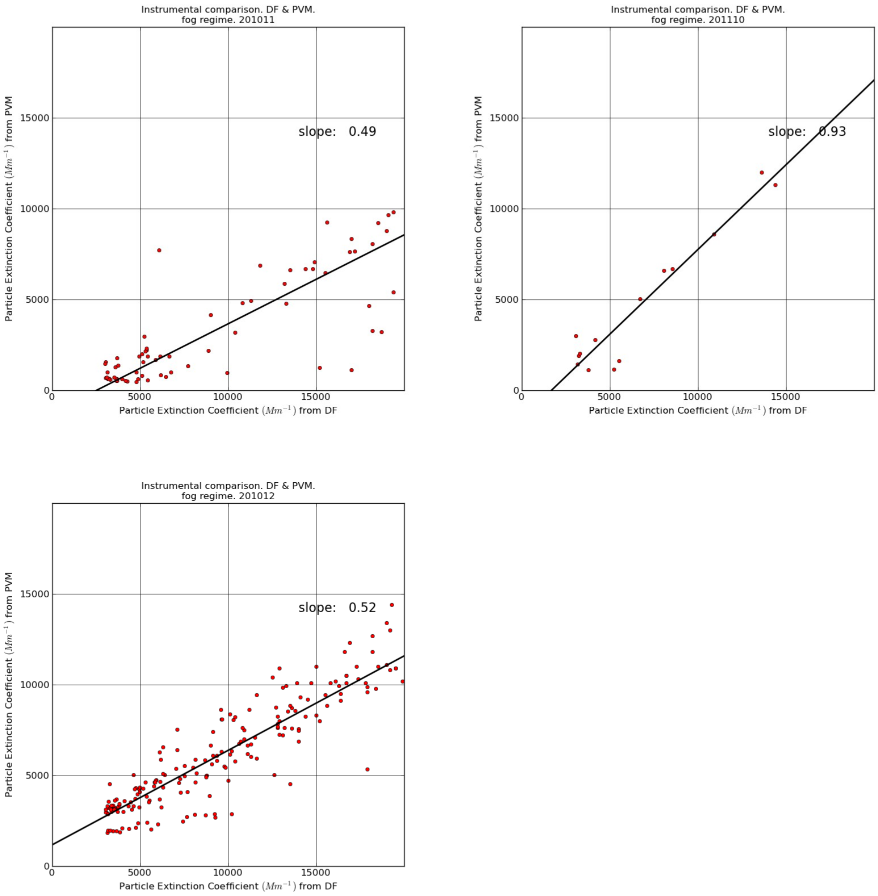

Figure 7. Comparison between DF visibilimeter and PVM instrument, in terms of particle extinction coefficient in fog regime only (visibility < 1000 m), for November, December 2010 (left column) and October 2011 (right column). The slopes of the linear regression are indicated.

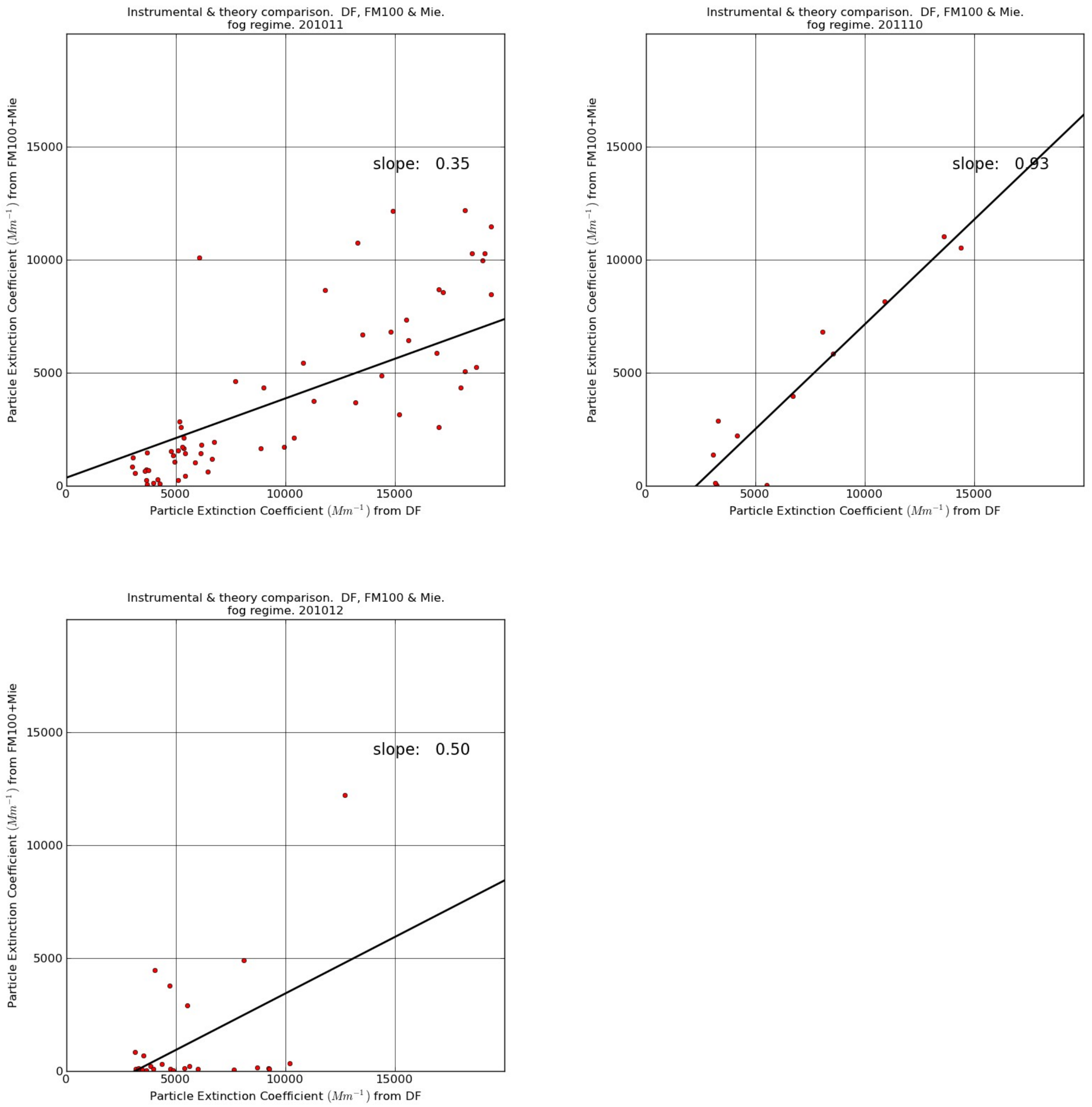

Figure 8. As Figure 7 but for comparison between DF and FM100 particle counter, with extinction coefficient computed according Mie theory.

Time series of several parameters deduced from 6 instruments are plotted in Figure 9 during one fog event of November 2010 and one fog event of October 2011: particle extinction coefficient, particle number concentration and particle effective radius. The increase of extinction as the fog appears is well represented during both events, with however a quantitative agreement only on 22 October 2011 (***Figure 9***). FM100 and PVM seem to both underestimate the extinction coefficient by a factor 2 on 19 November 2010. There is good agreement between effective radius computed from PVM and FM100. per (particle effective radius) reaches 10 µm in 19/11/2010 fog and 8 µm in 22/10/2011 fog.

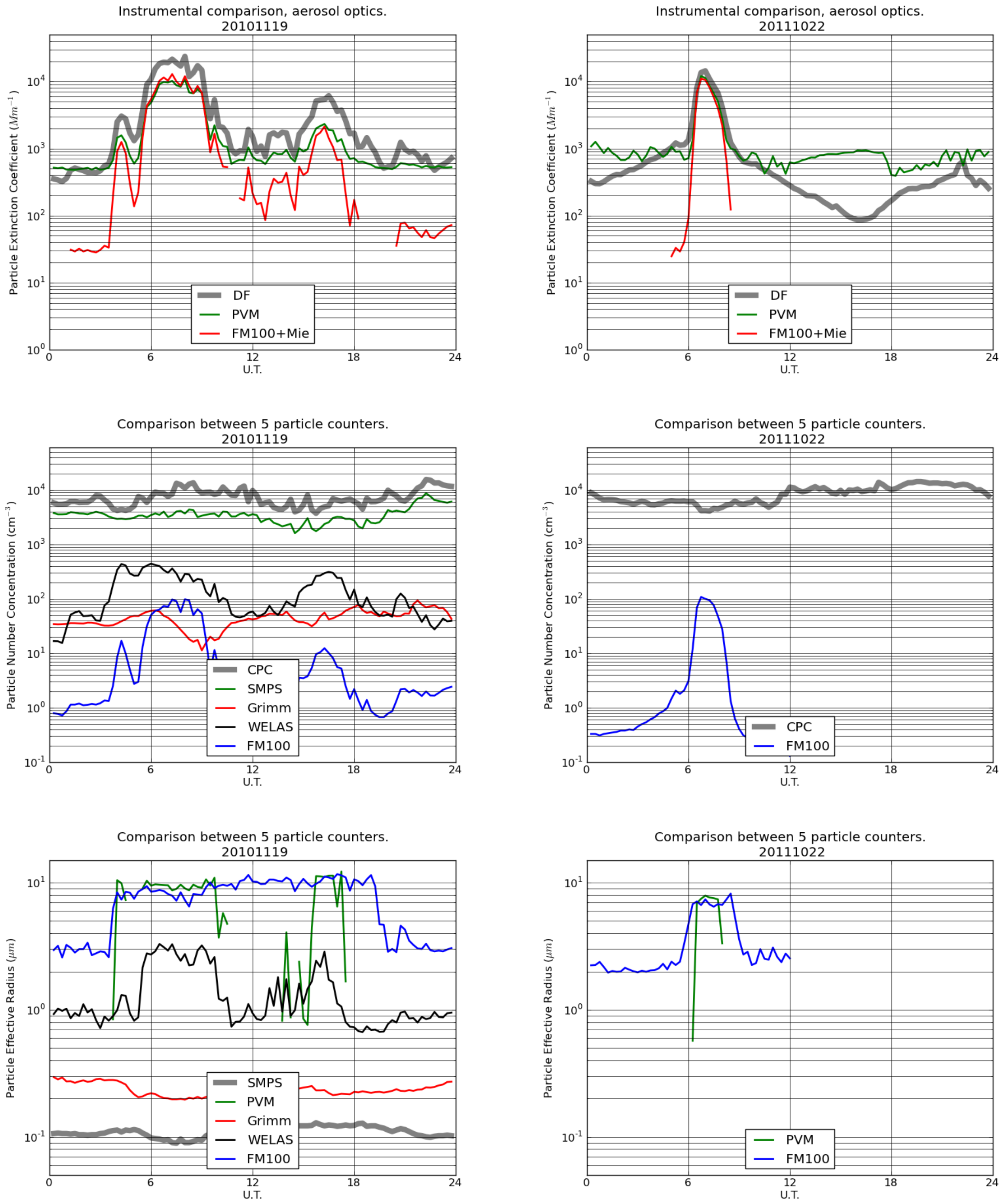

Figure 9. Comparison of several parameters derived from seven instruments (DF, PVM, CPC, SMPS, Grimm, WELAS and FM100), for the two 19/11/2010 and 22/10/2011 fog events: particle extinction coefficient, particle number concentration and particle effective radius.

3. Data processing

- Meteo.

meteoZ1: ok.

DF: ok.

BSRN z1: ok

- Pollution particulaire.

CPC:
ajouter la description de l'instrument.
2007. "Grimm CPC, 4 nm - 2.5 microns, owned by LSCE"
2010. "TSI CPC 3025, 2.5 nm - 2.5 micron, owned by CNRM"

Il est ecrit TEOM FDMS dans le fichier 1a de CPC, ce qui ne colle pas avec cet instrument.
Le format du nombre d'aerosols pourrait etre 7.1 au lieu de 7.2.

TEOM:
de nombreuses valeurs négatives, comme le 06/10

AETHALO:
ok, discussion en cours par mail pour instabilites dans 3 canaux.

SMPS: pas de fichiers en 1a, septembre octobre 2011.

GRIMM: pas de fichiers en 1a, en 2011

- Brume:

WELAS: données CNRM dispo aujourd'hui, seront traitées pour le prochain point hebdo.

- Eau liquide.

PVM:
en-tete de 1a: Re pas en cm/m3, c'est une distance, peut-etre en cm.
Seuil de 10 mg m-3 imposé pour calculer le rayon effectif dans le brouillard. Valeur de base de lwc trop élevée pour servir de signal sur l'apparition du brouillard. Des valeurs de LWC, dans le fichier 1a, sont négatives, e.g. 22/10/2011.

FM100:
plus de donnees apres 13:00, chaque jour.