

To: All INAG Members

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Dear INAG members!

Re: Ionosondes.

I have no new *great thoughts* but I still use ionosonde data in my current work. So I again stress that a basic network remains vital for monitoring the solar-terrestrial environment. Times have changed, especially with the advent of continuous global total electron content (TEC) data, but TEC does not give the detail that ionosondes do - especially the very important critical frequencies / peak electron densities. Peak densities have always been good indicators, perhaps the best we have, of cyclical and long-term changes in the upper atmosphere. They are also valuable for studying short term events. Hence the global STP data archive, of which ionosonde data form a most important part, is a valuable resource for long-term monitoring. What *basic network* of ionosondes do we need? My ideas have evolved over the years but have not radically changed:

- First, the network should represent higher mid-latitudes, lower mid-latitudes, and the magnetic equatorial zone.
- Second, it should include both *near-to-magnetic pole* longitudes and *far-from-magnetic pole* longitudes. North America, Europe and Australasia are *near pole* sectors; Central and East Asia and South America / South Atlantic are *far-from-pole* sectors.
- Third, several well-calibrated long data runs from different regions of the globe must be maintained for the increasingly important topic of long-term global change.

Again I stress that individual stations are especially valuable if:

1. They have long runs of good data;
2. They are remote from any others;
3. They form close pairs or groups with others;
4. They are near major facilities, e.g. incoherent scatter radars and rocket ranges;
5. They are near the magnetic conjugates of other ionosondes or major facilities.

That said, I have to express disappointment by the limited extent that data from some of the key stations have actually been exploited.

Topical uses of ionosonde data: some examples of topics I and my close colleagues, and many scientists elsewhere, have worked on in recent years are:

- Modelling the global ionosphere
- Big ionospheric disturbances, including man-made ones
- Extreme solar-terrestrial events, such as in February 1956
- Timing of F-layer response to storms
- How certain ionospheric features demonstrate long-term change
- Alleged ionospheric "precursors" of earthquakes

We need more publicity for how ionosondes are used!

What practical steps can be taken to keep key ionosondes going?

Others can make much stronger cases for the practical uses of ionosondes than I can. Let them do so!

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