



Assessing the relationship between clouds and the interplanetary magnetic field

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ABSTRACT Climate changes problem must imply the study of the cloud cover variability, since clouds are essential for the terrestrial radiation budget. Equally or even more important it is to assess the causes of climate changes, subject which already reached even a political level debate, as it is disputed whether the anthropogenic activities are mainly responsible, in the context of aggressive global industrialization and its implied pollution. Still, the scientists cannot ignore the fact that solar activity and the interplanetary magnetic field (IMF) suffered changes during the period for which measurements are available. Since the Sun is essential for the terrestrial climate and also because the IMF changes could influence cloud at microphysical level, the connection between cloud cover and the IMF seems logical to be studied. And because the mechanisms of cloud formation change with altitude, the particularization of IMF connection with clouds from different altitudes is a useful type of study, which is what this paper proposes. Clouds cover data from ISCCP and the IMF data from NASA's Omniweb site, for the time span between 1984 and 2009 are the data used for analysis. The implication of local phenomena influencing the searched correlations is also considered.

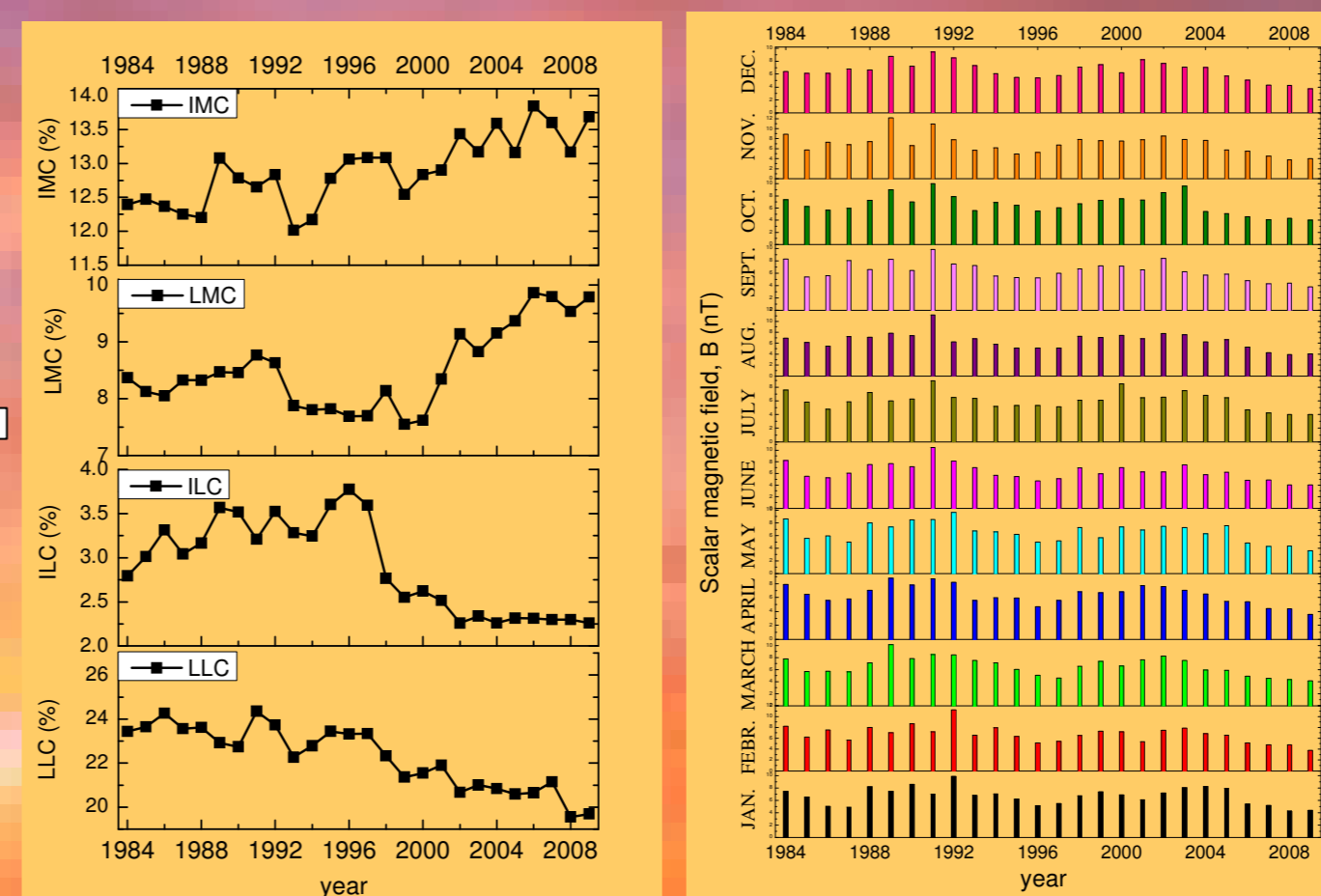
Keywords: cloud cover, IMF, time series

Methodics

- time span: 1984 - 2009
- data type:
 - low (L) and middle (M) type of clouds;
 - liquid (L) and ice (I) type of clouds;
 - IMF data – scalar magnetic field, B.
- data sources:
 - for cloud amounts- ISCCP;
 - for IMF data - NASA's Omniweb site.
- graphics:
 - Origin Lab program;
 - Matlab.

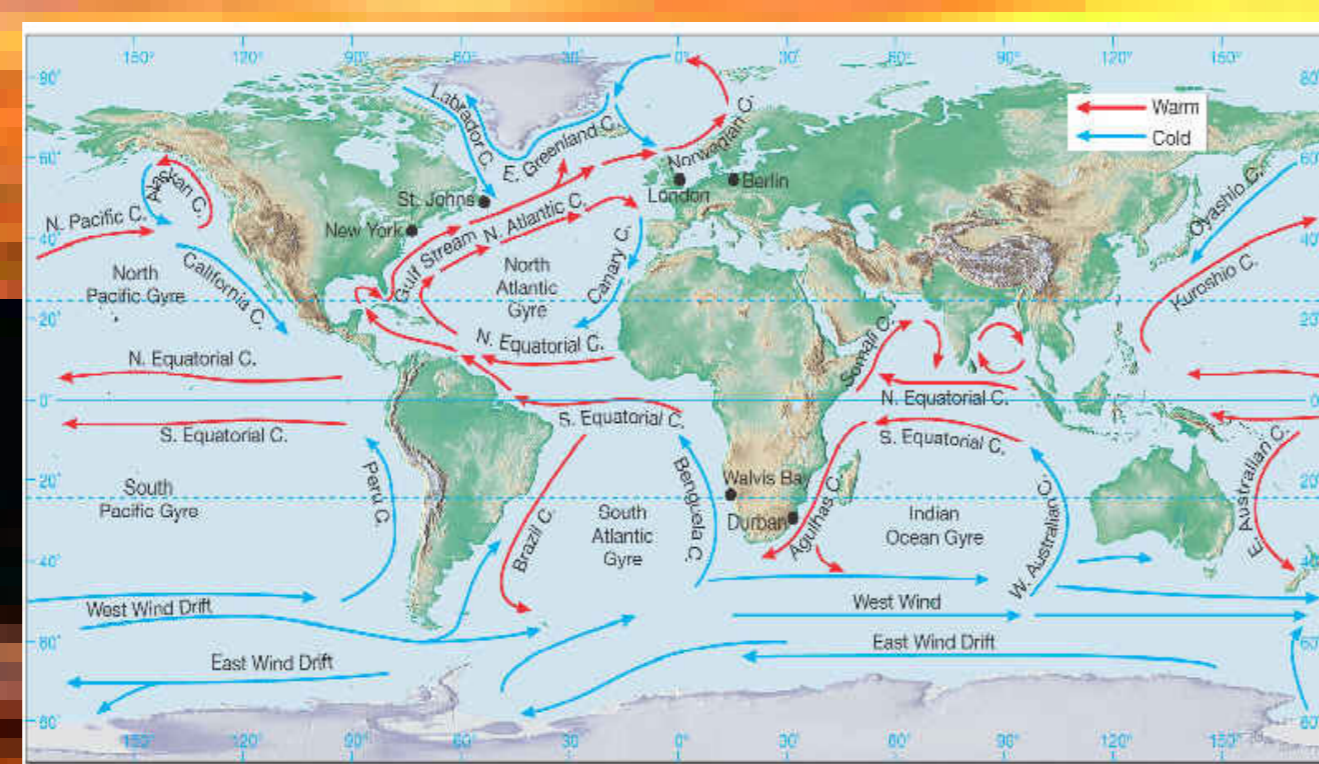
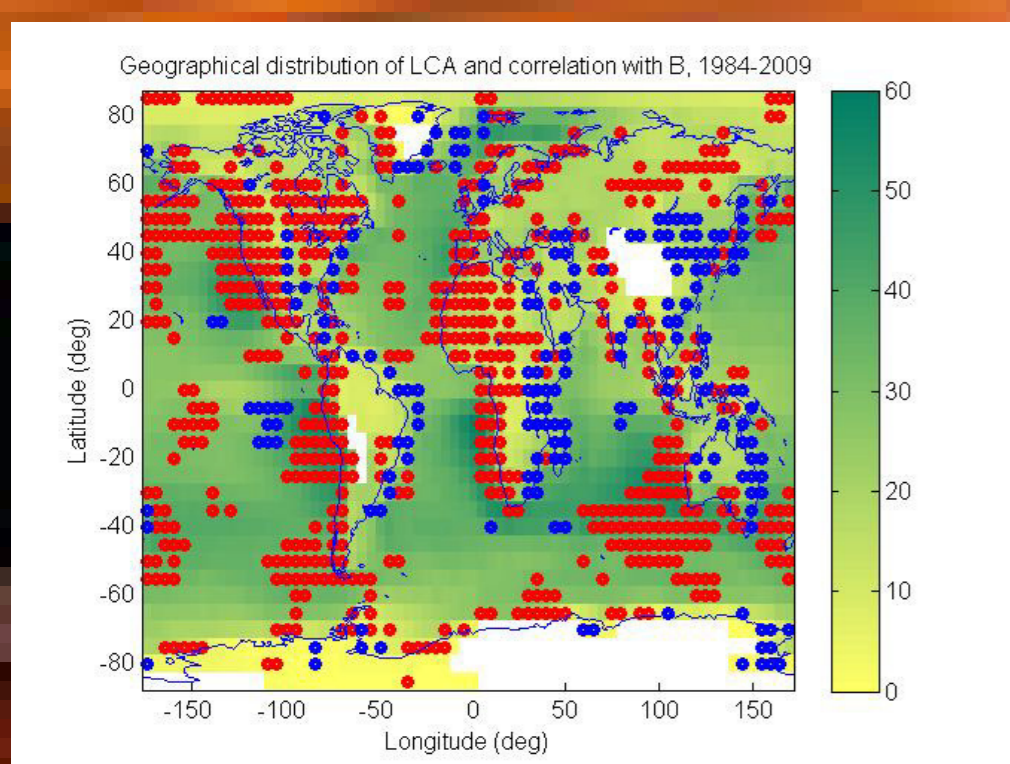
- increasing trends for IMC and LMC from 2002;
- quite similar trends for ILC and LLC;
- Decreasing trends for ILC and LLC from 2002.

Evolution of data, taken separately



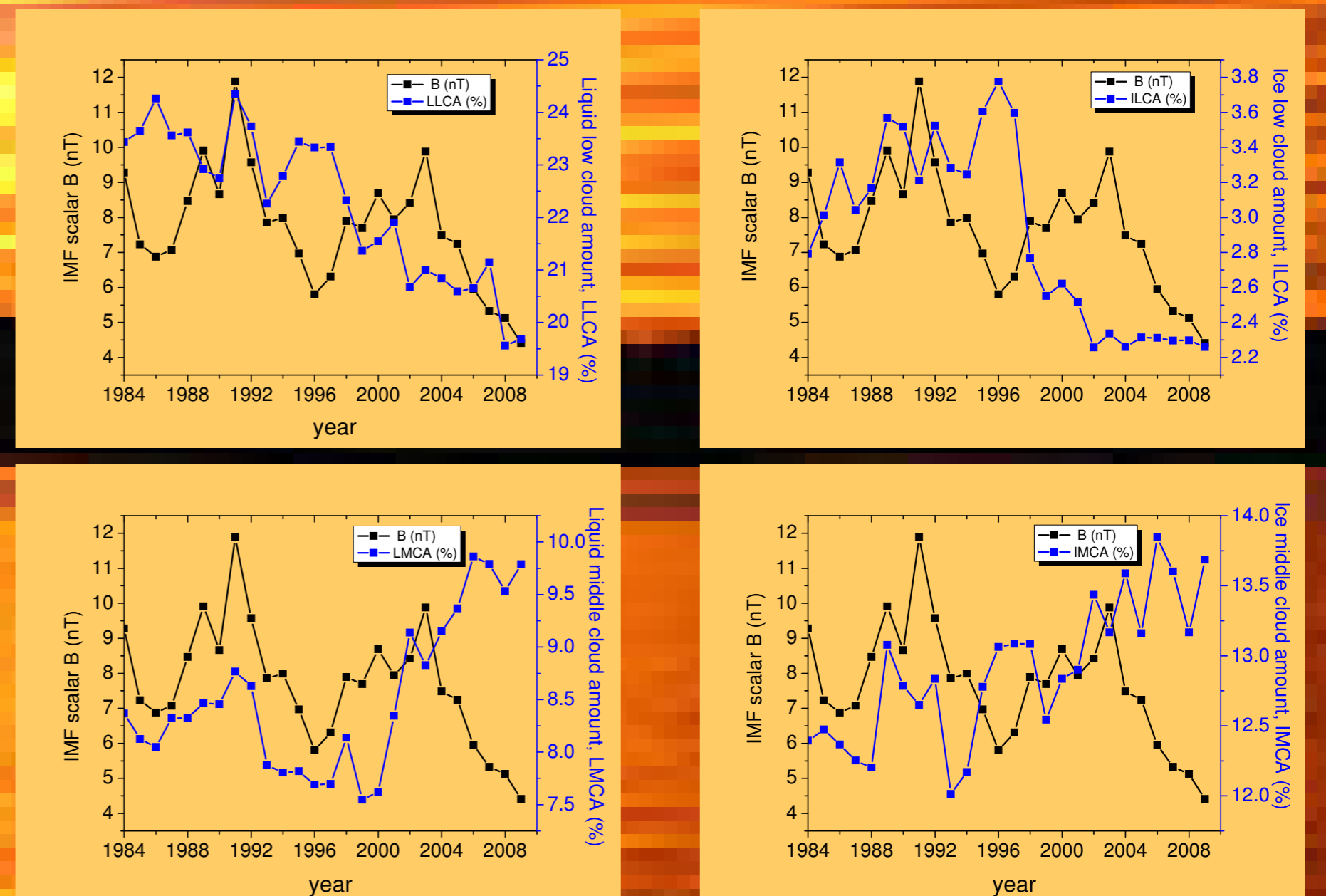
- similar IMF monthly variations;
- maximum IMF in 1990 (solar max);
- minimum IMF in 2009 (solar min).

Complex data correlations



- prevalence of positive correlations;
- apparent connection between positive/negative correlations and cold/warm ocean currents;
- positive correlations in the regions with the highest cloud amount.

Data correlations



- prevalent in-phase correlation between IMF and cloud amount;
- exceptions: between 2004 – 2009: anti-phase correlation between IMF and LMCA and IMCA, respectively.

Selective references:

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