

Monday, March 30, 2015

Planetary Diagnosis - Initial ideas

Global reanalysis data - produced by systematic data assimilation in the context of weather forecast models - enable a large fraction of today's weather and climate research. Offering consistent space and time coverage of essential meteorological and other atmospheric variables over many decades up to, in some cases, the most recent month, these data sets offer respected, convenient and irreplaceable resources from which to explore, compare or validate.

Meanwhile, a variety of additional and new planetary data, products of ongoing research, careful reconstructions or new sensors, open possibilities of extending existing atmospheric reanalyses products to include a much broader range of biogeochemical and even ecological factors. The development and open availability of these data stimulate conceptions of an earth system reanalysis. To avoid confusion with existing reanalysis efforts, some of which already apply the label 'climate reanalyses', we adopt the term 'Planetary Diagnosis' including its intentional 'health' connotations to encompass the idea of broad multi-parameter compilation of environmental data.

Carlson and Brasseur (EOS 2105) highlighted the earth system reanalysis idea as an outcome of the Lessons Learnt workshop. On an afternoon in Paris in March 2015 a small group (Marotzke, Dee, Dobles-Reyes, Rixen, Lee, Carlson) explored the idea in more depth, particularly in view of existing and planned reanalysis activities by global major reanalysis centers. From these sources we address and partly answer a series of questions:

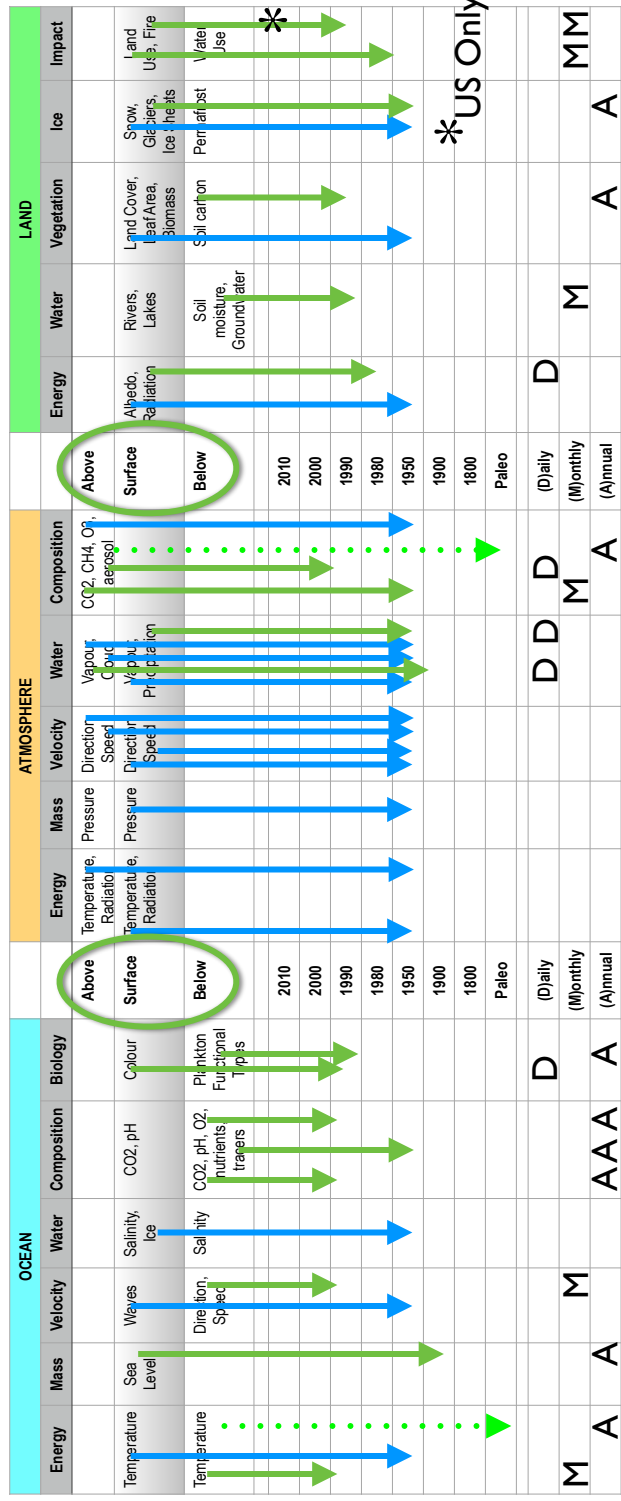
- Do reanalysis centers need additional data streams to extend present reanalysis products? *Answer - In large part at this moment no.*
- Do existing climate model efforts provide the motivation and context for development of integrated biogeochemical analysis products? *Answer - Perhaps for ocean carbon data but generally no.*
- Has the data publication process stimulated development and sharing of a variety of quality-controlled environmental data. *Answer - Emphatically yes.*

Now we propose two additional closely-interlinked questions:

- Would a systematic integration of the various emerging data sets prove a) plausible and b) useful for future research and modeling?
- Will future directions and developments in earth system models stimulate need and provide tools and context for planetary diagnosis data sets?

Figure 1 (below) provides a summary of reanalysis and earth system data.

Essential Climate Variables from GCOS



→ Included in ERA-Interim (daily)

→ Data available (global*) from ESSD, Scientific Data, Geophys. Data Jnl

From other sources: ice core CO₂ & temperatures (paleo), carbon emissions (global), ocean carbon sink, heat index (land), growing season precip (land, paleo), etc.....



Figure 1. Essential climate variables, from GCOS for Ocean, Atmosphere and Land sorted as above the surface (atmospheric column), at the surface or below the surface (ocean and land). Blue arrows denote reanalysis data (ERA-Interim) overlapping with ECVs. Green arrows denote data - in a wide variety of types, extents and formats - openly available through data publication journals.