

# ATDnet – current status and future development

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### Network status

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## **Network Status**



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Fig. 1. Locations of sensors in the current operational ATDnet.



# Valentia back in operational





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Fig. 2. Location of Valentia.

**Fig. 3.** Valentia impact on the ATDnet performance: ratio of good fix numbers with and without Valentia in the operational network.



Fig. 4. Minimum theoretical location uncertainty difference between operational networks with and without Azores.



#### **Research and development**

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# Validation of ATDnet during HyMeX SOP1



#### ATDnet/Lightning Mapping Array (LMA) analysis of cloud flashes.

IC classification is attributed to ATDnet fixes co-located with HyLMA sources associated with high altitude level developing channels.

Anderson *et al, 2015:* Analysis of ATDnet intracloud lightning characteristics. *Manuscript in preparation.* 

**Fig. 5.** An example of a CG flash located by both, the LMA and ATDnet 05/09/2012.



# Wave propagation model

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• To develop a VLF sferic propagation model, in order to gain a better understanding of the physics constraining the ATDnet network

To investigate certain sensitivities of ATDnet



**Fig. 6.** Plot of average Absolute Signal to Noise Ratio (ASN) with latitude and longitude (in bins of size 0.1x0.1 deg) over Europe, from 01/06/2013-31/08/2013, for ATDnet detector located at Payerne, Switzerland. Low ASN zones are in blue.



# Wave propagation model



**Fig. 7.** Model prediction (solid line) and ASN ratio for three outstations (summer 2013 10:00 to 16:00 UTC).



# Wave propagation model

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Hudson *et al* 2015: Diurnal, Seasonal and 11 yr Solar Cycle Variation Effects on the Virtual Ionosphere Reflection Height and Implications for the Met Office's Lightning Detection System, ATDnet. *Manuscript in preparation.* 

**Fig. 8.** Plot of the first two night-time interference minima locations predicted by the model for 00:00 UTC, June to August 2013.



### The future

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- Development of a new central processing software.
- Move to perform the lightning signal detection to central processor in Exeter.
- Currently, system senses at 13.7kHz. Plan to move to 9.7kHz where ITU will offer radio frequency protection.
- More R&D to estimate and monitor detection efficiency over various parts of the network coverage.
- Continue R&D on modal interference and wave propagation issues.



### Conclusion

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#### Questions and answers

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