Supporting ATDnet – the UK Met Office's lightning location system

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Overview of network

The ATDnet system is a long-range lightning location system designed and developed by the Met Office.

It is the second version of the network, coming online in December 2007 and has an operational range from network core of approximately 15000 km.

The network operates on a 'Arrival Time Difference' method of lightning location as opposed to Time of Arrival, hence 'ATDnet'. This relies on a distant network of sensors detecting the pulse generated by a lightning stroke (sferic). By measuring the differences in arrival time of this sferic between a reference station and at least three other stations, the stroke location can be calculated without ambiguity.
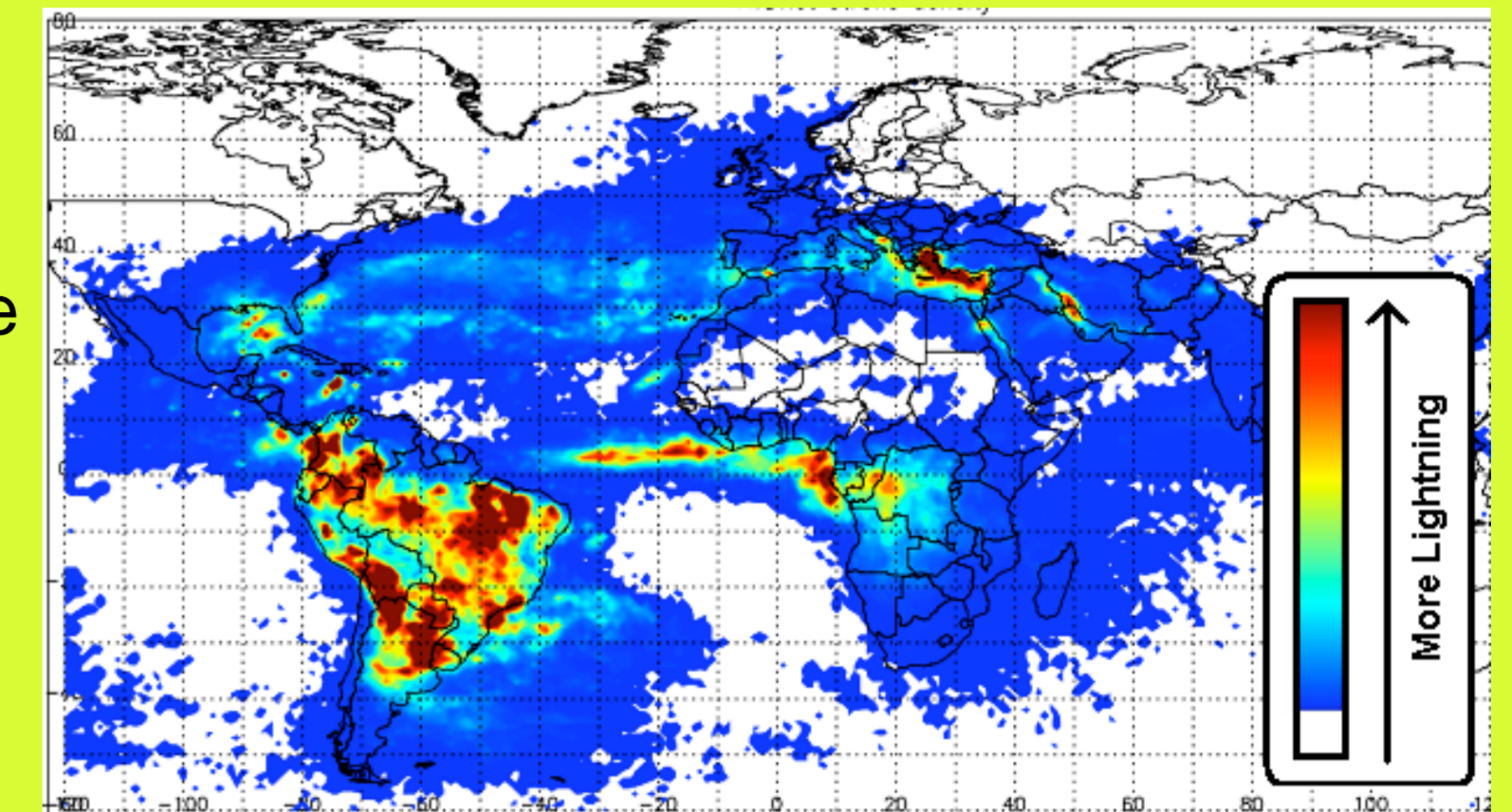

Fig 1. Typical lightning regions detected by ATDnet during December-February inclusive

Network organisation

The network currently consists of 11 sensors in remote locations known as outstations. These are connected to a central computer called the Flash Location Processor (FLP) which calculates the stroke locations and a database (the Logical Data Store – LDS). Products are generated by the FLP and sent to customers via various different methods. The products can be either generic or tailored to a customer's requirements.

Each of the sections of the network, processing system, database and product dissemination system can be monitored separately. The support of the outstations and FLP lies with the network management staff, but the messaging systems and LDS are managed by different teams as they are shared between multiple systems. It is the job of the network management staff to identify faults and assign their resolution to the correct teams – minimising network downtime whenever possible.
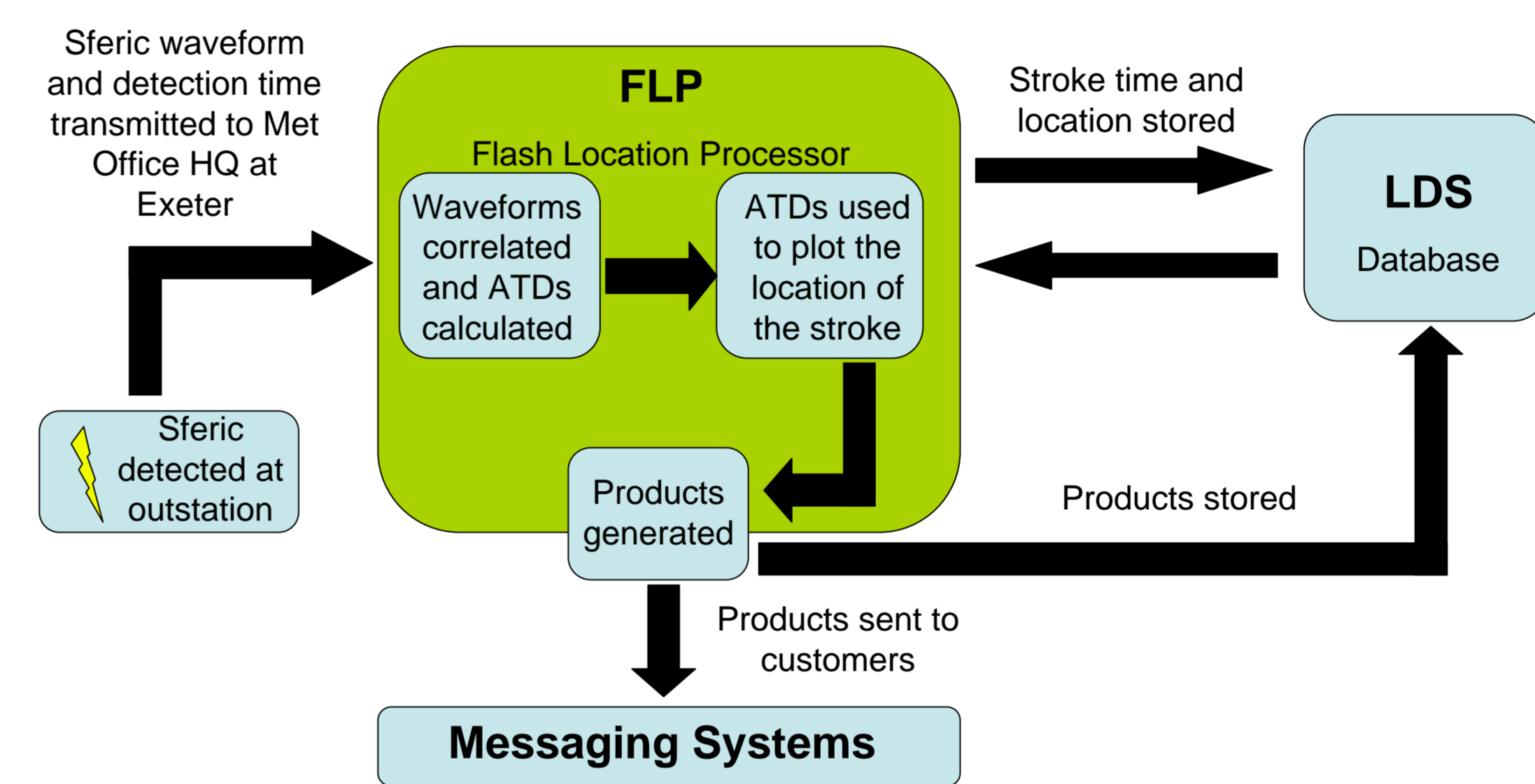

Fig 2. Current station configuration (11th station not shown)

Fig 3. Basic structure of the ATDnet system and processes

Fault management

The network is run with 24/7 support and has various uptime-related performance targets to meet which feed into overall Met Office performance targets. A sophisticated fault reporting tool called TIVOLI is used, allowing for automatic pinpointing of most fault locations which can then be dealt with by either network management staff or our Operations Centre, which provides out of hours support. TIVOLI works by collating the monitoring logs produced by different system components and processes and assigning faults a level of severity, linking to more detailed information and showing who is working on any given fault. In addition to this, human monitoring of all aspects of the system can be performed throughout the day by logging on to the system.

All remote and local systems can be securely connected to remotely by the network management team, allowing for modification and checking. This is especially important when considering the remote (and sometimes unmanned) location of many of the outstations. Each outstation is supported by local staff who can deal with minor issues and reset station hardware if required. The network management team may also decide to send Met Office engineers or members of the ATDnet development team to visit outstations if problems are more technical and cannot be solved remotely.

Fig 4. Screenshot from the TIVOLI monitoring software for ATDnet

Depending on what work needs to be done, a fault reporting tool called Remedy is used, and an 'Incident' is raised. Remedy stores all incidents on a central database, accessible by all staff, arranged by set categories. Incidents can be passed to other teams, have work-logs and attachments added to them and be referenced to each other. In addition, changes to systems and known errors are stored alongside incidents and can also be linked. This allows for a more joined up approach and helps to ensure that repeating problems are addressed and escalated when necessary.
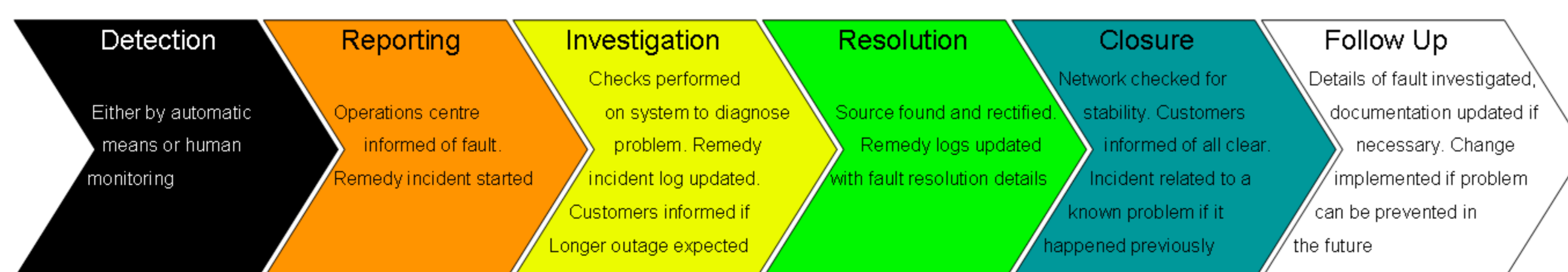

Fig 5. Screenshot from the Remedy fault logging and tracking software showing an overview of an ATDnet incident including work logs, level of incident (determining urgency and impact), group assignment etc.

Fig 6. Typical 'best practice' path taken for fault resolution within ATDnet