

Review: J. Geodesy Paper, 20 years of evolution for the DORIS permanent network: from its initial deployment to its renovation, by Herve Fagard.

Comments about the remarks that were not exactly followed, or deserve a comment:

The conclusion might include not only recommendations for the location of future stations, but also perspectives on how we can be assured the monumentation will remain stable given the need to maintain a stable ITRF (to within tenths of mm/year to assure stable measurements of sea level change) and measure geophysical phenomena (e.g. geocenter). Given his unique position, the author could offer observations on further improvements to the DORIS monumentation, and or the feasibility of densifying the network for use with the new multichannel spaceborne receivers.

See updated section 12.2

Detailed Commentary:

1. Abstract should be made more succinct, mentioning no of operational beacons, no of collocations, general purpose of paper.

The requested information was added, but no other reviewer has complained about the abstract being too long (one even asked that some information be added). I've tried to make it slightly shorter, but to be frank I don't see what could be removed.

6. Section 5.1, and later section (7.3, pp 17): Suggest other wording rather than 'Integrated man-machine interface', which sounds like a Borg implant.

The word "integrated" was removed, but MMI (which seems to be a widely used wording in the world of digital equipment) has been retained.

9. Section 5.2, page 10 top; which stations had the tower assembled in four sections?

I might give this information (EASA, NOUA, TLSA) but then people might wonder why I don't also list the one-section sites. Such detailed information is available in the ESM.

10. Section 6, pp 11. "Yaragadee" is misspelled throughout paper; should be "Yarragadee"

As I also wondered a couple of years ago what the correct spelling was, I asked a « local » (Ramesh Govind):

Dear Ramesh,

In your recent messages you wrote "Yaragadee" with one r. Some time ago you sent me a report entitled "Yarragadee Satellite Laser Ranging Observatory Local Tie Survey", whose text contains both spellings, with one or two r.

Which is the correct one?

He replied :

One "r" is the correct spelling.

11. Section 6.1 Specify stations affected by tilt and corrosion.

12. Section 6.1, pp11-12. As a matter of style, it might read better and be more concise if the bulleted points were written as narrative rather than as “bullets.”

The listed points are really distinct ones, so having a list rather than a sentence makes sense. I think one large, or several small sentences might result in a more muddled content.

17. Section 7.4. Suggest replacement second sentence “During this six year period, the following improvements IGN-F and the CNES made the following improvements to the network:”

This (awkward) sentence disagrees with the handwritten comment in the annotated manuscript. A compromise was chosen.

18. Suggest replacement of last paragraph in section 7.4 with sentence “The progress of the renovation was affected by the need for detailed site survey and the elaboration of logistical details for new installations and renovations, with some projects requiring 3 years to complete.”

See new wording, also taking other reviewers' comments into account.

20. PP 20, section 9.2; maintenance statistics. A chart of the percent operational beacons vs. time would be extremely useful.

I agree, but such information is unfortunately only available for the last 3 or 4 years, i.e. a very small part of the DORIS network history.

21. Suggest elimination of paragraph, pp 21, “Because of the shipment waiting period”

Was retained, as one other reviewer has asked that even more information be added on this subject.

24. Paragraph on custom clearance formalities is unnecessary detail.

Same remark as #21 above?

25. pp 22/23. Section 10.1/10.2. Perhaps this bullet information could be summarized in tables?

This would not make the document more compact. Moreover it would be difficult to include some additional information (like e.g. 1.1 beacon at Socorro).

26. Section 11.3. Determination of a priori coordinates. This section is not necessary.

See my reply below to remark #27.

Since other reviewers seem to be happy with this section, it has been retained.

27. Section 11.4. This section needs to begin with the definition of what constitutes a collocation. Are sites that are several km apart truly collocated?

See updated paragraph

While the section focuses on collocation with current geodetic techniques, if there is any information on ties between DORIS beacons and old Transit/Tranet/Doppler beacons this might be provided in the ESM.

Some information on this subject is given in 11.3.

This is of historical but not inconsequential importance since the GEOSAT Transit/Tranet/Opnet stations have no direct tie to current SLR/DORIS/GPS reference frames.

This applies to a few old DORIS stations, no longer operating.

I also think the ESM or in a table, there should be a list of the currently known tie vectors and their associated uncertainties, and the dates of the last surveys (for the SLR/DORIS/VLBI ties, and even the Transit ties, if available).

Such information is likely to change and be outdated. An URL to the Site logs was provided in 10.3 instead.

The ESM material does not list the distances to the tidal collocations. Another column in the table, or a separate table would be useful.

See added table in the ESM (file "DORIS-co-locations").

28. Section 11.5. The internal DORIS ties should also be documented in the paper, probably in the ESM, along with the dates of the surveys establishing the ties, and the associated uncertainty.

Such information is in the site logs.

29. Section 12.1, Is Gavdos also a station whose collocated GPS antenna could be made part of the IGS?

Gavdos is not part of the permanent network and is hence listed in section 8.

30. Section 12.2 could be subsumed into section 12.1 which would become a section 12.

No, they address distinct points: 12.1 lists a number of issues, and 12.2 makes proposals to address them. See new information added to both subsections following other reviewers' requests.

32. Section 12 or conclusion. The “optimal” density of 50ish stations was designed with the idea of supporting POD on satellites with single channel receivers (Spot2, Topex). In a period where dual or seven channel receivers are the norm, is a densification of the network feasible? (Benefits better ITRF products, orbits done with reduce-dynamic techniques?)

See added sentence

33. Conclusion section. Last two paragraphs are a bit flat. Might mention that a new geodetic network conceived in the 1980's now produces positioning on weekly basis at level of 10 – 15 mm, and contributes to success of altimetric missions. It is synergistic with other techniques, especially with SLR for POD applications. What are the biggest future challenges?

Although such a remark applies more to the system than to the network, see updated section 12.2

34. The figures in the paper show the DORIS tracking coverage in Mollweide or Hammer (or similar) whole world projection. The ESM might include current and projected coverage in polar projections (N and S Poles). This would be most interesting for polar altimetric missions (envisat, cryosat2).

I might add such maps but sorry, several reviewers have complained about too many figures and maps.

35. Figure 33 shows the location of the 2 GHz phase center wrt. the antenna reference point. This (vertical) eccentricity for the two antennae should be documented in a table in the paper.

See added table.

36. As a matter of stylistic preference, suggest “antennae” as the plural form rather than “antennas” throughout the paper.

All 5 other reviewers are happy with “antennas”, so since both are correct according to my Robert & Collins, I'll keep “antennas”.

39. Commentary on ESM material: Collocation table:
A. GPS column four should be GNSS

No, “GPS” clearly indicates that the listed co-locations refer to GPS only, not the

other GNSS.

and “(IGS)” should be eliminated

It specifies that only IGS stations are listed (there are other, non-IGS co-located permanent GPS)

Goldstone is also a VLBA station and data are used in VLBI solutions on an annual basis. For instance DSS 15 was scheduled for two experiments in 2005, and one was completed.

The distance is >> 10 km.

F. Jiufeng/Wuhan: It is a site of a current GPS antenna. Suggest using “Jiufeng/Wuhan” as designation

No, the GPS is at a different site, >> 10 km away.

H. Syowa: Listed as current VLBI station on IVS website.

See footnote in the same ESM file

I. “Yaragadee” should be “Yarragadee”.

See above

K. Collocation table should be on IDS website with links to site logs for other techniques.

Noted

40. Comment on Stability assessment ESM excel file.

A. Measured “excentricity” should be “eccentricity”. What is the significance of this quantity?

See explanation in 10.4.D.

B. At the appropriate point in the text where the stability assessment is discussed there needs to be a table that summarizes the mean, standard deviation, and min/max values and which stations are min/max. The table should show this for (a) the start of the renovation; (b) status in march 2006

See added table.

and it could be broken down in (b) by beacon and by antenna type.

No, the beacon has no influence. And the influence of the antenna type is not much

(see ESM).

D. Perhaps a better name for “instability degree” would be “stability index” where like a golf score, the lower the better.

As other reviewers are happy with “degree”, and the lower ID the better, “degree” was retained.

E. The stability index information should be placed on the IDS website attached to the station list and/or site log, and updated at regular intervals.

Noted.

41. Commentary on Occupation Table:

B. Perhaps Add comments about station incidents: i.e. FAIB, earthquake; AREA earthquake; GOLLA/GOMA, Landers earthquake; Ottawa station falling over; stations with corrosion problems, etc.

This would require to add too much additional detail (e.g. earthquake date).

C. A very useful table. Should be on the IDS website and updated on a regular basis with links to site logs.

Noted